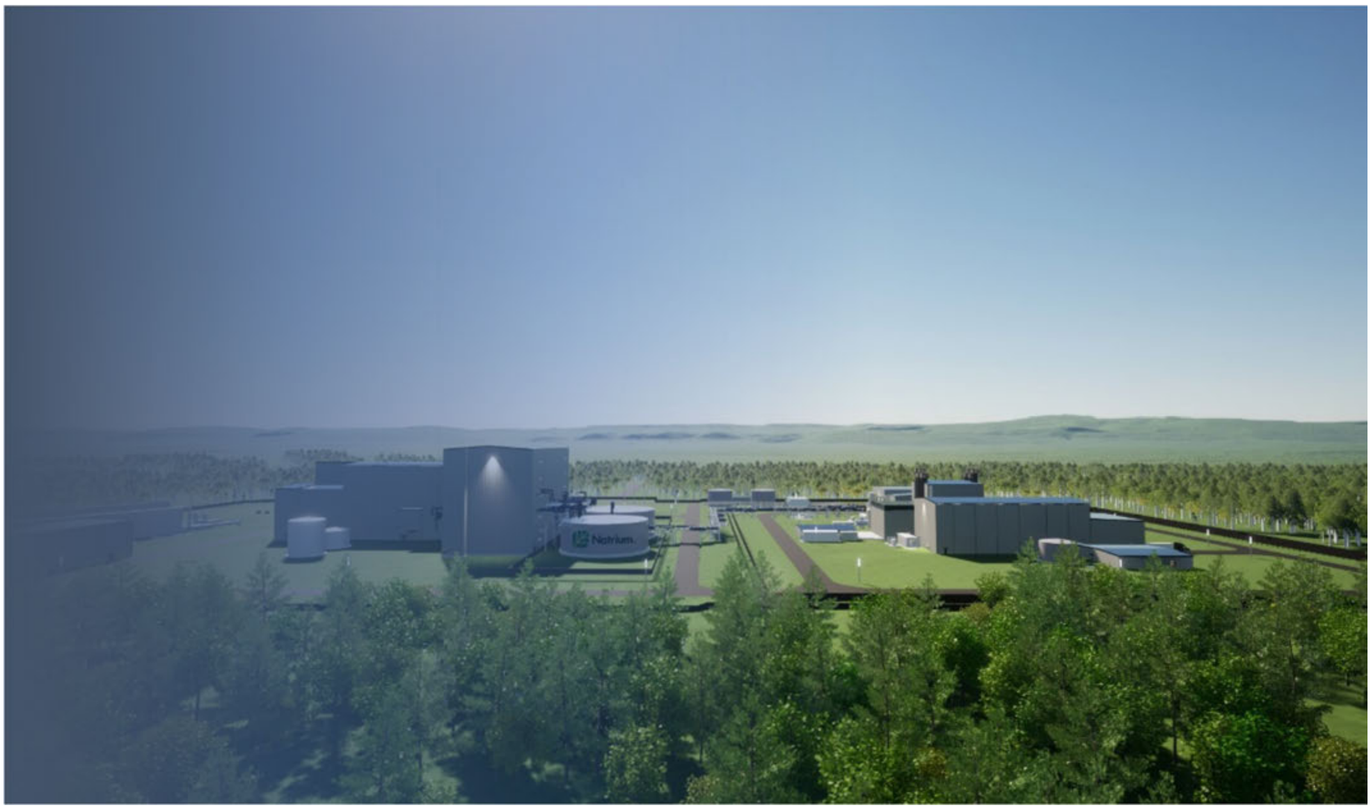
ENCLOSURE 3

Environmental Report

Public



Kemmerer Power Station Unit 1 Environmental Report

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

NAT-9401, Environmental Report, Revision 0

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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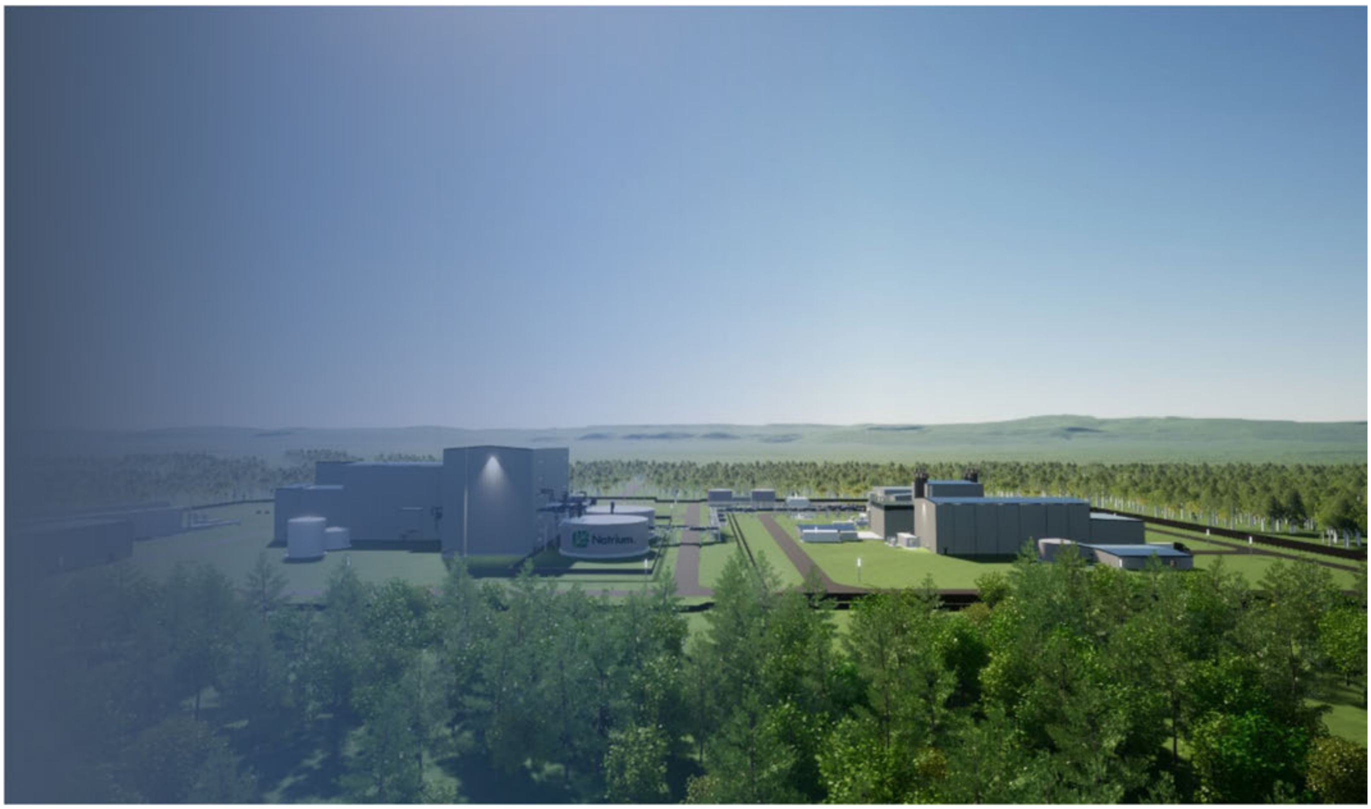

Kemmerer Power Station Unit 1
ER, Chapter 1

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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LIST OF ACRONYMS AND ABBREVIATIONS

Term	Description
AADT	Average Annual Daily Traffic
AEC	United States Atomic Energy Commission
ac-ft/yr	acre-feet per year
ALARA	as low as reasonably achievable
ANR	Advanced Nuclear Reactor
ANS	American Nuclear Society
APE	Area of Potential Effects
ARDP	Advanced Reactor Demonstration Program
BEA	United States Department of Commerce’s Bureau of Economic Analysis
BLM	Bureau of Land Management
BLS	United States Bureau of Labor Statistics
BMP	Best Management Practice
C&I	commercial and industrial
Ca.	circa
CAISO	California ISO
CFR	Code of Federal Regulations
CMC	construction-related measures and controls
CP	construction permit
CPA	construction permit application
CPUE	catch-per-unit-effort
CWA	Clean Water Act
CWIS	Cooling Water Intake Structure
dBA	A-weighted decibel
DBA	design basis accident
DEM	Digital Elevation Model
DHHS	United States Department of Health and Human Services
DOE	Department of Energy
DOT	Department of Transportation
D/Q	atmospheric deposition factor(s)
DSM	demand side management
DTS	Dry Transfer System
DWSRLF	Drinking Water State Revolving Loan Fund
EA	Environmental Assessment
EAB	exclusion area boundary
EI	Energy Island
EIB	Steam Generator Building

LIST OF ACRONYMS AND ABBREVIATIONS

Term	Description
EIS	Environmental Impact Statement
EMF	Electromagnetic Field
EMS	emergency medical service
EO	Executive Order
EOP	Emergency Operations Plan
EPA	United States Environmental Protection Agency
EPP	Environmental Protection Plan
ER	environmental report
ERFP	Emergency Response Facility Primary
ERI	Energy Research Institute
ESA	Endangered Species Act of 1973
ESS	Salt Heat Transport System
EWS	Energy Island Water Systems
FAB	Fuel Auxiliary Building
FBR	Fast Breeder Reactor
FEMA	Federal Emergency Management Agency
FGD	Flue Gas Desulfurization
FHB	Fuel Handling Building
FSAR	final safety analysis report
FTE	full-time equivalent
FWS	United States Fish and Wildlife Service
FY	fiscal year
GEIS	Generic Environmental Impact Statement
GGRB	Greater Green River Basin
GHG	greenhouse gas
GIS	Geographic Information System
GLO	General Land Office
GNF-A	Global Nuclear Fuels – Americas, LLC
gpcpd	gallons per capita per day
GPS	Global positioning system
GRBP	Green River Basin Plan
GRRSSCJPWB	Green River, Rock Springs, Sweetwater County Joint Powers Water Board
HALEU	High-Assay Low-Enriched Uranium
HAR	Heat-Altered Rocks
HDD	Horizontal directional drilling
HFWUA	Hams Fork Water Users Association
HIFLD	Homeland Infrastructure Foundation-Level Data

LIST OF ACRONYMS AND ABBREVIATIONS

Term	Description
HLW	High-Level Waste
HMA	hunter management area
HRCQ	highway route controlled quantities
HRS	Heat Rejection System
HTGR	High-Temperature Gas-Cooled Reactor
HZI	Hydraulic Zone of Influence
I&I	inflow and infiltration
IHT	Intermediate Heat Transport System
INL	Idaho National Laboratory
IPaC	Information for Planning and Consultation
IR	Isolated Resource
IRP	Integrated Resource Plan
ISC	Division’s Industrial Siting Council
ISFSI	Independent Spent Fuel Storage Installation
ISO	independent system operators
ISR	In Situ Leach Recovery
IUP	Intended Use Plan
IVS	In-Vessel Storage
KDWWJPB	Kemmerer-Diamondville Water and Wastewater Joint Powers Board
KOP	Key Observation Point
KY	Kentucky
LCOEM	Lincoln County Office of Emergency Management
LCSD	Lincoln County School District
LLW	Low-Level Waste
LMDCT	Linear Mechanical-Draft Cooling Tower
LOS	Level of Service
LTP	License Termination Plan
LWR	Light Water Reactor
MCDB	mean coincident dry bulb
MEI	maximally exposed individual
MiSA	micropolitan statistical area
MMT	million metric tons
MOA	Memorandum of Agreement
MP	Mile Post
MSA	metropolitan statistical area
MT	metric tons
MTU	metric ton uranium

LIST OF ACRONYMS AND ABBREVIATIONS

Term	Description
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NCB	Nuclear Island Control Building
NCES	National Center for Education Statistics
NEPA	National Environmental Policy Act of 1969
NERC	North American Electric Reliability Corporation
NFFF	Natrium Fuel Fabrication Facility
NFLM	North Fork Little Muddy Creek
NHV	Nuclear Island Heating, Ventilation, and Air Conditioning
NI	Nuclear Island
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRC	United States Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NSS	Nuclear Island Salt System
NWI	National Wetland Inventory
NWS	National Weather Service
OCED	Office of Clean Energy Demonstrations
OL	operating license
OLA	operating license application
OMC	operations-related measures and controls
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PCPI	per capita personal income
PNNL	Pacific Northwest National Laboratory
PPA	power-purchase agreements
PPSM	persons per square mile
PRA	probabilistic risk assessment
PRISM	Power Reactor Innovative Small Module
PSAR	preliminary safety analysis report
PSDAR	Post-Shutdown Decommissioning Activities Report
QF	qualifying facility
RAB	Reactor Auxiliary Building
RCA	Radiological Control Area
REMP	Radiological Environmental Monitoring Program
RFB	Reactor Fabrication Building

LIST OF ACRONYMS AND ABBREVIATIONS

Term	Description
RG	Regulatory Guide
RIMS	Regional Input-Output Modeling System
Rn	Radon
RO	reverse osmosis
ROI	region of interest
ROW	Right-of-Way
RTO	regional transmission operators
RV	recreational vehicle
RWG	Gaseous Radwaste Processing System
RWL	Liquid Radwaste Processing System
RWS	Solid Radwaste Processing System
RXB	Reactor Building
SACTI	Seasonal/Annual Cooling Tower Impacts
SAMA	severe accident mitigation alternative
SAMDA	severe accident mitigation design alternative
SCC	School Capitalization Construction Program
SCSD	Sweetwater County School District
SDWA	Safe Drinking Water Act
SEO	State Engineer's Office
SFP	spent fuel pool
SGCN	Species of Greatest Conservation Need
SGS	Steam Generator System
SHPO	State Historic Preservation Office(r)
SPCC	Spill Prevention, Control and Countermeasures
SSC	structure, system, and component
SWPP	Storm Water Pollution Prevention
SWPPP	Stormwater Pollution Prevention Plan
SWU	Separative Work Unit
TCS	Tribal Cultural Specialist
TEDE	Total Effective Dose Equivalent
TFF	Sodium Test and Fill Facility
TRU	Transuranic
TSS	Thermal Salt Storage System
TVES	Terrestrial Visual Encounter Survey
UCSD	Uinta County School District
UDP	Unanticipated Discoveries Plan
UGRB	Upper Green River Basin

LIST OF ACRONYMS AND ABBREVIATIONS

Term	Description
ULT	Ute Ladies'-Tresses
USACE	United States Army Corps of Engineers
USC	United States Code
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USEIA	United States Energy Information Administration
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USO	US SFR Owner, LLC
WB	wet bulb
WDEQ	Wyoming Department of Environmental Quality
WDOE	Wyoming Department of Education
WDOR	Wyoming Department of Revenue
WDWS	Wyoming Department of Workforce Services
WEAD	Wyoming Department of Administration and Information Economic Analysis Division
WGFD	Wyoming Game and Fish Department
WLSO	Wyoming Legislative Service Office
WNA	World Nuclear Association
WOHS	Wyoming Office of Homeland Security
WPSC	Wyoming Public Service Commission
WSCD	Wyoming State Construction Department
WSII	Wyoming Stream Integrity Index
WTA	Wyoming Tourism Account
WWDC	Wyoming Water Development Commission
WYCRO	Wyoming Cultural Records Office
WYDEQ	Wyoming Department of Environmental Quality
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database
WYPDES	Wyoming Pollutant Discharge Elimination System
X/Q	atmospheric dispersion factor

Chapter 1 Introduction

1.0 Introduction

US SFR Owner, LLC (USO), a wholly owned subsidiary of TerraPower, LLC plans to construct and license an advanced reactor, the Natrium reactor, for power production at a site in Kemmerer, Wyoming, Kemmerer Unit 1. The Natrium reactor is a pool-type reactor which uses liquid sodium as the coolant instead of water.

TerraPower is developing the Natrium reactor and plans to construct Kemmerer Unit 1 through a public-private partnership with the Department of Energy (DOE) Advanced Reactor Demonstration Program (ARDP), the Natrium Demonstration Project. To provide context, the introduction comprises a description of the DOE's ARDP relative to TerraPower's participation in the ARDP. Additionally, the following introductory information is subsequently provided, describing:

- Plant Owners and Reactor Type - Section 1.1
- Description of the Proposed Action and the Purpose and Need - Section 1.2
- Planned Activities and Schedule - Section 1.3
- Status of Compliance - Section 1.4

The DOE implements programs, such as the ARDP, in support of its mission to maintain the Nation's technological leadership position in the global nuclear industry and ensure national energy security. The DOE identified that work remains to ensure continued United States leadership in the research, design, and development of advanced reactors and to ensure the successful deployment of these reactors in the United States and international marketplaces. In support of this mission, the DOE developed the ARDP with funding provided by the Fiscal Year 2020 Consolidation Appropriations Act (House of Representatives 1865) (Public Law 116-94 2019).

Elements of the ARDP include Advanced Reactor Demonstration, Risk Reduction for Future Demonstrations, Regulatory Development, and Advanced Reactor Safeguards. The Advanced Reactor Demonstration serves to speed the demonstration of advanced reactors through cost-shared partnerships with the United States industry. The Advanced Reactor Demonstration supported projects are expected to result in a fully functional advanced reactor within seven years of the award. TerraPower was selected by the DOE to demonstrate the Natrium advanced reactor and energy system technologies, consisting of its sodium fast reactor with a molten salt energy storage system (DOE 2021).

Pursuant to the Atomic Energy Act of 1954, as amended, and Title 10 of the Code of Federal Regulations (CFR), the Nuclear Regulatory Commission (NRC) is responsible for licensing the construction and operation of domestic nuclear power plants. In accordance with the provisions of 10 CFR Part 50 and supporting guidance, a construction permit application has been developed for submittal to the NRC for the construction of a new nuclear generating unit, Kemmerer Unit 1, located in Lincoln County, Wyoming, near Naughton Power Plant owned by PacifiCorp.

The National Environmental Policy Act of 1969 (NEPA) requires Federal agencies to assess the environmental impact of major Federal actions in their decision-making process. Major Federal action refers to an activity or decision subject to Federal control and responsibility, which includes the approval of specific projects. Projects include actions approved by permit or other regulatory decision as well as Federal and Federally-assisted activities.

As a Federal agency, the NRC assesses the environmental effects of proposed actions prior to making decisions.The NRC prepares an environmental impact statement (EIS) for “major Federal actions significantly affecting the quality of the human environment.” The NRC also prepares an EIS for proposed actions which the Commission, in the exercise of its discretion, has determined should be covered by an EIS. Issuance of a construction permit is one such action. As such, the construction permit application includes an environmental report, in accordance with the provisions of 10 CFR Part 51. The environmental report includes an analysis of the reasonably foreseeable impacts to the environment from site preparation, construction, operation, and decommissioning of Kemmerer Unit 1.

In addition to the NRC Federal action, issuance of a construction permit, is a second Federal action, DOE’s Federal action, resulting from the provision of financial assistance related to TerraPower’s selection in the ARDP. Participation in the ARDP includes financial assistance through the cost-shared partnership and, therefore, is considered a Federal action subject to DOE NEPA regulation (10 CFR 1021).

DOE regulations require that a completed NEPA review occur prior to initiating the project, the Natrium demonstration project. However, activities not defined as construction in the NRC’s NEPA regulations (10 CFR 51.4) are planned to occur prior to issuance of NRC’s EIS. As a result, DOE will complete a NEPA review related to this scope, inclusive of the activities not defined as construction associated with Kemmerer Unit 1 that would occur prior to receiving the NRC EIS. The DOE has issued two categorical exclusions for site characterization and environmental monitoring activities at Kemmerer Unit 1.

This environmental report follows the content and organization of the NRC’s Regulatory Guide 4.2, Revision 3, “Preparation of Environmental Reports for Nuclear Power Stations.” Other guidance, such as NRC’s “Standard Review Plans for Environmental Reviews for Nuclear Power Plants,” NUREG-1555, and the NRC’s draft NUREG-2249, “Generic Environmental Impact Statement (NRC GEIS) for Advanced Nuclear Reactors,” have been considered.

Environmental impacts from the proposed project are required, as part of 10 CFR Part 51, to be evaluated and described in a concise, clear, and analytical manner. This report describes the project and potential alternatives and the methods and sources used in the environmental impact analysis. Environmental issues identified in this environmental report are evaluated using a three-tier standard of significance as defined in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Footnote 3, as follows:

SMALL — Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE — Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE — Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

References

(DOE 2021) U.S. Department of Energy. “Advanced Reactor Demonstration Program, Office of Nuclear Energy.” 2021. https://www.energy.gov/ne/advanced-reactor-demonstration-program. Accessed April 19, 2023.

(PL 116-94 2019) Public Law. December 20, 2019. “116-92,” 116th Congress, Further Consolidation Act 2020.

1.1 Plant Owners and Reactor Type

The requisite information regarding the owner and applicant for the proposed Kemmerer Unit 1 along with brief descriptions of the site location, reactor type, cooling system, and transmission system are provided in this section. Additional details regarding the design are provided in Chapter 3.

1.1.1 The Applicant and Owners

As provided in Preliminary Safety Analysis Report (PSAR) Section 11.1, TerraPower is responsible for the design and construction of Kemmerer Unit 1. USO is the applicant and is responsible for the safe operation of Kemmerer Unit 1 from pre-operational testing through commercial operation.

1.1.2 Site Location

The Kemmerer Unit 1 property boundary comprises approximately 334 acres (135 hectare) in Lincoln County, Wyoming. The Kemmerer Unit 1 Site comprises approximately 290 acres (117 hectare) within the 334 acre (135 hectare) property and is located approximately 3.8 miles (6.1 kilometers) southeast of the Naughton Power Plant. Currently located on the Naughton Power Plant property are three electrical generating units: two coal units (Naughton 1 and 2 with nameplate capacities of 156 megawatts and 201 megawatts) and one natural gas unit (Naughton 3 with a nameplate capacity of 247 megawatts) (PacifiCorp 2023, 149).

Kemmerer Unit 1 will be approximately 3.0 miles (4.8 kilometers) south of the City of Kemmerer, Wyoming, located approximately 85.4 miles (137 kilometers) northeast of Salt Lake City, Utah, and 66.3 miles (107 kilometers) west of Rock Springs, Wyoming. All distances are measured from the proposed Kemmerer Unit 1 reactor building centerpoint to the closest municipal boundary. Figure 1.1-1 and Figure 1.1-2 illustrate the location of Kemmerer Unit 1 and the surrounding area and region.

1.1.3 Reactor Type

The Natrium reactor plant is an 840 megawatts thermal (MWt) pool-type sodium fast reactor (SFR) that contains a molten salt energy storage system which enables the plant to vary its supply of energy to the grid, up to 500 megawatts electric (MWe) net, while maintaining constant reactor power.

1.1.4 Cooling System

The Natrium reactor operates near atmospheric pressure and uses sodium, instead of water, as its coolant. The reactor operates at a temperature of more than 662 degrees Fahrenheit (350 degrees Celsius) below the boiling point of sodium. Using sodium to cool the reactor, along with the overall increased thermal efficiency of the Natrium design, provides the additional advantage of requiring significantly less water per megawatt to operate than a traditional light-water reactor.

During operation of Kemmerer Unit 1, waste heat is dissipated by mechanical draft cooling towers. The source of makeup to replace cooling tower blowdown is the Raw Water Settling Basin located at Naughton Power Plant. Naughton Power Plant uses water supplied by a pipeline that draws from the Hams Fork River, emanating from the Viva-Naughton Reservoir. A new water corridor, co-located with the transmission corridor through much of the macro-corridor path, will be required to connect the Naughton Power Plant Raw Water Settling Basin with Kemmerer Unit 1.

The design for Kemmerer Unit 1 includes a zero-liquid radioactive waste discharge system. Any liquid radioactive waste will go through a treatment system and an evaporator before discharge to the environment. Solids collected from the waste treatment process will go into high integrity containers and shipped offsite.

Blowdown controls the accumulation of dissolved solids in the cooling system. Descriptions of the cooling system, makeup water sources, and the anticipated cooling system operation and discharge are provided in Section 3.2.

1.1.5 Transmission System

The existing transmission system consists of a 230 kV substation that connects Naughton Power Plant to the grid.

PacifiCorp’s bulk transmission network is designed to transport electric energy from generation resources (owned or contracted generation, including market purchases) to load centers. PacifiCorp provides open access transmission and interconnection service in accordance with its Open Access Transmission Tariff, as approved by the Federal Energy Regulatory Commission. The Open Access Transmission Tariff obligates PacifiCorp to expand its system as needed, in concert with its Open Access Transmission Tariff, to grant requests for generator interconnection service (PacifiCorp 2023, 96 and 97).

In 2020, PacifiCorp transitioned from a serial queue generation interconnection process to a first ready, first served cluster study process. The new procedures require interconnection customers to provide increasing readiness demonstrations throughout the study process to facilitate projects that have a clearer path forward to proceed through the process while at the same time applying financial penalties to those customers who withdraw speculative generation interconnection requests. A transition cluster study process was initiated in 2020. The first annual cluster study process was initiated in June of 2021 with subsequent cluster studies initiated annually in June (PacifiCorp 2023, 98).

An Interconnection Request Application to PacifiCorp Transmission was submitted on April 18, 2022, indicating the intent to generate and supply power to the grid. A Cluster Study Agreement was executed on June 14, 2022. The initial Cluster Study Report was released on November 14, 2022. The cluster study process is iterative and is continuing.

A new transmission corridor will be required to connect Kemmerer Unit 1 to the existing Naughton Power Plant substation.

The following facilities will be constructed to support Kemmerer Unit 1:

- One new 230 kV substation to transmit power from Kemmerer Unit 1
- Two new 230 kV transmission lines, approximately 5.7 miles (9.7 kilometers) in length, connecting the Kemmerer Unit 1 substation to the existing PacifiCorp Naughton Power Plant substation

Upgrades and associated modifications will also be required at the Naughton Power Plant substation. Transmission system upgrades and associated modifications may be required at the Naughton Power Plant substation and transmission system. Any upgrades and associated modification will be identified in the final Cluster Study, which is expected to be completed in April 2024, and made in accordance with a Large Generator Interconnection Agreement.

References

(PacifiCorp 2023) PacifiCorp. “2023 Integrated Resource Plan, Volume I.” May 31, 2023. https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2023-irp/2023_IRP_Volume_I_Final_5-31-23.pdf. Accessed November 12, 2023.

Figure 1.1-1 Kemmerer Unit 1 Surrounding Area

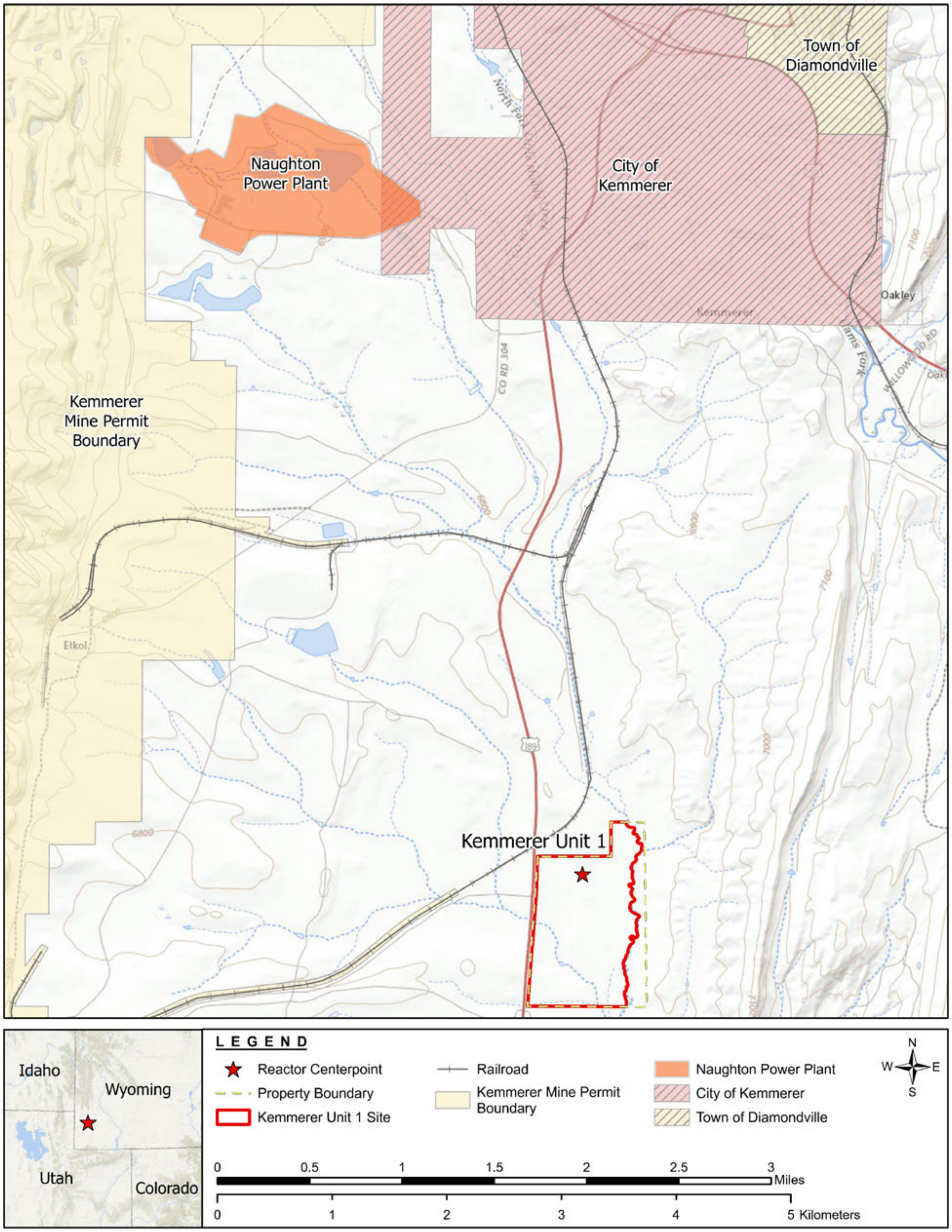


Figure 1.1-2 Kemmerer Unit 1 Surrounding Region

1.2 Description of the Proposed Action and the Purpose and Need

The proposed Federal action is for the Nuclear Regulatory Commission to authorize the construction and operation of Kemmerer Unit 1 in support of participation in the Advanced Reactor Demonstration Program.

The purpose and need of the proposed action is to demonstrate the Natrium advanced reactor while ultimately replacing electricity generation capacity in the PacifiCorp service area following planned retirement of existing coal-fired facilities, furthering the environmental goals of the United States Government for achieving a carbon net-zero emission goal by 2050, and providing operational flexibility through energy storage to complement a region with high penetration of renewables.

1.3 Planned Activities and Schedules

The activities and associated milestones shown below are based on Kemmerer Unit 1 construction schedule as of the construction permit application. These activities include the major site construction-related activities starting with site mobilization and continuing through full power operations. A description of building activities, preconstruction, and construction, for Kemmerer Unit 1 are described in Section 3.3.

The following are the major milestones and activities in support of the construction and operation of Kemmerer Unit 1 along with their completion or anticipated completion dates:

Activity or Milestone	Date
DOE ARDP Award	October 2020
Interconnection Request Application Submitted to PacifiCorp Transmission	April 2022
Cluster Study Agreement Executed	June 2022
Construction Permit Application Submitted to NRC	March 2024
Industrial Siting Permit Application Submittal to WYDEQ	Projected Q3 2024
DOE NEPA Review for Kemmerer Unit 1 Complete	Projected Q2 2025
Kemmerer Unit 1 Site Preparation Start	Projected Q2 2025
Nuclear Island First Concrete	Projected Q4 2026
Operating License Application Submittal	Projected Q3 2027
Kemmerer Unit 1 Construction Complete	Projected Q4 2029
Fuel Load Start	Projected Q3 2030
Full Power Operations	Projected Q3 2031

1.4 Status of Compliance

The authorizations, including the Federal, State, regional, and local environmental protection licenses, permits, reviews, approvals, and consultations identified, that are applicable to the proposed action to construct and operate Kemmerer Unit 1 are described in this section.

Required environmental-related authorizations are listed in Table 1.4-1. The information listed below is included in Table 1.4-1 for each authorization, as applicable:

- Jurisdictional agency
- Authority, law, or regulation that dictates the requirement
- Authorization description
- Activity covered
- Status and projected submission date

1.4.1 Authorizations and Consultations

The necessary authorizations are in the process of being obtained. Table 1.4-1 provides a status for each.

The Nuclear Regulatory Commission (NRC), as a Federal agency, is required to consult with other Federal agencies under several Federal laws, along with State and local agencies as appropriate. Appendix A contains copies of consultation letters and responses received to date that the NRC could use to complete the consultation process.

Each of the considered principal Federal or State Acts are described below:

- Endangered Species Act of 1973 (16 United States Code (USC) 1531-1544, as amended): The Endangered Species Act of 1973 requires Federal agencies to ensure that agency action is not likely to jeopardize any species that is listed or proposed for listing as endangered or threatened. Depending on the action involved, the Act requires consultation with the United States (U.S.) Fish and Wildlife Service about effects on non-marine species, the National Marine Fisheries Act for marine species, or both.
- Magnuson-Stevens Fishery Conservation Act of 1996 (16 USC 1855): Section 305 of the Magnuson-Stevens Fishery Conservation Act requires Federal agencies to consult with the Secretary of Commerce through the National Marine Fisheries Act before authorizing any action which may adversely affect EFH identified under the Magnuson-Stevens Fishery Conservation Act.
- National Historic Preservation Act of 1966 (16 USC 470): The National Historic Preservation Act of 1966 requires that Federal agencies that have the authority to license an initiative consider (before the license is issued) the effects of the initiative on historic properties or properties eligible for protection under the National Historic Preservation Act.
- Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1976 (33 USC 1251, et seq.), also known as the “Clean Water Act”: The Clean Water Act, Section 401, requires any Federal license applicant who plans to conduct activities that

might result in a discharge into navigable waters to provide the licensing agency a certification from the State that the discharge would comply with applicable Clean Water Act requirements; the Clean Water Act, Section 404, requires applicants proposing the discharge of dredge or fill materials into “waters of the United States” to obtain a permit for this activity from the U.S. Army Corps of Engineers.

- Rivers and Harbors Act of 1899 (33 USC 401 et. seq.) The Rivers and Harbors Act, Section 10, prohibits the creation of any obstruction and prohibits the excavation or filling within navigable waters of the U.S. without prior authorization from the U.S. Army Corps of Engineers.
- The Wyoming Industrial Development Information and Siting Act, Title 35, Chapter 12, Wyoming Statutes, mandates that any industrial facility with an estimated construction cost of $271,468,250 or more must obtain a permit for that facility from the Industrial Siting Council prior to commencing construction of the facility. Commence to construct means: Any clearing of land, excavation, construction, or other action that would affect the environment of the site of any facility but does not include changes needed for temporary use of sites for less than ninety (90) days, changes required to conduct required studies and tests under this chapter, or any other State or Federal act or regulation, or access roads and services associated with utilities, or routes for non-utility purposes or for uses in securing geological data but not limited to necessary borings or drillings to ascertain foundation conditions.

Table 1.4-1 Authorizations for Kemmerer Unit 1
(Sheet 1 of 6)

Jurisdictional Agency	Authority, Law, or Regulation	Authorization Description	Activity Covered	Status and Projected Submission Date, as Applicable
Federal Authorizations				
U.S. Nuclear Regulatory Commission	Atomic Energy Act of 1954, 10 Code of Federal Regulation (CFR) 50.50	Construction Permit	Approval for construction of a nuclear power plant	March 2024 Submittal
	Atomic Energy Act of 1954, 10 CFR 50.57	Operating License	Approval for operation of a nuclear power plant	Projected 2027 Submittal
	National Environmental Policy Act, 10 CFR 51	NRC Issuance of Environmental Impact Statement	Evaluation of environmental impacts from construction and operation	March 2024 Submittal
U.S. Department of Energy	National Environmental Policy Act, 10 CFR 51	Department of Energy completes National Environmental Policy Act of 1969 review for building activities that occur prior to issuance of NRC Environmental Impact Statement	Evaluation of building activities that occur prior to issuance of NRC Environmental Impact Statement	Ongoing, Projected 2025 Submittal
	Nuclear Waste Policy Act (42 USC 10101 et seq.), 10 CFR 961	Spent Fuel	Contract for disposal of spent nuclear fuel entered or under negotiation in accordance with 42 USC 10222(b)(1)	Projected 2030
U.S. Army Corps of Engineers	Clean Water Act of 1976 (33 USC 1251, et seq.)	Section 404 Permit; Nationwide Permit	Approval for activities required for crossings of waters of the U.S. from construction of linear projects	Ongoing, Projected 2024 Submittal

Table 1.4-1 Authorizations for Kemmerer Unit 1
(Sheet 2 of 6)

Jurisdictional Agency	Authority, Law, or Regulation	Authorization Description	Activity Covered	Status and Projected Submission Date, as Applicable
U.S. Fish and Wildlife Service	Endangered Species Act of 1973 (16 USC 1531-1544, as amended)	Endangered Species Act Section 7 Consultation - Potential Impacts to Protected Species and Critical Habitats	Consultation with the U.S. Fish and Wildlife Service to ensure actions will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats	Ongoing, See Appendix A
Federal Aviation Administration	Federal Aviation Act 14 CFR 77	Construction Notice	Construction of structures that potentially may impact air navigation. Construction or building activities greater than 200 feet (60.96 meters)	Not Anticipated

Table 1.4-1 Authorizations for Kemmerer Unit 1
(Sheet 3 of 6)

Jurisdictional Agency	Authority, Law, or Regulation	Authorization Description	Activity Covered	Status and Projected Submission Date, as Applicable
State of Wyoming Authorizations				
Wyoming Department of Environmental Quality	Wyoming Industrial Development Information and Siting Act Wyoming Statute Title 35, Chapter 12	Industrial Siting Permit	Facilities with an estimated construction cost above the annually adjusted construction cost indicated in Title 35, Chapter 12. Cannot commence construction without permit	Ongoing, Projected 2024 Submittal
	Clean Water Act of 1976 (Wyoming has delegation authority) Wyoming Environmental Quality Act of 1973, Wyoming Statute Title 35, Chapter 11	National Pollutant Discharge Elimination System/Wyoming Pollutant Discharge Elimination System Large Construction General Permit	Large Construction General Permit covers stormwater discharges from construction activities that disturb 5 or more acres A Stormwater Pollution Prevention Plan along with a notice of intent to Wyoming Department of Environmental Quality within 30 days prior to start of construction	Ongoing, Projected 2024 Submittal
		National Pollutant Discharge Elimination System/Wyoming Pollutant Discharge Elimination System Individual Industrial Discharge Permit	Coverage includes industrial wastewater discharge activities (operation) and stormwater discharges from industrial activities	Ongoing, Projected 2025 Submittal
		Temporary Construction Dewatering Permit	Construction dewatering activities less than 12 months	Ongoing, Projected 2024 Submittal

Table 1.4-1 Authorizations for Kemmerer Unit 1
(Sheet 4 of 6)

Jurisdictional Agency	Authority, Law, or Regulation	Authorization Description	Activity Covered	Status and Projected Submission Date, as Applicable
Wyoming Department of Environmental Quality (Continued)	Clean Air Act Amendments of 1990, (Wyoming has delegation authority) Wyoming Environmental Quality Act of 1973, Wyoming Statute Title 35, Chapter 11	New Source Review, Title V Operations Permit Construction Notice	Operation that generates air emissions	Ongoing, Projected 2025 Submittal
	Safe Drinking Water Act (SDWA) and Wyoming Water Quality Rules and Regulations, Chapters 3, 5, 11, and 12. The Wyoming Environmental Quality Act, W.S. 35-11-101 and Article 3, W.S. 35-11-103, and 301	WYDEQ Water Quality Division Water and Wastewater Permit to Construct.	Construction of, "a system for the provision to the public of water for human consumption through pipes or constructed conveyances, if such system has at least fifteen (15) service connections or regularly serves at least twenty-five (25) individuals."	Projected 2030
		Certificate of Completion	Submit a Certificate of Completion form after construction of water distribution and wastewater facilities are complete.	Projected 2030
		Operator Certificate	Operation of a public water supply. EPA Operator Certificate Program Management, administered under the Wyoming Operator Certification Program in coordination with the EPA Region 8 coordinator	Projected 2030

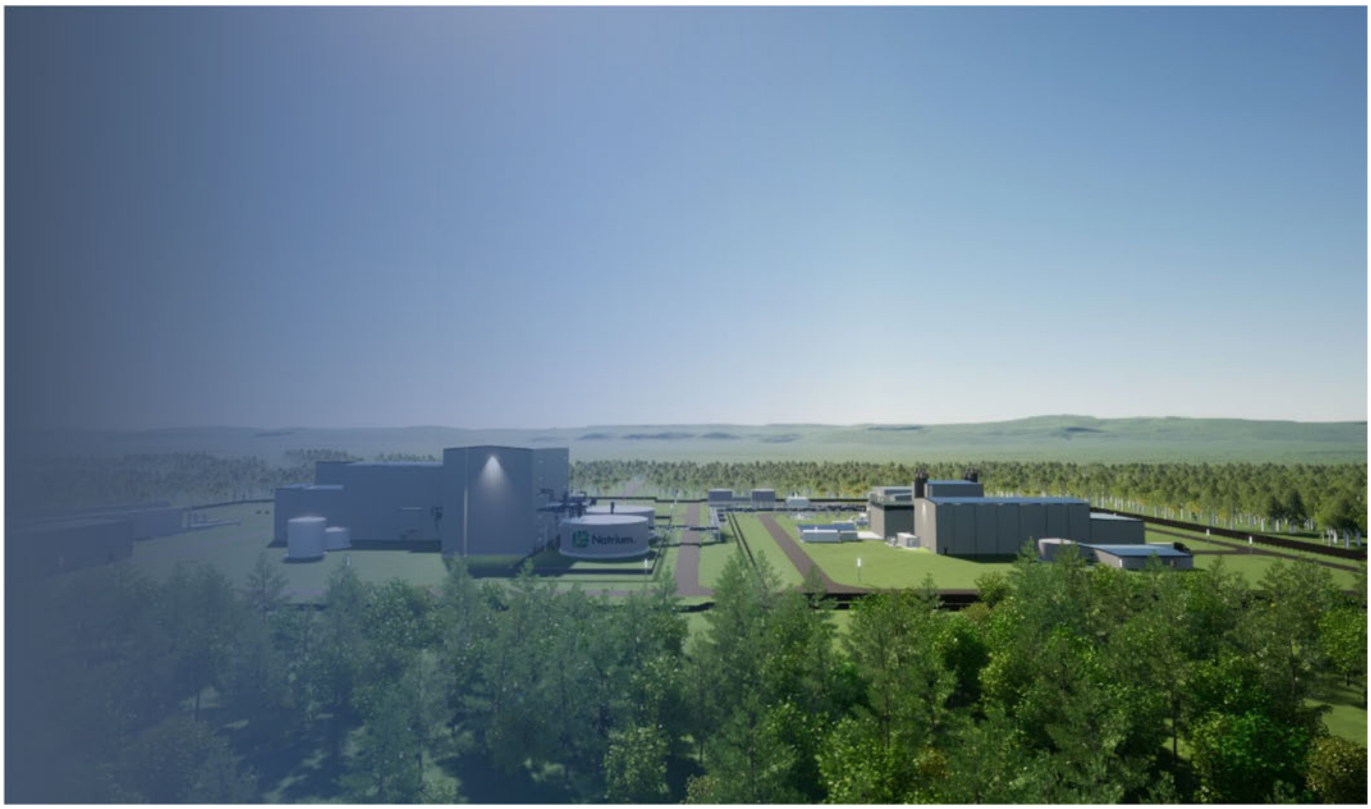
Table 1.4-1 Authorizations for Kemmerer Unit 1 (Sheet 5 of 6)

Jurisdictional Agency	Authority, Law, or Regulation	Authorization Description	Activity Covered	Status and Projected Submission Date, as Applicable
Wyoming State Historic Preservation Office	National Historic Preservation Act of 1966 Wyoming Antiquities Act of 1935	National Historic Preservation Act Section 106 Consultation for Historic and Cultural Resources	Consultation, cultural resource inventory, and project review in compliance with Section 106 of the National Historic Preservation Act and Wyoming Antiquities Act of 1935	Ongoing, DOE lead
Wyoming Department of Transportation	Wyoming Department of Transportation Rules and Regulations, General Section, Chapter 13, Access Facilities, W.S. 24-2-105 and W.S. 24-6-101 through W.S. 24-6-111.	Wyoming Department of Transportation Access Permit	An Access Permit is required for any widening or building of an approach from land joined to a State highway right-of-way Requires applicants to be responsible for construction, maintenance, and removal (if necessary) of the approach	Ongoing, Projected 2024 Issuance
Other State Authorizations				
Wyoming State Engineer's Office	Wyoming Industrial Development Information and Siting Act Wyoming Statute Title 35, Chapter 12	SEO issuance of preliminary and final opinion that there is a sufficient quantity of water available for operation of the proposed facility - Part of ISP	The Wyoming State Engineer's Office is charged with the regulation and administration of the water resources in Wyoming	Ongoing, Projected 2024 Issuance
	Wyoming Statute Title 41, Chapter 3, Section 41-3-930	Permit to Appropriate Groundwater	Beneficial use of groundwater during construction	Ongoing, Projected 2024 Submittal

Table 1.4-1 Authorizations for Kemmerer Unit 1
(Sheet 6 of 6)

Jurisdictional Agency	Authority, Law, or Regulation	Authorization Description	Activity Covered	Status and Projected Submission Date, as Applicable
Local Authorizations				
Lincoln County, Wyoming, Office of Planning and Development	Lincoln County Land Use Regulations	Land Use Permit and Driveway Access Permit	Issuance of Land Use Permit- No premises shall be used, or building, or structure constructed within any zoning district, as a conditional use until the owner has obtained a conditional use permit from the Board of County Commissioners	Ongoing, Projected 2024 Submittal
		Floodplain Permit	Issuance of Floodplain Permit: All impacts of activities proposed within regulated floodplains must be evaluated in compliance with the Lincoln County Land Use Regulations, Appendix C, “Flood Overlay Provisions”	Ongoing, Projected 2024 Submittal
		Small Wastewater Permit	The installation of a small wastewater system requires a permit to construct in compliance with Lincoln County Land Use Regulations, Appendix E, “Small Wastewater Design Standards”	Ongoing, Projected 2025 Submittal

a TerraPower & GE-Hitachi technology



Kemmerer Power Station Unit 1
ER, Chapter 2

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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Chapter 2 The Proposed Site and the Affected Environment

2.0 The Proposed Site and the Affected Environment

The Kemmerer Unit 1 property boundary, 334 acres (135 hectare) owned by USO encompasses the approximate 290 acre (117 hectare) Kemmerer Unit 1 Site. North Fork Little Muddy Creek forms the eastern boundary of the Kemmerer Unit 1 Site. Descriptive information, including location and defined peripheries of the proposed site, the Kemmerer Unit 1 Site, is provided in this chapter. The following sections describe the baseline conditions:

- Land Use- Section 2.1
- Water Resources- Section 2.2
- Ecological Resources- Section 2.3
- Socioeconomics- Section 2.4
- Environmental Justice- Section 2.5
- Historic and Cultural Resources- Section 2.6
- Air Resources- Section 2.7
- Nonradiological Health- Section 2.8
- Radiological Environment and Radiological Monitoring- Section 2.9

The Kemmerer Unit 1 property boundary along with the Kemmerer Unit 1 Site is depicted in Figure 1.1-1. An aerial photograph of the Kemmerer Unit 1 Site is shown in Figure 2.0-1. Figure 2.1-1 shows the macro-corridors, which contain the proposed linear facilities along with the Kemmerer Unit 1 Study Area. The Kemmerer Unit 1 Study Area includes the Kemmerer Unit 1 Site along with an additional area initially investigated west of US 189, no longer considered as part of the Kemmerer Unit 1 Site.

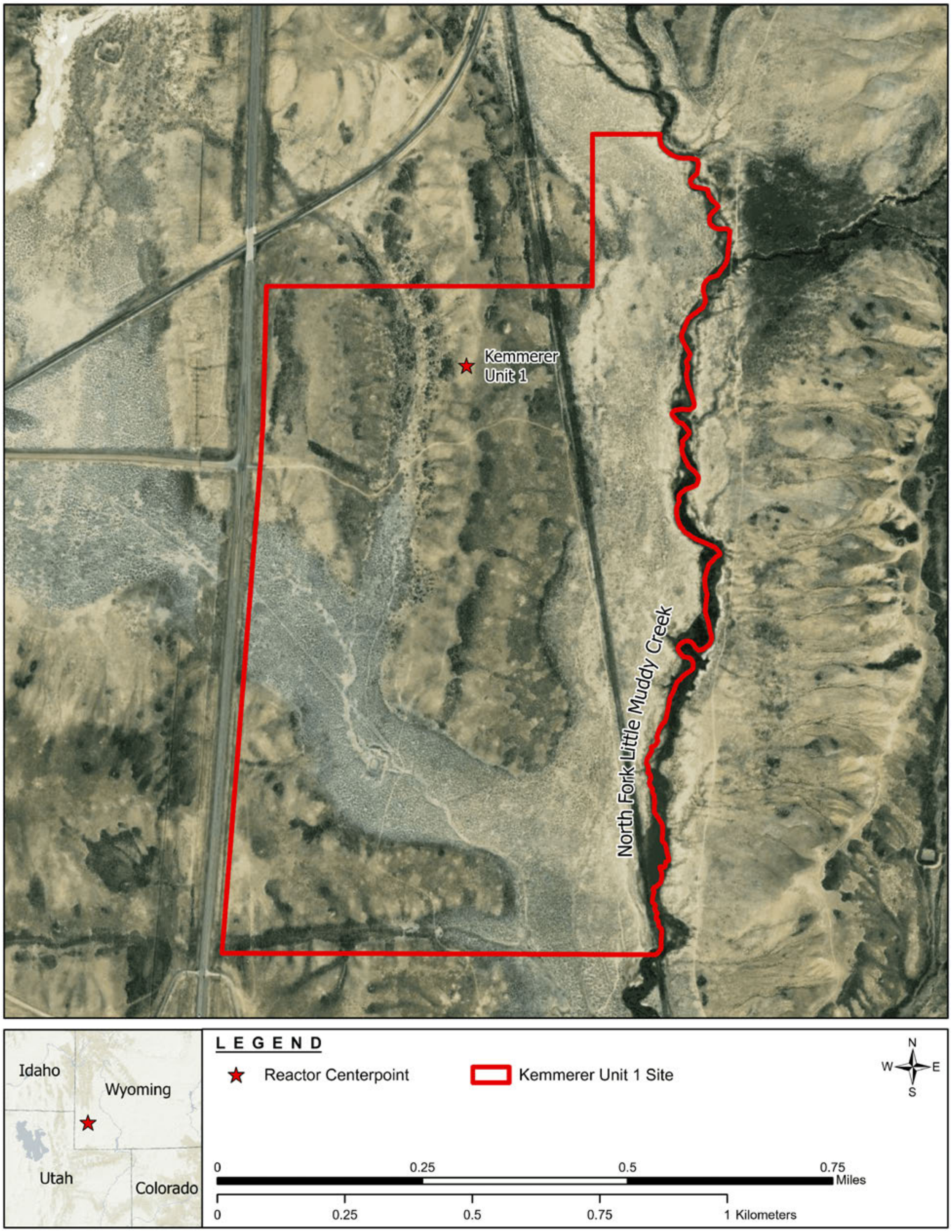
Figure 3.1-3 shows the plant arrangement within the Kemmerer Unit 1 Site. The Kemmerer Unit 1 Reactor Building centerpoint coordinates are: longitude -110.560547, latitude 41.705841.

The Kemmerer Unit 1 Site is in Lincoln County in southwestern Wyoming. Measured from the centerpoint of the reactor building, the site is approximately 3.0 miles (4.8 kilometers) south of the City of Kemmerer municipal boundary and approximately 4.2 miles (6.8 kilometers) southwest of the Town of Diamondville, as shown in Figure 1.1-1.

The site is approximately 3.8 miles (6.1 kilometers) southeast of Naughton Power Plant. Naughton Power Plant is comprised of three electrical generating units. Infrastructure associated with Naughton Power Plant, such as the Raw Water Settling Basin, intake structure on Hams Fork River, meteorological tower, and tie-in to electric transmission lines would be shared as practicable. Figure 3.1-1 illustrates Naughton Power Plant's location, including the planned shared infrastructure.

Table 7.0-1 provides an overview of resource areas that could be directly or indirectly impacted by the proposed action.

Figure 2.0-1 Kemmerer Unit 1 Site Aerial Photograph



2.1 Land Use

An understanding of the land involved in the proposed project is needed for the analysis of land use, ecology, and other disciplines in Chapters 4 and 5. Accordingly, this section describes the land characteristics of the proposed site, the vicinity, the transmission corridor and other offsite areas. The site and affected offsite lands do not lie within the coastal zone as defined under the Coastal Zone Management Act of 1972 (16 United States Code 1451 Section 304(1), (3), and (5)). As discussed in Section 2.6, there are no Native American lands within the region. More detailed land use information, as it pertains to socioeconomics, is provided in Section 2.4.2.4.

2.1.1 Site, Vicinity, and Region

2.1.1.1 The Site

The Kemmerer Unit 1 Site and its location with respect to the Land Use Study Area (study area), nearby roads, highways, waterways, and communities and cities in the 6-mile (10-kilometer) vicinity, is shown in Figure 2.1-1 and Figure 2.1-2. Figure 2.1-3 shows the 50-mile (80-kilometer) region. As shown in Figure 2.1-1, US 189 is the nearest major roadway and provides access to the site. The Skull Point Spur of the Cumberland Branch of the Union Pacific Railroad runs adjacent to the northwest corner of the site. County Road 325 (Skull Point Road) intersects US 189 on the west side (shown in Figure 2.1-1 and Figure 2.1-2). There are no public roads, railroads, or waterways within the site.

The site has no active mining or oil and gas wells; however, the site is located near potential exploitable coal, oil, and gas resources (Reference 2.1-26). United States Sodium Fast Reactor Owner, LLC acquired all the mineral rights within the site. No transmission lines or pipelines cross the site. A 25 kV distribution line runs adjacent to US 189 in the southern portion of the site.

Based on GIS data and aerial interpretation of the study area using United States Geological Survey land cover classifications, the site is undeveloped and covered in shrub/scrub with delineated wetlands along North Fork Little Muddy Creek, which lies east of and adjacent to the site. Figure 2.1-4 and Table 2.1-1 indicate the land cover within the study area. The site is zoned industrial by Lincoln County (Reference 2.1-8). The site is rural and on occasion is grazed by livestock but is not used for other agricultural activities. The site does not occupy land that is classified as prime or unique farmlands (Reference 2.1-13).

The site has a gently rolling terrain at elevations ranging from about 6,740 feet to 6,760 feet (2054 meters to 2060 meters) above mean sea level (Reference 2.1-22). The naturally rolling terrain is interrupted by an elevated rail bed of an abandoned mining railroad that traverses the site from northwest to southeast.

A wetland delineation of the study area was performed (Reference 2.1-17). Wetlands are located along North Fork Little Muddy Creek. Three unnamed ephemeral streams traverse the southern portion of the site. The areas along North Fork Little Muddy Creek and the ephemeral streams are 100-year floodplains. Wetlands are further discussed in Section 2.3. Surface and groundwater features of the site and surrounding area are discussed in Section 2.2. Additional information on floodplains is provided in Section 2.2.

The site is located east of the Absaroka thrust fault and its geologic units are of Cenozoic and Mesozoic age. The site lies within an alluvial plain, the Cumberland Flats, with the north-south trending Oyster Ridge approximately 1 mile (2 kilometers) to the east and an unnamed uplift to the west. Oyster Ridge is part of the Oyster Ridge Sandstone Member (Kfo) of Upper Cretaceous age (Reference 2.1-9). Unconsolidated gravel deposits (Qg) are distributed within the Cumberland Flats. The site is underlain by the Hilliard Shale (Kh) of Upper Cretaceous age, and alluvium (Qas) and colluvium (Qc) of Holocene to Pleistocene age. The Hilliard Shale (Kh) is a dark olive-gray marine shale, siltstone, and sandy shale containing thin, tan to light-gray sandstone and limestone interbeds (Reference 2.1-9). The thickness of the Hilliard Shale varies from 2500 to 3000 feet (762 meters to 914 meters) (Reference 2.1-15). Below the Hilliard Shale is the westerly dipping coal-bearing Frontier Formation (Kf) of approximately 2000 feet (610 meters) thickness of Upper Cretaceous age. Additional details on the site's geologic setting, as well as detailed seismologic and geotechnical information, is presented in PSAR Chapter 2.

Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The site lies within the Green River Formation, a lacustrine deposit containing fossils of fish, insects, birds, reptiles, leaves, and wood, and large deposits of oil shale (lamosite: organic matter from planktonic blue-green algae [cyanobacteria]) and trona (hydrated sodium bicarbonate carbonate). The layered rock of the Green River Formation is a historical record of three Eocene lakes: Fossil Lake, Lake Gosiute, and Lake Uinta. These lakes once covered large parts of present-day Wyoming, Utah, and Colorado. The site lies between the deposits of Fossil Lake on the west and Lake Gosiute on the east. Fossil Butte National Monument, approximately 12 miles (19 kilometers) west of the site, is associated with Fossil Lake. The site is within the maximum extent of Lake Gosiute (middle Eocene). Lake Uinta was south of the site in Utah. (Reference 2.1-1, Reference 2.1-11, and Reference 2.1-16)

The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface, and geologic maps of a project area can be used for assessing the potential for occurrence of paleontological resources. The Bureau of Land Management (BLM) utilizes the Potential Fossil Yield Classification system, which is meant to provide baseline guidance for predicting paleontological resources. The Potential Fossil Yield Classification system assigns the probability for paleontological resources within geologic units as Class 1 (very low) through Class 5 (very high). (Reference 2.1-2) The BLM Potential Fossil Yield Classification classes for the site are Class 2, low, and Class 3, moderate.

2.1.1.2 The Vicinity

The vicinity is defined as the area within 6 miles (10 kilometers) of the site. As mentioned above in Section 2.1.1.1, the site is located on a rolling alluvial plain within the Cumberland Flats between Oyster Ridge to the east and an unnamed uplift to the west. A topographic map of the vicinity is presented in Figure 2.1-5.

The vicinity has potentially exploitable minerals including bentonite, coal, phosphorus, sulfur, as well as oil and gas (Reference 2.1-26). As shown on Figure 2.1-5, the Elkol strip mine lies to the west of the site approximately 3.7 miles (6.0 kilometers). The mine's coal yields from the Adaville Formation (Kav), which is a coal-bearing formation of Upper Cretaceous age. The Elkol strip mine is owned and operated by Kemmerer Operations, LLC and is the only active mine in the vicinity. The vicinity also includes various sand and gravel pits (Reference 2.1-25). Also, as shown on Figure 2.1-2, within the vicinity southwest of the site is an active oil and gas well at the Fabian Ditch field (Reference 2.1-26). The Elkol oil and gas field is also southwest of the site within the vicinity and is shown on Figure 2.1-2 (Reference 2.1-26).

The land cover found in the vicinity is presented in Figure 2.1-6 and Table 2.1-1. The vicinity is dominated by shrub/scrub land cover (94 percent). Developed land within the vicinity occurs in and around the Town of Diamondville and the City of Kemmerer and Naughton Power Plant. Approximately 35 percent of the land in the vicinity is managed by the BLM Kemmerer Field Office (Reference 2.1-3 and Reference 2.1-4). The BLM lands in the vicinity are undeveloped. The majority of unincorporated southern Lincoln County outside of the public lands is zoned rural. In the vicinity, land south of Kemmerer encompassing Naughton Power Plant and along US 189 is zoned industrial. (Reference 2.1-8)

Public and private property owners in the vicinity have allowed seasonal hunting on their properties. Hunter Management Areas are parcels of land where the Wyoming Game & Fish Department manages access for hunters. The Bear-River-Divide Hunter Management Area is located southwest of the proposed site and is comprised of approximately 230,000 acres (93,000 hectares) of private or leased lands in Lincoln and Uinta counties (Reference 2.1-24). Hunting properties are further discussed in Section 2.4.2.

There are multiple transmission lines and natural gas pipelines in the vicinity (Figure 2.1-6) associated with the Naughton Power Plant. Also shown in Figure 2.1-6 are the United States highways in the vicinity. US 189 traverses the vicinity north to south. US 30 crosses the vicinity northwest to east to the north of the site. The vicinity is also served by a rail mainline and two spurs. The transportation network is further discussed in Section 2.4.2.

The urban areas in the vicinity are the Town of Diamondville and the City of Kemmerer. The City of Kemmerer has zoning within the city limits and established a future land use plan (Reference 2.1-5, Reference 2.1-6, and Reference 2.1-7). Development will be in accordance with zoning classification or subject to Kemmerer approval for any re-zoning applications. Anticipating greater demand for housing and commercial establishments from this project and others in the area, developers have approached Kemmerer city officials with single- and multi-family housing and commercial development plans. Therefore, additional development within Kemmerer is reasonably foreseeable, some of which could involve re-zoning. A re-zoning request to allow multifamily housing was approved in 2023. (Reference 2.1-10)

There are two large industrial sites in the vicinity, the Naughton Power Plant and the above-mentioned Kemmerer Operations, LLC coal mine. Naughton Power Plant is approximately 3.8 miles (6.1 kilometers) northwest of the site. The Kemmerer Mine is a surface mine that provides the coal for Naughton Power Plant. The mine permit boundary extends along the ridge with the closest point being approximately 2.2 miles (3.5 kilometers) from the proposed Kemmerer Unit 1 site. The mine permit boundary is shown in Figure 2.1-6.

The former Kemmerer Coke Plant, owned by FMC Corporation is located south of the common macro-corridor. The former plant was located on a 700-acre (300-hectare) site. All above-grade equipment and structures were scheduled to be demolished and removed as of October 2022

(Reference 2.1-23). Remaining is a permitted hazardous waste landfill in post-closure and a closed industrial waste landfill (Reference 2.1-14). The common macro-corridor crosses an undeveloped portion of the FMC Corporation-owned property to the north of the former Kemmerer Coke Plant facilities (Figure 2.1-7).

The waterways in the vicinity are the North Fork Little Muddy Creek and Hams Fork River. There are wetlands within the vicinity primarily associated with these waterways. A wetland delineation of the site and macro-corridors was performed. Wetlands are further discussed in Section 2.3. Surface and groundwater features of the site and surrounding area are discussed in Section 2.2. Additional information on floodplains in the vicinity are provided in Section 2.2.

2.1.1.3 The Region

The region is the area within 50 miles (80 kilometers) of the site. In determining relevant regional land use information, worker commuting patterns and other economic data were evaluated to determine the counties in the region subject to land use changes from the proposed project. The evaluation determined that the potential for land use changes was limited to the site, the vicinity, and those counties in the region that are likely to receive the bulk of new residents and taxes. Therefore, the counties of interest that are the focus of this subsection are Lincoln, Sweetwater, and Uinta. Information on land use plans for these counties is provided in Section 2.4.

The major land use classifications in the region are depicted in Figure 2.1-8 and summarized in Table 2.1-1. Again, the dominant land cover category is shrub/scrub (approximately 75 percent) followed by evergreen forest comprising 6.1 percent of the region's land cover. The evergreen forest land cover is primarily found in the Bridger-Teton National Forest in the north and the Uinta-Wasatch-Cache National Forest on the west and south (Reference 2.1-20, Reference 2.1-19). Developed land comprises approximately one percent of the region, with the largest urban areas being Evanston in Uinta County and Kemmerer in Lincoln County.

The Fossil Butte National Monument is located approximately 12 miles (19 kilometers) northwest of the site (Figure 2.1-2). Fossil Butte is managed by the National Park Service and covers 8,198 acres (3,318 hectares) (Reference 2.1-12). Additional information on the park is presented in Section 2.4.2.

The United States Fish and Wildlife Service manages two national wildlife refuges in the region. The Cokeville Meadows National Wildlife Refuge in western Lincoln County approximately 24 miles (39 kilometers) northwest of the site. The Refuge is centered around a 20-mile (32-kilometer) stretch of the Bear River Valley and Bear River runs through portions of the Refuge. Cokeville Meadows is about 6,500 acres (2,600 hectares) and another 2,800 acres (1,100 hectares) are held in conservation easements. The Seedskadee National Wildlife Refuge in Sweetwater County is approximately 33 miles (53 kilometers) east of the site. Seedskadee is 26,210 acres (10,610 hectares) along 36 miles (58 kilometers) of the Green River. (Reference 2.1-20, Reference 2.1-21)

The region, like the vicinity, has Federally-owned lands managed by BLM's Kemmerer Field Office. Within Lincoln County, large contiguous areas of BLM-administered lands are intermingled with state, private, and small parcels of other Federal lands (Bureau of Reclamation, United States Forest Service, and United States Fish and Wildlife Service). In southeastern

Lincoln County, the BLM-administered land is a "checkerboard" pattern of 1-mile (2-kilometer) parcels alternating between BLM and private ownership (Reference 2.1-4), interspersed with an occasional state-owned parcel (Figure 2.1-9).

2.1.2 Transmission Corridor and Other Offsite Areas

Two new 230 kV transmission lines, approximately 5.9 miles (9.5 kilometers) in length, will be constructed (of which 4.1 miles [6.6 kilometers] would be part of a common right-of-way (ROW) with the water supply pipeline) connecting the onsite Kemmerer Unit 1 substation to the regional electrical transmission infrastructure at Naughton Power Plant. The Naughton Power Plant substation will be expanded to accommodate the electrical power from Kemmerer Unit 1. Upgrades and associated modifications will also be required for the Naughton Power Plant substation's existing equipment. No changes are proposed at this time to the electrical transmission system beyond the Naughton Power Plant substation.

A new water supply pipeline, approximately 6.0 miles (9.7 kilometers) in length, will be constructed connecting the Kemmerer Unit 1 facilities to the existing raw water settling basin at the Naughton Power Plant.

Since the routes for the transmission lines and water pipeline connecting the Kemmerer Unit 1 facilities to the existing infrastructure at Naughton Power Plant are not currently known, macro-corridors that encompass the potential routes to determine the probable corridor characteristics for analysis were identified in the environmental report. As shown on Figure 2.1-10, a common macro-corridor 4.1 miles (6.6 kilometers) in length for routing both the transmission and water supply lines was identified. The routing of the water supply pipeline and transmission lines will diverge where they reach the existing transmission ROWs. Separate macro-corridors were identified for transmission (1.8 miles [2.9 kilometers] in length) and water supply (1.9 miles [3.1 kilometers] in length) for the final leg to connect with the existing Naughton Power Plant infrastructure. The electrical macro-corridor is routed to the east of the existing transmission ROW. The water macro-corridor crosses the existing transmission ROW before turning north and running on the west side of the existing transmission ROW to the Raw Water Settling Basin. Throughout the environmental report, the macro-corridors are used to characterize the potential impacts associated with the construction and operation of the water supply pipeline and transmission lines. Detailed routing of the transmission lines and water pipeline will avoid or minimize impact on resources identified within the macro-corridors to the extent practicable.

As shown in Figure 2.1-7, the land within the macro-corridors is owned by three entities. The majority of the land within the macro-corridors is owned by Kemmerer Operations, LLC, the owner of the Kemmerer Mine. The transmission and water supply macro-corridors and a portion of the common macro-corridor cross the Kemmerer Mine permit boundary. The macro-corridors cross land owned by PacifiCorp near County Road 304 and at Naughton Power Plant. FMC Corporation owns land that hosted the former Kemmerer Coke Plant. A portion of the common macro-corridor near County Road 304 crosses land owned by FMC Corporation to the north of the former plant. Easements and land access for installation of the transmission lines and pipeline are being sought.

The land crossed by the macro-corridors is undeveloped until reaching Naughton Power Plant. The common macro-corridor crosses a Union Pacific rail spur, US 189, and County Road 304. The macro-corridors land cover is dominated by shrub/scrub (93 percent). The macro-corridors include approximately 10 acres (4 hectares) of delineated wetlands. The land cover for the macro-corridors is presented in Figure 2.1-10 and Table 2.1-1. The macro-corridors do not include land that is classified as prime or unique farmlands (Reference 2.1-13).

With the exception of one land section, the macro-corridors are zoned industrial by Lincoln County. One land section (T20N, R116W, Section 8) along the common macro-corridor is zoned rural by Lincoln County. (Reference 2.1-8)

Construction of Kemmerer Unit 1 will require backfill meeting engineering specifications. Such backfill will be acquired from existing commercial backfill sources, and there are no plans to develop offsite borrow areas or roads for transport of backfill.

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2.1-25 (WSGS 2023) Wyoming State Geologic Survey. “Mines and Minerals of Wyoming.” 2023. https://portal.wsgs.wyo.gov/arcgis/apps/webappviewer/index.html?id=9f8e71851d0c421dbeb8ed608bc2dd48. Accessed February 27, 2023.

2.1-26 (Wyoming GIS Center 2023) Wyoming Geographic Information Science Center of the University of Wyoming. “Natural Resource and Energy Explorer.” 2023.https://nrex.wyo.gov. Accessed February 27, 2023.

Table 2.1-1 Study Area, Offsite Areas, Vicinity, and Region Land Use (acres)

Land Use Category	Study Area	Macro-Corridors	Vicinity	Region
Urban or Built-up Land				
Developed, high intensity	--	0.68	55.5	1298
Developed, medium intensity	--	4.57	324	5266
Developed, low intensity	0.038	3.47	440	13,993
Developed, open space	--	2.74	506	28,813
Total	0.038 (0.01%)	11.5 (2%)	1,326 (1.8%)	49,370 (1.0%)
Agricultural Land				
Cultivated Crops	--	--	--	27,349
Pasture/Hay	--	--	11.3	161,985
Total			11.3 (0.02%)	189,334 (3.8%)
Rangeland				
Herbaceous	0.15	8.58	1454	220,640
Shrub/scrub	368	474	66,210	3,744,391
Total	368 (98%)	483 (94%)	67,664 (93%)	3,965,031 (79%)
Forestland				
Deciduous	--	--	8.35	92,823
Evergreen	--	--	25.0	305,970
Mixed	--	--	3.24	24,714
Total			36.6 (0.05%)	423,507 (8.4%)
Water				
Open water	--	--	393 (0.5%)	96433 (1.9%)
Wetlands				
Delineated	7.10	10.1	46.6	46.6
Emergent herbaceous	--	--	784	116,423
Woody	--	--	172	28,155
Total	7.10 (2%)	10.1 (2%)	1002 (1.4%)	144,625 (2.9%)
Barren land				
Barren land	--	7.04 (1%)	1939 (2.7%)	157,768 (3.1%)
Total[a]	**376**	**511**	**72,372**	**5,026,066**

Note: Totals may not sum to 100 due to rounding.

Figure 2.1-1 Kemmerer Unit 1 Site

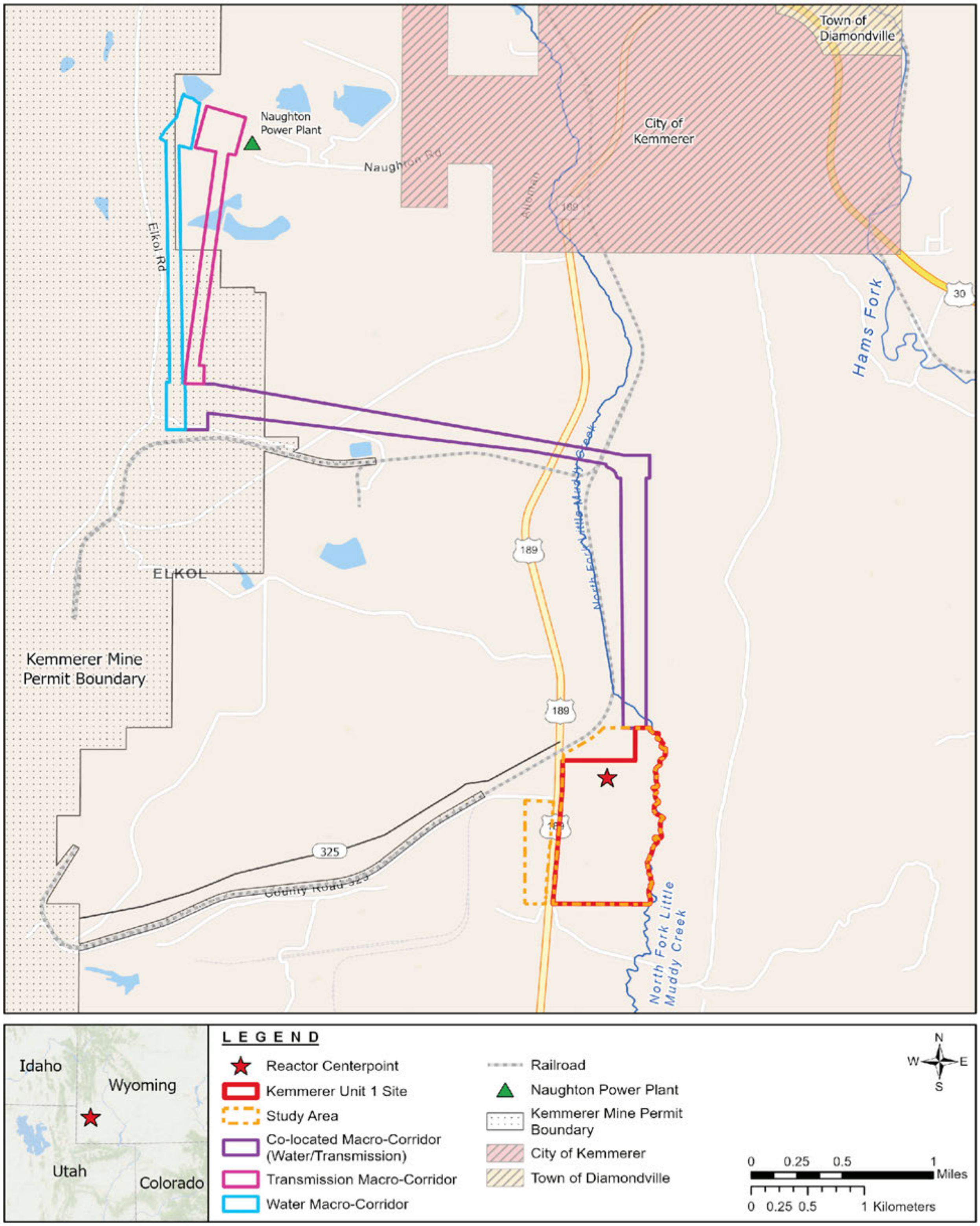


Figure 2.1-2 Project Location and 6-Mile Vicinity

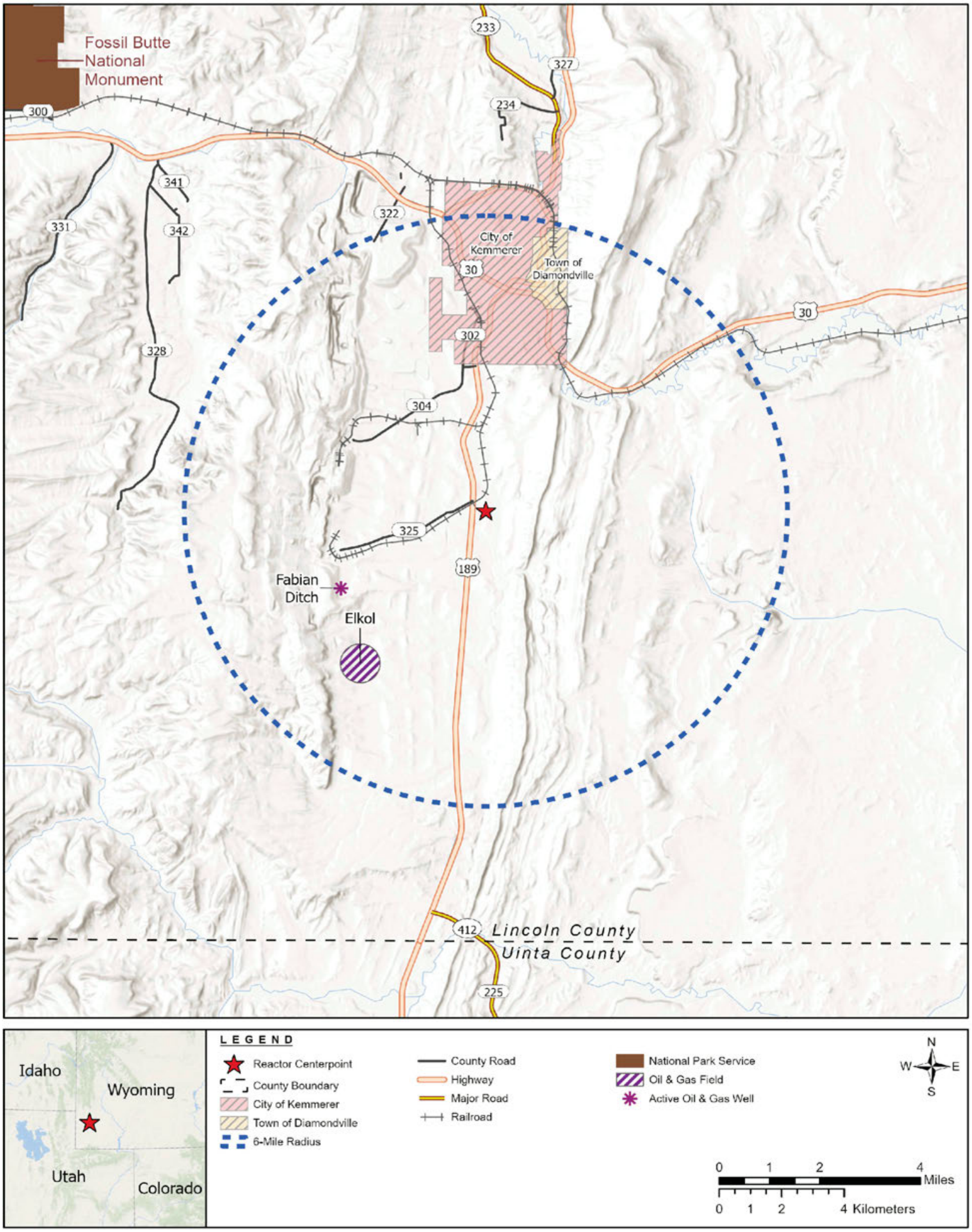


Figure 2.1-3 50-Mile Region

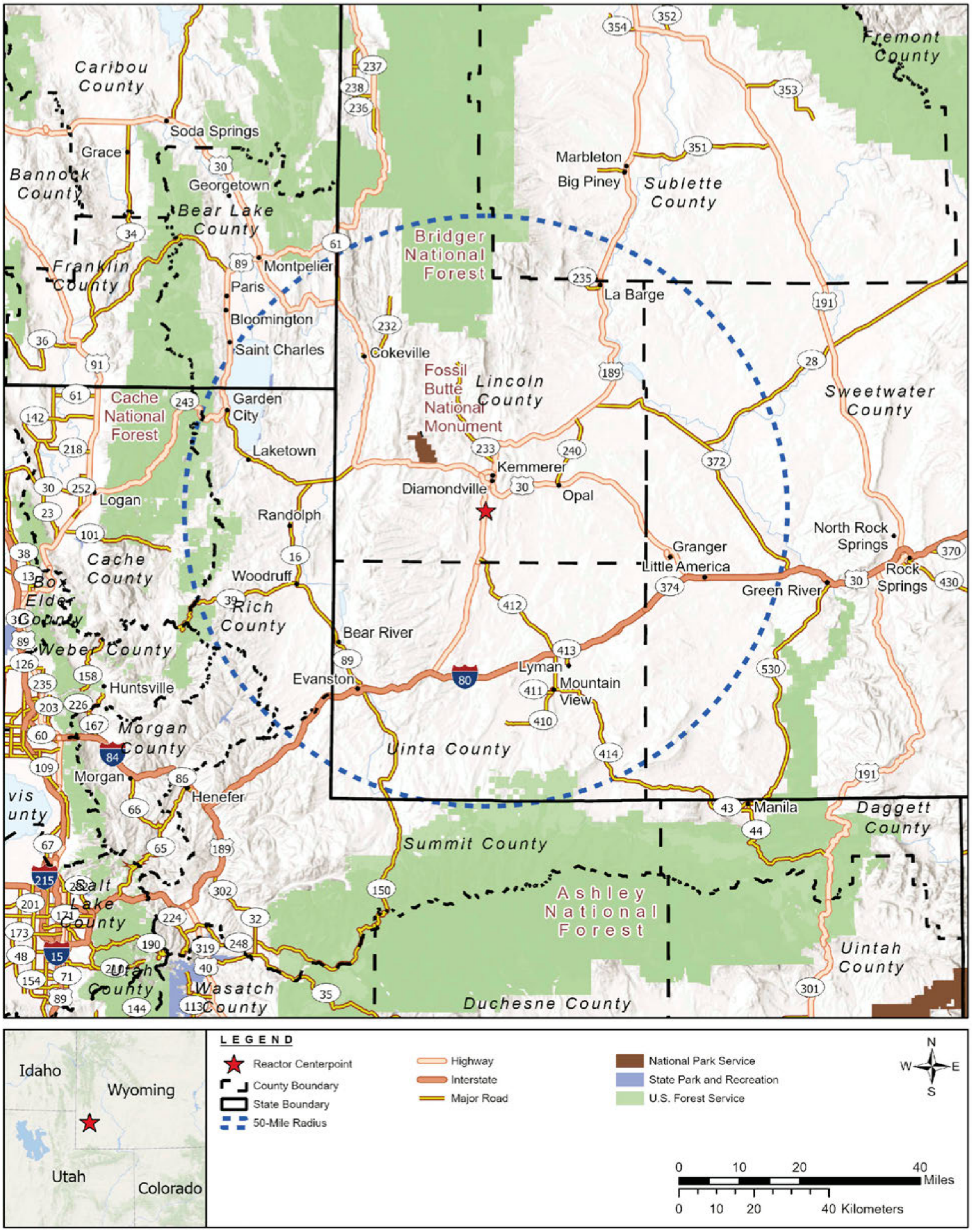


Figure 2.1-4 Study Area Land Use

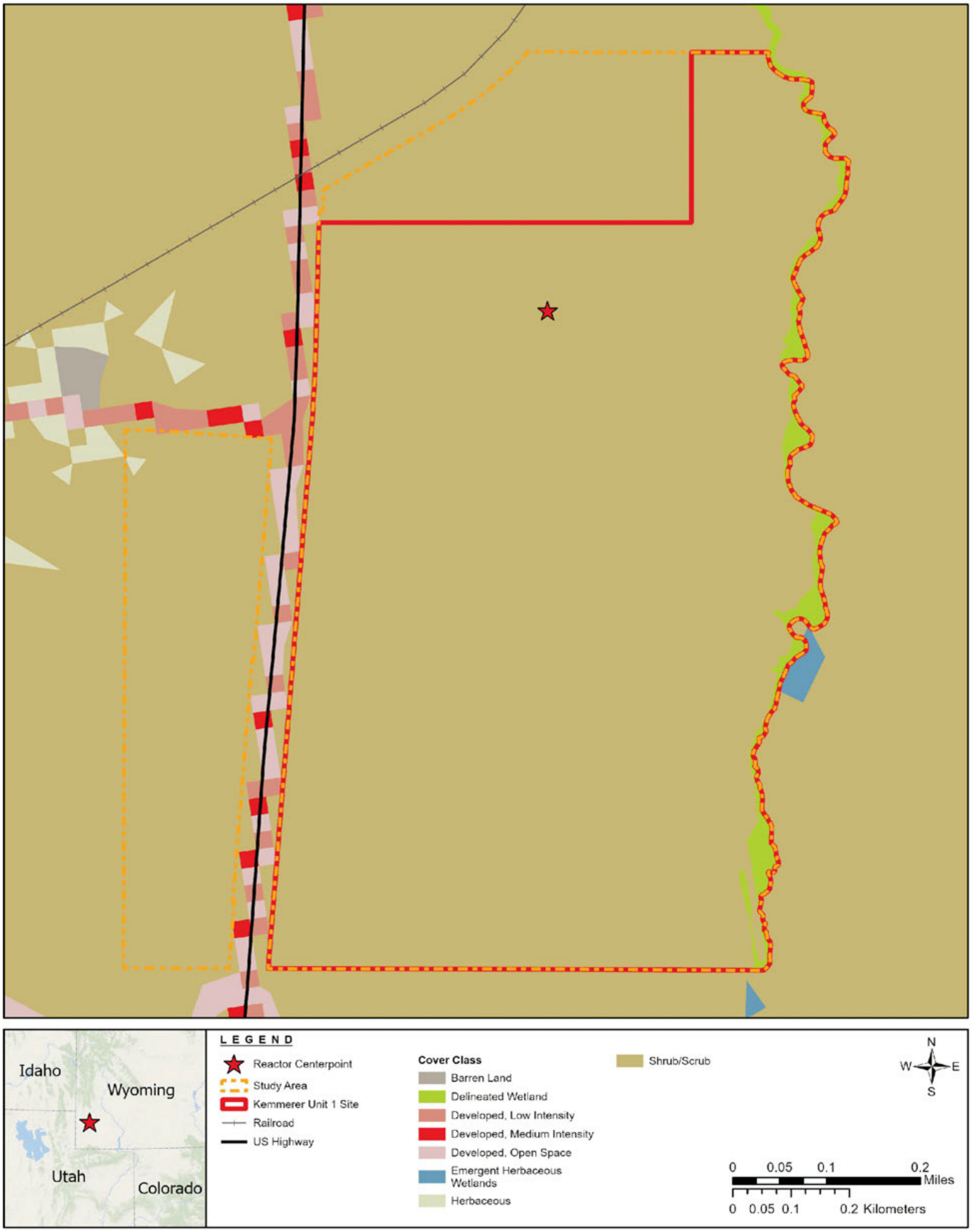


Figure 2.1-5 Vicinity Topography

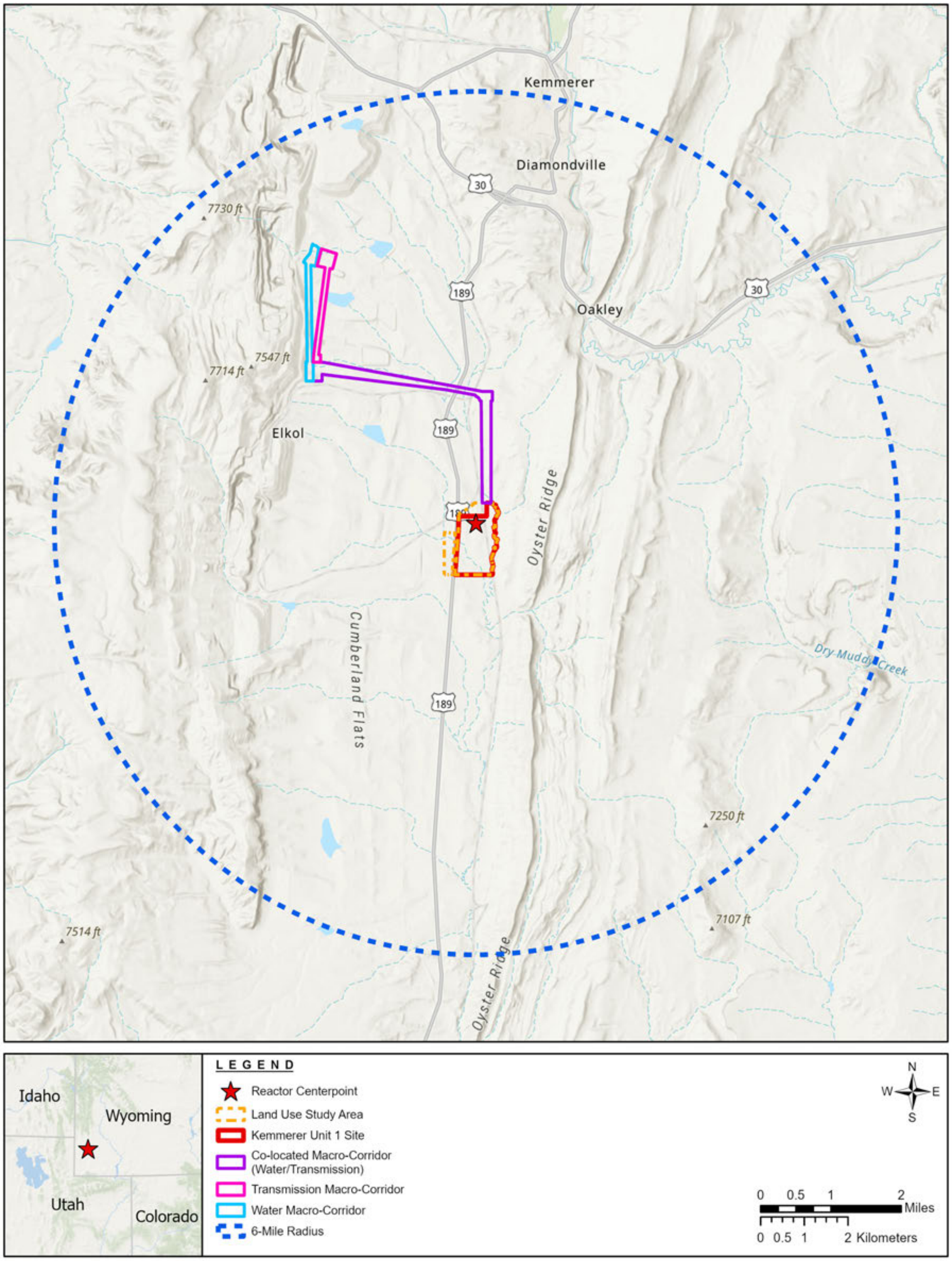


Figure 2.1-6 Vicinity Land Use

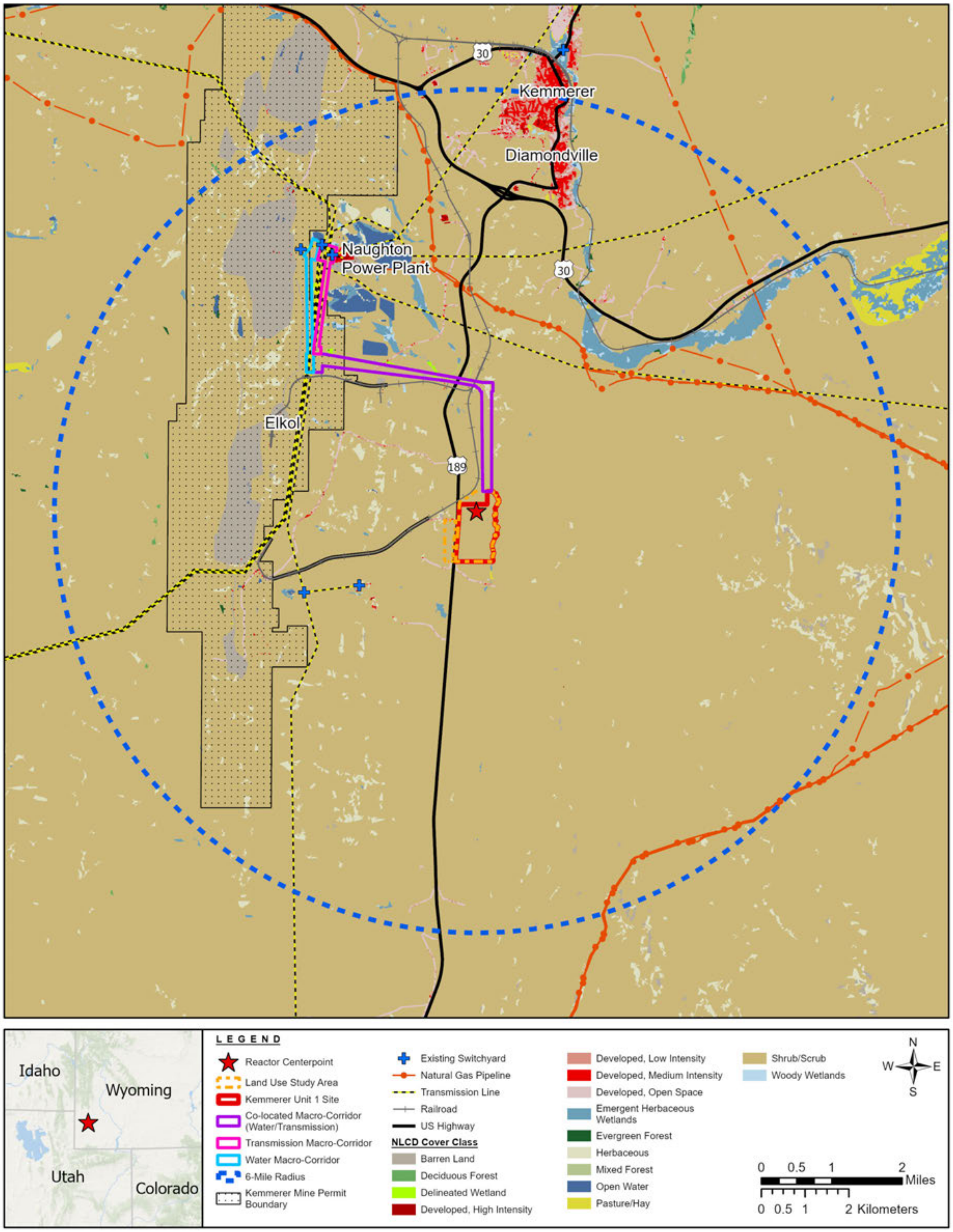


Figure 2.1-7 Macro-Corridors Landownership

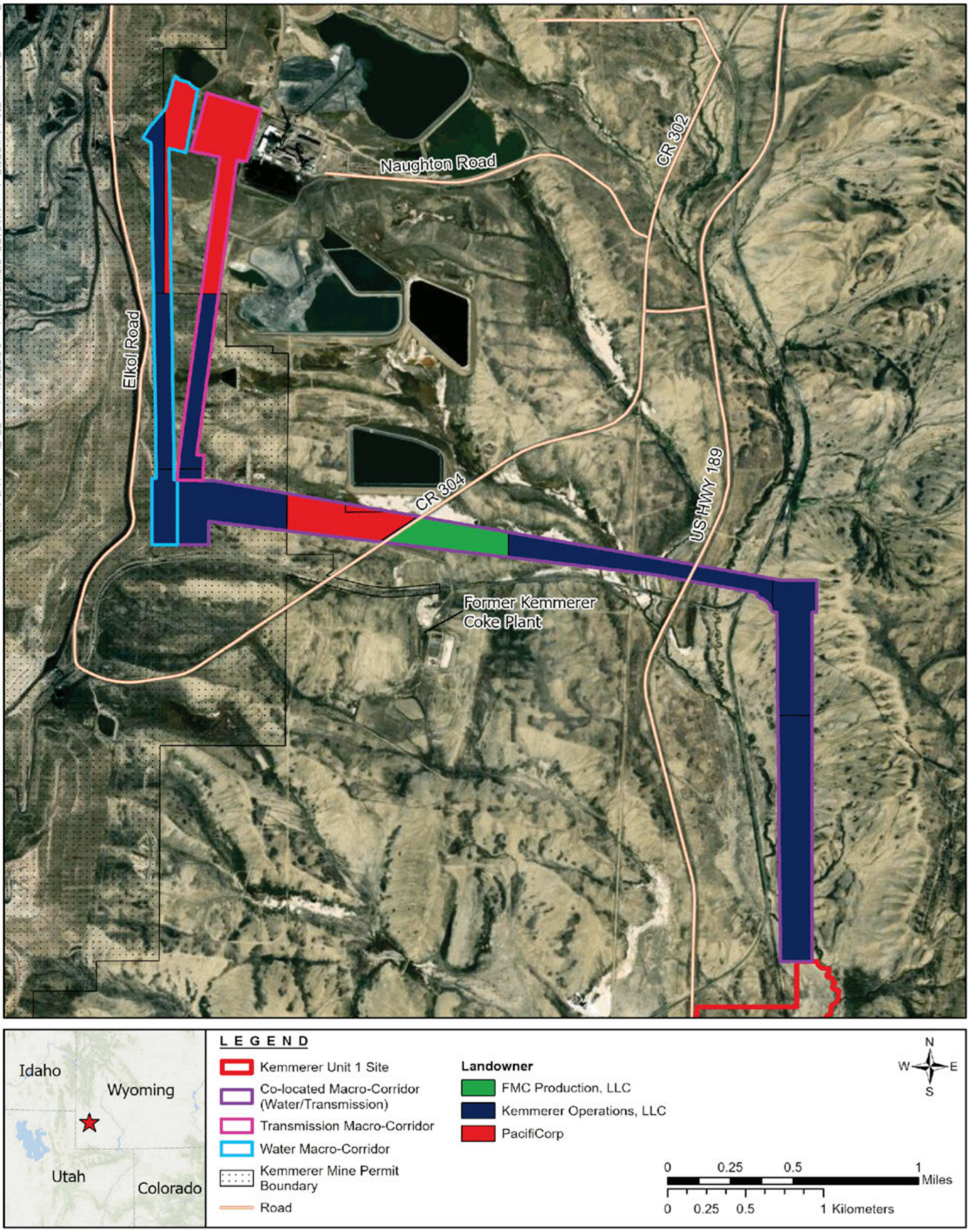


Figure 2.1-8 Region Land Use

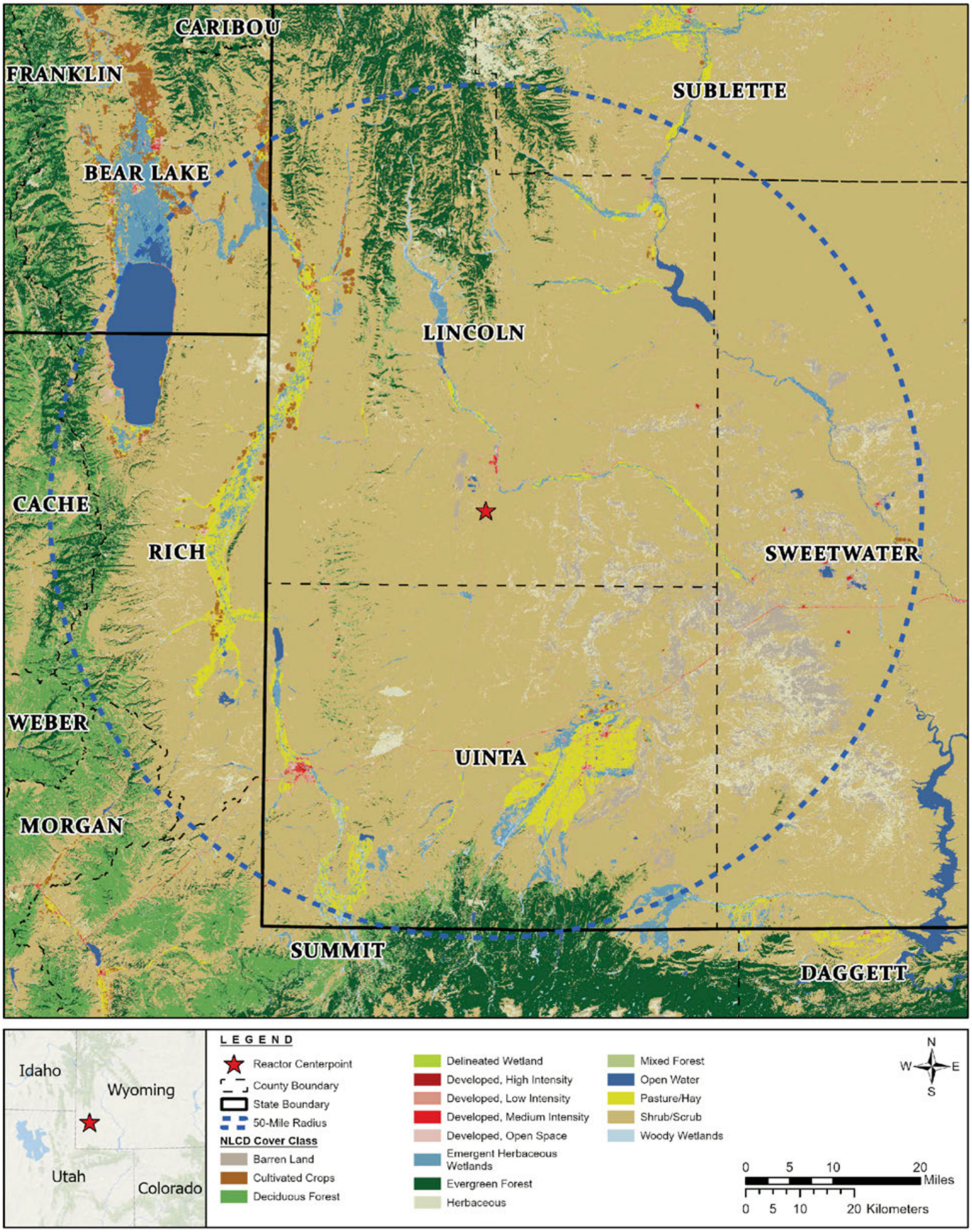


Figure 2.1-9 Federal Land Ownership

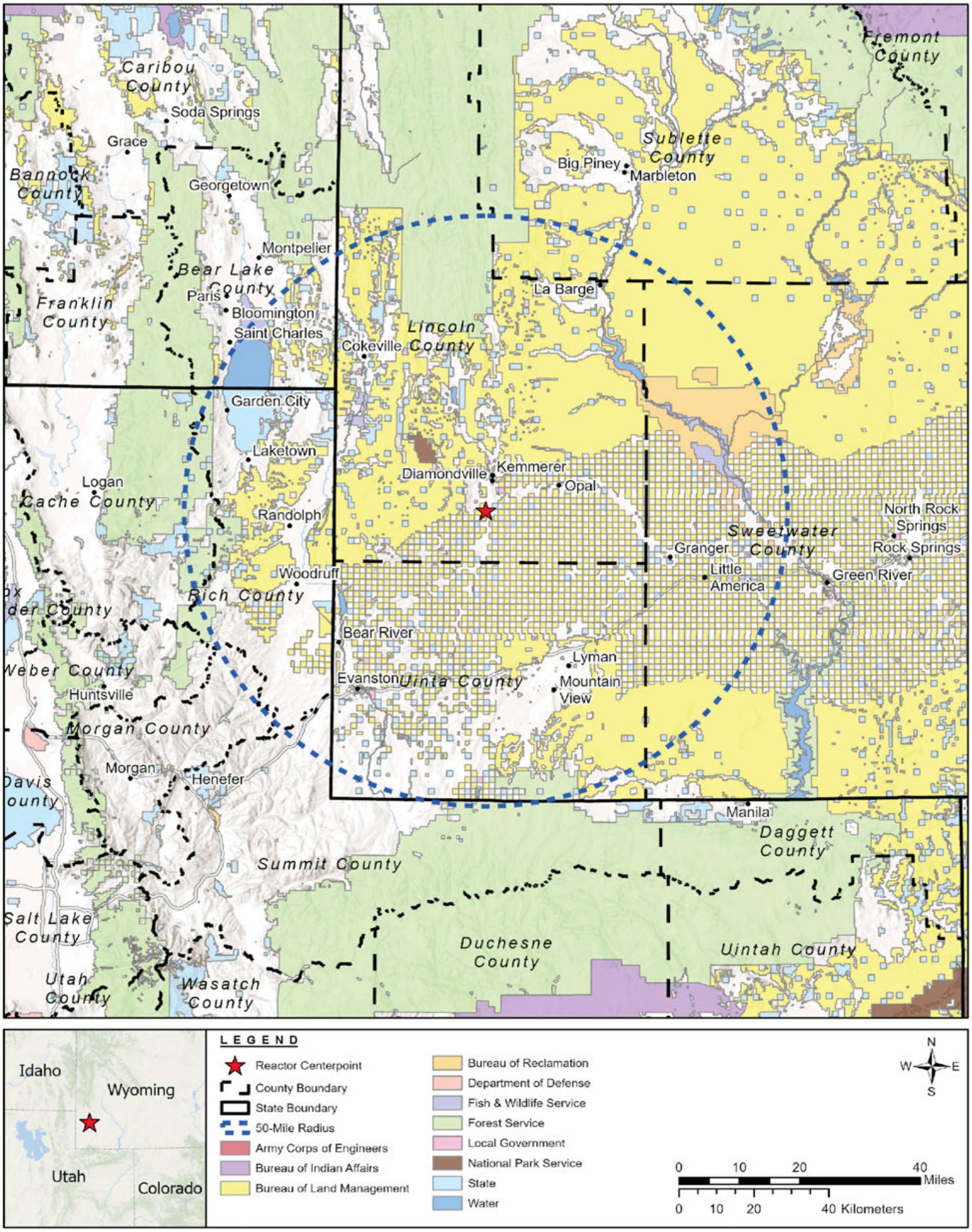
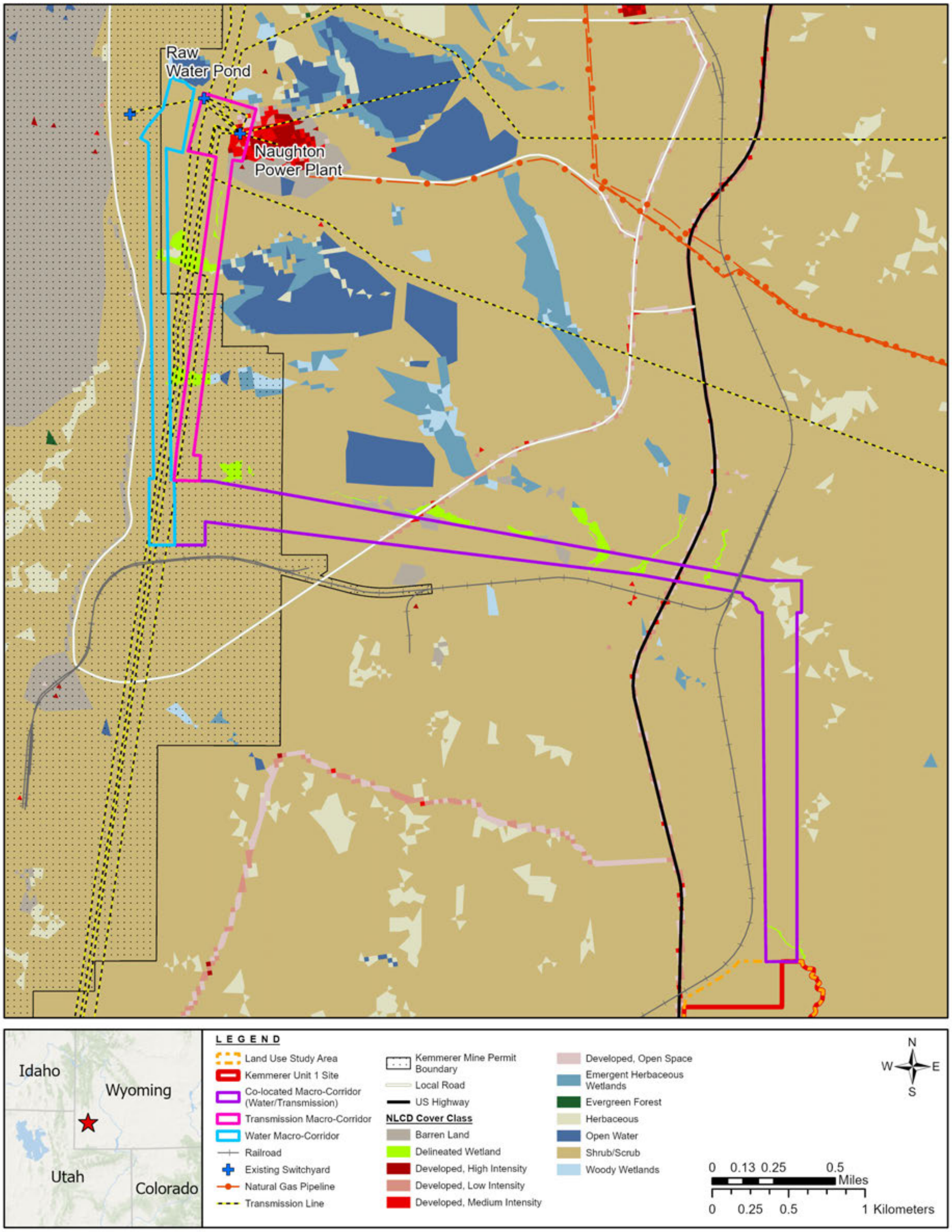


Figure 2.1-10 Electrical and Water Macro-corridor Land Use



2.2 Water Resources (Surface Water and Groundwater)

Site-specific and regional descriptions of the hydrology, water use, and water quality conditions that could affect or be affected by the construction and operation of Kemmerer Unit 1 are described in this section. The detailed overview of the surface water and groundwater resources in the region surrounding the site are described in the following sections.

Section 2.2.1 describes the hydrologic characteristics of the surface water resources and groundwater aquifers and aquitards that can affect the Kemmerer Unit 1 water supply and could be affected by the construction and operation of Kemmerer Unit 1. Section 2.2.2 describes surface water and groundwater uses in the vicinity of the facility that can affect or be affected by the construction and operation of Kemmerer Unit 1. Section 2.2.3 provides detailed water quality information regarding the surface water and groundwater in the vicinity of the site. Section 2.2.4 describes the preapplication monitoring program that will be used to assess the characteristics of the surface water and groundwater resources in the resource impact area. The monitoring program will address spatial coverage (i.e., surface area and depth) and temporal coverage (i.e., duration and sampling frequency).

The potential impacts of plant construction and operation on surface water and groundwater are described in Sections 4.2 and 5.2. All elevations presented in this section are provided in the NAVD 88 vertical datum, unless otherwise specified.

2.2.1 Hydrology

Surface water and groundwater hydrologic characteristics that could potentially impact or be affected by the construction and operation of the Kemmerer Unit 1 Site are described in this section. These characteristics collectively define the supply of water within the resource impact area, including the location, quantity, and temporal variability of that supply.

2.2.1.1 Surface Water Resources

The hydrologic characteristics of surface water resources in a 50-mile (80-kilometer) radius include all water resources that convey raw water to the site. A discussion is provided concerning watersheds, reservoirs, lakes, rivers and streams, sedimentation, drainage areas and gradients, regional bathymetry, wetlands, floodplains, historical flood and drought data, flood control measures, and hydrologic modifications to surface water resources. Figures depicting these resources are also provided.

2.2.1.1.1 Hydrologic Setting

The Kemmerer Unit 1 Site is located within the Upper Green River Basin in Lincoln County, Wyoming, approximately seven miles (11 kilometers) south of the City of Kemmerer (NHD 2019). The Basin includes lands in Wyoming, Colorado, and Utah that drain to the Green River. Counties with significant areas in Wyoming’s Green River Basin are Sweetwater, Sublette, Carbon, Lincoln, and Uinta, as shown in Figure 2.2-1 (Reference 2.2-3).

Figure 2.2-1 shows the general location of the site on the east side of US Highway 189 about four miles (6.4 kilometers) southeast of the existing Naughton Power Plant. The site is within the Upper North Fork Little Muddy Creek watershed within the Upper Green River Basin and is bounded by North Fork Little Muddy Creek on the east side and by an unnamed tributary on the southwest and south sides. The confluence of the unnamed tributary with North Fork Little Muddy Creek is located just south of the site. The regional climate is considered semi-arid with an annual precipitation of about 10 inches (250 millimeters) (Reference 2.2-26). Naughton Power Plant has a meteorological station which is located in the North Fork Little Muddy Creek watershed. The nearest meteorological gauge outside the North Fork Little Muddy Creek watershed is in the Hams Fork River watershed in the City of Kemmerer. Stream and reservoir water level gauges on the Hams Fork River watershed are discussed in PSAR Section 2.5.4.

Major hydrologic features of the Upper Green River Basin within the 50 mile (80 kilometer) site region are identified on Figure 2.2-1 and Figure 2.2-2 and include:

- Blacks Fork
- Hams Fork River
- Kemmerer Reservoir
- Viva Naughton Reservoir
- North Fork Little Muddy Creek
- Naughton Power Plant Raw Water Settling Basin
- Naughton Power Plant Flue Gas Desulfurization (FGD) Ponds (FGD 4 and FGD 5)
- Lake Arambel

The Upper Green River flows southward out of the Upper Green River Basin through a series of deep canyons across the Uinta Mountains to the south of the site region. Site region drainages generally flowed eastward across the present Continental Divide until the Green River was diverted to a south-flowing drainage in the middle Pleistocene period (Reference 2.2-8). Currently, drainage patterns in the site region generally flow from north to south or southeast. Tributaries leading from the various mountain ranges that fringe the Upper Green River Basin within the site vicinity include the Hams Fork River and Muddy Creek drainages (Figure 2.2-1). The Hams Fork River is a principal tributary of the Blacks Fork, a tributary of the Green River. From the northwest, Hams Fork River flows south-southeast for approximately 160 miles (257 kilometers) to its confluence with Blacks Fork in Sweetwater County, just outside the site vicinity. Blacks Fork flows into the Green River (Flaming Gorge Reservoir) approximately 20 miles (32 kilometers) north of the Wyoming-Utah boundary (Reference 2.2-17). Muddy Creek also flows into the Blacks Fork near the southeast margin of the site vicinity (Reference 2.2-17).

At Kemmerer Unit 1 Site, North Fork Little Muddy Creek is perennial, having a continuous flow. However, most of the time, the flow in the creek comprises only plant discharge from Naughton Power Plant. Natural stream flow occurs only during heavy rainstorms and during spring snowmelt. The creek has a wide floodplain of at least 1,000 feet (305 meters) and a gentle longitudinal slope near the site. The unnamed tributary on the southwest and south sides of the site is considered an ephemeral stream that is dry most of the time with flows occurring only during heavy rainstorms and during the spring snowmelt, typical of the smaller streams and creeks in the area. Additional information about the watersheds for North Fork Little Muddy Creek and the unnamed tributary can be found in PSAR Section 2.5.

Several ponds with earth dam embankments associated with Naughton Power Plant are located upstream of the Kemmerer Unit 1 Site within North Fork Little Muddy Creek watershed. Detailed information on these ponds and their potential flooding impact on the site are provided in PSAR Section 2.5.1.3.

2.2.1.1.2 Reservoir Characteristics and Descriptions

Viva Naughton Reservoir

PacifiCorp (previously Utah Power and Light Company) owns and operates Viva Naughton Reservoir, located approximately 18 miles (29 kilometers) northwest of the site, and will serve as the primary water supply for Kemmerer Unit 1 (Figure 2.2-2). Viva Naughton Reservoir is a State-designated Class 2AB waterway. According to the Wyoming Surface Water Classification List (also in Wyoming State Code, 020-1 Wyo. Code R. § 1-4), a 2AB waterway is designated for protection as a cold-water game fishery and also protected for drinking water, non-game fish, fish consumption, other aquatic life, recreation, wildlife, agriculture, industry, and scenic value (Reference 2.2-31).

Viva Naughton Reservoir is a significant fishing, hunting, camping, floating, boating, and wildlife viewing recreational area (Reference 2.2-27). The reservoir covers approximately 1,524.5 acres (616.9 hectares) in total area and is fed by Hams Fork River. The Viva Naughton Reservoir maximum operating level is 7,241.7 feet (2,207.3 meters), at which it impounds 44,732 acre-feet (55,176,027 cubic meters) and has a maximum depth of approximately 70 feet (21 meters).

This reservoir provides raw water supply to Naughton Power Plant via a pump intake structure on Hams Fork River that delivers river water to the Raw Water Settling Basin at Naughton Power Plant. Viva Naughton Reservoir is also a source of plant water for Kemmerer Unit 1 in that water is diverted from Naughton Power Plant’s Raw Water Settling Basin to the plant. Kemmerer Unit 1 does not rely on a surface water body as the ultimate heat sink or for other safety-related water supply. Kemmerer Reservoir, located about one mile (1.6 kilometers) south and downstream of the Viva Naughton Reservoir, is primarily used for recreational purposes and does not have a regulated spillway. Average monthly flow rates on Hams Fork River as well as surface water uses are described in PSAR Section 2.5.4.

Historical water level measurements at Viva Naughton Reservoir are used to estimate the 100-year low water level and provide an evaluation for water availability for Kemmerer Unit 1. The historical water level measurements at Viva Naughton Reservoir are maintained by Naughton Power Plant and are provided as end of the month measurements from December 1960 to July 2022. A frequency analysis is conducted on reservoir level measurements from February 1982 to July 2022. Prior to 1982, there is a considerable amount of missing data in the record.

After taking into consideration the required submergence at the outlet pipe of Viva Naughton Reservoir, the water demands for Naughton Power Plant and Kemmerer Unit 1 Site (68.5 acre-feet/day [84,493 cubic meters/day]), and the future water demand for the City of Kemmerer (an additional 14.1 acre-feet/day [17,392 cubic meters/day]), it is estimated that there is water available at the Viva Naughton Reservoir for approximately 54 days under a 100-year low water level at the reservoir and with no inflow.

Evaporation and seepage estimates, stage-storage curves, as well as bathymetry data for Viva Naughton Reservoir and some ponds at Naughton Power Plant are maintained by PacifiCorp. Bathymetry data was obtained from PacifiCorp for use in design calculations and to support the analysis in PSAR Section 2.5.4.

Average monthly Hams Fork River discharges are provided in Table 2.2-6 and Section 2.2.2.1.5. Hams Fork River discharge is estimated from daily record at United States Geological Survey (USGS) gauging station below Viva Naughton Reservoir from 2007 to 2016 and from daily outflow record at Viva Naughton Reservoir from 1995 to 2021 maintained by Naughton Power Plant.

Kemmerer Reservoir

Kemmerer Reservoir is a contributing source of drinking water supply for the City of Kemmerer, Town of Diamondville, and surrounding area and is approximately one mile (1.6 kilometers) south of Viva Naughton Reservoir. Kemmerer Reservoir receives inflow from Hams Fork River primarily through releases from Viva Naughton Reservoir. The reservoir has a maximum storage capacity of 1,058 acre-feet (1,305,002 cubic meters) and a drainage basin area of approximately 298 square miles (772 square kilometers) (Reference 2.2-3).

Evaporation, seepage, and elevation-area-capacity curves, as well as bathymetry, temperature, and currents data for Kemmerer Reservoir were not found.

Ponds at Naughton Power Plant

Naughton Power Plant has two ash pond complexes (North Ash Pond and South Ash Pond), two FGD ponds (FGD 4 and FGD 5), and one Raw Water Settling Basin. The North Ash Pond complex consists of an ash pond and a clear water pond referred to as Lake Arambel.

2.2.1.1.3 Drainage Areas and Gradients

Drainage Area

The Green River Basin’s rivers and streams drain to the Green River, the largest tributary of the Colorado River within the 50 mile (80 kilometer) region (Reference 2.2-17).

The drainage area contributing flow to the site was determined for the PMF analysis. The Kemmerer Unit 1 Site is in North Fork Little Muddy Creek watershed, and the drainage area is approximately 27 square miles (70 square kilometers) at a location less than a mile south of the site. It includes the area draining Naughton Power Plant and its on-site water impoundment basins and ash ponds located on the west side of US Highway 189.

Viva Naughton Reservoir has a drainage area of 235 square miles (609 square kilometers) at the dam. Kemmerer Reservoir, located downstream of Viva Naughton Reservoir, has a drainage area of 271 square miles (702 square kilometers) (Reference 2.2-22, Reference 2.2-21).

Gradients

A review of available LiDAR topographic data indicates that existing ground elevation at the Kemmerer Unit 1 Site varies from approximately 6,750 to 6,760 feet (2,060 meters). A ridge slopes gently to the east and more steeply to the west.

In North Fork Little Muddy Creek drainage area of the site, the high elevation of the watershed varies from approximately 7,540 feet (2,300 meters) in the west and 7,240 feet (2,210 meters) in the north. The low point of the site watershed of 27 square miles (7,000 hectares) is at about 6,720 feet (2,050 meters).

The average channel slope (gradient) of the main flow path in North Fork Little Muddy Creek watershed running northeast and east to south of the site is on the order of one percent. The gradient near the top of the watershed is steeper, on the order of 10 percent in the north and 20 percent in the west. Near the site, the main channel slope is typically less than 0.5 percent.

Bathymetry Data

Bathymetry data for Viva Naughton Reservoir and some ponds at Naughton Power Plant are maintained by PacifiCorp. Descriptions of Hams Fork River and North Fork Little Muddy Creek channel widths and depths are provided in Section 2.3.

2.2.1.1.4 Wetlands

Wetlands and waterbodies, as well as floodplains and other aquatic resources that influence hydrologic conditions on site, are shown on Figure 2.2-4 and discussed in Section 2.3. The site is sparsely vegetated, consisting primarily of sage brush. There are wetlands surrounding the water's edge of North Fork Little Muddy Creek on the eastern boundary of the site. No other wetlands are found within the site.

2.2.1.1.5 Flooding

There are Federal Emergency Management Agency (FEMA) 100-Year floodplains on the west and east sides of the site for North Fork Little Muddy Creek and its tributaries. According to the FEMA National Flood Hazard FIRMette (Flood Insurance Rate Map), all mapped 100-year floodplains within the site are denoted as "Zone A" or an area with no base flood elevations determined, as shown in Figure 2.2-3 (Reference 2.2-6 and Reference 2.2-7).

Wyoming has experienced some major floods in the past, but there were relatively few reported in Lincoln County (Reference 2.2-19) and none of them near the site. A search of publicly available sources did not produce any reports of significant flooding in the site vicinity.

2.2.1.1.6 Drought Characteristics

Precipitation in Kemmerer is relatively low, and the area can be prone to drought conditions. Most precipitation occurs during the spring and early summer with occasional thunderstorms. Winters are drier with snowfall being the primary form of precipitation. Wyoming, like the rest of the Great Plains, is susceptible to droughts, which are occasionally severe. From 1999 to 2008, large portions of the State experienced drought conditions. The State then experienced several years of above average precipitation until 2012, which was Wyoming's driest year since historical records began in 1895. By October 2012, almost 90 percent of the State was in "severe" drought (the U.S. Drought Monitor's third-highest category of drought severity).

The drought, along with high temperatures and high winds, resulted in one of Wyoming's worst wildfire seasons with more than 350,000 acres (140,000 hectares) burned (more than 3 times the yearly average [2002–2020] of 113,000 acres [45,700 hectares]). Another severe wildfire season occurred in 2020; by October 2020, about 60 percent of the State was in severe drought, and almost 340,000 acres (140,000 hectares) had burned. The intensity of future droughts is projected to increase, even if precipitation amounts increase. Increases in evaporation rates due to rising temperatures may increase the rate of soil moisture loss during dry spells. Thus, future summer droughts, a natural part of Wyoming's climate, are likely to become more intense. This in turn will increase the risk of wildfires, which are projected to become more frequent and severe (Reference 2.2-11).

The region tends to have low humidity levels, especially during the summer months. This low humidity can contribute to dry conditions and is typical of semi-arid climates. Wyoming is the fifth driest State and has been affected by moderate to severe drought since 1999. Drought is an ongoing concern in Kemmerer, and the region has experienced a range of drought events over the years. Notable droughts include the 1930's Dust Bowl Drought, which affected Kemmerer and the surrounding region that led to crop failures, dust storms, and economic hardship for many residents, and the 1950's Drought affected Kemmerer and throughout the western U.S. with far reaching impacts on agriculture, water supplies, and ranching activities. The 2000s–2020s Drought impacted Kemmerer and the western U.S with intermittent droughts, impacting water resources, agriculture, and contributing to wildfires in some instances.

According to the National Integrated Drought Information System, which is populated with weather data from the National Oceanic and Atmospheric Administration, in 2023, zero percent of people in Lincoln County, Wyoming, are affected by drought with no change in the last week or month, as of end of January 2024. The year 2023 was the 23rd wettest year to date over the past 129 years for the period of January to December 2023 (3.32 inches above normal precipitation). According to the Multi-Indicator Drought Index, 57.73 percent of Lincoln County experienced abnormally dry conditions (Drought and Dryness Category D0) for the month of December 2023 (Reference 2.2-13).

2.2.1.1.7 Estuaries and Oceans

There are no estuaries or nearby oceans as the site is located in Wyoming and is several hundred miles from a tidally influenced waterway. Therefore, no tidal currents or salinity data are available for the 50-mile (80-kilometer) site region.

2.2.1.1.8 Plant Cooling Water Source

The raw water needs of Kemmerer Unit 1 will be supplied from the Naughton Power Plant Raw Water Settling Basin located at N 41°45’43.39” and W 110°36’14.88”. The Raw Water Settling Basin receives water through two 7-mile (10-kilometer) long pipelines from the Naughton Cooling Water Intake Structure (CWIS) located at N 41◦51’28.37” and W 110◦33’52.19” on the Hams Fork River (see Figure 2.2-2 and Sections 3.1 and 3.2). Flow in this section of the Hams Fork River is controlled by releases from an outlet structure at the Viva Naughton Reservoir dam. The Naughton CWIS and the Raw Water Settling Basin are part of the water supply system that was designed to deliver raw water including cooling tower makeup to Naughton Power Plant from the river. There are two radial gates over a low head dam spanning across the river width at Naughton CWIS to divert flow toward the intake and to maintain sufficient water level for intake operations. Based on information provided by PacifiCorp, the low water level at Naughton CWIS is at an elevation of 6,969.5 feet (2,124.3 meters). This water level provides adequate submergence to the pumps at the Naughton CWIS to operate and supply the design flow to Naughton Raw Water Settling Basin.

No new intake structure is proposed to operate the Kemmerer Unit 1 Site. The beginning of the raw water system infrastructure for Kemmerer Unit 1 will be at Naughton Power Plant Raw Water Settling Basin.

Naughton Power Plant also has water storage available for use from the Viva Naughton Reservoir. PacifiCorp uses flow from the Hams Fork River through storage rights gained by the construction of the Viva Naughton Dam. Using storage enlargement permit #7476 Res, PacifiCorp raised the original dam to increase the storage capacity to approximately 45,465 acre-feet (56,080,000 cubic meters). The permit originally allowed the storage volume to be increased to 69,645 acre-feet (85,906,000 cubic meters); however, construction of the dam raise was never completed. PacifiCorp keeps enlargement permit #7476 Res in good standing by performing studies and seeking extensions from the State Engineer's Office (SEO) to build the enlarged dam (Reference 2.2-2).

2.2.1.2 Groundwater Resources

The regional, local, and site-specific data on the physical and hydrologic characteristics of the groundwater resources are summarized in this section. The two major units in this regard are the Hilliard Shale, a major aquitard directly beneath the site, and the Frontier Formation, a minor aquifer.

Groundwater is not a primary source of potable water in the region as surface water is abundant and provides nearly all of the supply for users in the region.

Total projected groundwater withdrawals for municipal supply in the six towns within the Greater Green River Basin (GGRB) for low, moderate, and high population growth are as follows:

- Year 2035: 1,642, 2,238, and 3,007 acre-feet (2,025,000, 2,761,000, and 3,709,000 cubic meters) per year

- Year 2055: 2,170, 3,403, and 4,382 acre-feet (2,677,000, 4,198,000, and 5,405,000 cubic meters) per year

No future groundwater withdrawals (year 2055) are planned for municipal supply water use for the City of Kemmerer and Town of Diamondville (Reference 2.2-28, Tables 1-3).

The closest industrial permitted well to the site is 1.6 miles (2.6 kilometers) to the southwest. The permitted capacity is 20 gallons per minute (80 liters per minute). However, the status of the permitted well is unknown.

Groundwater conditions, recharge and discharge areas and fluxes, groundwater head contour maps, hydraulic gradients, permeabilities, total and effective porosities, advective travel times, bulk density, storage coefficients, and dispersion and adsorption coefficients are discussed in detail in PSAR 2.5.3.1.

Kemmerer Unit 1 will not rely on groundwater for its operating supply. Thus, there will be no groundwater demand for plant operation, though the local flow regime at the site could be affected by excavation and construction.

According to the U.S. Environmental Protection Agency (EPA) Map of Sole Source Aquifer Locations, there are no EPA sole source aquifers within the 50-mile (80-kilometer) region that will be affected by building activities or plant operations (Reference 2.2-5).

2.2.1.2.1 Geologic Setting

The Kemmerer Unit 1 Site is located in the southwestern corner of Wyoming in the Middle Rocky Mountains physiographic province near the eastern edge of the Overthrust Belt portion. It is bordered to the east by the Wyoming Basin (Figure 2.2-4). The area is characterized by a series of westward dipping thrust sheets formed during the Cretaceous Sevier orogeny.

The site lies east of the Absaroka thrust fault near the western edge of the Green River Structural Basin. Geologic units in the vicinity are of Cenozoic and Mesozoic ages. Surface units found at the site are the Hilliard Shale (Kh) and Quaternary sedimentary deposits (Qas and Qc). Other notable units in the vicinity include the coal-bearing Adaville Formation (Kav) located at the Elkol strip mine, approximately 3.7 miles (6 kilometers) to the west, and the Oyster Ridge Sandstone Member (Kfo), visible one mile (1.6 kilometers) to the east in the north-south trending Oyster Ridge (Reference 2.2-12). The area between the strip mine and Oyster Ridge is known as the Cumberland Flats. Figure 2.2-5 shows a local geologic map and a cross section taken from a location 3 miles (4.8 kilometers) south of the site, which is projected onto the cross section.

The Hilliard Shale formation is comprised of dark olive-gray marine shale, siltstone, and sandy shale containing thin, interbedded, tan to light-gray sandstone and limestone (Reference 2.2-12). According to Rubey et al., formation thickness varies from 2500 to 3000 feet just 3 miles (4.8 kilometers) north of the site (Reference 2.2-16). Below the Hilliard Shale in descending order are the westerly dipping (25 degrees to 30 degrees) units of the following:

- The coal-bearing Frontier Formation (Kf) (2000 feet [600 meters] thick)
- The Aspen Shale (Ka) (600 feet [200 meters] thick)

- The Bear River Formation (Kbr) (1000 feet [300 meters] thick)
- The Gannett Group (Kg)
- The Stump Sandstone (Js) and Preuss Redbeds (Jp) (500 feet [150 meters] thick)

The bottom of the Stump Sandstone and Preuss Beds is likely to be below sea level elevation at the site (profile G-G of Plate 2 in Reference 2.2-16). The dipping units belong to the asymmetric Lazeart syncline whose eastern limb dips at a 30 degree angle and whose western limb dips at a steeper 55 degrees. The Elkol strip mine is located at the eastern edge of the syncline with the Absaroka fault truncating the western limb. The axial trace of the syncline parallels the Absaroka thrust fault.

2.2.1.2.2 Hydrogeologic Setting

The site is located in the western part of the GGRB (Figure 2.2-6). The Quaternary alluvium and colluvium deposits in the major drainage basins of the GGRB are composed of unconsolidated clay, silt, sand, and gravel concentrated along stream and river channels. Their thickness is generally less than 50 feet (15 meters) but can locally exceed 100 feet (30 meters). These surface deposits are significantly permeable and act as major aquifers where they are sufficiently thick. The bedrock formations also contain aquifers with flow primarily constrained to weathered rock and discontinuities. Shallow groundwater flow within 300 to 500 feet (100 to 150 meters) depth is heterogeneous and anisotropic at both local and regional scales; it follows topography and stream or river drainage patterns. Within near-surface bedrock formations, groundwater flow generally is unconfined; however, at depth the groundwater flow is confined by the low permeability strata between the highly permeable layers of sandstone, coal, limestone, and dolomite beds. Artesian groundwater flow is observed in some areas of the GGRB where the confining pressure head is greater than the ground surface elevation.

Groundwater recharge occurs along the outcrops and flows downward towards the center of the basins within the GGRB. Potential recharge by direct infiltration of precipitation to Mesozoic hydrogeologic units in the GGRB is shown in Figure 2.5-62 of PSAR Section 2.5.3.1.1. Recharge to the aquifers at the site is low (i.e., winter precipitation is less than 8 inches (20 centimeters) in Figure 2.5-62 of PSAR Section 2.5.3.1.1). The Hilliard Shale lies underneath the Kemmerer Unit 1 Site below the alluvial soil and is classified as an aquitard with a highly weathered section (less than 30 feet [10 meters]) and unweathered rock with less fracture frequency as depth increases. Groundwater primarily flows along the weathered section of the Hilliard Shale with significantly less flow along the deeper part of the Hilliard Shale where groundwater flows through isolate fractures.

Groundwater discharge occurs along stream drainages as springs or as subcrop flow into overlying geological units. Groundwater and surface water interactions are dominant along the streams and river channels, and recharge to the groundwater occurs from surface water sources in these areas (see PSAR Figure 2.5-62). Table 2.5-23 of PSAR Section 2.5.3.1.1 shows the mapped outcrop area percentages of hydrogeologic units in the Wyoming GGRB, the table shows the Cenozoic hydrogeologic unit outcrop accounts for 83 percent of the GGRB area.

Figure 2.5-63 of PSAR Section 2.5.3.1.1 shows hydrogeologic nomenclature for Mesozoic rocks in the GGRB in Wyoming. The Hilliard Shale, which underlies the site, is classified as a major aquitard while the deeper Frontier Formation is classified as a minor aquifer.

The mean annual precipitation for 1951–1980 ranges from about 8 to 60 inches within Lincoln County with a mean value of approximately 8 inches at the Kemmerer Unit 1 Site (Figure 2.5-64 of PSAR Section 2.5.3.1.1).

Hydraulic conductivity data acquired from borehole packer testing and observation well slug testing of the Hilliard Shale are aggregated and plotted as a function of depth in Figure 2.5-68 of PSAR Section 2.5.3.1.4. These results indicate that the formation exhibits extreme heterogeneity with hydraulic conductivity values spanning nine orders of magnitude and ranging from 1.0E-07 to 1.0E+2 feet (3.0E-08 to 3.0 meters) per day. The results also indicate a trend of decreasing hydraulic conductivity with increasing depth, which is generally consistent with the transition from highly weathered rock to fresh rock with increasing depth.

Porosity data obtained from laboratory rock testing show the porosity to be relatively heterogeneous in the upper 50 feet (15 meters) below ground surface, ranging from 2.6 percent to 8.9 percent in this depth interval, and then decreasing with depth and averaging 3.0 percent at depths greater than 50 feet (15 meters) below ground surface. The porosity results are plotted as a function of depth in Figure 2.5-69 of PSAR Section 2.5.3.1.4.

Bulk specific gravity data resulting from laboratory rock testing, numerically equivalent to rock density, are plotted as a function of depth in Figure 2.5-70 of PSAR Section 2.5.3.1.4. The data reflect a decreasing trend in bulk specific gravity with increasing depth and with the bulk specific gravity becoming relatively constant with an average of 2.506 for depths greater than 50 feet (15 meters) below ground surface.

2.2.1.2.3 Site Groundwater Occurrence

Data from the subsurface investigation suggests that groundwater flow at the site occurs through the rock mass within the weathered rock and through discontinuities within the fresh rock. Groundwater monitoring did not exist at the Kemmerer Unit 1 Site prior to subsurface investigations in 2022. PSAR Section 2.5.3.1.6 and Figure 2.5-71 describe the installation of 52 observation wells at the site and a piezometer in the creek bed at North Fork Little Muddy Creek.

Surface water levels are measured at a stilling well in North Fork Little Muddy Creek. The 52 observation wells include 24 shallow wells (referred to as “upper” wells), 24 intermediate wells (referred to as “middle” wells), and 4 deep wells (referred to as “lower” wells). All observation wells are screened within bedrock. Transducers are installed to automatically record water levels at 20 observation wells, one piezometer, and one stilling well. Monthly water levels are measured manually at all locations after transducer logging began on July 20, 2022. In addition, manual daily water levels were measured between completion of well development and start of transducer logging.

Groundwater level contours for the upper and middle series of wells were manually interpreted and drawn for the period from August 2022 through April 2023. Groundwater flow paths were assumed to be orthogonal to equipotential lines, which assumes the hydraulic conductivity in the horizontal plane is isotropic. Figures 2.5-97 through 2.5-115 of PSAR Section 2.5.3.1.7 display the resulting groundwater level contour maps and groundwater flow paths across the Kemmerer Unit 1 Site. Groundwater at the site flows from the west, north, and east, converging near the center, and then flows south towards the southerly site boundary. These groundwater flow paths did not exhibit significant variation for the August 2022 through April 2023 period.

The groundwater level maps were used to estimate horizontal hydraulic gradients for the upper and middle series of wells, along easterly (OW-187-U to OW-137-U and OW-187-M to OW-137-M), westerly (OW-185-U to OW-186-U and OW-185-M to OW-186-M), and southerly (OW-106-U to OW-164-U and OW-106-M to OW-164-M) flow directions as shown in the groundwater level contour maps and Table 2.5-37 of PSAR Section 2.5.3.1.7. The horizontal hydraulic gradients for the upper and middle series of wells vary from 0.002 to 0.015 and from 0.003 to 0.019. For the upper series of wells, the average hydraulic gradients along the easterly, westerly, and southerly flow directions are 0.004, 0.014, and 0.003. For the middle series of wells, the average hydraulic gradients along the easterly, westerly, and southerly flow directions are 0.004, 0.019, and 0.004. Thus, the average horizontal gradients between the upper and middle series of wells are similar.

The vertical hydraulic gradient is calculated by dividing the difference in groundwater level between well pairs by the vertical distance between midpoint screen elevations of the upper middle, and lower series wells. Water level data from the U and M well pairs generally indicate a downward gradient between upper and middle well pairs in the central area of the site (except OW-106-U and M, OW-137-U and M, and OW-140-U and M), and an upward gradient along the periphery of the site (OW-185-U and M, OW-187-U and M, OW-188-U and M, OW-189-U and M, and OW-191-U and M). Deeper groundwater flows upward near well clusters OW-117 and OW-153, resulting in an upward vertical gradient (between upper-lower and middle-lower well pairs) in these wells. For all the wells, the average downward gradient varies from 0.0002 to 1.6259, whereas the upward gradient averages between 0.0020 and -1.7165. Table 2.5-38 of PSAR Section 2.5.3.1.7 presents the calculated vertical hydraulic gradients between the cluster well pairs from August 2022 through April 2023 and provides a time-averaged vertical gradient for each of the well pairs. Figure 2.5-115 of PSAR Section 2.5.3.1.7 shows the spatial variation of the time-averaged vertical gradient for each of the well pairs.

Based on the subsurface properties, groundwater flow paths, and gradients described above, contaminants released to the saturated zone at the site will be transported in the southerly direction within the upper, most conductive interval of the Hilliard Shale. For the purpose of assessing an accidental release of liquid effluent to the groundwater, a conservative groundwater velocity of 1.44 feet/day is estimated.

Hydrostatic uplift pressures for plant foundations and other safety-significant SSCs were calculated and presented in PSAR Section 2.5.3.1.9. The design groundwater levels for safety-related structures are presented in PSAR Table 2.5-39.

2.2.2 Water Use

Present and known future surface water, groundwater, and reclaimed water uses that could affect or be affected by building activities or plant operations at the site are discussed in this section.

2.2.2.1 Surface Water Use

Surface water features in the vicinity of the site and their users are discussed in this section.

2.2.2.1.1 Basin-wide Historic Surface Water Use

Estimated use of water in Lincoln County, Wyoming, was tabulated by USGS hydrologists in 1993 in nine categories: public supply, self-supplied domestic, commercial, irrigation, livestock, industrial, mining, thermoelectric power, and hydroelectric power. USGS hydrologists estimated that total water consumption was distributed between 4 percent groundwater resources and 96 percent surface water resources (Reference 2.2-14).

The 2010 Greater River Basin Plan (GRBP) describes water use in six categories: agriculture, municipal and domestic, industrial, recreational, environmental, and evaporation. Table 2.2-6 provides a breakdown of total surface water flow generated by the Green River Basin by sector of water use. The table shows that water supply from 2010 decreased about 235,000 acre-feet compared to the supply in 2001. Although this data is nearly 15 years old, no new water use information for the Green River Basin has been published by USGS or the SEO (Reference 2.2-17).

Agricultural Water Use

Agricultural water use, specifically through irrigation, accounts for the majority of water consumption in the Green River Basin and the State. According to the 2010 GRBP, irrigated acreage by sub-basin for the Hams Fork River was 10,287 acres (4,163 hectares) (Reference 2.2-17).

Municipal and Domestic Water Use

There are 14 Green River Basin cities, towns, and joint power water boards (including Kemmerer-Diamondville Water and Wastewater Joint Powers Board (KDWWJPB) that supply water to their residents or customers.

The KDWWJPB public water supply is the nearest municipal public water supply to Kemmerer Unit 1 and is solely supplied by Hams Fork River (Reference 2.2-3).

Industrial Water Use

Industry is a major user of water in the Green River Basin. Industries that obtain their primary water supply from surface water sources are electric power generation, soda ash production, and miscellaneous smaller users (Reference 2.2-17).

The largest industries that obtain their primary water supply from surface water and their water sources are:

Electric Power Generation

- Jim Bridger Power Plant (PacifiCorp): Green River
- Naughton Power Plant (PacifiCorp): Hams Fork River

Soda Ash Production and Related Products

- FMC Wyoming: Green River
- General Chemical: Green River
- OCI Wyoming: Green River
- Solvay Minerals Inc: Green River
- Church and Dwight (baking soda production): Green River

(Reference 2.2-17)

2.2.2.1.2 Water Use Regulations

Relevant water use regulations for the Kemmerer Unit 1 Site include:

- Wyoming Department of Environmental Quality - Industrial Siting Permit under the Wyoming Industrial Development Information, Siting Act Wyoming Statute Title 35, Chapter 12
- Wyoming Department of Environmental Quality - National Pollutant Discharge Elimination System Wyoming Pollution Discharge Elimination System (WYPDES) under the Clean Water Act of 1976 (Wyoming has delegation authority), Wyoming Environmental Quality Act of 1973, Wyoming Statute Title 35, Chapter 11
- Wyoming State Engineer’s Office - SEO issuance of a preliminary and final opinion that there is sufficient quantity of water for operation of the plant (as part of the Industrial Siting Permit)
- Wyoming State Engineer’s Office - Permit to Appropriate Groundwater under Wyoming Statute Title 41, Chapter 2, Section 41-3-930

Confirmation of water availability for appropriated uses of surface water and groundwater must be obtained from the SEO prior to the issuance of an industrial siting permit and the WYPDES permit for the Kemmerer Unit 1 Site. Information about required permits for the Kemmerer Unit 1 Site is provided in Section 1.4.

2.2.2.1.3 Surface Water Use Near the Kemmerer Unit 1 Site

According to Article 8, Section 1, of the Wyoming State constitution, “The water of all natural streams, springs, lakes or other collections of still water, within the boundaries of the State, are hereby declared to be property of the State.” Anyone desiring to use water beneficially in Wyoming must apply for and obtain an approved permit from the State Engineer to appropriate water. Once a permit to appropriate water has been obtained from the State Engineer, the permittee may proceed with construction of the water-diversion works and with beneficial use of the diverted water for the purposes specified in the permit. Such diversion and beneficial use need to be made in accordance with statutory provisions. After the permittee has beneficially used the diverted water for all of the permitted uses at all of the permitted point(s) or area(s) of use, proof of beneficial use is filed, and the water right is adjudicated (finalized). The adjudication process fixes the location of the water-diversion structure, the use, the quantity, and the points or areas of use for the water right (Reference 2.2-17).

Power plants were the largest industrial water users in the Green River Basin in 2010, accounting for approximately 70 percent of industrial water use in the region. Jim Bridger and Naughton Power plants, both owned and operated by PacifiCorp, were estimated to deplete approximately 47,800 acre-feet (59,000,000 cubic meters) of water per year in the year 2000. Based on industry reported diversions to the SEO, both power plants depleted approximately 39,700 acre-feet (49,000,000 cubic meters) in the year 2005–2006. Both power plants have rights to store water. PacifiCorp maintains a contract for storage water from Fontenelle Reservoir for use at Jim Bridger Power Plant during times of severe drought. PacifiCorp also owns and operates Viva Naughton Reservoir. At both facilities, water is used to produce steam for power production. A majority of the water is evaporated in the plant cooling towers or evaporation ponds. A small percentage of water is used for dust abatement, plant washdown, and domestic use (Reference 2.2-17).

Upstream of the Kemmerer Unit 1 Site, the primary surface water uses are for recreation (Viva Naughton Reservoir and Kemmerer Reservoir), municipal, and industrial purposes. As mentioned in Section 2.2.2.1.2, Naughton Power Plant is the only electric power generating facility that obtains its water supply from surface water (Hams Fork) in the Upper Green River Basin (Reference 2.2-17).

Naughton Power Plant

Average monthly maximum water usages at Naughton Power Plant water compared to anticipated water usage for the site are summarized in Table 2.2-8.

Downstream Surface Water Users

Downstream of the Kemmerer Unit 1 Site, surface water use of North Fork Little Muddy Creek is primarily for cattle ranching operations. Surface water users near the site are shown on Figure 2.2-8, and water usage permit information for those users is provided in Table 2.2-9.

The Hams Fork Water Users Association (HFWUA) is a group of irrigators that hold water rights for water use from the Hams Fork River. HFWUA members control a majority of the senior direct flow rights in the basin. The members divert most of their water rights to irrigate hay fields. The diversions originate above the Viva Naughton Reservoir and extend up to a few miles of Granger. PacifiCorp and HFWUA share the storage generated by the first Viva Naughton Enlargement completed under permit #7476 (Reference 2.2-2).

Through mutual agreement, PacifiCorp makes available and releases some water from Viva Naughton Reservoir with certain conditions to the HFWUA in exchange for downstream senior water right holders to limit calls placed on the reservoir (Reference 2.2-25). The agreement allows PacifiCorp to store direct flows out-of-priority during the spring runoff and in turn provides storage for the HFWUA (Reference 2.2-2).

The water use agreement was most recently renewed on April 5, 2023, for a period of two years, with renewals authorized for a period of 10 years (Reference 2.2-18). It allows the HFWUA to use up to 80 cubic feet per second (2 cubic meters per second) of direct flows in Hams Fork released from Viva Naughton Reservoir commencing on May 1 and continuing through May 14 of each year. From May 15 through the end of runoff of each calendar year PacifiCorp would release up to 141 cubic feet per second (3.99 cubic meters per second) from Viva Naughton Reservoir for use by HFWUA. HFWUA might request additional releases from the reservoir, but additional releases could come from an irrigation pool of 6,000 acre-feet (7,000,000 cubic meters). PacifiCorp holds the 6,000 acre-feet (7,000,000 cubic meters) irrigation pool for the benefit of HFWUA which will be available from May 1 through September 30 of each year. There is no carryover of the irrigation pool from year to year. Furthermore, the agreement called for HFWUA to waive its rights to demand or otherwise call for additional flows from Hams Fork or discharges from the Viva Naughton Reservoir over and above the minimum flows or irrigation pool.

Future Water Users

Based on currently available information, no other future users are expected to consume water from the Viva Naughton Reservoir with the exception of Kemmerer Unit 1 (Reference 2.2-15).

2.2.2.1.4 Site Surface Water Occurrence

Flow to the portion of North Fork Little Muddy Creek near the site is fed almost exclusively by discharge from Naughton Power Plant. Snow and ice melt as well a stormwater runoff are additional contributors to stream flow in North Fork Little Muddy Creek and the wetlands adjacent to the creek.

2.2.2.1.5 Surface Water Use for the Proposed Site

Confirmation of water availability for proposed water use at the site will be obtained from the SEO. Confirmation of water availability is required for the Industrial Siting Permit for the project (see Table 1.4-1). An SEO water use determination is being pursued in the first half of 2024.

Kemmerer Unit 1 will use mechanical draft cooling towers as the normal heat sink for dissipation of excess heat load. Raw water demand for the plant, which includes cooling tower makeup, is supplied from the existing Naughton Power Plant Raw Water Settling Basin using new transfer pumps downstream of the settling basin. Cooling tower blowdown will be routed to the site wastewater facility, then discharged to North Fork Little Muddy Creek. Discharge to North Fork of Little Muddy Creek will meet EPA WYPDES End of Pipe Guideline Limits and Wyoming Department of Environmental Quality State water quality standards.

The primary uses of raw water at Kemmerer Unit 1 are for cooling tower makeup, fire water makeup, service water, and demineralized water, following onsite water treatment. Proposed water use at Kemmerer Unit 1 is depicted in Figure 3.2-2 and described in Section 3.2.

Information with regards to the average monthly withdrawal at Naughton CWIS at Hams Fork for Units 1, 2, and 3 and the average monthly river flow at USGS Station 09223385, Hams Fork below Viva Naughton Reservoir is provided in PacifiCorp Naughton Power Plant Cooling Water Intake Structure Permit Application Requirements document. The average monthly withdrawals were estimated using available intake flow measurements from June 2016 to June 2017, which range from a minimum value of 11.7 cubic feet per second (0.331 cubic feet per second) to a maximum of 20.8 cubic feet per second (0.589 cubic feet per second) with average of 15.2 cubic feet per second (0.430 cubic feet per second). The ratio of maximum to average withdrawal flow is about 1.4, and a conservative value of 1.5 is selected in assessing the ability of the Viva Naughton Reservoir to meet the plant water demand during a 100-year low water condition. See Table 2.2-8.

The average monthly flow at the USGS Hams Fork stream gauge is estimated in two additional ways as summarized in Table 2.2-7.

- Daily USGS data (2007 to 2016) for USGS station 09223385, Hams Fork below Viva Naughton Reservoir (Reference 2.2-23).
- Daily outflow record (1995 to 2021) from Viva Naughton Reservoir provided by Naughton Power Plant.

Based on Table 2.2-7 and Table 2.2-8, there is sufficient flow in Hams Fork River to meet the water demands of Naughton Units 1, 2, and 3 and Kemmerer Unit 1, assuming that the future water demands of Naughton Units 1, 2, and 3 will not change. The most recent Integrated Resource Plan from PacifiCorp (Reference 2.2-15) indicates that Naughton Units 1, 2, and 3 will be retired at the end of 2036. Availability of water will further improve for Kemmerer Unit 1 after 2036.

2.2.2.1.6 Major Permitted Sources of Discharge

The KDWWJPB is located approximately 7 miles (11.3 kilometers) from Kemmerer Unit 1. The wastewater facility is the only “major EPA-permitted water discharger” near the site according to the EPA’s Facility Registry Service ArcGIS geospatial hub website (Reference 2.2-4). This facility is part of the EPA’s National Pollutant Discharge Elimination System Program (Registry ID No.: 110055177847 and WYPDES Permit No.: WY0020320) and has two departments—the Water Treatment Plant and the Wastewater Treatment Plant. The Water Treatment Plant draws water from Hams Fork River, cleans and tests the water, and then supplies the distribution system with the treated water for domestic, commercial, industrial, and fire-protection uses. The Wastewater Treatment Plant processes both City of Kemmerer and Town of Diamondville sewage before it is released back into the Hams Fork River. The wastewater treatment plant serves approximately 1,400 metered customers and has a flow capacity of 1.43 million gallons (5.41 million liters) per day (Reference 2.2-10).

2.2.2.1.7 Existing Capacity for Water and Wastewater Utilities

In the GRBP from 2010, Table 5-11 shows a comparison of municipal use and system capacity from 2007. KDWWJPB had a peak day demand of 6.14 acre-feet (7,570 cubic meters) per day, system capacity of 12.83 acre-feet (15,830 cubic meters) per day, water right capacity (GW or Direct Flow) of 17.07 acre-feet (21,060 cubic meters) per day, and storage rights of 1,700 acre-feet (21,000,000 cubic meters) per day (Reference 2.2-17).

According to the 2010 GRBP, there are 14 water suppliers in the Green River Basin. The 2010 GRBP indicates that the water suppliers had sufficient system and water right capacities to meet their demands at the time as well as demands from future growth. However, the report also indicated that the suppliers may have other water supply problems in the form of system rehabilitation needs. It was clarified that the possession of water rights does not necessarily guarantee those water rights can meet water demands in drought years, and therefore there must be water available at the points of diversion, and the water rights must have priority dates that can withstand water rights regulation in times of water shortage. Since 2010, the population of both Kemmerer and Diamondville have increased with no change in water rights allocations (Reference 2.2-17).

The KDWWJPB is a political division of the State of Wyoming that manages the water and wastewater treatment plants for City of Kemmerer and Town of Diamondville (see Section 2.4). The water treatment plant currently serves about 3,600 residents and has 3.9 million gallons (15 million liters) per day of excess production capacity (Table 2.4-25). The plant is over 42 years old and needs upgrades and replacement. The KDWWJPB is currently searching for funding to address the system-wide repairs, upgrades, and expansions that are needed. No significant grants or other forms of financing for system-wide changes have been secured at this time. No existing public water and wastewater infrastructure lies within the site. Raw water from Naughton Power Plant will be delivered to the Kemmerer Unit 1 Site through a new water pipeline connection to the existing Naughton Power Plant Raw Water Settling Basin. Therefore, Kemmerer Unit 1 will not receive water from KDWWJPB Water Treatment Plant for operations or send wastewater to their Wastewater Treatment Plant to support building activities or for operations. Wastewater generated at the site will be treated onsite and is explained in more detail in Sections 3.2 and 5.2.

2.2.2.2 Groundwater Use

Use of groundwater by type, including information on wells and aquifers is discussed in this section.

2.2.2.2.1 Historic Groundwater Use

Estimated groundwater usage for Lincoln County in 1993 was 7.3 billion gallons (28 billion liters). Approximately 71 percent and 26 percent of the 1993 groundwater usage in Lincoln County was utilized for irrigation and public water supply. The remaining 3 percent of the groundwater usage was for domestic systems, livestock, industrial, and mining purposes.

Based on a study published in 1996, six towns within the GGRB received their primary water supply from groundwater; their locations are shown in Figure 2.2-9. The six towns, the aquifer formations, and the distances from the site are as follows:

- Town of Bairoil (Battle Springs Formation): 159 miles (256 kilometers)
- Town of Big Piney (Wasatch Formation): 62 miles (100 kilometers)
- Town of Marbleton (Wasatch Formation): 63 miles (101 kilometers)
- Town of Opal (Green River Formation): 13 miles (21 kilometers)
- Town of Superior (Erickson Sandstone): 83 miles (134 kilometers)
- Town of Wamsutter (Wasatch Formation): 134 miles (216 kilometers)

Table 2.2-2 shows the regional municipal groundwater users with their populations, number and depths of wells, and amount of groundwater used in 2005 (Reference 2.2-28, Table 2).

2.2.2.2.2 Groundwater Users Near the Kemmerer Unit 1 Site

A database of groundwater well permits was obtained from the WSGS (Reference 2.2-30). A subset of wells within a 5 mile (8 kilometer) radius of the Kemmerer Unit 1 Site was then plotted. The discharge values range from 1 to 500 gallons (4 to 2,00 liters) per minute.

Of the 326 permitted water wells within 5 miles (8 kilometers) of the site, 76 percent are monitoring wells. These are primarily clustered to the northwest and southwest of the site. Many are located within the Elkol Strip Mine. Figure 2.5-66 of PSAR Section 2.5.3.1.2 shows only those permitted water wells which have reported values for extraction rates (rates are not shown on figure). Thirteen percent of the permitted wells within the 5 mile radius are for domestic use and are located to the northeast, close to the city of Kemmerer. Miscellaneous use and livestock watering account for 6 percent and 3 percent of the wells. The remaining 2 percent (6 wells total) are for irrigation, industrial, and other use. The closest active downgradient well is about 1.6 miles (2.6 kilometers) to the south and is permitted for monitoring.

There are six permitted springs within a 5 mile (8 kilometer) radius of the site. The closest spring is approximately 1.7 miles (2.7 kilometers) southeast of the site, and it is permitted for domestic, industrial, municipal, and steam use. According to the SEO, there are no permitted water wells or springs within a 1 mile (1.6 kilometer) radius of the site.

2.2.2.2.3 Future Groundwater Use Projections

The future groundwater use by the six towns in the GGRB mentioned above is based on low, medium, and high growth populations, as stated in WWC Engineering (Reference 2.2-29). Table 2.2-3, Table 2.2-4, and Table 2.2-5 show use for 2007 and projected use for 2015, 2035, and 2055 for low, moderate, and high growth populations.

No publications containing groundwater use projections within a 1 mile (1.6 kilometer) radius of the site were found. However, because Hilliard Shale is considered an aquitard, it is unlikely that water-supply wells will be developed in this formation in the future. Even if water-supply wells were developed in the vicinity of the site, they will be low-yielding and will have limited potential for reversing or altering groundwater flow directions on the site. There are no permitted pumping or extraction wells within a 1 mile (1.6 kilometer) radius of the site as shown in PSAR Figure 2.5-66. Only monitoring wells were installed for Kemmerer Unit 1 and should have no impact on nearby pumping wells.

2.2.2.2.4 Kemmerer Unit 1 Plant Groundwater Needs

The plant design does not require groundwater as a source for cooling water, potable water, or other plant needs. As such, there are no anticipated plant operation impacts to local groundwater resources. However, water will be needed for fill compaction and dust control, and it is anticipated that it will be sourced from the KDWWJPB municipal water supply. Temporary excavation dewatering will be required for construction at the site, and this may also be used as a source for dust control and compaction.

2.2.3 Water Quality

The quality characteristics of surface water and groundwater bodies that could be affected by station water use and effluent disposal are discussed in this section. Information includes physical, chemical, and biological characteristics and how they, and water availability, vary around the vicinity and over short-term and long-term intervals.

2.2.3.1 Surface Water Quality Characterization

Impaired waters, water pollutant sources, and other quality data for surface water features in the vicinity of the site are discussed in this section.

2.2.3.1.1 Section 303(d) List of Impaired Waters

Section 303(d) of the Clean Water Act requires States to develop a list of waters not meeting water quality standards or waters not supporting their designated uses. Chapter 1 of the Wyoming's Surface Water Quality Standards, Water Quality Rules, sets forth the process by which the list is refined through more detailed water quality assessments. Total maximum daily loads are required for the waters determined to be impaired. Based on detailed assessments and due to technology-based effluent limitations, current effluent limitations required by State or local authority or other pollution-control, the requirements are not stringent enough to meet current water quality standards. To protect present and future most beneficial uses of the waters, water quality criteria have been established for each designated use classification. While some criteria are intended to protect aquatic life, others are designed to protect human health (Reference 2.2-31). North Fork Little Muddy Creek is a Class 3B waterway according to the Wyoming Surface Water Classification List. A 3B waterway is designated for protection of aquatic life other than fish, recreation, wildlife, agriculture, industry, and scenic value. The portion of Hams Fork River where Naughton CWIS is located and North Fork Little Muddy Creek are not on the Section 303(d) list, and there are no other 303(d) listed impaired waters at the Kemmerer Unit 1 Site.

2.2.3.1.2 Surface Water Pollutant Sources

Naughton Power Plant holds an existing WYPDES wastewater discharge permit (WY0020311) for the protection of North Fork Little Muddy Creek. Wastewater discharge from Naughton Power Plant contains cooling tower blowdown, boiler water treatment blowdown, boiler quench water, and treated sewage from the facility's onsite wastewater treatment plant. The wastewater discharge leaves Outfall 003 via an unnamed drainage waterway that flows directly into North Fork Little Muddy Creek.

2.2.3.1.3 Surface Water Quality Data

Table 2.2-10 presents water quality data obtained to date from the Naughton Power Plant Raw Water Settling Basin and from one USGS stream gage in the site vicinity. Short term data indicating seasonal variations of surface water quality is not available at this time. Surface water sampling and testing needed to complete the waste water treatment design is planned to occur July 2024 through July 2026. Adequate raw water quality data, with the necessary constituents and frequency of measurement, is required to progress the design of water treatment systems to the detailed design phase. Aspects of design such as cooling tower cycles of concentration, chemical dose rates, and equipment (e.g., ultrafiltration, reverse osmosis, deionization) cannot be confirmed until adequate data has been acquired (Reference 2.2-23).

The surface water quality parameters for available data obtained to date and presented in Table 2.2-10 are from USGS stream gage 09223000 Hams Fork River Below Pole Creek near Frontier, Wyoming, and Naughton Power Plant. There is a USGS stream gage on the Hams Fork River below Viva Naughton Reservoir; however, USGS only records discharge flow rates at this stream gage. One set of comprehensive raw water quality data was provided to the project from Naughton Power Plant, obtained by PacifiCorp, and analyzed by Chemtech-Ford Laboratories on March 20, 2019. Raw water samples from this data set were taken from discharge piping of raw water pumps. A reduced selection of constituents was analyzed by American West Analytical Laboratories for raw water on June 4, 2019 (one set of data). Three sets of circulating water were analyzed, one set by American West Analytical Laboratories on January 31, 2017 and two sets by Chemtech-Ford Laboratories on June 4, 2019. Two sets of cooling tower data were analyzed by Chemtech-Ford Laboratories on January 31, 2022. An additional set of data was analyzed by American West Analytical Laboratories for discharges leaving Naughton Power Plant for three constituents (copper, iron, and selenium) on January 31, 2021, April 5, 2021, August 3, 2021, and November 1, 2021. It is assumed these constituents were selected for additional analysis due to detected concentrations above reporting limits prior to the sampling in January 2021 (Reference 2.2-23).

2.2.3.2 Groundwater Quality Characterization

The findings from the site subsurface investigation that detail groundwater characteristics in the vicinity of the site are described in this section. Characteristics include hydraulic conductivity and hydraulic gradient, rock porosity and specific gravity, and groundwater flow paths and velocities. Section 2.2.2.2 discusses the temporal variability of groundwater in the vicinity.

Baseline groundwater chemistry was evaluated from 22 observation wells in addition to two surface water samples from the North Fork of Little Muddy Creek. The results of the laboratory analysis are presented in Table 2.5-32, Tables 2.5-33a through 2.5-33e, and Table 2.5-34 of PSAR Section 2.5.3.1.5. The background chemistry shows high concentrations of the major anions and cations along with high total dissolved solids concentrations.

2.2.4 Water Monitoring

The following section describes the water monitoring program that will be used to characterize the surface and groundwater resources in the resource impact area. Spatial and temporal aspects of the program are covered including details about monitoring locations and equipment used, frequency and duration of monitoring, sampling and analysis procedures followed, and data-quality objectives.

2.2.4.1 Surface Water Monitoring

No monitoring or preconstruction testing of surface water is proposed for the project at this time. Existing data obtained via USGS and from Naughton Power Plant is provided in Table 2.2-10. Water quality data from Naughton Power Plant was used to determine preconstruction water quality conditions since the site will use the same water source as Naughton Power Plant (Raw Water Settling Basin).

The Naughton Power Plant monitors end of day flow in the Viva Naughton Reservoir to ensure the water in the Raw Water Settling Basin can support plant operations.

2.2.4.2 Groundwater Monitoring

A site subsurface investigation involving the installation of observation wells was used to determine groundwater levels at the site. Groundwater was monitored for the site to inform the design of the proposed plant. Borehole packing tests were performed and interpreted in accordance with USACE Method 381-80 (Reference 2.2-20). Hydraulic conductivity was estimated from the resulting test data using the Bouwer and Rice Slug Test method. Porosity and specific gravity testing were conducted in accordance with International Society of Rock Mechanics and Rock Engineering (Reference 2.2-9). Data analysis methods used for groundwater monitoring on site are described in more detail in PSAR Section 2.5.3.1.

Groundwater monitoring included the following:

- Periodic water level measurements in observation wells and geochemical sampling and analysis are made to detect changes in the groundwater system that may impact groundwater levels or the accidental release analysis.
- Operational accident monitoring is conducted. (The effluent and process monitoring program is addressed in the operating license application.)

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Table 2.2-1 Mapped Outcrop Area Percentages of Hydrogeologic Units in the Greater Green River Basin

Unit	Area (square miles)	Area (percentage)
Surface water and ice	104.0	0.50
Volcanic rocks (Mesozoic and Cenozoic)	8.4	0.04
Cenozoic hydrogeologic units:	17,177.1	82.62
• Quaternary hydrogeologic units	4,190.6	20.16
• Upper Tertiary hydrogeologic units	774.0	3.72
• Lower Tertiary hydrogeologic units	12,212.5	58.74
Mesozoic hydrogeologic units:	2,504.3	12.04
• Upper Cretaceous hydrogeologic units	1,962.3	9.44
• Lower Cretaceous	179.5	0.86
• Jurassic hydrogeologic units	181.8	0.87
• Triassic hydrogeologic units	180.7	0.87
Paleozoic hydrogeologic units	181.6	0.87
Precambrian hydrogeologic units	816.2	3.93

Source: (Reference 2.2-1, Table 3-1)

Table 2.2-2 Municipal Groundwater Use for 2005 in the Greater Green River Basin (GPCPD = gallons per capita per day)

City/Town	Wells	Depth (feet)	Population [1]	GPCPD[1] [2]	Total (acre-feet/year)
Bairoil	5	35-51	96	350	38
Big Piney	7	90-900	455	90	46
Marbleton	8	580-830	811	787	715
Opal	3	400-480	99	150	17
Superior	3	1700	239	146	39
Wamsutter	3	1365-1905	265	100	30
Total	**29**	**-**	**1965**	**402**	**884**

Source: (Reference 2.2-28, Table 2)

[1] Populations estimates for 2005

[2] GPCPD in the Total row is calculated from the total water use divided by the total municipal populations

Table 2.2-3 GGRB Municipal Service Area Groundwater Use Projections-Low Growth (ac-ft/yr = acre-feet per year; gpcpd = gallons per capita per day)

City/Town Service Area	Current Population [1]	Current Use [1][2] (gpcpd)	Current Use [1] (ac-ft/yr)	2015 Pop	2015 Use (ac-ft/yr)	2035 Pop	2035 Use (ac-ft/yr)	2055 Pop	2055 Use (ac-ft/yr)
Bairoil	96	350	38	97	38	89	35	83	33
Big Piney	455	90	46	625	63	913	92	1,232	124
Marbleton	811	787	715	1,109	978	1,622	1,430	2,189	1,930
Opal	99	150	17	112	19	122	20	134	23
Superior	239	146	39	242	40	224	37	207	34
Wamsutter	265	100	30	267	30	251	28	239	27
Total	1,965	347	884	2,452	1,167	3,221	1,642	4,084	2,170

Source: (Reference 2.2-29, Table 1)

[1] Current population and water usage as of 2007.

[2] GPCPD in the Total row is calculated from the total water use divided by the total municipal populations.

Table 2.2-4 GGRB Municipal Service Area Groundwater Use Projections-Moderate Growth (ac-ft/yr = acre-feet per year; gpcpd = gallons per capita per day)

City/Town Service Area	Current Population [1]	Current Use[1][2] (gpcpd)	Current Use[1] (ac-ft/yr)	2015 Pop	2015 Use (ac-ft/yr)	2035 Pop	2035 Use (ac-ft/yr)	2055 Pop	2055 Use (ac-ft/yr)
Bairoil	96	350	38	109	43	122	48	130	51
Big Piney	455	90	46	703	71	1,244	125	1,932	195
Marbleton	811	787	715	1,247	1,099	2,210	1,948	3,433	3,026
Opal	99	150	17	126	21	166	28	211	35
Superior	239	146	39	272	44	305	50	325	53
Wamsutter	265	100	30	300	34	342	38	374	42
Total	1,965	347	884	2,757	1,312	4,389	2,238	6,405	3,403

Source: (Reference 2.2-29, Table 2)

[1] Current population and water usage as of 2007.

[2] GPCPD in the Total row is calculated from the total water use divided by the total municipal populations.

Table 2.2-5 GGRB Municipal Service Area Groundwater Use Projections-High Growth (ac-ft/yr = acre-feet per year; gpcpd = gallons per capita per day)

City/Town Service Area	Current Population [1]	Current Use[1][2] (gpcpd)	Current Use[1] (ac-ft/yr)	2015 Pop	2015 Use (ac-ft/yr)	2035 Pop	2035 Use (ac-ft/yr)	2055 Pop	2055 Use (ac-ft/yr)
Bairoil	96	350	38	109	43	164	64	168	66
Big Piney	455	90	46	703	71	1,672	169	2,488	251
Marbleton	811	787	715	1,247	1,099	2,970	2,618	4,421	3,897
Opal	99	150	17	126	21	223	37	271	46
Superior	239	146	39	272	44	409	67	419	69
Wamsutter	265	100	30	300	34	459	51	482	54
Total	1,965	347	884	2,757	1,312	5,897	3,007	8,249	4,382

Source: (Reference 2.2-29, Table 3)

[1] Current population and water usage as of 2007.

[2] GPCPD in the Total row is calculated from the total water use divided by the total municipal populations.

Table 2.2-6 Surface Water Use in the Green River Basin

Sector of Water Use	Depletion (Acre-Feet)
Agriculture	389,324
Municipal	21,859
Domestic	0
Industrial	56,833
Recreational	Non-consumptive
Environmental	Non-consumptive
In-State Reservoir Evaporation [1]	121,300
Total Depletions	**589,316**

Source: (Reference 2.2-17)

Notes:

[1] Evaporation estimate from 2001 Green River Basin Water Plan.

Table 2.2-7 Comparison of Total Water Usage from Kemmerer Unit 1 and Naughton Power Plant with Average Monthly Hams Fork Discharge from USGS Daily Data and Daily Outflow at Viva Naughton Reservoir

Month	Total Water Usage for Kemmerer Unit 1 and Naughton Power Plant (cubic feet per second)[1]	USGS Stream Gage Data		Viva Naughton Reservoir Outflow	
		Average Monthly Hams Fork Discharge (cubic feet per second)[2]	Total Water Demand as a Percentage of Hams Fork Discharge (%)	Average Monthly Hams Fork Discharge (cubic feet per second)[3]	Total Water Demand as a Percentage of Hams Fork Discharge (%)
January	25.0	38.4	65%	41.2	61%
February	24.3	33.5	73%	41.3	59%
March	24.8	32.3	77%	57.7	43%
April	23.9	93.9	25%	149.3	16%
May	23.4	364.1	6%	371.7	6%
June	29.3	413.4	7%	374.5	8%
July	32.5	159.6	20%	145.5	22%
August	30.9	79.9	39%	87.4	35%
September	30.4	100.4	30%	83.8	36%
October	27.6	52.1	53%	57.1	48%
November	25.6	39.7	65%	46.0	56%
December	25.0	39.2	64%	43.7	57%

Notes:

[1] From Table 2.2-8

[2] From USGS Gauging Station Hams Fork Below Viva Naughton Reservoir, 2007 to 2016 (Reference 2.2-23)

[3] From data provided by Naughton Power Plant covering the period from 1995-2021 for outflow from Viva Naughton Reservoir

Table 2.2-8 Summary of Monthly Maximum Water Usage for Naughton Units 1, 2, and 3 and Maximum Water Demand for Kemmerer Unit 1

Facility	Water Demand		
	gallons per minute	cubic feet per second	acre-feet / day
Kemmerer Unit 1	5,270	11.7	23.3
Naughton Power Plant Units 1 and 2[1]	4,845	10.8	21.4
Naughton Power Plant Unit 3[1]	5,391	12.0	23.8
Totals	**15,506**	**34.5**	**68.5**

Notes:

[1] A ratio of 1.5 is applied to obtain the maximum monthly value from the average monthly value.

Table 2.2-9 Nearby Industrial Surface Water Users

	Water User	Water Source	Permit #	Permitted Allocation (cubic feet per second)	Yearly Industrial Water Use (acre-feet)	Location from the Site		
						Dir.	Approximate Distance (US feet)	Approximate Distance (miles)
Jim Bridger Power Plant	Power	GRB	32112	62.8	34320.00	W	485423	92
Naughton Power Plant*	Power	Hams Fork River	22297	20	13500.00	NNW	20215	4
FMC Granger	Trona	GRB	22808	5	3000.00	W	179315	34
FMC Westvaco	Trona	GRB	20077	17	6000.00	W	207564	39
General Chemical	Trona	GRB	22748	6.5	3600.00	W	224090	42
OCI Wyoming	Trona	GRB	22075	8.72	3000.00	W	237190	45
Solvay	Trona	GRB	26126	5	2280.00	ESE	231442	44
Church & Dwight	Baking soda and laundry detergent	GRB	6304Enl.	1.78	215.00	W	222976	42
Exxon Shute Creek	Natural Gas	GRB	29509	0.134	16.00	ENE	144376	27
Simplot Phosphates	Fertilizer	GRB	N/A	N/A	N/A, municipal	W	394330	75

Source: Technical Memorandum Green River Basin Plan II - Basin Water Use Profile - Industrial (Reference 2.2-17)

* PacifiCorp also possesses a direct flow water right pursuant to Permit # 22297. However, the quantity of water available pursuant to that permit is not part of the water usage agreement.

Table 2.2-10 Characterization of Surface Water Quality

Data Source:	**Available water quality data sampled within the project vicinity.**													
USGS Stream Gage 09223000:	Hams Fork River Below Pole Creek Near Frontier, WY, Stream Gage Data. Average data is from 21 samples taken from 2011-2013 obtained online via USGS.													
EWS.1:	Naughton Power Plant Raw Water Settling Basin (Kemmerer Unit 1 raw water source referred to as EWS.1), 8 samples taken by PacifICorp, analyzed by American West Analytical Laboratories and Chemtech-Ford Laboratories. See footnotes below.													
Constituents/ Parameters[1]	Test Method	USGS 09223000 Stream Gage Data (milligram/ liter)[2]	Surface Water Result EWS. 1 (milligram/ liter)[3]	Surface Water Result, EWS. 1 (milligram/ liter)[4]	Surface Water Result, EWS. 1 (milligram/ liter)[5]	Surface Water Result, EWS. 1 (milligram/ liter)[6]	Surface Water Result, EWS. 1 (milligram/ liter)[7]	Surface Water Result, EWS. 1 (milligram/ liter)[8]	Surface Water Result, EWS. 1 (milligram/ liter)[9]	Surface Water Result, EWS. 1 (milligram/ liter)[10]	Minimum Reporting Limit MRL[11]	Minimum Concentration (milligram/ liter)	Maximum Concentration (milligram/ liter)	Average Concentration (milligram/ liter)[12]
Temperature, water, degrees Celsius		7.10	26.67								-	7.10	26.67	16.89
Temperature, air, degrees Celsius		6.81									-	6.81	6.81	6.81
Color			35.0								-	35.00	35.00	35.00
pH at 25 degrees Celsius	SM 4500 H-B		7.47					8.7	8.6		0.1	7.47	8.70	8.26
Dissolved oxygen											-	-	-	-
Biological oxygen demand (BOD5)			ND								5.00	0.00	0.000	0.00
Chemical oxygen demand (COD)			65.0								10.0	65.00	65.000	65.00
Total Dissolved Solids (TDS)	SM 2540C			296	248	1340	1660	952	780	1527	20	248.00	1660.00	972
Total Suspended Solids (TSS)	SM 2540D	227.75	17.6	7.00	6.80	23.6	74.0	13	20	15.6	4	6.80	227.75	45.04

Table 2.2-10 Characterization of Surface Water Quality

Data Source:	**Available water quality data sampled within the project vicinity.**													
USGS Stream Gage 09223000:	Hams Fork River Below Pole Creek Near Frontier, WY, Stream Gage Data. Average data is from 21 samples taken from 2011-2013 obtained online via USGS.													
EWS.1:	Naughton Power Plant Raw Water Settling Basin (Kemmerer Unit 1 raw water source referred to as EWS.1), 8 samples taken by PacifICorp, analyzed by American West Analytical Laboratories and Chemtech-Ford Laboratories. See footnotes below.													
Constituents/ Parameters[1]	Test Method	USGS 09223000 Stream Gage Data (milligram/ liter)[2]	Surface Water Result EWS. 1 (milligram/ liter)[3]	Surface Water Result, EWS. 1 (milligram/ liter)[4]	Surface Water Result, EWS. 1 (milligram/ liter)[5]	Surface Water Result, EWS. 1 (milligram/ liter)[6]	Surface Water Result, EWS. 1 (milligram/ liter)[7]	Surface Water Result, EWS. 1 (milligram/ liter)[8]	Surface Water Result, EWS. 1 (milligram/ liter)[9]	Surface Water Result, EWS. 1 (milligram/ liter)[10]	Minimum Reporting Limit MRL[11]	Minimum Concentration (milligram/ liter)	Maximum Concentration (milligram/ liter)	Average Concentration (milligram/ liter)[12]

Abbreviations:

ND = Not detected at the corresponding Minimum Reporting Limit (MRL).

Notes:

1. Constituents/parameters provided in Table 2.2-10 align with sampling data requirements in NUREG-1555.
2. USGS 09223000 Hams Fork River Below Pole Creek Near Frontier WY Stream Gage Data, Average data from 21 samples taken from 2011-2013 obtained online via USGS.
3. Circulating Water Sampling from Naughton Power Plant analyzed by American West Analytical Laboratories on 1/31/2017 obtained by PacifiCorp
4. Raw Water Reservoir Water Sampling from Naughton Power Plant analyzed by Chemtech-Ford Laboratories on 3/20/2019 obtained by PacifiCorp
5. Raw Water Reservoir Water Sampling from Naughton Power Plant analyzed by American West Analytical Laboratories on 6/4/2019 obtained by PacifiCorp
6. Circulating 1 Water Sampling from Naughton Power Plant analyzed by American West Analytical Laboratories on 6/4/2019 obtained by PacifiCorp
7. Circulating 2 Water Sampling from Naughton Power Plant analyzed by American West Analytical Laboratories on 6/4/2019 obtained by PacifiCorp
8. U1 Cooling Tower Water Sampling from Naughton Power Plant analyzed by Chemtech-Ford Laboratories on 1/31/2022 obtained by PacifiCorp
9. U2 Cooling Tower Water Sampling from Naughton Power Plant analyzed by Chemtech-Ford Laboratories on 1/31/2022 obtained by PacifiCorp
10. Discharge Water Sampling Data from Naughton Power Plant analyzed by American West Analytical Laboratories, Average data taken from 4 samples from 1/3/2021, 4/5/2021, 8/3/2021, and 11/1/2021 obtained by PacifiCorp
11. Minimum Reporting Limit varies depending on the Laboratory, test method employed, analysis date, etc. The lowest limit has been reported in this table to be conservative.
12. Averages of raw water, circulating water, discharge data provided by Naughton Power Plant and USGS stream gage data are assumed to be similar and adequate data sets to use for characterization of the raw water supply, in lieu of surface water field data collected for this project.

Source: (USGS 2023b)

Figure 2.2-1 Hydrologic Features in a 50-Mile Radius of Kemmerer Unit 1

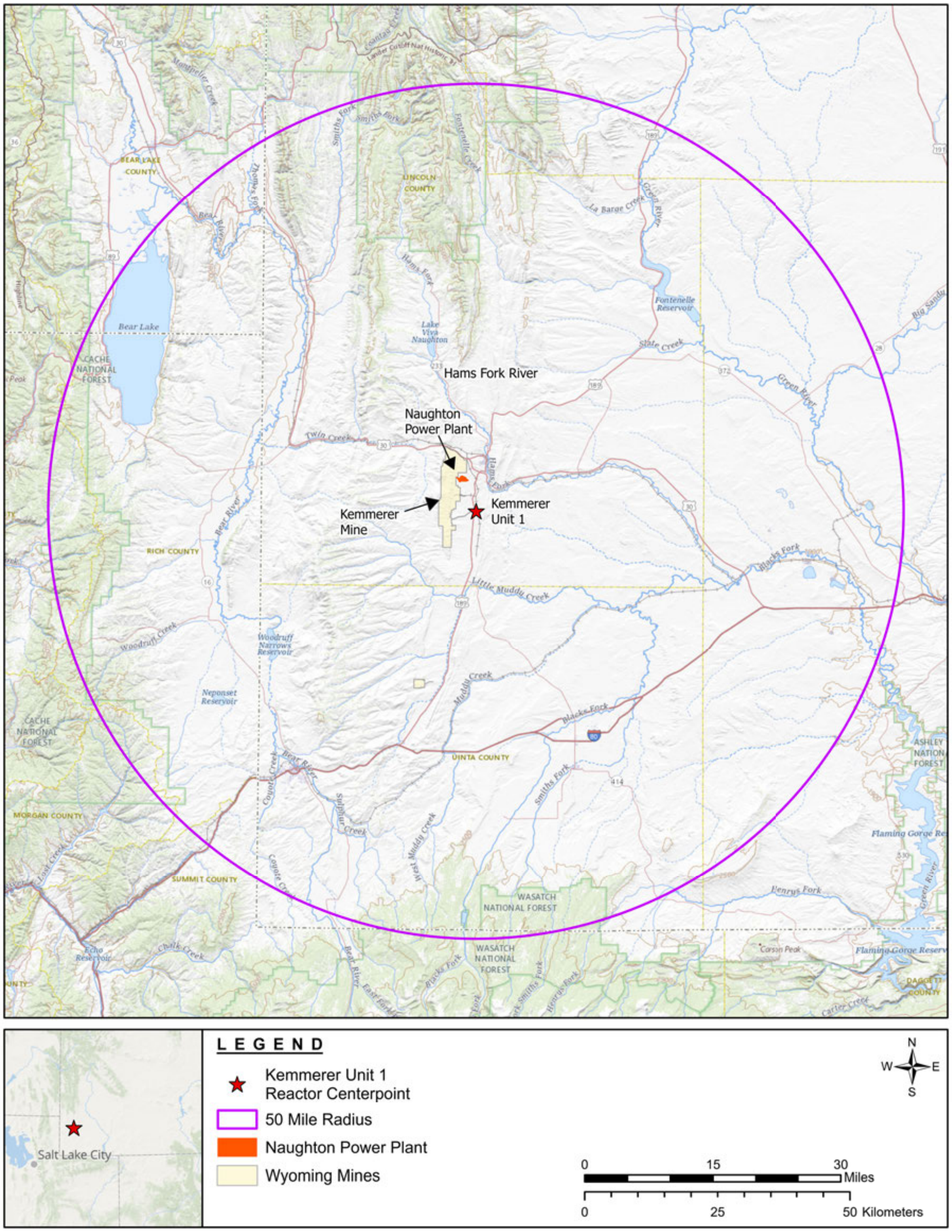


Figure 2.2-2 Regional Hydrology

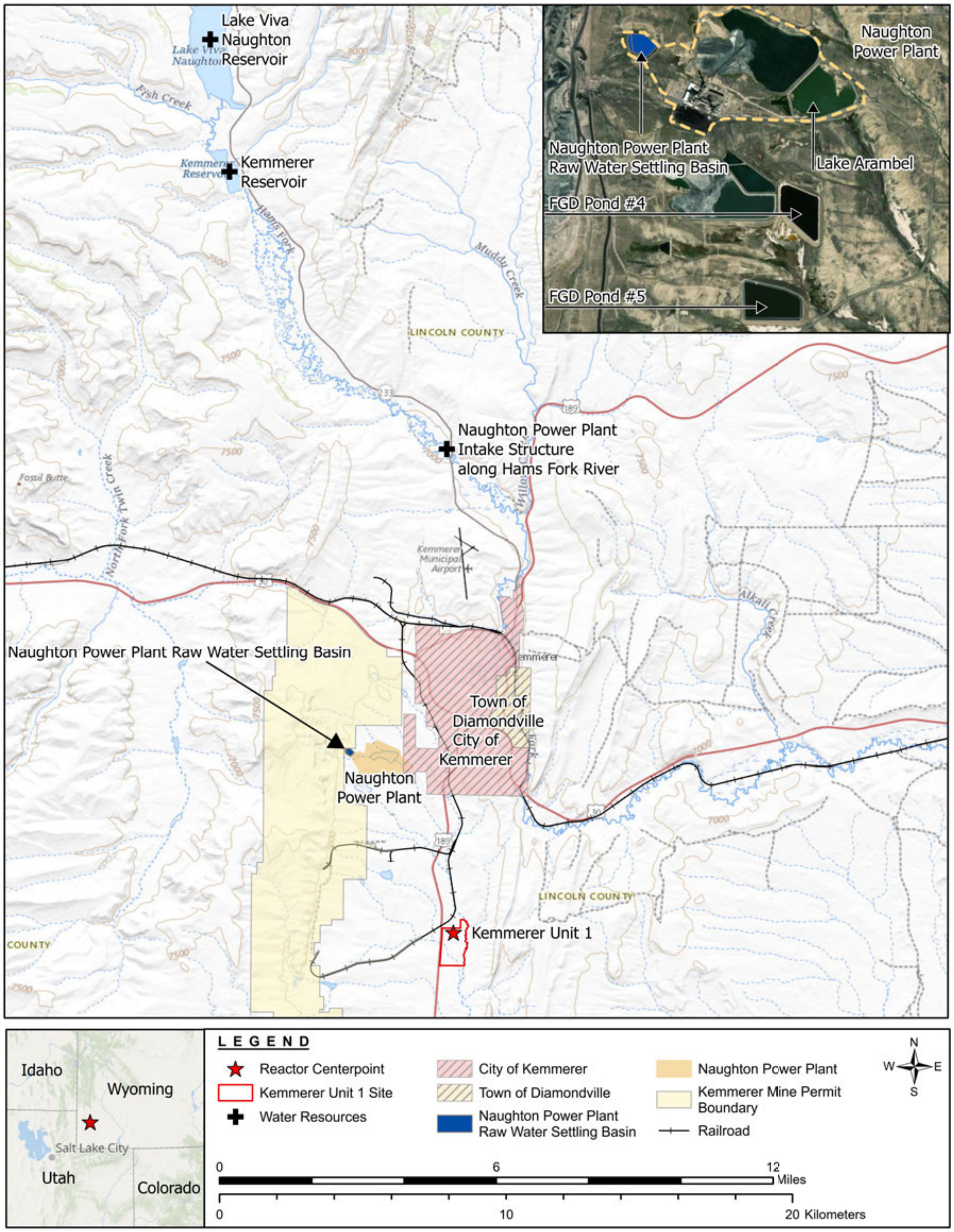


Figure 2.2-3 FEMA 100-Year Floodplains and North Fork Little Muddy Creek within the Site

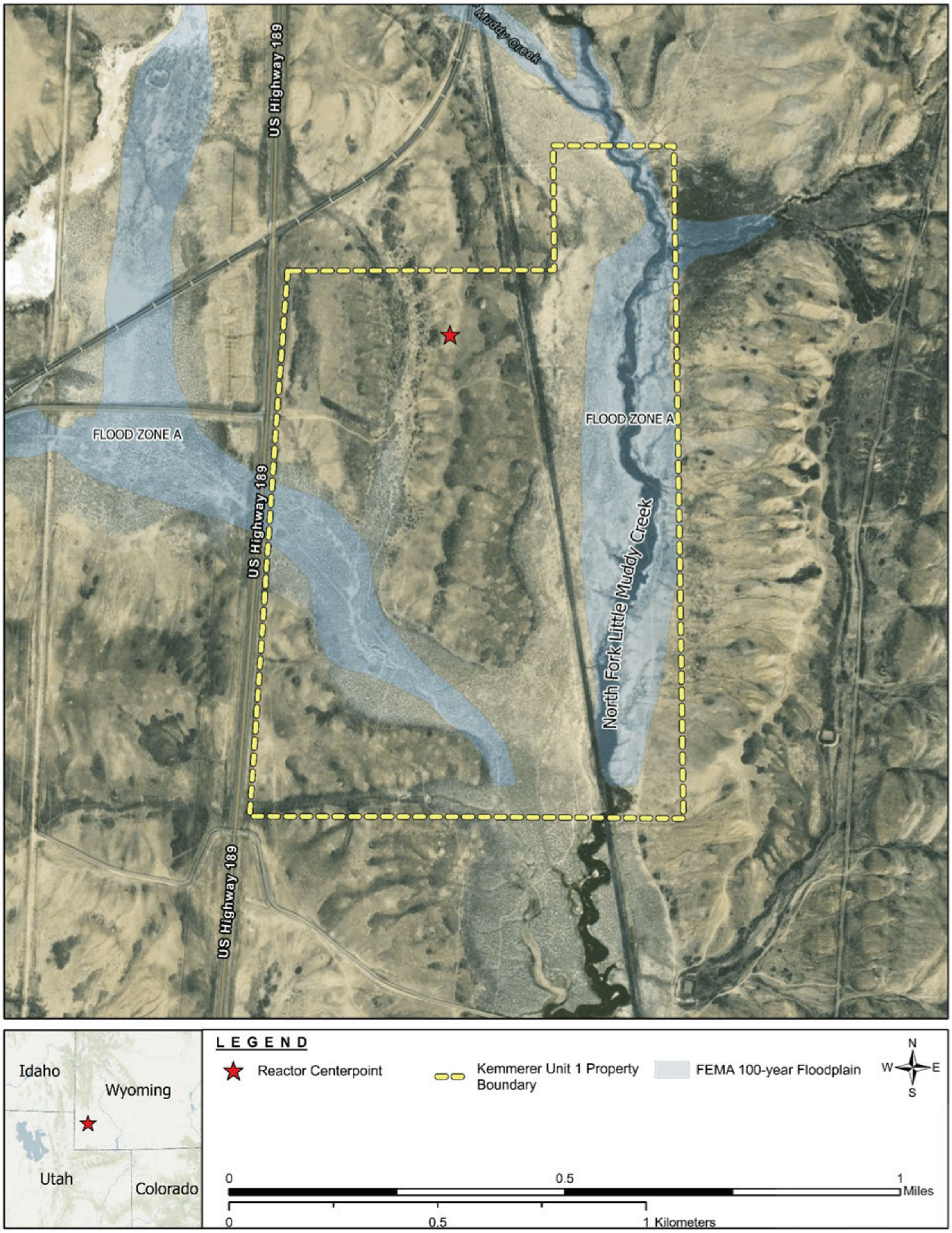


Figure 2.2-4 Regional Physiographic Provinces

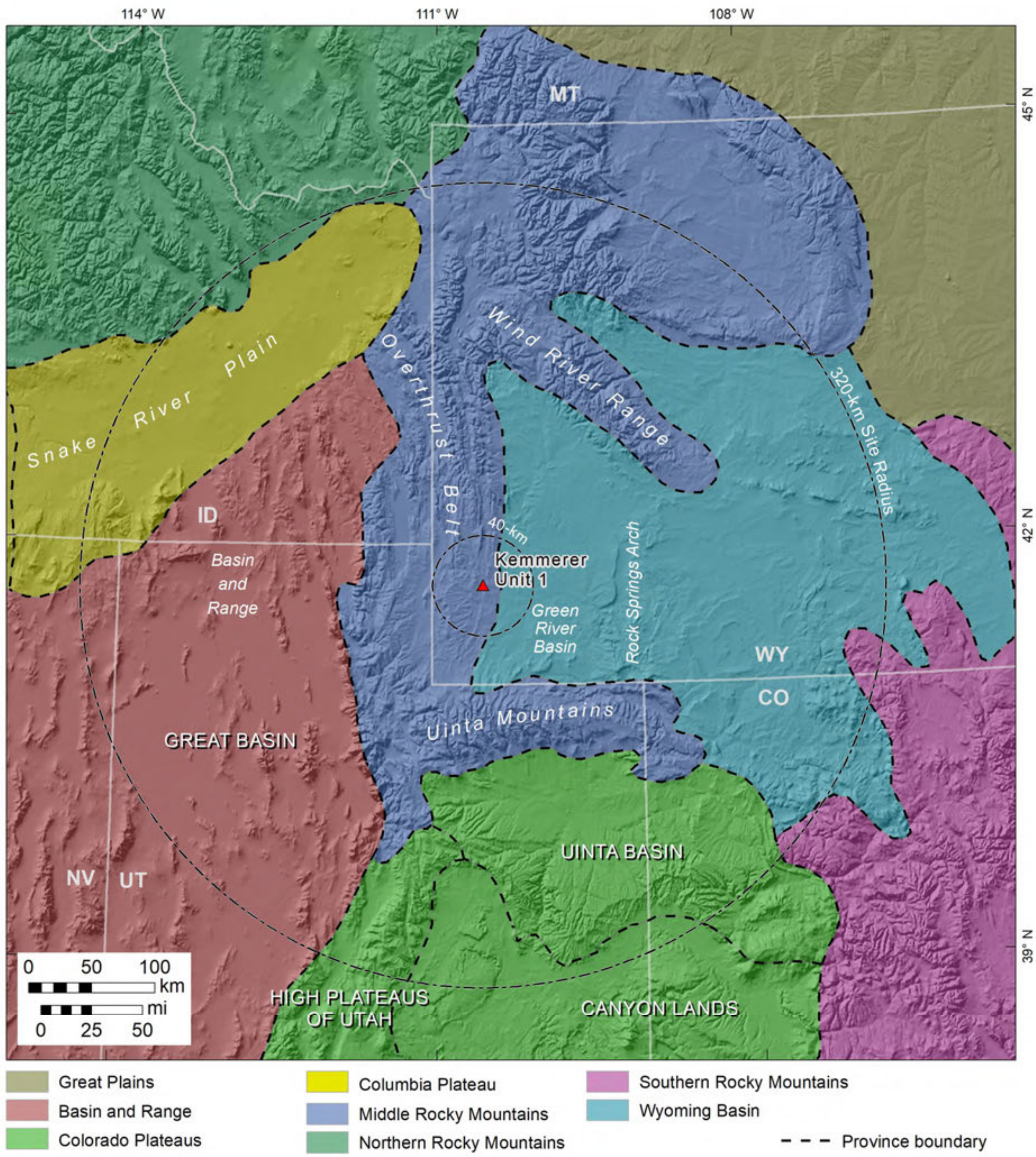


Figure 2.2-5 Geologic Profile Section (A-A') of the Elkol Quadrangle

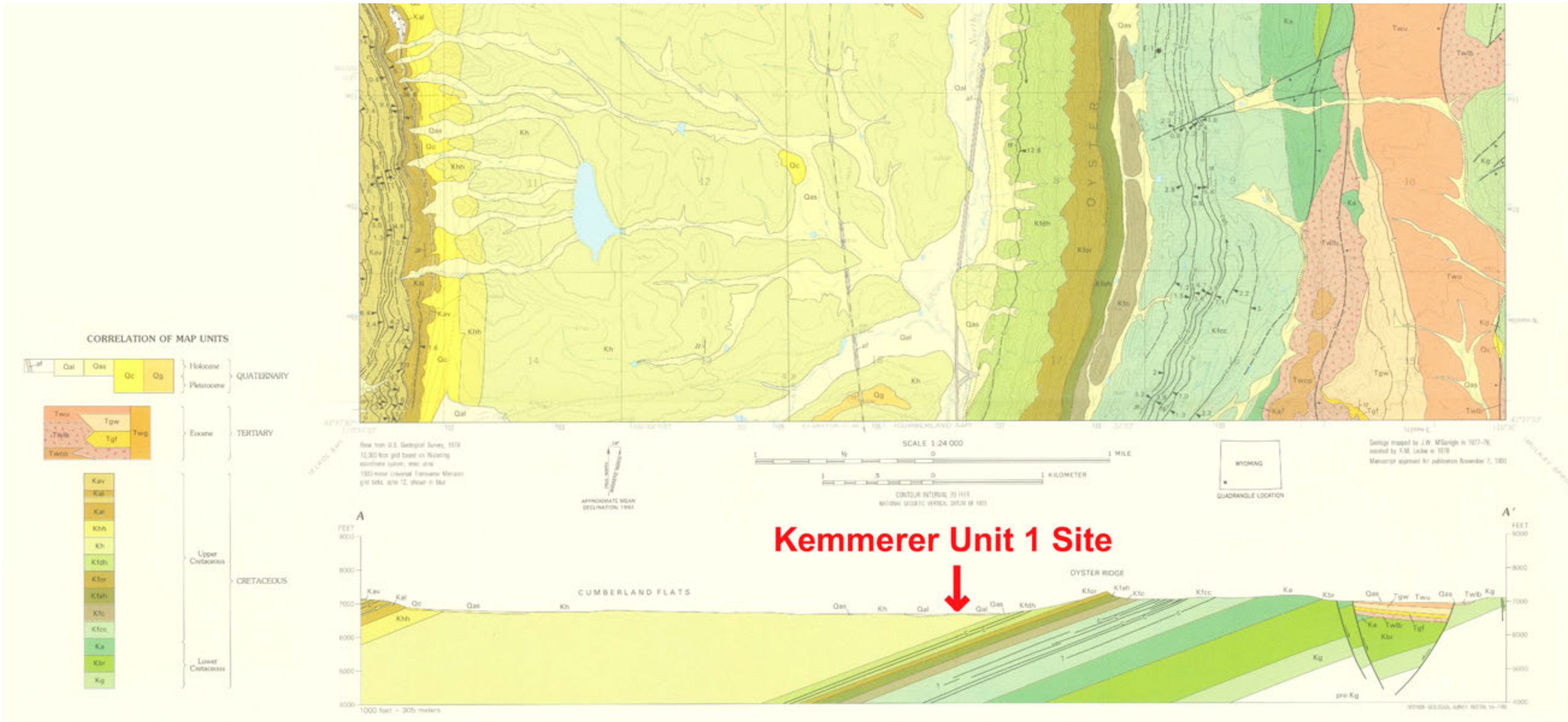


Figure 2.2-6 Greater Green River Basin and the Kemmerer Unit 1 Site

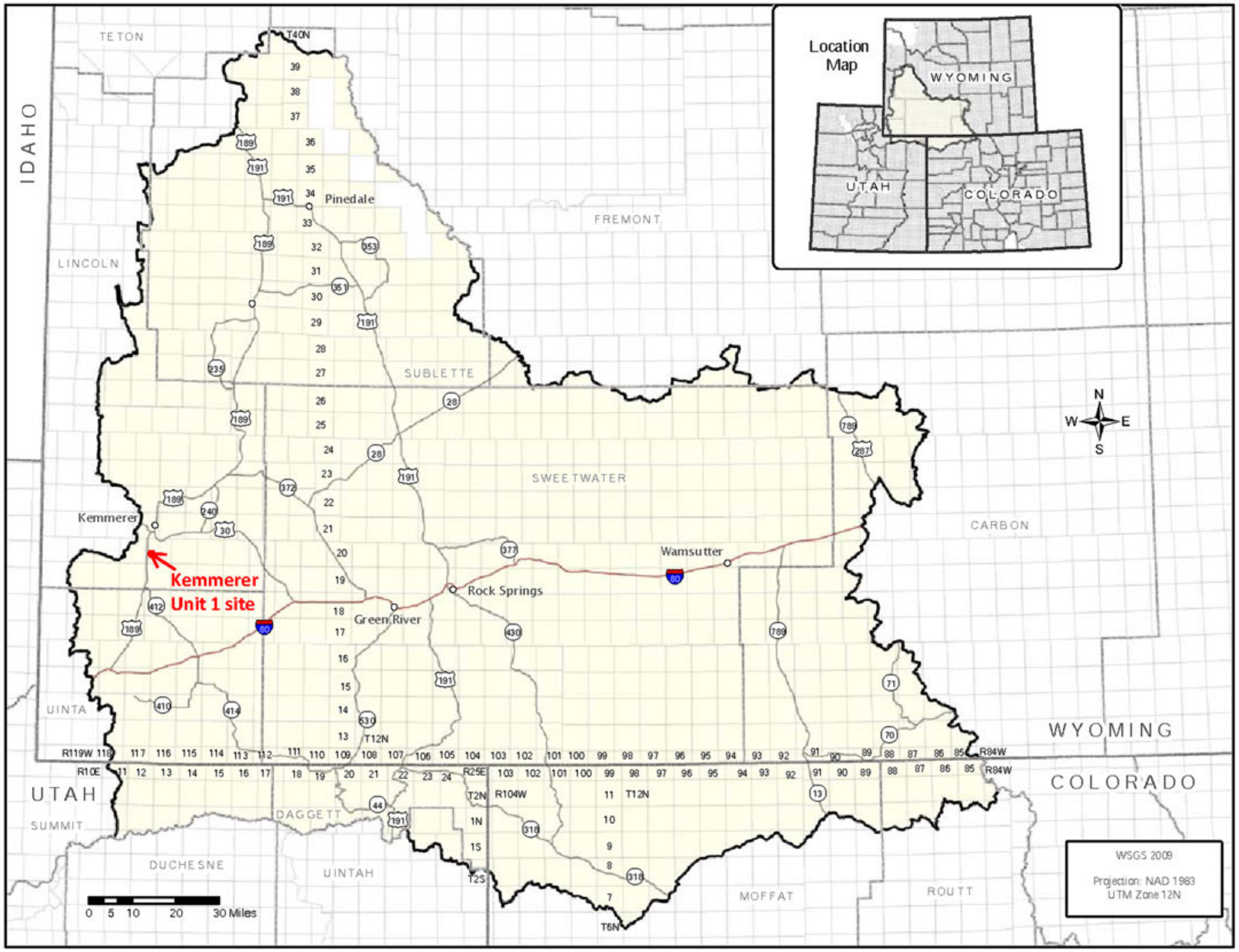


Figure 2.2-7 Groundwater Recharge Potential from Precipitation in the Greater Green River Basin

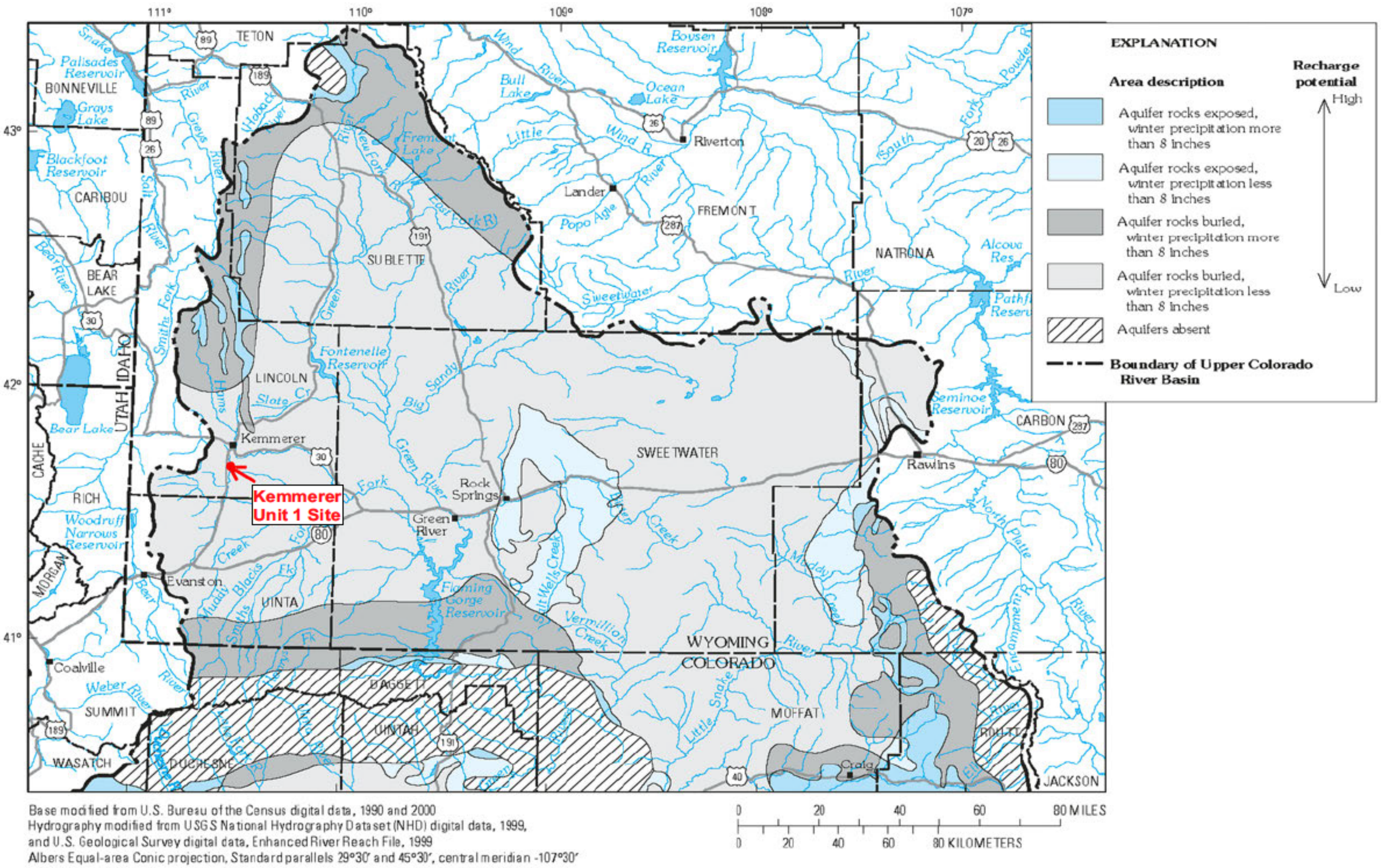


Figure 2.2-8 Surface Water Users Near Kemmerer Unit 1

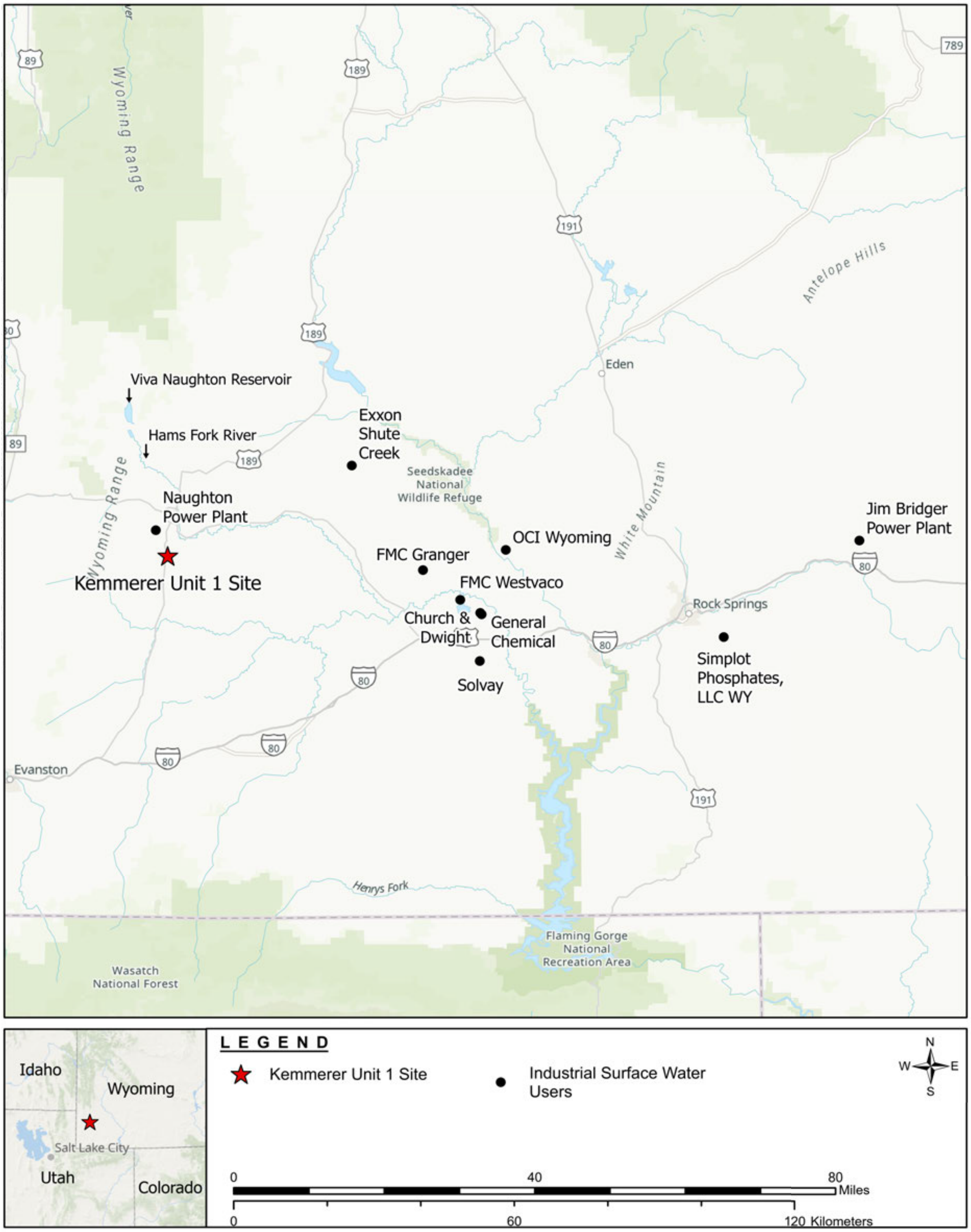


Figure 2.2-9 Location of Groundwater-Dependent Towns Relative to the Kemmerer Unit 1 Site

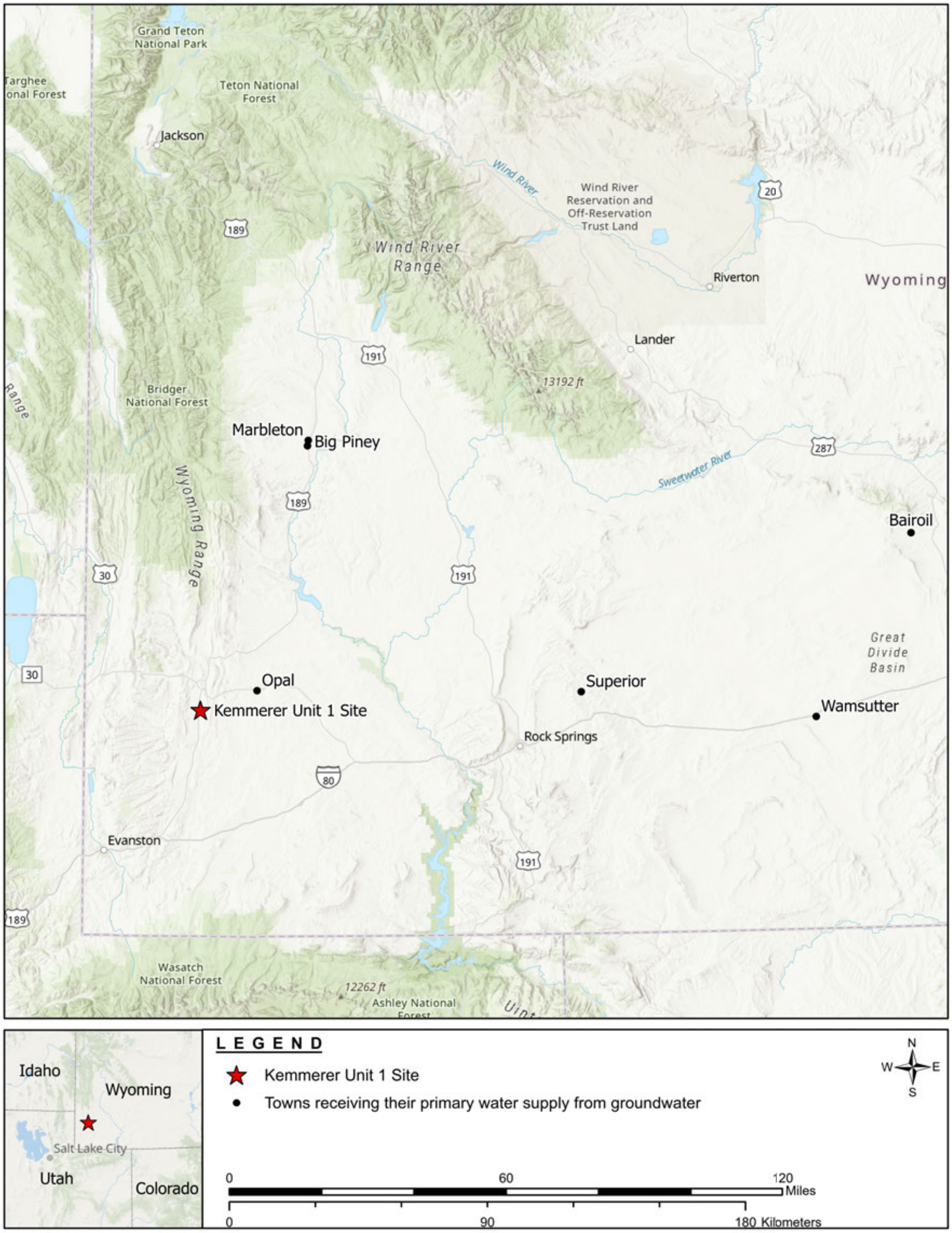
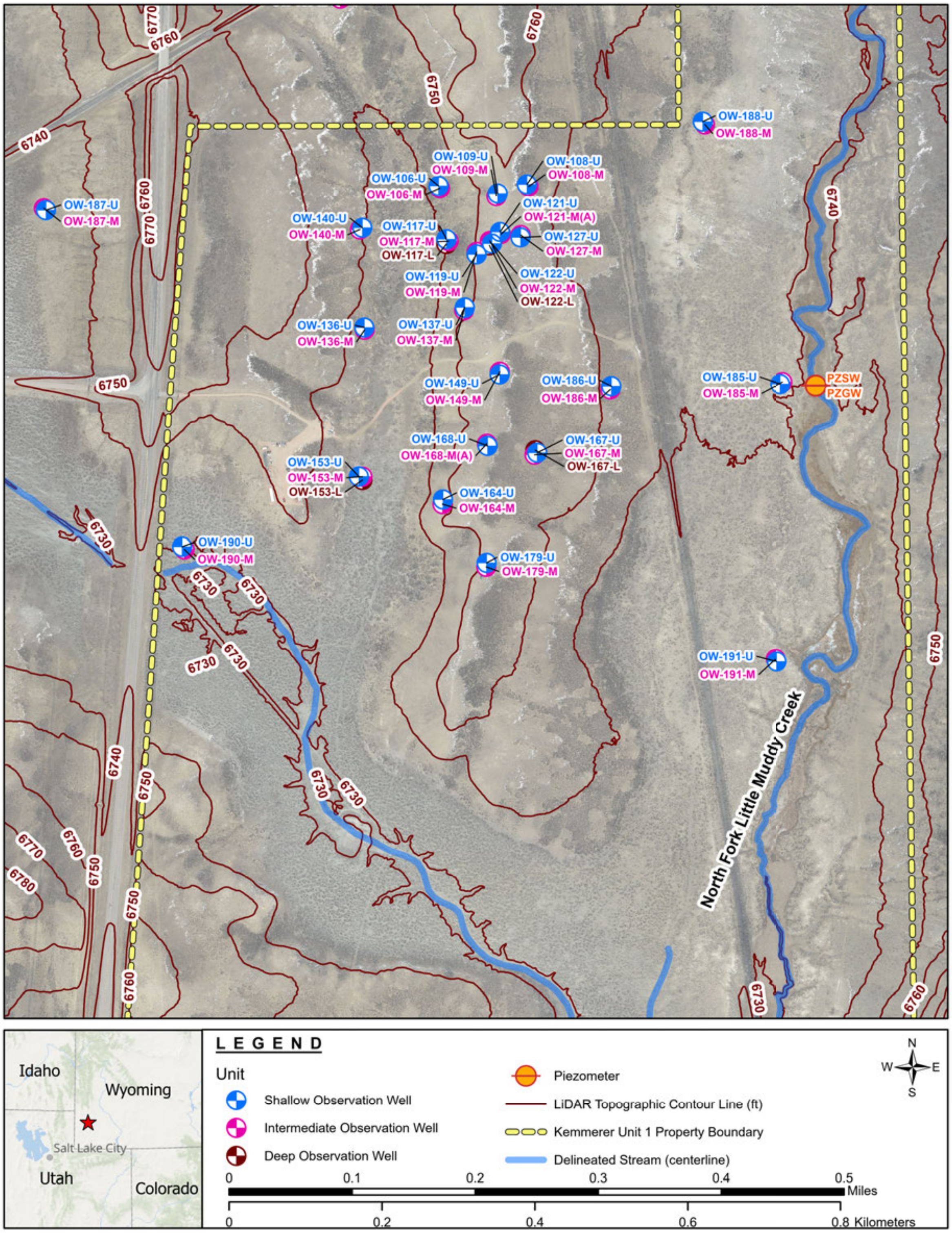


Figure 2.2-10 Observation Well Locations for the Site Subsurface Investigation



2.3 Ecological Resources

2.3.1 Terrestrial Ecology

2.3.1.1 Terrestrial Habitat

The Kemmerer Unit 1 Site is located within the Rolling Sagebrush Steppe (Level IV) sub-division of the Wyoming Basin Level III Ecoregion of Wyoming (Reference 2.3-8). This vast region is dominated by shrubland communities. Typical plant species or plant associations in this region include Wyoming big sagebrush (*Artemisia tridentata*), Western wheatgrass (*Pascopyrum smithii*), needle-and-thread grass (*Hesperostipa comata*), rabbitbrush (*Ericameria nauseosa*), silver sagebrush (*Artemisia cana*), and Sandberg bluegrass (*Poa secunda*) (Reference 2.3-8).

2.3.1.1.1 Site Conditions

The Kemmerer Unit 1 Site and Land Use Study Area (study area) are shown in Figure 2.1-1. The land use within the study area is described in Section 2.1 as predominantly shrub/scrub (98 percent) according to the National Land Cover Database (Reference 2.3-52). Land cover and vegetation type described in the United States (U.S.) Department of the Interior (DOI) LANDFIRE dataset also indicates the study area to be primarily inter-mountain basins big sagebrush shrubland (76 percent) with additional minor components of sagebrush steppe, saltbush shrubland, and greasewood flat habitats as shown in Table 2.3-1. Terrestrial Visual Encounter Survey (TVES) performed in June 2022 generally support the classifications in the LANDFIRE dataset, with inter-mountain basins big sagebrush shrubland and greasewood flats accounting for approximately 56 percent and 44 percent of the study area. The big sagebrush shrubland is interspersed with ephemeral and intermittent streams and low-lying depressional wet areas that generally occur within the greasewood flat vegetation type.

The sagebrush biome supports people and communities in the West, providing ecosystem services such as wildfire suppression, water filtration, irrigation water supply, and carbon sequestration. Sagebrush also provides habitat for more than 350 species of plants and animals, many dependent upon it, and many considered species of conservation concern (Reference 2.3-34). The areas occupied by sagebrush ecosystems are declining and becoming increasingly fragmented because of conifer encroachment, exotic annual grass invasion, and development. Range-wide declines and localized extirpations of sagebrush are threats to sagebrush-dependent fauna and flora (Reference 2.3-11).

2.3.1.1.2 Offsite Areas

The land use within the water and electrical macro-corridors is described in Section 2.1 as predominantly shrub/scrub habitat (93 percent) according to the National Land Cover Database (Reference 2.3-52). The U.S. DOI LANDFIRE dataset also indicates that offsite areas are primarily inter-mountain basins big sagebrush shrubland (72 percent) with additional minor components of sagebrush steppe habitat and developed areas, including the Kemmerer Mine, as shown in Table 2.3-1. The TVES performed in June 2022 generally support the classifications in the LANDFIRE dataset.

2.3.1.2 Wetlands

The site falls within the Elkol, Wyoming, and Kemmerer, Wyoming, United States Geological Survey 7.5-minute topographic quadrangles. The site is located within the Little Muddy Creek watershed (HUC 1404010802). All aquatic resources within the site vicinity drain east and southeast toward North Fork Little Muddy Creek, which eventually flows to Little Muddy Creek, Muddy Creek, and ultimately to Blacks Fork and the Flaming Gorge Reservoir. Wetland habitats within the site and macro-corridors were examined in June, September, and October 2022, employing the United States Army Corps of Engineers *Wetland Delineation Manual* (Reference 2.3-44) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West, Version 2.0* (Reference 2.3-45) methods to assess for occurrence of hydrophytic vegetation, hydric soils, and wetland hydrology. In addition, the Montana Wetland Assessment Method (MWAM) (Reference 2.3-5) was used to conduct a functional assessment of the wetlands. All stream features and other waterbodies, including drainage ditches and ponds, were identified and mapped based on the presence of an Ordinary High-Water Mark (OHWM). Stream channel duration was assessed using the Streamflow Duration Assessment Method (Reference 2.3-28).

2.3.1.2.1 Site Conditions

North Fork Little Muddy Creek has been categorized as an intermittent stream from its headwaters to its confluence with the Little Muddy Creek (Reference 2.3-53); however, based on field observations from June and October 2022 (Reference 2.3-39; Reference 2.3-6), the portion of North Fork Little Muddy Creek bordering the site appears to flow perennially. Results of the wetland delineation identified a total of approximately 7.1 acres (2.9 hectares) of riparian Palustrine Emergent wetland within the study area boundary, all occurring along the floodplain of North Fork Little Muddy Creek (Figure 2.1-4). The riparian wetland was largely dominated by Baltic rush (*Juncus balticus*), also known as mountain rush (*Juncus arcticus*), foxtail (*Alopecurus* sp.), and broadleaf cattail (*Typha latifolia*). The wetland was assessed for function and value. Located in an area of high disturbance with rutted banks from cattle and sheep grazing, it was rated as a Category III wetland with moderate suitability for wildlife and adequate aquatic habitat quality for fish. Macroinvertebrates were observed in the stream (Reference 2.3-39). While the wetland is not ecologically “unique,” it provides stopover habitat for birds migrating through the area. Section 4.3.1.2.1 describes the identification of wetlands, other waters, and avoidance of impacts during building activities; no wetland losses are anticipated. No jurisdictional determination has been submitted, nor is one anticipated. All features will be assumed jurisdictional and a pre-construction notification for stream crossing impacts will be submitted under Nationwide Permit 14, as discussed in Section 4.3.1.2.1.

2.3.1.2.2 Offsite Areas

Wetlands along the water macro-corridor are fed by waters that flow out of the Kemmerer Mine; other wetlands along the electrical and common macro-corridors are fed directly by water that flows out of man-made ponds at Naughton Power Plant. A perennial stream near the center of the common macro-corridor carries flow from Naughton Power Plant to North Fork Little Muddy Creek. Results of the wetland delineation identified a total of approximately 10.0 acres (4.0 hectares) of Palustrine Emergent wetland within the macro-corridors (Figure 2.1-10).

Wetlands were largely dominated by Baltic rush, foxtail, common reed (*Phragmites australis*), Nuttall's alkali grass (*Puccinellia nuttalliana*), Rocky Mountain glasswort (*Salicornia rubra*), sagebrush (*Artemisia* sp.), sedges (*Carex* spp.), and Utah arrowgrass (*Triglochin concinna*). All wetlands in the macro-corridors were considered highly disturbed due to the surrounding industrial and agricultural (cattle and sheep grazing) land uses. Each of the wetlands were rated as Category III with moderate suitability for wildlife and adequate aquatic habitat quality for fish (when perennial flow was present) (Reference 2.3-5). Macroinvertebrates were observed in perennial streams. While none of the wetlands are ecologically "unique," they provide stopover habitat for migrating birds.

Multiple aquatic features within and along the water and electrical macro-corridors associated with Naughton Power Plant are potentially isolated, non-jurisdictional features. North Fork Little Muddy Creek, its tributaries, and associated wetlands are potentially jurisdictional.

2.3.1.3 Wildlife

The wildlife biologists who conducted the TVES (Reference 2.3-40, Reference 2.3-41) walked meandering transects across the survey area (Figure 2.3-1), composed of the Kemmerer Unit 1 Site and macro-corridors, and recorded animals (and animal sign) observed. They also noted vegetation types, as a check on land cover and vegetation geo-spatial data obtained from LANDFIRE, which is based on satellite imagery. Biologists documented 54 general wildlife species in the survey area, 40 birds and 11 mammals, one amphibian, and two invertebrates in 2022 and 2023 (Table 2.3-2). Another 12 species, mostly waterfowl and shorebirds, were observed outside of, but in close proximity to, the survey area. Once surveys were completed, species were assigned to abundance categories (i.e., abundant, common, uncommon). These determinations were subjective, based on how frequently animals were observed during the surveys.

The waterbird species presented in Table 2.3-2 (marked with an asterisk) were recorded in and around North Fork Little Muddy Creek, and on or around small freshwater ponds near the macro-corridors and Naughton Power Plant.

Swallow species: barn swallow (*Hirundo rustica*), cliff swallow (*Petrochelidon pyrrhonota*), northern rough-winged swallow (*Stelgidopteryx serripennis*), tree swallow (*Tachycineta bicolor*), and violet-green swallow (*Tachycineta thalassina*) were observed flying in the site vicinity. Cliff swallow was the swallow species seen most frequently in both 2022 and 2023 surveys (Reference 2.3-40; Reference 2.3-41).

Vesper sparrows (*Pooecetes gramineus*) were the songbirds most often observed during surveys and were typically found in sagebrush and greasewood flat habitats (Reference 2.3-40; Reference 2.3-41). Horned larks (*Eremophila alpestris*) were also abundant but were observed mainly in the southern segment of the common macro-corridor and the site, while Western meadowlarks (*Sturnella neglecta*) were concentrated in the water and electrical macro-corridors. Savannah sparrows (*Passerculus sandwichensis*), though less numerous than vesper sparrows, were recorded in all habitat types throughout the site and macro-corridors. Brewer's blackbirds (*Euphagus cyanocephalus*) were also common throughout the sagebrush and riparian habitats and concentrated where the water and electrical macro-corridors diverge.

A ground-based survey of raptor and eagle nests was conducted concurrently with the TVES during the spring of 2023. The objective of survey was to inventory all raptor and eagle nests within the site and macro-corridors plus a 2-mile (3-kilometer) buffer. The biologists systematically searched raptor and eagle nest habitat within the area by vehicle and on foot. The buffer area between the site and the 2-mile (3-kilometer) radius was searched by scanning suitable nesting habitat from public roads. Periodic stops were made to scan suitable habitat (e.g., trees, utility towers, and power poles) and examine nests with the aid of binoculars and a spotting scope.

Red-tailed hawks (*Buteo jamaicensis*) were recorded in the northern part of the water and electrical macro-corridors and were also observed in surrounding areas. Active red-tailed hawk nests were recorded just outside the site and macro-corridors. In 2022, one was observed on a power pole approximately 350 feet (107 meters) west of the northwest corner of the site, and one was observed on a power pole approximately 350 feet (107 meters) south of the common macro-corridor near the point at which the railroad crosses US 189. Both nests were confirmed active when revisited in 2023. Two additional active red-tailed hawk nests were observed in 2023; one was located 0.5 miles (0.8 kilometers) north of the common macro-corridor adjacent to the railroad tracks, and another was located 1.5 miles (2.4 kilometers) east of the electrical macro-corridor, north of the entrance road to Naughton Power Plant. Northern harriers (*Circus hudsonius*) were uncommon but documented flying in the common macro-corridor. A single great horned owl (*Bubo virginianus*) was documented in the northern-most part of the water macro-corridor in 2022.

No reptiles or amphibians were observed by biologists who conducted the TVES in summer 2022 (Reference 2.3-40). Wyoming Natural Diversity Database (WYNDD) researchers who carried out Reptile Transect Visual Encounter Survey of BLM's Kemmerer Field Office area (which encompasses the Kemmerer Unit 1 Site) in 2015 also detected no reptiles (Reference 2.3-12). The authors of the study noted that reptiles and amphibians in Wyoming are associated with isolated habitat features that are widely dispersed in the landscape, like rock outcrops and wetlands. In 2016, the WYNDD researchers employed what they called "expert opinion surveys," in which experienced herpetologists searched habitats they felt were likely to harbor reptiles. These surveys were somewhat more successful. The WYNDD biologists ultimately used a suite of survey methods to characterize the herpetofauna of the Kemmerer area in 2014 and 2015: Wetland and Riparian Visual Encounter Survey , Rock Outcrop Visual Encounter Survey, Reptile Transect Visual Encounter Survey, Nocturnal Call Surveys, and Expert Opinion Surveys (Reference 2.3-12). WYNDD biologists also recorded any amphibian or reptile they observed while travelling between survey locations. They surveyed 95 locations (sites or transects) and detected four amphibian species (*Pseudacris maculata, Rana pipiens, Spea intermontana, Ambystoma mavortium*) and two reptile species (*Sceloporus graciosus, Thamnophis elegans vagrans*). As these herpetological surveys were carried out a relatively short distance from the Kemmerer Unit 1 site and involved similar habitats, the reptile and amphibian communities observed there are assumed to be similar to those of the Kemmerer Unit 1 Site.

During the spring 2023 TVES, the boreal chorus frog was detected near wetlands along the electrical macro-corridor (Reference 2.3-41). The most common amphibian in Wyoming, the boreal chorus frog is found in habitats ranging from deserts to shrublands to montane forests

(Reference 2.3-71). Within these habitats, the species is closely associated with wetlands and vegetated margins of streams, ponds, and lakes. No reptiles were observed during the 2022 or 2023 TVES.

In 2022, least chipmunks (*Tamias minimus*) and mountain cottontails (*Sylvilagus nuttallii*) were relatively common and observed throughout the site and macro-corridors (Reference 2.3-40). Uinta ground squirrels (*Spermophilus armatus*) were documented throughout the central and southern segments of the common macro-corridor and the site. In 2023, mammal sightings were scarce, with white-tailed jackrabbits (*Lepus townsendii*) and mountain cottontail being the species most often observed (Reference 2.3-41). The previous winter lasted for an extended duration, and it appeared that mortality for small and large mammals was very high.

Adult male and female pronghorn “antelope” (*Antilocapra americana*) were observed on both the site and the macro-corridors in 2022 and 2023 (Reference 2.3-40; Reference 2.3-41). Most were concentrated along the water corridor and at the junction of all three macro-corridors in sagebrush and grassland habitats. The skeletal remains (skull, bones) and shed horns of pronghorns were also found throughout the site and macro-corridors. Mule deer (*Odocoileus hemionus*) sign was found within the central segment of the utility corridor and concentrated where the water and electrical macro-corridors diverge. A small amount of elk (*Cervus canadensis*) sign (scat and tracks) was recorded in the same areas as the mule deer sign. No live mule deer or elk were observed in 2022; one live mule deer was observed near Naughton Power Plant in 2023.

The site and macro-corridors are occupied by white-tailed prairie dogs (*Cynomys leucurus*) with numerous burrows found throughout. This amount of burrowing in the area could alter some of the vegetation communities in and around the prairie dog colonies. However, these habitats evolved with prairie dogs and provide habitat for other species. Other mammal burrows were also identified during the TVES, but these were less common and will not likely affect the surrounding habitat in any significant way. As noted previously, pronghorn were observed during the TVES, but it is unlikely that the pronghorn grazing in the site vicinity will substantially alter the vegetative community. Like the prairie dogs, pronghorn and the vegetative community evolved together.

The white-tailed prairie dog serves as a biological indicator of habitat quality and enhance the biodiversity of the locations they inhabit. The white-tailed prairie dog is a keystone species in this sage-steppe habitat. Many other species, including some species of greatest conservation need and birds of conservation concern, depend on prairie dog burrows for shelter and breeding. Greater sage-grouse (*Centrocercus urophasianus*) serves as an indicator of the overall ecosystem health. Western Wyoming has relatively stable sage-grouse populations, and a decline could indicate that habitat degradation has taken or is taking place.

Likely the most important predator and prey relationship within the project vicinity is that of small mammals and raptors. Bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), and ferruginous hawk (*Buteo regalis*) were observed during the TVES and the white-tailed prairie dogs will make up a significant portion of their diets. Both eagle species and other raptors are known to scavenge, and roadkill in the vicinity of the project will also be contributing to their diets. Coyotes (*Canis latrans*) will also prey upon small mammals and pronghorn that occupy the area.

The site falls mainly within the Pacific avian migration “flyway.” These flyways are the general routes some bird species will take during their seasonal migrations between their wintering and breeding grounds. Some of the wetland habitats within the site and macro-corridors provide stopover habitat where birds rest and “refuel” during these seasonal migrations. Mule deer, elk, and pronghorn also migrate between summer and wintering grounds in Wyoming. These species usually summer in the mountainous areas and migrate to valleys at lower elevations during the winter. In Wyoming, pronghorn depend on broadleaf species like sagebrush for winter forage.

Elk, mule deer, and pronghorn are the species most likely to be hunted or used for subsistence in the project vicinity. These species have specific quotas for each hunt area that are maintained by Wyoming Game and Fish Department (WGFD).

2.3.1.4 Important Species and Habitats

Important species include: (1) Federally-listed species, (2) species proposed for Federal listing, (3) species that are candidates for Federal listing, (4) State-listed species and species otherwise considered rare, (5) bald and golden eagles protected under the Bald and Golden Eagle Protection Act, (6) commercially- or recreationally-valuable species, (7) species essential to the survival of rare and commercially- or recreationally-valuable species, and (8) species that serve as sensitive biological indicators, revealing the effects of a proposed action on the terrestrial environment. Important habitats include: (1) Federally-designated or proposed critical habitat, (2) Federal wildlife refuges, (3) State wildlife preserves or sanctuaries, (4) lands owned and protected by private conservation organizations, such as The Nature Conservancy and National Audubon Society, (5) wetlands, and (6) other habitats identified by Federal or State agencies as unique or rare or prioritized for protection.

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) report for the project indicated that the following Federally-listed and candidate-terrestrial species could be “potentially affected by activities at this location” (Reference 2.3-50):

- Yellow-billed cuckoo (*Coccyzus americanus*): threatened
- Monarch butterfly (*Danaus plexippus*): candidate species
- Ute ladies’-tresses (*Spiranthes diluvialis*): threatened

The discussion that follows is focused on important terrestrial species. Important aquatic species, including four Federally-listed fish species, are discussed later in Section 2.3.2.3.

Desktop review of the scientific literature and information on resource agency websites (e.g., the WYNDD) in conjunction with reconnaissance visits and the TVES suggest that only one of these species, Ute ladies’-tresses (ULT), and one candidate species for listing, the monarch butterfly, could be present.

There is no habitat in the site or macro-corridors that supports yellow-billed cuckoos. Yellow-billed cuckoos in Wyoming are associated with cottonwood and willow-dominated riparian areas with densely vegetated understories. There are no riparian woodlands in the surrounding vicinity. North Fork Little Muddy Creek flows in a southerly direction by the site, but there are no trees growing along the stream that would provide nesting habitat for the yellow-billed cuckoo.

The nearest stream with a wooded riparian zone is Hams Fork River, which flows north and east of the site (Figure 2.3-2) but comes no closer than 2.5 miles (4.0 kilometers). The WYNDD Data Explorer shows no observations, recent or historic, of yellow-billed cuckoos along Hams Fork River.

Milkweed (*Asclepias* spp.) is an essential feature of monarch butterfly habitat because it is a monarch host plant: monarchs lay their eggs only on milkweeds, and monarch larvae only eat milkweed leaves (Monarch Joint Venture undated). As a result, monarch butterflies can be found anywhere within their range where milkweed and other insect-pollinated flowers are common, including in weedy margins between buildings or adjacent to roads. They have been observed across the state of Wyoming but are regarded as rare (Reference 2.3-73). No milkweed or adult monarch butterflies were observed during the 2022 or 2023 surveys. The only lepidopteran observed in 2023 was the clouded sulphur (butterfly) (*Colias philodice*), a common species found across Wyoming.

Because the IPaC project review indicated that ULT could be present, a consulting wetland scientist surveyed wetlands in the site vicinity in early September 2022 to determine if any contained ULT or suitable habitat for the species. Individual ULT bloom from late July-September, depending on site conditions and moisture availability (Reference 2.3-14; Reference 2.3-24). Blooms have been recorded as late as October (57 FR 2048). Based on studies of other *Spiranthes* species, ULT are thought to live as long as 50 years (Reference 2.3-18). The plant is suited to well drained, stabilized alluvial terraces and sparsely vegetated floodplains or wet meadows where a perennial water table exists at no greater than 18 inches below the soil surface. ULT have been documented to occur in elevations ranging from 720 feet to 7,000 feet (219 meters to 2,134 meters) (Reference 2.3-51). Based on surveys conducted within Wyoming and records from the WYNDD (Reference 2.3-13), ULT are not known to occur within Lincoln County. Additionally, approximately ten occurrences of ULT are known from Wyoming and all occur in the eastern half of the state with the closest known population being in excess of 200 miles (322 kilometers) away (Reference 2.3-74).

Of the locations selected for 2022 surveys, two locations with perennial flow were deemed suitable. None of the other locations surveyed contained a suitable habitat for the species. The largest area of suitable habitat was associated with the riparian habitat along North Fork Little Muddy Creek. This area exhibited suitable hydrology, soils, and vegetation, with acceptable levels of disturbance. The only other area that contained suitable habitat was associated with a perennial stream along the common macro-corridor that receives flow from Naughton Power Plant. No ULT or other similar orchid species were observed during the 2022 surveys (Reference 2.3-42). Areas judged to provide marginally suitable habitat for ULT were surveyed during the July 20–August 31 blooming period in 2023 (none were observed) and will be re-surveyed in 2024 in accordance with USFWS's “Interim Survey Requirements for Ute Ladies-tresses Orchid (*Spiranthes diluvialis*).”

In addition to the Federally-listed and candidate species, the IPaC report indicated that six Birds of Conservation Concern could be present: black rosy-finch (*Leucosticte atrata*), Cassin’s finch (*Carpodacus cassinii*), golden eagle, rufous hummingbird (*Selasphorus rufus*), Western grebe (*Aechmophorus occidentalis*), and willet (*Tringa semipalmata*). No Federally-listed species, species proposed for listing, or candidate for listing were observed in 2022 or 2023. In 2022, two golden eagles, an adult and a sub-adult, were observed flying in the area where the macro-corridor takes a 90 degree turn to the west; in 2023, a single golden eagle was observed perching on the east-west running transmission line that roughly parallels the macro-corridor. During the 2023 raptor nest survey, two golden eagle nests were observed approximately 0.75 miles (1.21 kilometers) southeast of Kemmerer Unit 1 Site. One nest was in good condition, but no activity was observed. The other nest was in very poor condition and likely had not been used in several years. A sub-adult bald eagle was observed well north of the east-west corridor in both 2022 and 2023. The willet and Western grebes, both Birds of Conservation Concern (BCC), were observed on a Naughton Power Plant pond, north of the macro-corridors in 2022 and 2023. A willet was also observed within the site in 2023, along the wetlands of North Fork Little Muddy Creek.

The species occurrence database maintained by the WYNDD was also queried to determine the occurrence of Species of Greatest Conservation Need (SGCN) within the site and macro-corridors and within 5 miles (8 kilometers) of these areas (Reference 2.3-70). Species designated SGCN by WGFD are those whose conservation status warrants increased management attention and funding as well as consideration in conservation, land use, and development planning in Wyoming (Reference 2.3-60). The query revealed that 59 SGCN could potentially occur in the project vicinity (within 5 miles [8 kilometers] of the site and macro-corridors).

Thirteen special-status species were observed on the site, on one of the macro-corridors, or both,12 birds and one mammal (Table 2.3-3). Four more special-status species were observed outside of the survey area but have been included because they are assumed to use wetlands bordering the site or within the macro-corridors to feed, forage, or nest. The American white pelican (*Pelecanus erythrorhynchos*), bald eagle, Brewer's sparrow (*Spizella breweri*), burrowing owl (*Athene cunicularia*), Clark's grebe (*Aechmophorus clarkii*), common yellowthroat (*Geothlypis trichas*), ferruginous hawk, Franklin's gull (*Leucophaeus pipixcan*), great blue heron (*Ardea herodias*), greater sage-grouse (*Centrocercus urophasianus)*, golden eagle, loggerhead shrike (*Lanius ludovicianus)*, sage thrasher (*Oreoscoptes montanus*), Swainson's hawk (*Buteo swainsoni*), Western grebe, and white-tailed prairie dog (*Cynomys leucurus*) are designated SGCN in Wyoming (Reference 2.3-70). Bald and golden eagles are also considered a special-status species because they are fully protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d). The willet is a USFWS BCC.

The waterbird species presented in Table 2.3-3 (marked with an asterisk) were recorded in and around North Fork Little Muddy Creek and on or around small freshwater ponds near the macro-corridors and Naughton Power Plant.

A single American white pelican was observed both years flying over the northern segment of the water macro-corridor. Ferruginous and Swainson's hawks were seen flying or soaring over the central (east-west) segment of the common macro-corridor. Golden eagles were observed in both years flying over the common macro-corridor. Sage thrashers were frequently observed in sagebrush and greasewood flat habitats throughout the project vicinity. The common yellowthroat was recorded singing in the wetland habitat associated with North Fork Little Muddy Creek on the southeastern edge of the site. Brewer's sparrows were observed frequently in 2022, mostly in a sagebrush habitat, but also in the greasewood flat habitat throughout the project vicinity, including a nest with an egg and nestling in a sagebrush; in 2023, Brewer's sparrow was the most encountered species during the TVES. A single great blue heron was recorded foraging in the wetland habitat associated with North Fork Little Muddy Creek on the southeastern edge of the site in 2023.

The white-tailed prairie dog colonies ranged in size from one burrow to approximately two hundred burrows and were observed throughout the entire site and macro-corridors. A pair of burrowing owls were observed in 2023 nesting in one of the white-tailed prairie dog colonies within the TVES survey area, just east of where the water and electrical macro-corridors diverge. A small group of six Franklin's gulls were observed flying south over the electrical macro-corridor. Additionally, two waterbird species on the WGFD list of SGCN, Clark's grebe and Western grebe, were observed on Naughton Power Plant ponds just north of the plant entrance road, outside of the site, and could use wetlands in or adjacent to the site and macro-corridors seasonally. A bald eagle was observed perching on the east-west running transmission line that roughly parallels the central segment of the common macro-corridor.

Baseline data on "important habitats" in the vicinity should include National parks, State parks, State wildlife management areas, Federal and State wildlife refuges, State heritage program natural areas, and wildlife preserves and sanctuaries owned and managed by conservation organizations like The Nature Conservancy and Audubon Society.

The Kemmerer Unit 1 Site lies in the northern part of a broad valley called Cumberland Flats that extends approximately 26 miles (42 kilometers) from the Kemmerer area south almost to Interstate 80. Most of Cumberland Flats (106 square miles [68,000 acres, 27,500 hectares]) has been designated pronghorn crucial winter, yearlong range by the State of Wyoming (Reference 2.3-67). The entire site and most of the macro-corridors (82 percent) lie within this crucial winter, yearlong range for pronghorn (Figure 2.3-3; Reference 2.3-59). Other species with nearby crucial winter or crucial winter, yearlong range include mule deer (approximately 2.5 miles [4.0 kilometers] northeast of the macro-corridors (Reference 2.3-65)), moose (approximately 4.1 miles [6.6 kilometers] northeast of the macro-corridors (Reference 2.3-56)), and elk (approximately 8.5 miles [13.7 kilometers] northwest of the macro-corridors (Reference 2.3-62)). No WGFD-designated migration corridors established in Executive Order (EO) 2020-01 overlap with the Kemmerer Unit 1 Site or macro-corridors.

The Wyoming Governor's Office EO 2019-3 ultimately aims to prevent Endangered Species Act listing of the greater sage-grouse (Reference 2.3-38). This EO defines Core and Non-Core Population Areas for the greater sage-grouse. Core Population Areas are the geographical extents with the highest densities of breeding greater sage-grouses in the State. Non-Core Population Areas are habitats suitable for greater sage-grouses located outside of the Core Population Area. Development stipulations are more flexible in Non-Core Population Areas, but are still required to follow stipulations that will maintain greater sage-grouse populations and habitats. Additionally, the EO describes Connectivity Areas and Winter Concentration Areas. These areas are recognized as areas that are important to the greater sage-grouse population for movement and during certain periods of the year but are not captured in the Core Population Area boundaries. The Core Population Areas divide Wyoming into individual working group areas to facilitate and implement local conservation plans that benefit the greater sage-grouse and its habitats. The greater sage-grouse requires large, contiguous areas of sagebrush habitat that include a variety of semiarid shrub-grassland (shrub steppe) habitats, particularly big sagebrush (Reference 2.3-60).

Based on WGFD data, no greater sage-grouse leks (breeding areas) or Core Population Areas overlap the site or macro-corridors (Figure 2.3-4; Reference 2.3-65; Reference 2.3-66; Reference 2.3-68). The nearest Core Population Area (Sage) is approximately 0.5 miles (0.8 kilometers) east of the site; the macro-corridors are within approximately 2 miles (3 kilometers) of the same Core Population Area. The site is approximately 4.2 miles (6.8 kilometers) west of an occupied lek (G - Little Round Mountain NW), and the macro-corridors are approximately 3.7 miles (5.9 kilometers) east of an occupied lek (G - Anna Richey). There are no Connectivity Areas or Winter Concentration Areas in Lincoln County (Reference 2.3-58).

The USFWS maintains recommendations for disturbance buffer sizes for raptor nests. The recommended buffer size for raptor nests ranges from 0.125 to 1 mile (0.2 to 1.6 kilometers) depending on the species. WGFD recommends a disturbance-free buffer of 300 feet (91.4 meters) for songbird nests. Songbird nests were observed within the site during the TVES. Additionally, four red-tailed hawk nests and two golden eagle nests were observed outside of the site boundary. While these nests are located outside of the site, the disturbance areas fall within the recommended buffer distance for the species.

No other special or unique habitats or wildlife management areas are encompassed by the site or macro-corridors. However, the Commissary Ridge Raptor Migration Route, designated as an Important Bird Area by the National Audubon Society (Reference 2.3-29), is located approximately 1 mile (1.6 kilometers) west of the site. Commissary Ridge is well known in birding circles for the large numbers of hawks, owls, and falcons that can be seen there in the fall migrating south to wintering areas in the southwestern US, Mexico, and Central America.

2.3.1.5 Other Species of Concern

The state of Wyoming has formally designated six species (and groups) as “noxious pests” (Reference 2.3-76). Four of these are known to occur in southwest Wyoming: grasshopper (insects of sub-order Caelifera), mole cricket (*Anabrus simplex*), prairie dogs (*Cynomys* sp.), and ground squirrels (Sciuridae family). Prairie dogs can also be carriers of sylvatic plague, a flea-borne bacterial disease.

From the perspective of wildlife, mosquitoes and ticks are two important disease vectors in southwest Wyoming. Mosquitoes can transmit the West Nile Virus, which has been detected in every county in Wyoming (Reference 2.3-77). West Nile virus has been detected in 250 bird species, but corvids (jays, crows, ravens) are the species most likely to die from the disease (Reference 2.3-10). Diseases transmitted to wildlife in Wyoming by infected ticks include tularemia, Rocky Mountain spotted fever, and Colorado tick fever. Lagomorphs (e.g., cottontail rabbits, jackrabbits, hares) and rodents (e.g., voles, beavers, and muskrats) are especially susceptible to tularemia and can die in large numbers during outbreaks. Small rodents and rabbits have potential to be carriers of Rocky Mountain spotted fever, a bacterial disease that does little harm to the small mammals but could be fatal to very young and very old humans.

Colorado tick fever is a viral disease transmitted by wood ticks that is found in ground squirrels and chipmunks. Small mammals with the virus do not become seriously ill, but they do spread the disease to humans via infected ticks.

2.3.1.6 Correspondence with USFWS and WGFD

A letter of introduction was sent to the USFWS Wyoming Ecological Services Field Office in March 2023 providing background information on the project and preliminary information from field surveys and solicited the agency's concerns regarding important species and habitats. In 2022, the agency's online database (IPaC) was queried about special-status species and habitats that might occur in the vicinity of the Kemmerer Unit 1 Site and proposed utility corridors while planning and designing fish and wildlife surveys.

The USFWS expressed concerns about project impacts on birds protected under the Migratory Bird Treaty Act and recommended "additional" avian surveys (only one was discussed in the March 2023 letter, though more were planned). Project biologists conducted avian surveys of the Kemmerer Unit 1 Site and associated utility macro-corridors in summer 2022 and spring 2023. In its letter, the USFWS recommended conducting nest surveys of raptors and eagles within a 2-mile (3.2-kilometer) radius of the project area. Raptor and eagle nest surveys were conducted in June 2023. Based on the concerns expressed by the USFWS, Section 4.3 describes preconstruction nest surveys and mitigation measures that will be employed if nests of migratory birds are discovered.

A similar letter was sent to the WGFD soliciting the agency's concerns regarding important species under its jurisdiction. In its response, WGFD recommended measures to avoid and minimize impacts to big game, generally, and to pronghorn (antelope), specifically. WGFD also expressed concerns about migratory birds and nesting raptors and recommended surveys of both. They provided specific recommendations on how and when preconstruction nest surveys should be conducted (72 hours prior to construction disturbance from April 10 to July 15). WGFD also provided recommendations regarding excessive artificial lighting, design and location of fencing, and potential threats to wildlife posed by industrial ponds (issues addressed in Section 5.3 of the Environmental Report). Finally, WGFD identified several fish species of concern known to occur in the Muddy Creek and Blacks Fork drainages downstream of the site and recommended a suite of best construction management practices to mitigate impacts of construction on the aquatic communities of North Fork Little Muddy Creek. Potential impacts of building activities on aquatic communities and proposed mitigation measures are discussed in Section 4.3.

2.3.2 Aquatic Ecology

The surface waterbodies of interest, those that could potentially be affected by construction and operation of Kemmerer Unit 1, are Hams Fork River and North Fork Little Muddy Creek. Both streams flow south to join tributaries of the Green River, which empties into the Colorado River in Canyonlands National Park in southeastern Utah. A pre-application monitoring program was implemented in the fall of 2022 to characterize the aquatic communities of these two streams.

The monitoring program was designed to inform the descriptions of aquatic communities in the Environmental Report and provide a basis for the assessment of potential impacts from construction and operation of Kemmerer Unit 1.

The pre-application monitoring program included assessments of aquatic habitats (i.e., hydraulic conditions, aquatic vegetation) and surveys of fish and benthic macroinvertebrates (Reference 2.3-6). Survey results for fall (October) 2022 are summarized in the sections that follow. Scheduled winter sampling (January 2023) was canceled due to extreme temperatures and heavy snowfall that would have made fieldwork logistically challenging and possibly unsafe. Spring surveys were conducted in June 2023, later than planned, because of late snows and high stream flows. Spring fish 2023 surveys are discussed in the sections that follow.

Biological Surveys

Biologists surveyed fish and benthic macroinvertebrates in three study segments in Hams Fork River and three study segments in North Fork Little Muddy Creek (Figure 2.3-2). Survey locations were based on an examination of aerial photos and satellite imagery, United States Geological Survey stream and topographic maps, and an August 2022 field reconnaissance. Each of the study segments were a minimum of 100 meters long. Fish were collected at Hams Fork River using barge-mounted electrofishing gear and minnow traps in wadeable areas and a boat-mounted electrofishing unit in deeper areas (Study Segment HF-3). Fish were collected at North Fork Little Muddy Creek using a backpack electrofisher and minnow traps. Electrofishing was timed (minimum of 15 minutes per segment) at eachlocation to allow comparisons of catch-per-unit-effort (CPUE). Fish collected were identified to species and counted. Up to 50 individuals of each species were measured and weighed, with voucher photographs taken of each species. Fish were released near the point of capture after processing.

Benthic macroinvertebrates were collected with a D-frame kick net (500-micron mesh) in wadeable areas and a petite-Ponar grab sampler in deeper areas. Kick net sampling was conducted in swift-flowing riffle habitats (where present) and was also supplemented with jab-style sampling in undercut banks, backwaters, and littoral areas, generally following methods described in Barbour et al. (Reference 2.3-2). A petite-Ponar grab sampler was used to collect benthic organisms in deeper portions of study segment HF-3, which is impounded by a low dam. In the laboratory, benthic samples were sorted and organisms were identified to the lowest practical taxonomic level with the aid of a stereo-microscope.

Macroinvertebrate data from the various stream segments were used to calculate indices of stream condition. Stream segments were assigned scores based on the Wyoming Stream Integrity Index (WSII) methodology developed by the Wyoming Department of Environmental Quality (Reference 2.3-17). This index incorporates multiple metrics that were developed for specific bioregions in the state, integrating compositional, structural, and functional components of macroinvertebrate assemblages to quantify the status of aquatic life use. For the six stream segments sampled, WSII scores were calculated using ten metrics and scoring criteria provided for the Wyoming Basin.

Segment-level WSII scores were derived by calculating means of the ten assessed metrics, which were then assigned to one of three categories of aquatic life use attainment based on numeric thresholds assigned for the Wyoming Basin. Categories of aquatic life use attainment are “full support” (greater than 51.9 percent), “indeterminate” (34.6–51.9 percent), and “partial/ non-support” (less than 34.6 percent) (Reference 2.3-17).

2.3.2.1 Hams Fork River Aquatic Communities

Hams Fork River flows south-southeast from its headwaters at 9,640 feet (2,950 meter) elevation in the Wyoming Range (Bridger-Teton National Forest, in Lincoln County) for approximately 160 miles (257 kilometers) to its confluence with Blacks Fork, in Sweetwater County. Blacks Fork flows into the Green River (Flaming Gorge) approximately 20 miles (32 kilometers) north of the Wyoming-Utah boundary.

Hams Fork River flows through a broad floodplain, with shrubland and rangeland to the west and pastureland to the east. Sheep and horses can be seen grazing in the streamside pastures. Stream widths in the study segments range from 30 to 75 feet (9 to 23 meters). Depths range from 0.7 feet (0.21 meters) (riffles) to 4.1 feet (1.2 meters) (runs, backwaters) in the upstream segments (HF-1 and HF-2), and reach 8 feet (2.4 meters) in the downstream-most segment (HF-3), which is impounded by a small dam. Substrates at the two upstream study segments are primarily cobble, with some gravel, sand, and silt. Substrate at the downstream-most segment is primarily silt, with some cobble, gravel, and sand. Submerged aquatic vegetation (milfoil - *Myriophyllum* sp.) occurs in each of the segments.

Naughton Power Plant withdraws makeup water for its cooling towers from a section of Hams Fork River that is approximately 7 miles (11 kilometers) north of Naughton Power Plant and 8 miles (13 kilometers) up-river from the City of Kemmerer (Figure 2.3-2). Flow in this section of Hams Fork River is controlled by releases from the Lake Viva Naughton dam, which is approximately 18 miles (29 kilometers) upstream of the Naughton Power Plant Cooling Water Intake Structure (CWIS). The section of Hams Fork River adjacent to the Naughton Power Plant CWIS is impounded by a low dam, ensuring that water levels are adequate to provide year-round makeup to Naughton Power Plant’s cooling towers. Kemmerer Unit 1 will withdraw makeup for its cooling towers from the Raw Water Settling Basin at Naughton Power Plant.

Hams Fork River upstream of Kemmerer, including the river reach adjacent to the Naughton Power Plant CWIS, has been designated Use Class 2AB by Wyoming Department of Environmental Quality (WYDEQ), meaning this reach of the river supports cold-water game fish (salmonids) and is “presumed to have sufficient water quality and quantity to support drinking water supplies and [is] protected for that use.” Class 2AB waters are also protected for nongame fisheries, fish consumption, aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value uses.

2.3.2.1.1 Hams Fork River Fish Surveys

October 2022 Fish Survey

A total of 1,246 fish representing 8 species were collected at the three Hams Fork River stream segments (see Figure 2.3-5) in October 2022 (Table 2.3-4). Hams Fork River fish collections were dominated by small-bodied, schooling minnow species (cyprinids) and small (juvenile) suckers (catostomids). More than 90 percent of fish collected were representatives of two species, redside shiner (*Richardsonius balteatus*; 75.8 percent) and white sucker (*Catostomus commersonii;* 15.6 percent). Both are classified as non-native species in the Green River Basin (Reference 2.3-61). The redside shiner, native to the Pacific Northwest and Montana west of the Continental Divide, was introduced to southwest Wyoming, and is common in the Green and Little Snake river drainages of Wyoming (Reference 2.3-3). An adaptable species, the redside shiner could be found in lakes, ditches, headwater streams, and small-to-medium rivers, usually over mud or sand substrates and often near vegetation (Reference 2.3-31). Because the species has a high reproductive potential, their numbers can increase dramatically in a body of water when conditions are favorable. The white sucker is native to the Upper Midwest and Great Plains, including eastern Wyoming, but was likely a “bait bucket release” in the Colorado River drainage of southwest Wyoming (Reference 2.3-15). The white sucker’s preferred habitat is clear streams with sand or gravel bottoms, but it can also tolerate polluted and silty streams (Reference 2.3-37; Reference 2.3-25).

Three salmonids [rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and mountain whitefish (*Prosopium willamsoni*)] were collected during the October Hams Fork River surveys, but were present in small numbers, comprising less than three percent of fish captured there (see Table 2.3-4). Hams Fork River below Viva Naughton Reservoir and above the Naughton Power Plant CWIS supports a recreational trout fishery, with public access via several WGFD easements. Hams Fork River below the Kemmerer City Reservoir was regularly stocked with brown and rainbow trout in the 1980s and 1990s, but the WGFD’s online Fish Stocking Report shows no stocking in this river reach after 1998 (Reference 2.3-69).

Electrofishing CPUE in Hams Fork River showed a marked decrease from upstream to downstream, with 44, 21, and 6 fish caught per minute at HF-1, HF-2, and HF-3 (Table 2.3-5). This could be related to differences in habitat quality, as the two upstream segments had significant flow, rock or gravel substrates, and abundant submerged aquatic vegetation, while HF-3 had barely perceptible flow, a silty substrate, and less submerged aquatic vegetation. The three locations had adequate dissolved oxygen levels (> 9.0 mg/L) in October 2022 (Reference 2.3-6). Species richness, unlike measures of abundance, showed very little between-segment variation.

White suckers (37.4 percent of total) and redside shiners (21.7 percent) were also the fish species most often collected by WGFD biologists in 2004 at three sampling locations on Hams Fork River between Viva Naughton Reservoir and State Highway 233 (Reference 2.3-23). Longnose dace (*Rhinichthys cataractae*) and speckled dace (*R. osculus*) were also routinely collected, making up 22.3 percent of the total. The three previously mentioned salmonids made up 16.3 percent of the total in 2004.

June 2023 Fish Survey

Spring fish surveys, originally scheduled for May 2023, were delayed by late snows and high stream levels. Fish surveys were ultimately conducted in June, after stream flows subsided, but snowmelt and localized rains still hampered sampling (Reference 2.3-7). The boat-mounted electrofisher used in October 2022 could not be used in June 2023 for safety reasons (high water, high current velocities). A backpack electrofishing unit was used at HF-1 and HF-2 but was not as effective as the boat-mounted unit. Neither the boat-mounted unit nor the backpack unit could be used safely at HF-3. One fish was collected at HF-3, in a minnow trap.

Although many fewer fish were collected in June 2023 (90) (Table 2.3-13) than October 2022 (1,246), two species not collected at Hams Fork River in 2022, the Utah chub (*Gila atraria*) and the mountain sucker, were collected in June 2023 (Reference 2.3-7). The Utah chub is a large minnow that is native to the Bear and Snake River basins of Wyoming but has become established in the Green River Basin. It is regarded as a nuisance species by some fisheries managers, because it can compete with game fish, and has been the subject of eradication programs in the past (Reference 2.3-35). The mountain sucker, a slow-growing species (rarely exceeds 8 inches in length) that feeds on algae and invertebrates, ranges from northern California to South Dakota and Nebraska (Reference 2.3-3). It is native to most of the river basins in Wyoming, including the Green River.

2.3.2.1.2 Hams Fork River Benthic Macroinvertebrate Surveys

A total of 1,426 individual macroinvertebrates from 43 unique taxa were identified from Hams Fork River benthos samples in October 2022 (Table 2.3-6). Taxa richness and abundance measures were highest at the upstream station and lowest at the downstream station. Common Hams Fork River taxa included midges (Chironomidae), mayflies of the genus *Callibaetis* and *Tricorythodes*, riffle beetles of the genus *Optioservus*, caddisflies of the genus *Hydropsyche*, and pea clams of the family Sphaeriidae.

Since HF-3 had barely discernible current and a silty bottom, there were lower numbers of macroinvertebrates, lower measures of taxa richness and many fewer Ephemeroptera (mayfly), Trichoptera (caddisfly), and Plecoptera (stonefly) taxa than HF-1 and HF-2. Because Ephemeroptera, Plecoptera, and Trichoptera (EPT) are associated with unpolluted streams, EPT taxa richness is a widely used indicator of water quality (Reference 2.3-22; Reference 2.3-2). The number of Ephemeroptera, Trichoptera, and Plecoptera taxa was much higher at HF-1 (11) and HF-2 (12) than HF-3 (2). Five Trichopteran genera (228 individuals) were identified from HF-1 and HF-2. None was identified from HF-3. These two segments also had the lowest percent non-insect taxa and the lowest Hilsenhoff Biotic Index (HBI) values (Table 2.3-7). Composite WSII scores (Table 2.3-7) from Hams Fork River study segments were 44.8 (HF-1), 47.3 (HF-2), and 23.2 (HF-3), which corresponded with the “indeterminate” aquatic life use category at HF-1 and HF-2 and “partial/non-support” category at HF-3 (Reference 2.3-17).

The Hams Fork River food web appears to consist primarily of periphyton (consumed by benthic macroinvertebrates), benthic macroinvertebrates (e.g., small worms, small clams, aquatic insect larvae), small insectivorous fish (cyprinids), suckers (catostomids) that feed mostly on benthic macroinvertebrates, and larger fish (salmonids) that prey on both aquatic insects and small fish.

Hams Fork River is a shallow stream, for the most part, and zooplankton are assumed to be less important, trophically. Terrestrial insects (e.g., grasshoppers, beetles) from adjacent pastures and fields that fall into the stream probably make a modest contribution in some seasons and in some years.

2.3.2.2 North Fork Little Muddy Creek Aquatic Communities

From its headwaters, west of the City of Kemmerer, North Fork Little Muddy Creek flows south to join Little Muddy Creek, approximately 10 miles (16 kilometers) south of the Kemmerer Unit 1 Site. Little Muddy Creek flows east to join Muddy Creek, which flows into Blacks Fork. North Fork Little Muddy Creek is an intermittent stream, according to the United States Geological Survey (Reference 2.3-53) National Hydrography Dataset. Although it has the appearance of a perennial stream, stream flow is dependent on Naughton Power Plant effluent (mostly cooling tower blowdown), which reaches North Fork Little Muddy Creek via an unnamed tributary stream. This effluent constitutes a major portion of North Fork Little Muddy Creek’s flow when Naughton Power Plant is operating. When Naughton Power Plant is offline for repairs or maintenance, North Fork Little Muddy Creek is reduced to a muddy creek bed with standing water in deeper sections. There is no perceptible flow at these times.

North Fork Little Muddy Creek flows through rangeland, and cattle can be seen grazing along some stream reaches. Sheep are also present seasonally, as they are moved from spring pastures to higher-elevation summer ranges and back to lower valleys where they spend winters. It is a small stream, ranging from 3 to 9 feet (1 to 2.7 meters) wide, and shallow, from 0.5 to 3.1 feet (0.2 to 0.9 meters) deep (Reference 2.3-6). Low, weedy vegetation grows along the upstream survey segment (NFLM-1), while cattails grow along the downstream segments (NFLM-2 and -3). Substrates are mostly silt at each of the three survey segments. The three stream segments contained substantial growth of submerged aquatic vegetation (*Potamogeton foliosus*) in October 2022, with reduced coverage in other seasons. The stream segments of interest are shown in Figure 2.3-6.

North Fork Little Muddy Creek has been designated a Class 3B stream by WYDEQ, a designation normally given to “tributary waters…not known to support fish populations or drinking water supplies…” WYDEQ describes Class 3B waters as intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. Class 3B waters normally do not support fish populations (game fish or non-game fish) or fish consumption.

2.3.2.2.1 North Fork Little Muddy Creek Fish Surveys

October 2022 Fish Survey

Three small-bodied cyprinid species; speckled dace, longnose dace, and redside shiner - comprised almost 85 percent of the fish collected in North Fork Little Muddy Creek in October 2022 (Table 2.3-8). The speckled dace is native to the Pacific Northwest and parts of Wyoming west of the Continental Divide. Primarily a stream species, it is common in the Green, Bear, and Snake River drainages of Wyoming (Reference 2.3-3). The longnose dace is found across the northern U.S. from coast (Maine) to coast (Washington) and as far south as Texas

(Reference 2.3-21). They are native to parts of Wyoming, but populations in the upper Green River Basin are believed to be introduced, from bait bucket releases (Reference 2.3-33). They thrive in swift streams with rock and gravel substrates (Reference 2.3-21) but are adaptable and could be found in "virtually any aquatic habitat" (Reference 2.3-25). Smaller numbers of mountain suckers (*Catostomus platyrhynchyus*), white suckers, and fathead minnows (*Pimephales promelas*) were also collected from North Fork Little Muddy Creek in October 2022.

At North Fork Little Muddy Creek, both abundance (CPUE) and species richness increased from upstream to downstream (Table 2.3-9). This could be related to habitat differences or proximity to larger Little Muddy Creek. It is possible that fish move between North Fork Little Muddy Creek and Little Muddy Creek when stream flows and water levels allow it.

WGFD biologists surveyed North Fork Little Muddy Creek in 2004 and 2018 as part of their routine monitoring of fish in Green River Basin streams. In the most recent sampling in June 2018, white suckers were most abundant (58.3 percent of total) followed by fathead minnows (16.7 percent), mountain suckers (9.3 percent), and redside shiners (8.7 percent) (Reference 2.3-23). Two species not collected from North Fork Little Muddy Creek in October 2022 were collected by WGFD biologists in 2018 in relatively small numbers: Utah chub (*Gila atraria*; 3.0 percent) and roundtail chub (*Gila robusta*; <1.0 percent). Two individuals thought to be flannelmouth sucker (*Catastomus latipinnis*), white sucker hybrids were also collected by WGFD biologists in 2018.

Carter and Hubert (1995) studied fish populations in Bitter Creek, a stream system in southwest Wyoming similar to North Fork Little Muddy Creek. Like North Fork Little Muddy Creek, Bitter Creek and its tributaries have little or no flow at certain times of year. Like North Fork Little Muddy Creek, Bitter Creek receives supplemental flow from an industrial source (a wastewater treatment plant). Seven fish species were collected in the Carter and Hubert study: speckled dace, fathead minnow, Utah chub, Bonneville redside shiner (*Richardsonius balteatus hydrophlox*), mountain sucker, white sucker, and flannelmouth sucker. Only three of the seven species (speckled dace, flannelmouth sucker, and mountain sucker) were indigenous. The number of species and standing stocks (biomass) of fish increased from headwaters to downstream reaches. With the exception of the downstream-most reach, which received WWTP effluent, no more than three species were found at any of the study reaches. The authors of the study concluded that two indigenous species, speckled dace and mountain sucker, and one introduced species, fathead minnow, appear to be particularly well suited to survive in intermittent southwest Wyoming streams. Fathead minnows tend to be restricted to lower elevations than the two native species.

June 2023 Fish Survey

As discussed in the previous section, spring fish surveys originally scheduled for May 2023 were delayed by late snows and high river levels. Fish surveys were ultimately conducted in June after stream flows subsided, but snowmelt and localized rains still hampered sampling. A backpack electrofishing unit was used to collect fish in North Fork Little Muddy Creek, but high flows and muddy water made sampling difficult. Only eight fish were collected from North Fork Little Muddy

Creek in June 2023: one fathead minnow, one speckled dace, and six white suckers (Reference 2.3-7). No conclusions could be drawn from these samples regarding distribution or abundance of fish in North Fork Little Muddy Creek.

2.3.2.2.2 North Fork Little Muddy Creek Benthic Macroinvertebrates

Benthos samples from North Fork Little Muddy Creek in October 2022 were numerically dominated by chironomids, which are generally regarded as indicators of poor water quality; *Callibaetis* mayflies, the gastropod snail *Physella,* and oligochaete worms are also regarded as indicators of poor water quality (Table 2.3-10). Although mayflies are normally associated with excellent water quality, *Callibaetis*, the genus that was prevalent in North Fork Little Muddy Creek samples, is relatively pollution tolerant. *Callibaetis* had the highest tolerance value (9 on a scale of 10) of the mayfly taxa evaluated or rated by Hilsenhoff (Reference 2.3-19).

The food web of North Fork Little Muddy Creek is a simple one, reflecting the stream's small size and lack of habitat diversity. The benthos is dominated by pollution-tolerant chironomids, small snails *(Physella* sp.), and pollution-tolerant *Callibaetis* mayflies. The fish collected during the survey were either minnows (cyprinids) or small suckers (catostomids). Both groups eat algae, microcrustaceans, small snails, and aquatic insects.

The bioassessment metrics for North Fork Little Muddy Creek (Table 2.3-11) were indicative of a stressed system. The number of Ephemeroptera, Plecoptera, and Trichoptera taxa was low (1 to 3) at each of the North Fork Little Muddy Creek study segments, and much lower than the number (11 and 12) observed at the two upstream Hams Fork River study segments. The percent collector-gatherer and percent scraper scores decreased from upstream to downstream, suggesting worsening conditions. However, NFLM-3 had the highest HBI score, contradicting the other metrics. This disparity appears to have been caused by higher numbers of pollution-tolerant chironomids, *Callibaetis* mayflies, and *Physella* (snails) at the two upstream study segments.

2.3.2.3 Important Species and Habitats

"Important species" includes Federally-listed species, species proposed for Federal listing, species that are candidates for Federal listing, State-listed species, commercially or recreationally valuable species, species that are essential to the survival of rare and commercially or recreationally valuable species, and species that are critical to the structure and function of the local aquatic ecosystem.

The USFWS IPaC report for the Project indicated that the following Federally-listed aquatic species could be "potentially affected by activities at this location" (Reference 2.3-50):

- Bonytail (*Gila elegans*): endangered
- Colorado pikeminnow (*Ptychocheilus lucius*): endangered
- Humpback chub (*Gila cypha*): threatened
- Razorback sucker (*Xyrauchen texanus*): endangered

However, a desktop review of the scientific literature and information on resource agency websites (e.g., the WYNDD) indicated that none of these Federally-listed species were likely to be affected by project activities.

The bonytail, Colorado pikeminnow, and razorback sucker are considered extirpated from Wyoming according to the Wyoming Game and Fish Department's 2017 State Wildlife Action Plan (Reference 2.3-61). The humpback chub once occurred in the Green River as far upstream as Blacks Fork but is no longer found in the state of Wyoming, according to a Species Status Assessment prepared by USFWS (Reference 2.3-49). None of these Colorado River basin endemics is believed to survive in Wyoming.

Given the emphasis the 2017 Wyoming State Wildlife Action Plan placed on management and conservation of species designated as SGCN by the WGFD, it was determined that these species were also "important" and should be considered in the evaluation. Species designated as SGCN by the WGFD are those whose conservation status warrants increased management attention and funding as well as consideration in conservation, land use, and development planning in Wyoming (Reference 2.3-60). Species occurrence databases maintained by the WYNDD were queried to determine the occurrence of SGCN within the site and macro-corridors and within 5 miles of these areas (Reference 2.3-70).

Six fish species and one unionid mussel species designated as SGCN were identified as occurring in the site vicinity: Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*), Bonneville cutthroat trout (*Oncorhynchus clarkii utah*), bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*C. latipinnis*), Northern leatherside chub (*Lepidomeda copei*), roundtail chub, and California floater (*Anodonta californiensis*).

The likelihood of each of these species occurring in the site vicinity is discussed in the paragraphs that follow.

The Colorado River cutthroat trout, the only trout native to the Green River Basin, has not been observed in Hams Fork River below Viva Naughton Reservoir since 1980 (Reference 2.3-75). No Colorado River cutthroats were collected from Hams Fork River in 2004 when WGFD conducted basin-wide fish surveys (Reference 2.3-23). Based on WYNDD data, remnant populations of Colorado River cutthroats could still be found in the headwaters of Hams Fork River in the Commissary Ridge area, but the last observation was in 1997. This species is not expected to be affected by Project activities.

The Bonneville cutthroat trout is native to the Bonneville basin of Wyoming, Idaho, Utah, and Nevada (Reference 2.3-32). In Wyoming, it is found only in the Bear River and its tributaries (Reference 2.3-75) and, as such, could not be affected by project activities.

The bluehead sucker is native to the Colorado River Basin (Wyoming, Utah, New Mexico, and Arizona), the Bonneville basin of Utah, and the Snake River basin of Wyoming and Idaho (Reference 2.3-1). The bluehead sucker is typically found in mainstems and tributaries of rivers. The species historically occurred in the Green, Bear, Snake, and Little Snake River drainages of Wyoming (Reference 2.3-3). They were once found in small numbers throughout the upper Green River Basin, including the Hams Fork River drainage (Reference 2.3-16), but their current status in the Hams Fork River system is uncertain. The WYNDD shows no observations in Hams

Fork River after 1980. No bluehead suckers were collected from Hams Fork River in 2004 when WGFD conducted basin-wide fish surveys (Reference 2.3-23). This species is not expected to be affected by project activities.

The flannelmouth sucker, another Colorado River basin endemic, occurs in the Green and Little Snake River basins of Wyoming. It was found at several Hams Fork River locations downstream of Kemmerer in 2004 when WGFD conducted basin-wide fish surveys (Reference 2.3-23). It was not found in Hams Fork River between Viva Naughton Reservoir and Kemmerer in 2004 and was not collected by biologists conducting surveys in support of the project in October 2022. This species is not expected to be affected by project activities.

The Northern leatherside chub was historically found in the upper Hams Fork River,but it was last collected in 1996 in very small numbers in the reach of river upstream of Kemmerer (one fish) and the area of the Hams Fork River-West Fork, confluence (two fish), which is approximately 26 river miles above Viva Naughton Reservoir. This species is unlikely to be affected by project activities.

The roundtail chub is endemic to the Colorado River basin, where it is found in both large and small streams. In Wyoming, it occurs in the Green and Little Snake River drainages (Reference 2.3-3). It was found in several Hams Fork River locations downstream of Kemmerer in 2004 when WGFD conducted basin-wide surveys. The species was also collected in the lower reaches of North Fork Little Muddy Creek by WGFD biologists in 2004 and again in 2018. No roundtail chubs were collected by biologists conducting baseline surveys in support of the project in October 2022 or June 2023 (Reference 2.3-6; Reference 2.3-7).

The California floater is patchily distributed across the northwestern U.S., but in Wyoming is found only in the Bear River and its tributaries (Reference 2.3-75). This species will not be affected by project activities.

Important Aquatic Habitats

Examples of important aquatic habitats are areas protected by Federal and State law such as National and State parks, marine and estuarine sanctuaries, Federal and State refuges, areas designated Essential Fish Habitat or known to be critical to the survival of a Federally-listed species (critical habitat), and areas identified as important spawning or nursery grounds by Federal and State agencies during the consultation process. The State of Wyoming has identified a number of other important aquatic habitats, including Blue and Red Ribbon Streams (highly productive trout fisheries) and Aquatic Conservation Areas (watersheds containing high numbers of SGCN or more sensitive SGCN).

The Upper Hams Fork watershed, including the river reach with the Naughton Power Plant CWIS, has been designated a “crucial” Aquatic Conservation Area by WGFD (Reference 2.3-63). It was chosen because it is a priority conservation area for the native Colorado River cutthroat trout (Reference 2.3-64). The Hams Fork River population of Colorado River cutthroat appears to be restricted to the upper portions of the Hams Fork River system and potentially have been eliminated from the reach of river below Viva Naughton Reservoir.

2.3.2.4 Nuisance or Invasive Species

Only 12 fish species were historically found in the Green River Basin of Wyoming (Reference 2.3-61), an arid region with limited water resources that is subject to weather extremes and unpredictable stream flows. Three of the 12 species are known to have been extirpated: bonytail, Colorado pikeminnow, and razorback sucker (Reference 2.3-61). The elimination of the fourth, the humpback chub, has not been confirmed, but the weight of evidence suggests that this species no longer occurs in Wyoming (Reference 2.3-49).

The WGFD Aquatic Invasive Species page's interactive map (Reference 2.3-69) shows two invasive species in the Green River Basin, the curly pondweed (*Potamogeton crispus)* and the New Zealand mudsnail (*Potamopyrgus antipodarum*). Native to Eurasia, the curly pondweed has become established in 50 states and Canada (Reference 2.3-43). A submersed aquatic macrophyte, the curly pondweed can grow under low-light conditions (due to turbidity) that effectively exclude other aquatic plants. This species occurs in most Wyoming drainages east of the Continental Divide and in the Upper Green River Basin (Flaming Gorge Reservoir) (Reference 2.3-69). It has not been observed in the Hams Fork River drainage or Little Muddy Creek drainage. The New Zealand mudsnail, native to the New Zealand archipelago, was first discovered in the U.S. (Idaho) in 1987 and is now found in 22 states (Reference 2.3-4). In Wyoming, the New Zealand mudsnail occurs in the Big Horn, North Platte, Upper Snake, and Upper Green River Basins (Reference 2.3-69) but has not been observed in either the Hams Fork River or Little Muddy Creek drainages. Extremely prolific, they are believed to compete directly with native invertebrates for food and space (Reference 2.3-4).

The (2017) Wyoming State Wildlife Action Plan makes a distinction between Aquatic Invasive Speciesand other non-native aquatic species, but the reason for the distinction is not clear. Two non-native fish species, the burbot (*Lota lota*) and the white sucker, are identified as serious threats to the indigenous aquatic species of the Green River Basin, but neither has been designated an Aquatic Invasive Species (Reference 2.3-61).

Burbot are "voracious predators" whose range is expanding in the Green River Basin and "pose a significant threat" to three native species (bluehead sucker, flannelmouth sucker, and roundtail chub) in Blacks Fork and Hams Fork River. Burbot are native to Wyoming east of the Continental Divide and have been planted in waters west of the Divide by anglers. None were found in Hams Fork River or North Fork Little Muddy Creek in October 2022 nor were any collected by WGFD biologists from Hams Fork River in 2004 or North Fork Little Muddy Creek in 2018 (Reference 2.3-23).

The white sucker poses a threat to two native suckers (bluehead sucker and flannelmouth sucker) in the Green River Basin with which it competes and hybridizes. White suckers were collected at the three Hams Fork River study segments in October 2022 and made up more than 15 percent of fish collected there. Smaller number of white suckers were collected at the downstream-most station along North Fork Little Muddy Creek, NFLM-3.

Only two of eight fish species collected in Hams Fork River in October 2022 (making up only 1.5 percent of fish collected) were native to the Green River Basin (Table 2.3-12). Two of the six species collected in North Fork Little Muddy Creek (comprising 39.9 percent of fish collected) were Green River Basin natives. Of 1,399 fish collected from both streams in October 2022, only 80 (5.7 percent) were natives. These percentages will change as more data are collected, but it seems the fish community of the Hams Fork River has been severely altered by unauthorized introductions of cyprinid species such as the redside shiner, longnose dace, and fathead minnow. All these populations are likely descended from bait minnows that escaped or were released by anglers.

In addition to the nuisance or invasive plants and animals discussed in the preceding paragraphs, a disease that has caused declines in salmonid populations across the Intermountain West has appeared in the Green River Basin. Whirling disease, caused by a metazoan parasite that attacks the nervous and skeletal systems of salmonids, results in spinal deformities and erratic swimming behavior (whirling). The disease appeared in the eastern U.S. in the 1950s, spread west, and by 1988 had appeared in Wyoming (Reference 2.3-55). Whirling disease is believed to interfere with feeding, make fish more vulnerable to predation, and reduce their ability to cope with environmental stresses. Whirling disease is presumed to have caused the collapse of some blue-ribbon rainbow trout fisheries in Montana and is believed to be a major factor in the declines of wild rainbow trout populations in Colorado (NPS 2023; Reference 2.3-9). As of 2010, no large-scale die-offs or population declines had been linked to whirling disease in Wyoming (Reference 2.3-55). Whirling disease has been found in watersheds across Wyoming, including the Green River, but apparently has not been found in the Hams Fork, Blacks Fork, Muddy Creek, or Little Muddy Creek drainages (Reference 2.3-57).

More than 72 percent of all fish collected in October 2022 from both study locations were redside shiners, a hardy species native to the Columbia River basin that has been introduced illegally to waters across the Intermountain West (Reference 2.3-33; Reference 2.3-15). Smith et al. (Reference 2.3-36) discussed consequences of this species' introduction into novel habitats and the difficulty of eradicating populations once established. Johnson et al. (Reference 2.3-20) studied redside shiner competition with native salmonids and suggested that climate change could favor growth and expansion of redside shiner populations while negatively affecting some salmonids.

2.3.2.5 Pre-existing Stresses

Pre-existing environmental stressors can include both natural and man-induced elements that affect the health and structure of aquatic communities; but in the context of environmental impact assessment, they are typically anthropogenic stressors such as thermal and chemical pollutants (discharges) regulated under State Wyoming Pollutant Discharge Elimination System programs. The State of Wyoming is required by the Clean Water Act to submit a report to the U.S. Environmental Protection Agency every two years describing the condition or health of its surface waters [a "305(b) report"] and to compile a list [a "303(d) list"] of waterbodies that do not meet State water quality standards even after technology-based controls have been implemented. Wyoming, like many states, prepares an "integrated" 305(b) and 303(d) report that addresses both Federal requirements.

As noted earlier, Hams Fork River above Kemmerer (including the river reach from which the Naughton CWIS withdraws) is rated 2AB by WYDEQ, meaning its water quality is suitable to support cold-water game fish and serve as a supply of drinking water. In the latest Integrated

305(b) and 303(d) report (Reference 2.3-54), this section of Hams Fork River is described as fully supporting all designated uses: agriculture, cold-water game fish, industry, aquatic life other than fish, and wildlife. There are no industrial facilities with Wyoming Pollutant Discharge Elimination System discharges on Hams Fork River between the Viva Naughton dam and the Naughton Power Plant CWIS according to the U.S. Environmental Protection Agency's Facility Registry Service (Reference 2.3-48).

North Fork Little Muddy Creek is not one of the waterbodies assessed in the state of Wyoming's biennial Integrated 305(b) and 303(d) report, presumably because it is not a "natural" body of water. Most of the flow in North Fork Little Muddy Creek is effluent from Naughton Power Plant and as a result, contains elevated levels of suspended solids, low levels of metals (copper, iron, selenium), and low levels of chlorine. The Naughton Power Plant Wyoming Pollutant Discharge Elimination System permit stipulates that there will be "no acute toxicity from outfall number 003" (the only currently permitted outfall). The permit requires quarterly toxicity testing of the effluent in accordance with 40 CFR 136.3 and U.S. Environmental Protection Agency Region VIII guidelines. Should testing reveal acute toxicity (unacceptable mortality in test organisms), PacifiCorp is required to identify the source of the toxicity and develop controls or treatments to remedy the situation.

The fact that North Fork Little Muddy Creek supports a reasonably diverse assemblage of fish and invertebrates would seem to indicate that existing Naughton Power Plant pollution controls and effluent limits have been effective. Two native fish species, speckled dace and mountain sucker, were collected from North Fork Little Muddy Creek in October 2022 and a third, the roundtail chub, (a Wyoming SGCN) was collected there in 2018 by WGFD biologists conducting an assessment of the Muddy Creek drainage.

2.3.2.6 Correspondence with USFWS and WGFD

Letters to the USFWS Wyoming Ecological Services Office and WGFD were sent in March 2023, provided background information on the project, and solicited agency concerns regarding important species and habitats. In 2022, the Service's online database (IPaC) was queried about special-status species and habitats that might occur in the project vicinity.

In its response (dated May 1, 2023), USFWS identified four federally listed fish species that could be affected and associated critical habitats. The USFWS letter evidenced concerns about project-related water "depletions" (consumptive water use) that could impact the four listed fish species. The letter also asked that a detailed analysis of water use and diversions be included in the Environmental Report.

The WGFD (letter dated April 27, 2023) expressed concerns about Hams Fork River water use and potential impacts of Kemmerer Unit 1 construction and operations on North Fork Little Muddy Creek stream flows and water quality. The letter noted that a SGCN (roundtail chub) occurs downstream of the project in North Fork Little Muddy Creek and two more SGCN (flannelmouth sucker and bluehead sucker) occur further downstream in Muddy Creek and Blacks Fork River. Finally, WGFD provided a list of construction Best Management Practices to limit impacts to water quality and aquatic habitats.

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Table 2.3-1 Vegetation Types Recorded in the Study Area and in the Macro-Corridors

Vegetation Type	Study Area (Acres)	Macro-Corridors (Acres)
Developed-High Intensity	-	0.69
Developed-Low Intensity	-	1.24
Developed-Medium Intensity	-	2.26
Developed-Roads	0.03	2.83
Great Basin & Intermountain Introduced Annual and Biennial Forbland	-	0.81
Great Basin & Intermountain Introduced Perennial Grassland and Forbland	-	7.53
Great Basin & Intermountain Ruderal Shrubland	0.22	0.22
Interior West Ruderal Riparian Scrub	-	0.22
Interior Western North American Temperate Ruderal Shrubland	-	0.22
Inter-Mountain Basins Big Sagebrush Shrubland	284.49	368.24
Inter-Mountain Basins Big Sagebrush Steppe	10.63	9.20
Inter-Mountain Basins Cliff and Canyon	0.21	0.22
Inter-Mountain Basins Greasewood Flat	16.05	6.68
Inter-Mountain Basins Mat Saltbush Shrubland	22.35	4.31
Inter-Mountain Basins Mixed Salt Desert Scrub	0.22	0.70
Inter-Mountain Basins Montane Sagebrush Steppe	0.45	8.04
Inter-Mountain Basins Semi-Desert Shrub-Steppe	0.44	3.38
Inter-Mountain Basins Shale Badland	-	0.05
North American Arid West Emergent Marsh	1.00	0.49
Open Water	-	6.57
Quarries-Strip Mines-Gravel Pits-Well and Wind Pads	14.15	35.10
Rocky Mountain Foothill Limber Pine-Juniper Woodland	-	1.20
Rocky Mountain Lower Montane-Foothill Riparian Shrubland	4.33	16.44
Rocky Mountain Lower Montane-Foothill Riparian Woodland	0.38	0.80
Western Cool Temperate Close Grown Crop	-	0.41
Western Cool Temperate Pasture and Hayland	2.87	0.93
Western Cool Temperate Urban Deciduous Forest	-	0.22
Western Cool Temperate Urban Herbaceous	-	0.55
Western Cool Temperate Urban Shrubland	-	3.20
Wyoming Basins Dwarf Sagebrush Shrubland and Steppe	17.73	28.64
Grand Total	**375.57**	**511.38**

Source: Reference 2.3-47

Table 2.3-2 General Wildlife Species Recorded on the Site and in the Macro-Corridors (Sheet 1 of 3)

Common Name	Scientific Name	Site Occurrence	Macro-Corridors Occurrence	Surrounding Area Occurrence	Abundance[1]
BIRDS					
American Avocet*	*Recurvirostra americana*	X	X	X	Uncommon
American Coot*	*Fulica americana*	-	-	X	Common
American Goldfinch	*Spinus tristis*	-	X	-	Uncommon
American Robin	*Turdus migratorius*	-	X	-	Uncommon
Barn Swallow	*Hirundo rustica*	X	X	X	Common
Black-billed Magpie	*Pica hudsonia*	-	X	-	Common
Brewer's Blackbird	*Euphagus cyanocephalus*	X	X	X	Common
Brown-headed Cowbird	*Molothrus ater*	-	X	X	Common
Canada Goose*	*Branta canadensis*	X	X	X	Uncommon
Cinnamon Teal*	*Spatula cyanoptera*	X	-	-	Uncommon
Clay-colored Sparrow	*Spizella pallida*	X	-	-	Uncommon
Cliff Swallow	*Petrochelidon pyrrhonota*	X	X	X	Common
Common Raven	*Corvus corax*	X	X	X	Common
Eared Grebe*	*Podiceps nigricollis*	-	-	X	Uncommon
European Starling	*Sturnus vulgaris*	-	X	-	Common
Gadwall*	*Mareca strepera*	X	X	X	Uncommon
Great Horned Owl	*Bubo virginianus*	-	X	-	Uncommon
Green-winged Teal*	*Anas crecca*	X	-	X	Uncommon
Horned Lark	*Eremophila alpestris*	X	X	X	Abundant
House Finch	*Haemorhous mexicanus*	-	X	-	Common
House Sparrow	*Passer domesticus*	-	X	-	Uncommon
Killdeer	*Charadruis vociferus*	X	X	X	Uncommon
Lesser Scaup*	*Aythya affinis*	-	-	X	Uncommon
Mallard*	*Anas platyrhynchos*	-	X	X	Uncommon
Mountain Bluebird	*Sialia currucoides*	X	X	-	Uncommon

Table 2.3-2 General Wildlife Species Recorded on the Site and in the Macro-Corridors (Sheet 2 of 3)

Common Name	Scientific Name	Site Occurrence	Macro-Corridors Occurrence	Surrounding Area Occurrence	Abundance[1]
Mourning Dove	*Zenaida macroura*	X	X	-	Uncommon
Northern Harrier	*Circus hudsonius*	X	X	X	Uncommon
Northern Pintail*	*Anas acuta*	X	-	-	Uncommon
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	-	X	-	Uncommon
Northern Shoveler*	*Spatula clypeata*	X	-	X	Uncommon
Red-tailed Hawk	*Buteo jamaicensis*	X	X	X	Common
Red-winged Blackbird*	*Agelaius phoeniceus*	X	-	X	Common
Ring-necked Duck*	*Aythya collaris*	-	-	X	Uncommon
Sandhill Crane*	*Antigone canadensis*	-	-	X	Uncommon
Savannah Sparrow	*Passerculus sandwichensis*	X	X	X	Common
Say's Phoebe	*Sayornis saya*	X	X	X	Uncommon
Song Sparrow	*Melospiza melodia*	X	-	X	Uncommon
Sora*	*Porzana carolina*	X	-	-	Uncommon
Spotted Sandpiper*	*Actitis macularius*	-	-	X	Uncommon
Tree Swallow	*Tachycineta bicolor*	-	X	-	Uncommon
Turkey Vulture	*Cathartes aura*	X	X	X	Common
Vesper Sparrow	*Pooecetes gramineus*	X	X	X	Abundant
Violet-green Swallow	*Tachycineta thalassina*	X	X	X	Uncommon
Western Bluebird	*Sialia mexicana*	-	X	-	Uncommon
Western Meadowlark	*Sturnella neglecta*	X	X	X	Uncommon
Wilson's Phalarope*	*Phalaropus tricolor*	-	-	X	Uncommon
Yellow-headed Blackbird*	*Xanthocephalus xanthocephalus*	X	-	X	Uncommon
Mammals					
American Badger (burrows only)	*Taxidea taxus*	X	X	X	Common
Bobcat	*Lynx rufus*	-	X	X	Uncommon
Coyote (tracks only)	*Canis latrans*	-	X	-	Uncommon

Table 2.3-2 General Wildlife Species Recorded on the Site and in the Macro-Corridors (Sheet 3 of 3)

Common Name	Scientific Name	Site Occurrence	Macro-Corridors Occurrence	Surrounding Area Occurrence	Abundance[1]
Elk (track and scat only)	*Cervus canadensis*	-	X	X	Uncommon
Field Mouse	*Mus musculus*	-	-	X	Uncommon
Least Chipmunk	*Tamias minimus*	X	X	X	Common
Mountain Cottontail	*Sylvilagus nuttallii*	X	X	X	Common
Mule Deer	*Odocoileus hemionus*	X	X	X	Uncommon
Muskrat	*Ondatra zibethicus*	-	-	X	Uncommon
Pronghorn ‘Antelope’	*Antilocapra americana*	X	X	X	Common
Red Fox	*Vulpes vulpes*	-	X	-	Uncommon
Thirteen-lined Ground Squirrel	*Ictidomys tridecemlineatus*	-	-	X	Uncommon
Uinta Ground Squirrel	*Spermophilus armatus*	X	X	X	Common
Vole sp.	Cricetidae spp.	-	-	X	Uncommon
White-tailed Jackrabbit	*Lepus townsendii*	X	X	X	Uncommon
Amphibians					
Boreal Chorus Frog	*Pseudacris maculata*	-	X	-	Uncommon
Invertebrates					
Clouded Sulphur	*Colias philodice*	X	-	X	Uncommon
Orange-belted bumblebee	*Bombus ternarius*	-	X	-	Uncommon

Source: Reference 2.3-40, Reference 2.3-41

Note: waterbird species denoted with an *.

[1] Abundance classifications were intuitively based on species encounters within the project vicinity. “-” indicates species were not observed during the specified survey and thus relative abundance was not determined.

Table 2.3-3 Special-Status Species Recorded During 2022 and 2023 TVES from Vicinity (Sheet 1 of 2)

Common Name	Scientific Name	Site Occurrence	Macro-Corridors Occurrence	Surrounding Area Occurrence	Status[1]	Abundance[2]
Birds						
Bald Eagle*	*Haliaeetus leucocephalus*	-	-	X	BGEPA, SGCN	Uncommon
Brewer's Sparrow	*Spizella breweri*	X	X	X	SGCN	Abundant
Burrowing Owl	*Athene cunicularia*	-	-	X	SGCN	Uncommon
Clark's Grebe*	*Aechmophorus clarkii*	-	-	X	SGCN	Uncommon
Common Yellowthroat*	*Geothlypis trichas*	X	-	-	SGCN	Uncommon
Ferruginous Hawk	*Buteo regalis*	-	X	X	SGCN	Uncommon
Franklin's Gull*	*Leucophaeus pipixcan*	-	X	-	SGCN	Uncommon
Golden Eagle	*Aquila chrysaetos*	-	X	X	BGEPA, SGCN, BCC	Common
Great Blue Heron*	*Ardea herodias*	X	-	-	SGCN	Uncommon
Greater Sage-Grouse	*Centrocercus urophasianus*	X	X	-	SGCN	Common
Loggerhead Shrike	*Lanius ludovicianus*	X	X	X	SGCN	Uncommon
Sage Thrasher	*Oreoscoptes montanus*	X	X	X	SGCN	Common
Swainson's Hawk	*Buteo swainsoni*	-	X	-	SGCN	Uncommon
Western Grebe*	*Aechmophorus occidentalis*	-	-	X	SGCN, BCC	Uncommon
Willet*	*Tringa semipalmata inornate*	X	-	X	BCC	Uncommon
White Pelican*	*Pelecanus erythrorhynchos*	-	X	-	SGCN	Uncommon

Table 2.3-3 Special-Status Species Recorded During 2022 and 2023 TVES from Vicinity (Sheet 2 of 2)

Common Name	Scientific Name	Site Occurrence	Macro-Corridors Occurrence	Surrounding Area Occurrence	Status[1]	Abundance[2]
Mammals						
White-Tailed Prairie Dog	*Cynomys leucurus*	X	X	X	SGCN	Abundant

Source: Reference 2.3-40, Reference 2.3-41

Note: waterbird species denoted with an *.

[1] Species' status includes protection under the Bald and Golden Eagle Protection Act (BGEPA), Wyoming Game and Fish Department designation as a Species of Greatest Conservation Need (SGCN), and U.S. Fish and Wildlife Service designation as a Bird of Conservation Concern (BCC).

[2] Abundance classifications were intuitively based on species encounters within the project vicinity. “-” indicate species were not observed during the specified survey and thus relative abundance was not determined.

Table 2.3-4 Number (#) and Relative Abundance (%) of Fish Collected from Three Hams Fork River Study Segments in October 2022

Species	HF-1		HF-2		HF-3		Overall	
	#	%	#	%	#	%	#	%
Fathead Minnow (*Pimephales promelas*)	10	1.5	1	0.3	15	6.6	26	2.1
Longnose Dace (*Rhinichthys cataractae*)	5	0.7	27	7.9	-	-	32	2.6
Speckled Dace (*Rhinichthys osculus*)	10	1.5	4	1.2	-	-	14	1.1
Redside Shiner (*Richardsonius balteatus*)	526	77.6	278	81.8	141	61.8	945	75.8
White Sucker (*Catostomus commersonii*)	119	17.6	10	2.9	65	28.5	194	15.6
Rainbow Trout (*Oncorhynchus mykiss*)	-	-	-	-	1	0.4	1	0.1
Mountain Whitefish (*Prosopium williamsoni*)	-	-	4	1.2	1	0.4	5	0..4
Brown Trout (*Salmo trutta*)	8	1.2	16	4.7	5	2.2	29	2.3
Species Richness		**6**		**7**		**6**		**8**
Total Abundance		**678**		**340**		**228**		**1246**

Source: Reference 2.3-6

Table 2.3-5 Number (#) and Catch-per-Unit-Effort (CPUE, Fish per Minute) of Fish Captured Electrofishing at Three Hams Fork River Study Segments in October 2022

Species	HF-1		HF-2		HF-3		Overall	
	CPUE	#	CPUE	#	CPUE	#	CPUE	
Fathead Minnow (*Pimephales promelas*)	10	0.7	1	0.1	10	0.6	21	0.4
Longnose Dace (*Rhinichthys cataractae*)	4	0.3	27	1.7	-	-	31	0.6
Speckled Dace (*Rhinichthys osculus*)	10	0.7	3	0.2	-	-	13	0.3
Redside Shiner (*Richardsonius balteatus*)	519	34.4	277	17.6	40	2.2	836	17.1
White Sucker (*Catostomus commersonii*)	119	7.9	10	0.6	60	3.3	189	3.9
Rainbow Trout (*Oncorhynchus mykiss*)	-	-	-	-	1	0.1	1	0.0
Mountain Whitefish (*Prosopium williamsoni*)	-	-	4	0.3	1	0.1	5	0.1
Brown Trout (*Salmo trutta*)	8	0.5	16	1.0	5	0.3	29	0.6
Species Richness		**6**		**7**		**6**		**8**
Total Abundance (CPUE)	**670**	**44.4**	**338**	**21.4**	**117**	**6.4**	**1,125**	**23.0**

Source: Reference 2.3-6

Table 2.3-6 Benthic Macroinvertebrates Collected at Three Hams Fork River Study Segments (Sheet 1 of 3)

Order	Family	Genus/Species/ LTU	Study Segment				
			HF-1	HF-2	HF-3	Total	%
Annelida							
		Oligochaeta	10	10	68	88	6.2
Arthropoda							
Coleoptera	Dytiscidae	*Agabus sp.*	0	0	1	1	0.1
		Dytiscus marginicollis	0	0	0	0	0.0
		Laccophilus maculosus	-	-	-	0	0.0
		Liodessus sp.	0	0	0	0	0.0
		Rhantus binotatus	0	0	1	1	0.1
	Elmidae	*Dubiraphia sp.*	3	3	5	11	0.8
		Optioservus sp.	112	105	0	217	15.2
	Gyrinidae	*Gyrinus sp.*	0	1	0	1	0.1
	Helophoridae	*Helophorus sp.*	0	0	0	0	0.0
	Hydraenidae	*Ochthebius sp.*	0	0	0	0	0.0
Copepoda		*Copepoda*	2	0	1	3	0.2
Decopoda	Cambaridae	*Faxonius sp.*	3	4	0	7	0.5
Diptera	Athericidae	*Atherix sp.*	3	8	0	11	0.8
	Ceratopogonidae	*Bezzia/Probezzia*	0	0	1	1	0.1
		Culicoides sp.	0	0	0	0	0.0
	Chironomidae	Chironomidae	132	54	67	253	17.7
	Limoniidae	*Hexatoma sp.*	0	1	0	1	0.1
	Muscidae	*Limnophora sp.*	0	0	0	0	0.0
	Simuliidae	*Simulium sp.*	15	25	0	40	2.8
	Tabanidae	*Tabanus sp.*	0	0	0	0	0.0
Ephemeroptera	Baetidae	*Baetis sp.*	4	22	0	26	1.8
		Callibaetis sp.	34	0	68	102	7.2

Table 2.3-6 Benthic Macroinvertebrates Collected at Three Hams Fork River Study Segments (Sheet 2 of 3)

Order	Family	Genus/Species/ LTU	Study Segment				
			HF-1	HF-2	HF-3	Total	%
	Caenidae	*Caenis sp.*	0	0	0	0	0.0
	Ephemeridae	*Ephemera sp.*	5	7	0	12	0.8
	Heptageniidae	*Stenonema sp.*	19	14	0	33	2.3
	Leptohyphidae	*Tricorythodes sp.*	50	41	0	91	6.4
	Leptophlebiidae	*Leptophlebia sp.*	0	1	0	1	0.1
		Neoleptophlebia sp.	1	0	0	1	0.1
		Paraleptophlebia sp.	22	46	1	69	4.8
Hemiptera	Corixidae	*Callicorixa sp.*	0	0	4	4	0.3
		Cenocorixa bifida	0	0	14	14	1.0
		Corisella decolor	0	0	0	0	0.0
		Hesperocorixa laevigata	0	0	4	4	0.3
		Sigara sp.	4	0	4	8	0.6
	Notonectidae	*Notonecta spinosa*	0	0	9	9	0.6
Lepidoptera	Crambidae	*Petrophila sp.*	1	17	0	18	1.3
Megaloptera	Sialidae	*Sialis sp.*	0	2	2	4	0.3
Odonata	Aeschnidae	*Anax junius*	0	0	0	0	0.0
	Coenagrionidae	*Enallagma sp.*	7	1	8	16	1.1
	Gomphidae	*Ophiogomphus sp.*	1	0	0	1	0.1
Ostracoda		*Ostracoda*	0	0	0	0	0.0
Plecoptera	Perlodidae	Perlodidae	15	13	0	28	2.0
Trichoptera	Brachycentridae	*Brachycentrus occidentalis*	7	12	0	19	1.3
	Hydropsychidae	*Cheumatopshyche*	0	19	0	19	1.3
		Hydropsyche sp.	78	97	0	175	12.3
	Hydroptilidae	*Hydroptila sp.*	0	0	0	0	0.0
	Leptoceridae	*Oecetis disjunctus*	7	2	0	9	0.6

Table 2.3-6 Benthic Macroinvertebrates Collected at Three Hams Fork River Study Segments (Sheet 3 of 3)

Order	Family	Genus/Species/ LTU	Study Segment				
			HF-1	HF-2	HF-3	Total	%
	Limnophilidae	*Limnophilidae*	0	2	0	2	0.1
Amphipoda							
	Talitridae	*Hyallela sp.*	13	14	22	49	3.4
Mollusca							
	Ancylidae	*Ferrissia sp.*	2	0	2	4	0.3
	Lymnaeidae	*Stagnicola sp.*	0	0	2	2	0.1
	Physidae	*Physella sp.*	6	0	0	6	0.4
	Planorbidae	Planorbidae	1	0	1	2	0.1
	Sphaeriidae	Sphaeriidae	37	16	4	57	4.0
Platyhelmenthes							
	Dugesiidae	*Dugesia sp.*	2	4	0	6	0.4
Taxa Richness			**29**	**27**	**21**		
Total Abundance			**596**	**541**	**289**	**1426**	

Source: Reference 2.3-6

Table 2.3-7 Metric Values and Scores for Calculating the Wyoming Stream Integrity Index (Wyoming Basin) at Three Segments in the Hams Fork River Drainage Sampled in October 2022

Metric	HF 1		HF 2		HF 3	
	Value	Score	Value	Score	Value	Score
No. Ephemeroptera Taxa	7.0	77.8	6.0	66.7	2.0	77.8
No. Trichoptera Taxa	3.0	33.3	5.0	55.6	0.0	33.3
No. Plecoptera Taxa	1.0	16.7	1.0	16.7	0.0	0.0
% Non-Insect	12.4	83.6	8.9	88.3	34.3	53.9
% Plecoptera	2.5	11.2	2.4	10.8	0.0	0.0
% within Trichoptera (less Hydropsychidae)	15.2	15.2	12.1	12.1	0.0	0.0
% Collector-gatherer	49.7	61.2	39.9	74.1	79.9	21.2
% Scraper	20.8	53.9	22.6	58.4	2.1	5.4
HBI	4.7	55.5	3.8	70.4	5.7	40.4
No. Semivoltine Taxa (less semivoltine Coleoptera)	2.0	40.0	1.0	20.0	0.0	0.0
WSII Score		44.8		47.3		23.2

Source: Reference 2.3-6

Table 2.3-8 Number (#) and Relative Abundance (%) of Fish Collected from Three North Fork Little Muddy Creek Study Segments in October 2022

Species	NFLM-1		NFLM-2		NFLM-3		Overall	
	#	%	#	%	#	%	#	%
Fathead Minnow (*Pimephales promelas*)	-	-	1	1.2	2	3.8	3	2.0
Longnose Dace (*Rhinichthys cataractae*)	-	-	-	-	15	28.3	15	9.8
Speckled Dace (*Rhinichthys osculus*)	18	94.7	29	35.8	2	3.8	49	32.0
Redside Shiner (*Richardsonius balteatus*)	1	5.3	42	51.9	23	43.4	66	43.1
White Sucker (*Catostomus commersonii*)	-	-	-	-	8	15.1	8	5.2
Mountain Sucker (*Catostomus platyrhynchus*)	-	-	9	11.1	3	5.7	12	7.8
Rainbow Trout (*Oncorhynchus mykiss*)	-	-	-	-	-	-		
Mountain Whitefish (*Prosopium williamsoni*)	-	-	-	-	-	-		
Brown Trout (*Salmo trutta*)	-	-	-	-	-	-		
Species Richness	**2**		**4**		**6**		**6**	
Total Abundance	**19**		**81**		**53**		**153**	

Source: Reference 2.3-6

Table 2.3-9 Number (#) and Catch-per-Unit-Effort (CPUE, Fish per Minute) of Fish Captured Electrofishing at Three North Fork Little Muddy Creek Study Segments in October 2022

Species	NFLM-1		NFLM-2		NFLM-3		Overall	
	#	CPUE	#	CPUE	#	CPUE	#	CPUE
Fathead Minnow (*Pimephales promelas*)	-	-	-	-	2	0.1	2	0.0
Longnose Dace (*Rhinichthys cataractae*)	-	-	-	-	10	0.7	10	0.2
Speckled Dace (*Rhinichthys osculus*)	2	0.1	14	0.9	-	-	16	0.3
Redside Shiner (*Richardsonius balteatus*)	-	-	3	0.2	14	0.9	17	0.4
White Sucker (*Catostomus commersonii*)	-	-	-	-	8	0.5	8	0.2
Mountain Sucker (*Catostomus platyrhynchus*)	-	-	2	0.1	3	0.2	5	0.1
Rainbow Trout (*Oncorhynchus mykiss*)	-	-	-	-	-	-	0	0.0
Mountain Whitefish (*Prosopium williamsoni*)	-	-	-	-	-	-	0	0.0
Brown Trout (*Salmo trutta*)	-	-	-	-	-	-	0	0.0
Species Richness		**1**		**3**		**5**		**6**
Total Abundance/CPUE	**2**	**0.1**	**19**	**1.2**	**37**	**2.5**	**58**	**1.2**

Source: Reference 2.3-6

Table 2.3-10 Benthic Macroinvertebrates Collected at Three North Fork Little Muddy Creek Study Segments (Sheet 1 of 3)

Order	Family	Genus/Species/ LTU	Study Segment				
			NFLM 1	NFLM 2	NFLM 3	TOTAL	%
Annelida							
		Oligochaeta	15	26	68	109	9.1
Arthropoda							
Coleoptera	Dytiscidae	*Agabus sp.*	0	0	0	0	0.0
		Dytiscus marginicollis	0	1	0	1	0.1
		Laccophilus maculosus	1	2	0	3	0.3
		Liodessus sp.	1	0	0	1	0.1
		Rhantus binotatus	0	0	0	0	0.0
	Elmidae	*Dubiraphia sp.*	0	0	1	1	0.1
		Optioservus sp.	0	0	0	0	0.0
	Gyrinidae	*Gyrinus sp.*	0	0	0	0	0.0
	Helophoridae	*Helophorus sp.*	0	1	0	1	0.1
	Hydraenidae	*Ochthebius sp.*	0	1	0	1	0.1
Copepoda		Copepoda	0	1	0	1	0.1
Decopoda	Cambaridae	*Faxonius sp.*	0	1	1	2	0.2
Diptera	Athericidae	*Atherix sp.*	0	0	0	0	0.0
	Ceratopogonidae	*Bezzia/Probezzia*	0	1	4	5	0.4
		Culicoides sp.	0	0	1	1	0.1
	Chironomidae	Chironomidae	130	217	22	369	30.9
	Limoniidae	*Hexatoma sp.*	0	0	0	0	0.0
	Muscidae	*Limnophora sp.*	0	1	0	1	0.1
	Simuliidae	*Simulium sp.*	0	42	0	42	3.5
	Tabanidae	*Tabanus sp.*	1	0	0	1	0.1
Ephemeroptera	Baetidae	*Baetis sp.*	0	0	0	0	0.0
		Callibaetis sp.	107	138	7	252	21.1

Table 2.3-10 Benthic Macroinvertebrates Collected at Three North Fork Little Muddy Creek Study Segments (Sheet 2 of 3)

Order	Family	Genus/Species/ LTU	Study Segment				
			NFLM 1	NFLM 2	NFLM 3	TOTAL	%
	Caenidae	*Caenis sp.*	19	1	0	20	1.7
	Ephemeridae	*Ephemera sp.*	0	0	0	0	0.0
	Heptageniidae	*Stenonema sp.*	0	0	0	0	0.0
	Leptohyphidae	*Tricorythodes sp.*	0	0	0	0	0.0
	Leptophlebiidae	*Leptophlebia sp.*	0	0	0	0	0.0
		Neoleptophlebia sp.	0	0	0	0	0.0
		Paraleptophlebia sp.	0	0	0	0	0.0
Hemiptera	Corixidae	*Callicorixa sp.*	0	0	0	0	0.0
		Cenocorixa bifida	0	0	0	0	0.0
		Corisella decolor	-	5	0	5	0.4
		Hesperocorixa laevigata	0	1	0	1	0.1
		Sigara sp.	0	6	0	6	0.5
	Notonectidae	*Notonecta spinosa*	0	0	1	1	0.1
Lepidoptera	Crambidae	*Petrophila sp.*	0	0	0	0	0.0
Megaloptera	Sialidae	*Sialis sp.*	0	0	0	0	0.0
Odonata	Aeschnidae	*Anax junius*	5	0	0	5	0.4
	Coenagrionidae	*Enallagma sp.*	62	19	2	83	6.9
	Gomphidae	*Ophiogomphus sp.*	0	0	0	0	0.0
Ostracoda		*Ostracoda*	10	16	4	30	2.5
Plecoptera	Perlodidae	Perlodidae	0	0	0	0	0.0
Trichoptera	Brachycentridae	*Brachycentrus occidentalis*	0	0	0	0	0.0
	Hydropsychidae	*Cheumatopshyche*	0	0	0	0	0.0
		Hydropsyche sp.	0	0	0	0	0.0
	Hydroptilidae	*Hydroptila sp.*	32	2	0	34	2.8
	Leptoceridae	*Oecetis disjunctus*	0	0	0	0	0.0

Table 2.3-10 Benthic Macroinvertebrates Collected at Three North Fork Little Muddy Creek Study Segments (Sheet 3 of 3)

Order	Family	Genus/Species/ LTU	Study Segment				
			NFLM 1	NFLM 2	NFLM 3	TOTAL	%
	Limnophilidae	*Limnophilidae*	0	0	0	0	0.0
Amphipoda							
	Talitridae	*Hyallela sp.*	35	2	15	52	4.3
Mollusca							
	Ancylidae	*Ferrissia sp.*	0	0	0	0	0.0
	Lymnaeidae	*Stagnicola sp.*	0	0	0	0	0.0
	Physidae	*Physella sp.*	130	35	3	168	14.0
	Planorbidae	Planorbidae	0	0	0	0	0.0
	Sphaeriidae	Sphaeriidae	0	0	0	0	0.0
Platyhelmenthes							
	Dugesiidae	*Dugesia sp.*	0	0	0	0	0.0
Taxa Richness			**13**	**21**	**12**		
Total Abundance			**548**	**519**	**129**	**1196**	

Source: Reference 2.3-6

Table 2.3-11 Metric Values and Scores for Calculating the Wyoming Stream Integrity Index (Wyoming Basin) at Three Segments in the North Fork Little Muddy Creek Drainage (NFLM) Sampled in October 2022

Metric	NFLM-1		NFLM-2		NFLM-3	
	Value	Score	Value	Score	Value	Score
No. Ephemeroptera Taxa	2.0	22.2	2.0	22.2	1.0	11.1
No. Trichoptera Taxa	1.0	11.1	1.0	11.1	0.0	0.0
No. Plecoptera Taxa	0.0	0.0	0.0	0.0	0.0	0.0
% Non-Insect	34.7	53.3	15.4	79.5	70.5	4.7
% Plecoptera	0.0	0.0	0.0	0.0	0.0	0.0
% within Trichoptera (less Hydropsychidae)	100.0	100.0	100.0	100.0	0.0	0.0
% Collector-gatherer	55.8	53.1	74.2	28.8	88.4	10.1
% Scraper	29.6	76.6	7.3	19.0	2.3	6.0
HBI	7.1	19.5	6.9	22.6	4.9	52.5
No. Semivoltine Taxa (less semivoltine Coleoptera)	1.0	20.0	0.0	0.0	0.0	0.0
WSII Score		35.6		28.3		8.4

Source: Reference 2.3-6

Table 2.3-12 Native Versus Non-native Fish Collections, October 2022

	HF-1	HF-2	HF-3	HF Total	NFLM-1	NFLM-2	NFLM-3	NFLM Total
Fathead minnow	10	1	15	**26**	0	1	2	**3**
Longnose dace	5	27	0	**32**	0	0	15	**15**
Speckled dace*	10	4	0	**14**	18	29	2	**49**
Redside shiner	526	278	141	**945**	1	42	23	**66**
White sucker	119	10	65	**194**	0	0	8	**8**
Mountain sucker*	0	0	0	**0**	0	9	3	**12**
Rainbow trout	0	0	1	**1**	0	0	0	**0**
Mountain whitefish*	0	4	1	**5**	0	0	0	**0**
Brown trout	8	16	5	**29**	0	0	0	**0**

Source: Reference 2.3-6

*Native to Green River Basin

Table 2.3-13 Number (#) and Relative Abundance (%) of Fish Collected from Three Hams Fork River Study Segments in June 2023

Species	HF-1		HF-2		HF-3		Overall	
	#	%	#	%	#	%	#	%
Fathead Minnow (*Pimephales promelas*)	-	-	3	4.3	-	-	3	3.3
Longnose Dace (*Rhinichthys cataractae*)	1	5.3	19	27.1	-	-	20	22.2
Speckled Dace (*Rhinichthys osculus*)	1	5.3	20	28.6	-	-	21	22.3
Redside Shiner (*Richardsonius balteatus*)	15	78.9	16	22.9	1	100	32	35.6
Utah chub (*Gila atraria*)	1	5.3	2	2.9			3	3.3
White Sucker (*Catostomus commersonii*)	1	5.3	9	12.9	-	-	10	11.1
Mountain sucker (*Catostomus platyrhynchus*)	-	-	1	1.4	-	-	1	1.1
Rainbow Trout (*Oncorhynchus mykiss*)	-	-	-	-	-	-	-	-
Mountain Whitefish (*Prosopium williamsoni*)	-	-	-	-	-	-	-	-
Brown Trout (*Salmo trutta*)	-	-	-	-	-	-	-	-
Species Richness	**5**		**7**		**1**		**7**	
Total Abundance	**19**		**70**		**1**		**90**	

Source: Reference 2.3-7

Figure 2.3-1 Terrestrial Visual Encounter Survey Area

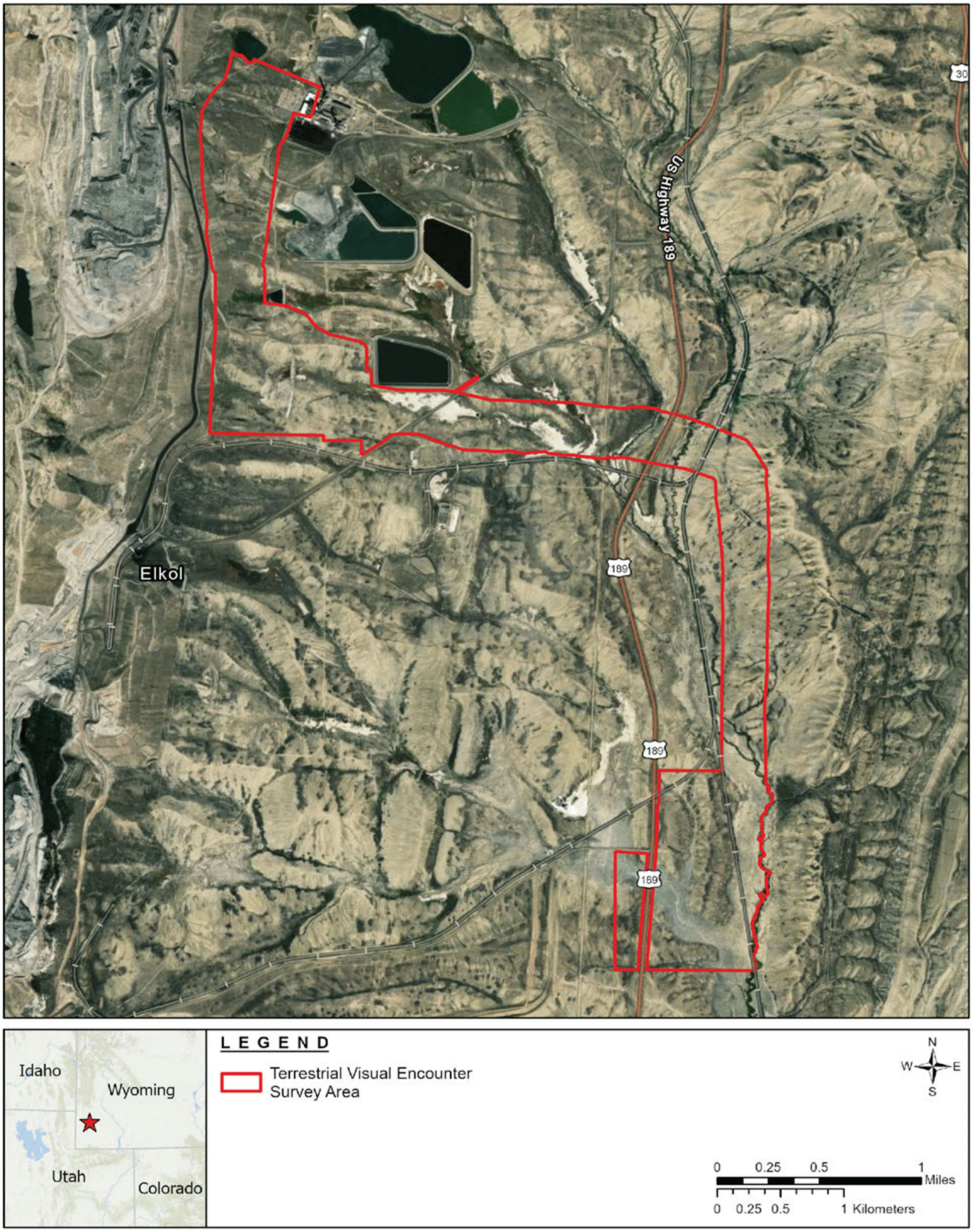


Figure 2.3-2 Aquatic Survey Segments

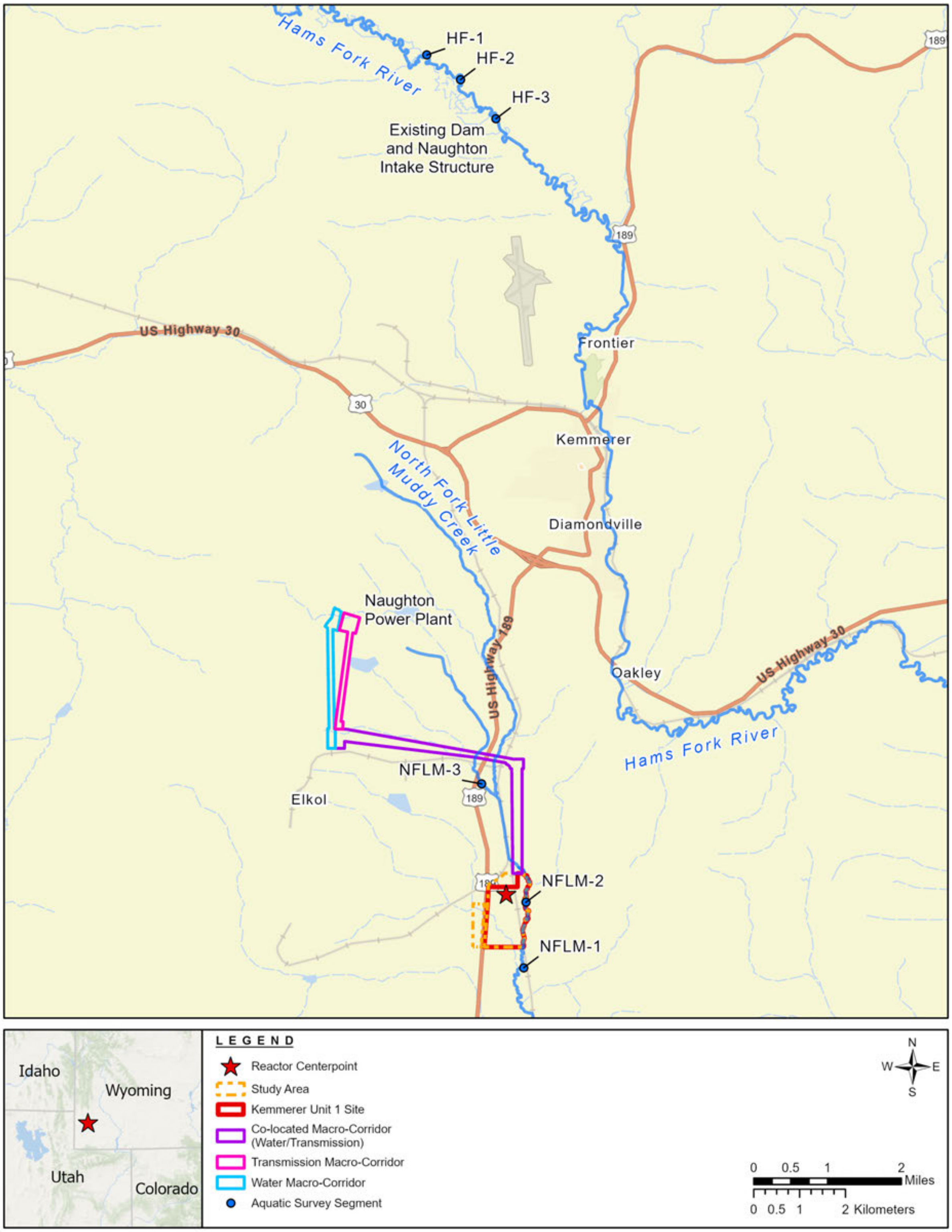


Figure 2.3-3 Pronghorn Crucial Range

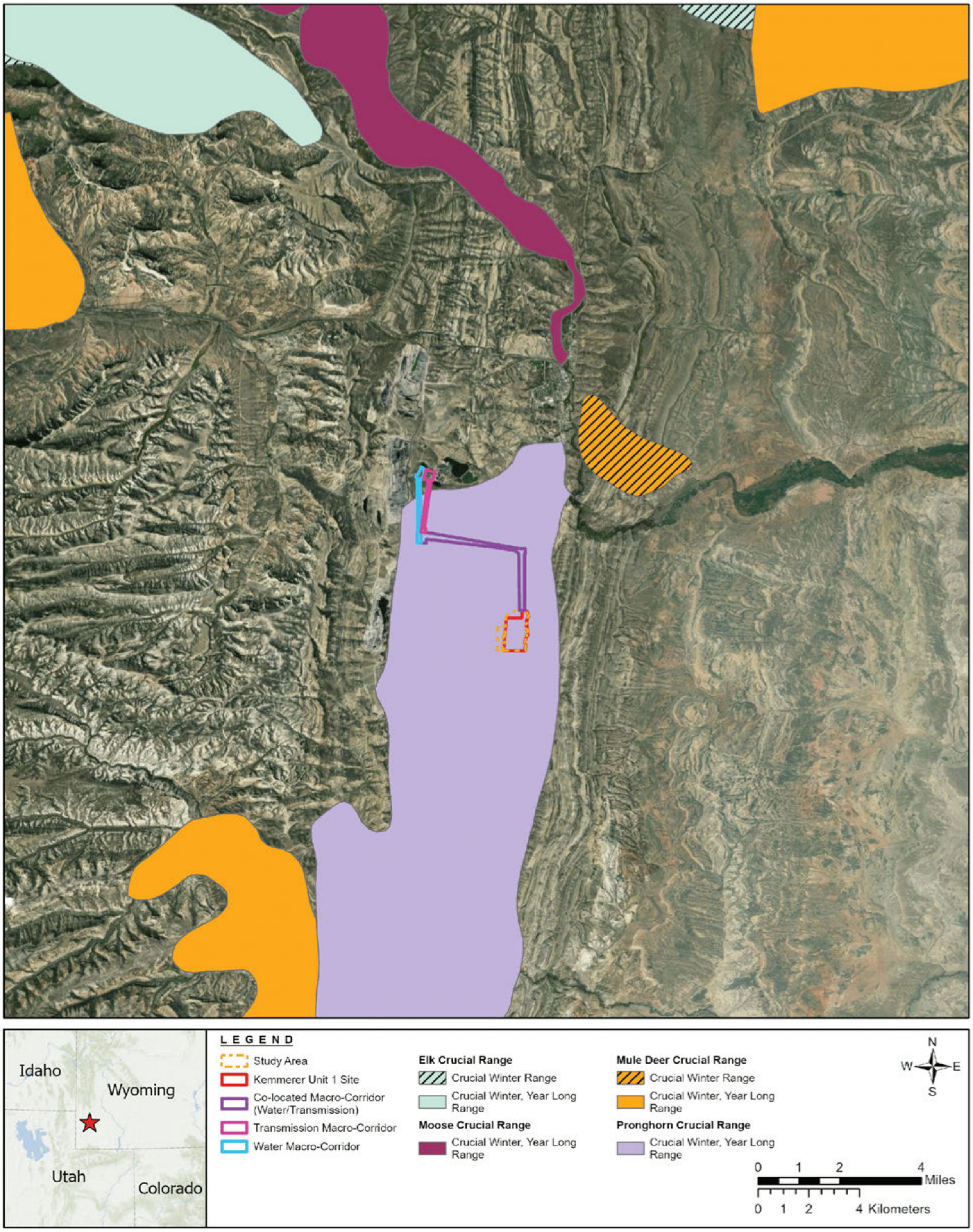


Figure 2.3-4 Greater Sage-Grouse Core Population Area

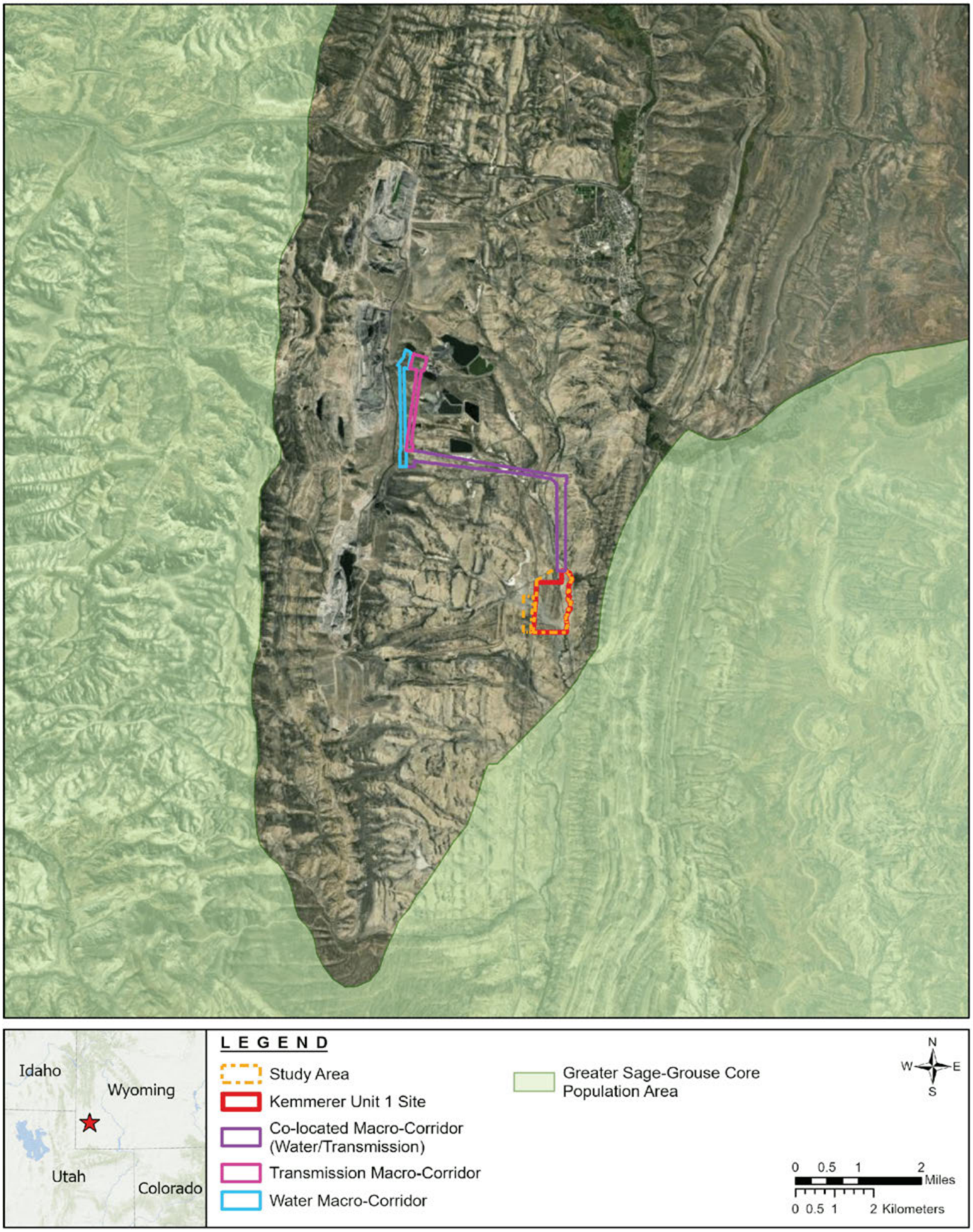


Figure 2.3-5 Hams Fork River Study Segments

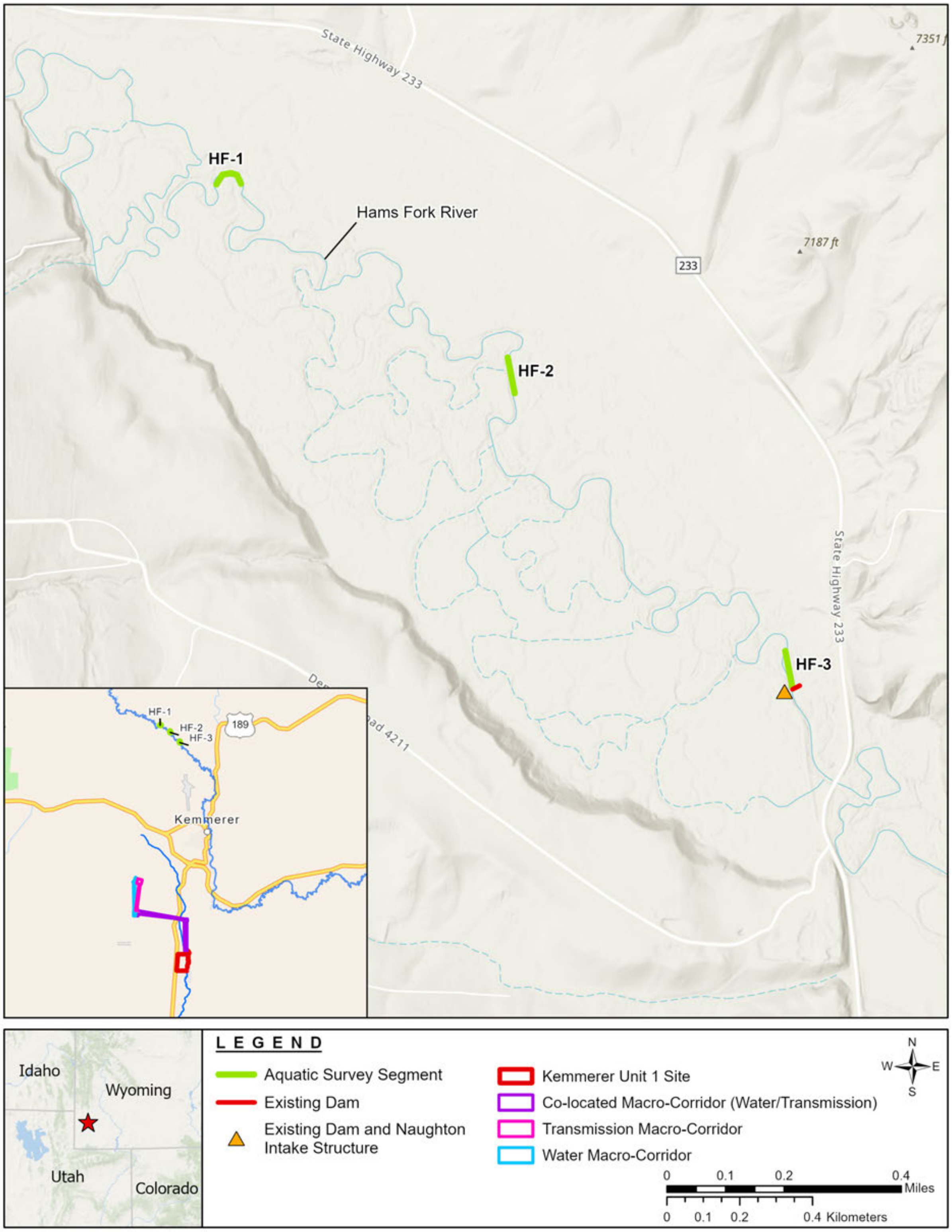
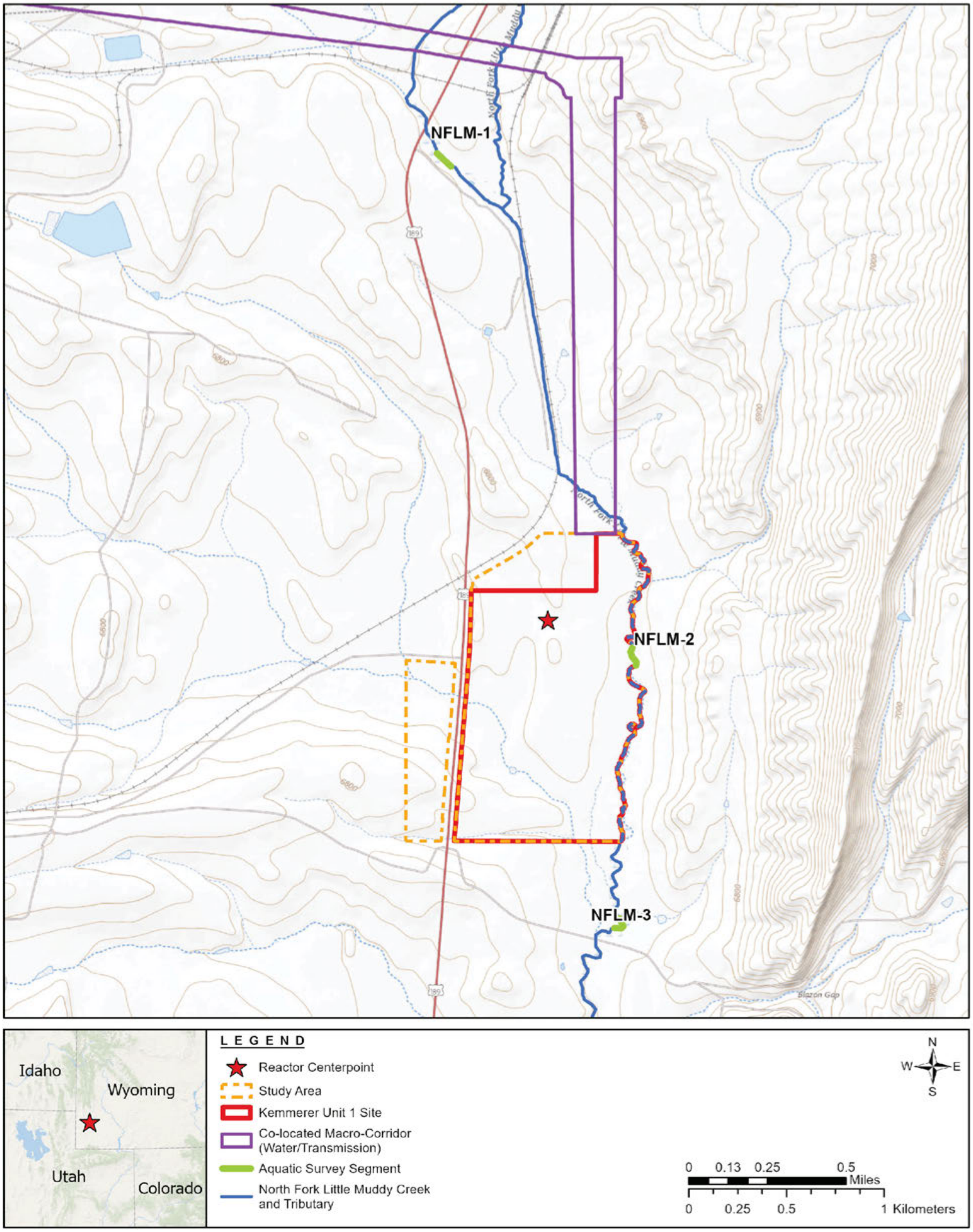


Figure 2.3-6 North Fork Little Muddy Creek Study Segments



2.4 Socioeconomics

Data and information were collected to establish the environmental and socioeconomic baselines against which socioeconomic effects were measured. Socioeconomic effects can be experienced in two regions: the demographic region (50-mile [80-kilometer] radius) and the economic region. For socioeconomic analyses, the economic region includes Lincoln, Uinta, and Sweetwater Counties for construction and Lincoln and Uinta Counties for operations (Figure 2.1-3). See Sections 4.4 and 5.4 for economic region determination analyses.

In general, Wyoming has geographically large counties, with small populations and low densities. The proposed Kemmerer Unit 1 Site is in Lincoln County, Wyoming, about 5 miles (8 kilometers) south of the City of Kemmerer (Figure 2.1-3). The northern part of Lincoln County falls outside of daily commuting distance to the Kemmerer Unit 1 Site. Daily commuting distance is defined as 90 miles (140 kilometers) or 90 minutes. Some data are reported at the county level only and include data for the part of the county not within daily commuting distance. Where possible, municipal data are presented for the Lincoln County municipalities that are within daily commuting distance to provide additional context. Because all of Uinta County is within daily commuting distance of the site, county-level data are appropriate for this analysis.

In Sweetwater County, the cities of Green River and Rock Springs are located at the edge of daily commuting distance, at 70 to 80 and 85 to 95 road miles (110 to 130 and 140 to 150 road kilometers) from the Kemmerer Unit 1 Site (Figure 2.1-3). Although relatively distant, both communities are adjacent to I-80, with easy access to Kemmerer. A portion of the construction workforce is expected to live in these cities because the potential supply of available housing in Lincoln and Uinta Counties could be limited. Approximately 84 percent (Section 2.4.1.2) of Sweetwater County's residents reside in Green River or Rock Springs, so county-level data are useful for this analysis. However, when available, Green River and Rock Springs data are also presented for additional context.

Throughout the socioeconomics sections, data are presented for the most current year available. Depending on the source of the data, that year may vary. Some data used in these analyses may reflect the economic disruptions caused by the COVID-19 pandemic. Where appropriate, 2019 data are included in the analysis to provide a pre-COVID-19 baseline against which later data can be compared.

Most of the population and housing-related data discussed in the following sections are from the U.S Census Bureau (USCB). When the socioeconomics analyses were performed, the USCB had only released Redistricting Data (PL 94-171) from the 2020 Decennial Census. Redistricting data files contain only high-level population, race, and housing counts. More detailed data were scheduled to be released after the development of these analyses (Reference 2.4-109). Consequently, 2020 Decennial Census data were used, as available. In their absence, the most current 5-year data from the USCB's American Community Survey were used. Data from the USCB's Population Estimates Program (based on the 2020 Decennial Census) were the source for 2021 population estimates.

2.4.1 Demographics

This section presents the following characteristics for the demographic and economic regions: population data by sector and population data by geopolitical boundary. Transient[1] population data, taken from a transient study of the region, are presented by 10-mile (16-kilometer) radius. Minority and low-income populations are characterized in Section 2.5, Environmental Justice.

2.4.1.1 Population Data by Sector

The population within a 50-mile radius of the proposed site was estimated based on the 2020 USCB Decennial Census data. The population distribution was estimated in 16 directional sectors, each direction consisting of 22.5 degrees, and in 10 concentric bands, measured from the reactor centerpoint: 0 to 1 mile (0 to 1.6 kilometers), 1 to 2 miles (1.66 to 3 kilometers), 2 to 3 miles (3 to 5 kilometers), 3 to 4 miles (5 to 6 kilometers), 4 to 5 miles (6 to 8 kilometers), 5 to 10 miles (8 to 16 kilometers), 10 to 20 miles (16 to 30 kilometers), 20 to 30 miles (30 to 50 kilometers), 30 to 40 miles (50 to 60 kilometers), and 40 to 50 miles (60 to 80 kilometers). Maps showing the sectors within 10 miles and 50 miles (16 kilometers and 80 kilometers), are included as Figure 2.4-1 and Figure 2.4-2. Census data provide the numbers and locations of residents, but the transient population for 0 to 10 miles was added, by grid element, to the 2020 resident population for use in the population numbers. The population for radii of more than 10 miles includes only residents.

Once the 2020 population (resident and transient, as appropriate) was determined for each sector, projections were made for the 10-year increments from 2030 to 2090. Population projections were estimated for each grid element using the following methodology:

1. The 2020 population of the part of a county in a particular grid element was estimated by multiplying the grid element population by the percent of the county land area that falls within that grid element. Thus, if a county occupied 30 percent of the land area of a specific grid element, the assumption was made that 30 percent of the grid element’s population resided in that county and would be subject to the growth rate of that county. In some cases, a grid element fell wholly within a single county.

2. The population of a particular grid element residing in a particular county, as determined in Step 1, was multiplied by that county’s annualized growth rate derived from State growth rate tables to estimate the future population. For any county with a negative growth rate, a growth ratio of one was used to produce conservative results. Using a growth ratio of one does not allow the county’s population to decline.

3. The population projections for each county in a grid element were then summed to determine the total estimate of the grid element’s future population.

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1. Transient populations are those who work, live part-time, or engage in recreational activities in an area, but are not permanent residents of the area (Section 2.4.1.4).

Table 2.4-1 presents the population projections to the year 2090 by grid element and includes both residents and transients. Regional population density and use characteristics of the site environs are presented in PSAR Section 2.2.3 including the exclusion area, low population zone, and population center distance.

2.4.1.2 Population by Geopolitical Boundary

Population data by geopolitical boundary has also been included in this Environmental Report to support analyses in the socioeconomic sections. The area defined by a 50-mile (80-kilometer) radius from the centroid of the proposed reactor (Figure 2.1-3) includes all or parts of nine counties in Wyoming, Utah, or Idaho (Table 2.4-2).

Population data for the key municipalities in the 50-mile (80-kilometer) demographic region are presented in Table 2.4-3. The Kemmerer Unit 1 Site is not located within a town or city boundary. The closest population center with about 25,000 residents is the City of Rock Springs (2020 population, 23,526), located approximately 85-95 miles (140-150 kilometers) ESE of the site.

There are no metropolitan statistical area[2] in the economic region (Reference 2.4-99). Uinta County forms the Evanston micropolitan statistical area, and Sweetwater County forms the Rock Springs micropolitan statistical area (Reference 2.4-99). Lincoln County is not part of any metropolitan statistical area or micropolitan statistical area (Reference 2.4-99). The Evanston MiSA had a 2020 population of 20,450 (Reference 2.4-100). The Rock Springs micropolitan statistical area had a 2020 population of 42,272 (Reference 2.4-100).

Table 2.4-4 presents historical and projected population and growth rate data for the economic region and the State of Wyoming. From 2000 to 2010, the State experienced a natural gas and fracking boom (Section 2.4.2.1). All counties within the economic region experienced positive population growth over this period; Lincoln County, the economic region as a whole (Lincoln, Uinta, and Sweetwater counties), and Wyoming grew at average annual rates of 2.2 percent, 1.4 percent, and 1.3 percent. From 2010 to 2020, growth rates for the three counties in the economic region declined, with rates ranging from -0.4 percent in Sweetwater County to 0.8 percent in Lincoln County. The economic region population declined at an average annual rate of -0.1 percent, while the State of Wyoming population grew at an average annual rate of 0.2 percent (Table 2.4-4).

For population projections, growth rates were calculated for Wyoming and each county in the economic region using State and county population forecasts developed by the Wyoming Department of Administration and Information’s Economic Analysis Division. The Wyoming Department of Administration and Information’s Economic Analysis Division’s most current forecasts extend from 2020 to 2040 and use the 2010 Decennial Census as the base year

2. Metropolitan statistical areas have at least one urbanized area of 50,000 or more population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties (Reference 2.4-106). Micropolitan statistical areas are a new set of statistical areas that have at least one urban cluster of at least 10,000 but less than 50,000 population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties (Reference 2.4-106).

(Reference 2.4-134). The forecasts were derived using trends in population variables (births, deaths, net migrations) and economic variables (e.g., employment, education, economy) (Reference 2.4-59).

The calculated growth rates were then applied to 2020 Decennial Census data to produce projected populations for each decade from 2030 to 2090. From 2030 to 2090, the average annual growth rates of the economic region and State are projected to be less than 1 percent, each. Uinta and Sweetwater Counties' populations are projected to decrease at average annual rates of -0.2 percent, while Lincoln County's and Wyoming's populations are projected to grow by average annual rates of 0.7 and 0.3 percent. The average annual growth rate projected for the three-county economic region is about 0.1 percent (Table 2.4-4).

2.4.1.3 Population Characteristics

Table 2.4-5 also presents the 2020 age distributions of the county populations within the demographic region and compares them to the age distributions of their corresponding States. The data indicate that the State of Utah and three out of four of its counties have the lowest median ages, ranging from about 25 to 33 years. The remaining States and counties have median ages ranging from about 36 to 40 years.

Table 2.4-5 also presents the 2020 gender distributions of the county populations within the demographic region and compares them to the gender distributions of their corresponding States. The data indicate that all nine counties and three States have more males than females.

Table 2.4-6 presents the 2021 income distributions of the county residents in the demographic region and compares them to the income distributions of their corresponding States. Bear Lake County (Idaho) and the State of Idaho have the smallest median incomes in the demographic region at $60,337 and $63,377. Morgan and Summit Counties in Utah have the highest, at $112,721 and $116,351.

Minority and low-income population distributions are provided in Section 2.5, Environmental Justice.

2.4.1.4 Transient Population

Transient populations are people (other than those just passing through the area) who work, reside part-time, or engage in recreational activities in a given area but are not permanent residents of the area.[3] Under this definition, transients include non-resident people in:

- Workplaces
- Places where people reside part-time, such as hotels, motels, and seasonal housing
- Recreational areas or at special events

3. People living in institutional settings, such as correctional institutions and nursing homes, and non-institutional settings, such as college dormitories and military quarters, are considered permanent residents by the USCB and are included in the Decennial Census.

American Nuclear Society's "Guidelines for Estimating Present and Projecting Future Population Distributions Surrounding Nuclear Facility Sites" (Reference 2.4-6) provides guidance on developing estimates and forecasts of population distributions around commercial and government-owned nuclear sites. Guidance from these documents was used to identify transient populations within a 10-mile radius of the Kemmerer Unit 1 centerpoint.

The transient study used the point source method of counting transient populations, and transient data were presented by peak daily person count or maximum daily capacity. The location of each facility or event was also identified.

Phone interviews and internet or literature searches were used to determine:

- In-migrating worker counts and work locations
- Seasonal housing counts and locations
- Hotel, motel, and recreational vehicle (RV) park counts and locations
- The locations, attendance numbers or capacities, and timing of recreation or tourism facilities and events
- The locations, timing, and numbers of migrant workers

Table 2.4-7 presents the results of the transient study. Figure 2.4-1 illustrates the 10-mile radius grid.

<u>Workplaces</u>

The USCB worker flow data was used to estimate the number of nonresidents that commute into the 10-mile radius to work. The USCB has an application called OnTheMap that can calculate the number of workers that live outside of and commute into an area for work. For this transient study, the Kemmerer Unit 1 reactor centerpoint and a 10-mile (16-kilometer) radius were used as inputs. The USCB application output indicates that 40.5 percent of all workers employed within a 10-mile radius of the centerpoint live outside of the 10-mile (16-kilometer) radius (Reference 2.4-101). The results were used to estimate the number of transient workers at workplaces within the 10-mile (16-kilometer) radius. This approach was used for all workplaces except PacifiCorp's Naughton Power Plant for which actual employee residence data was obtained.

<u>Seasonal, Recreational, and Occasional Use Units, Hotels and Motels, and RV Parks</u>

A discussion of all housing units within the 10-mile (16-kilometer) radius of the site is found in Section 2.4.2.6. In 2020, the City of Kemmerer had 24 seasonal, recreational, and occasional use units, and the town of Diamondville had eight. There are two hotels, three motels, and four RV parks within the 10-mile (16-kilometer) radius.

Recreation and Tourism

Descriptions of recreation and tourism opportunities within the 10-mile (16-kilometer) radius of the site is found in Section 2.4.2.5. There are no National parks, State parks, or wildlife habitat management areas within the 10-mile (16-kilometer) radius. The event or venue with the largest number of nonresidents is the Oyster Ridge Music Festival at 1,000 per day (Table 2.4-7).

- JC Penney Historic District National Historic Landmark – In 1902, James Cash Penney, Jr., founded the first J.C. Penney store, in Kemmerer. The district is composed of several properties, including the Golden Rule Store (the first in the J.C. Penney department store chain) and J.C. Penney's house. The store is still operating, and the house, a National Register of Historic Places site, is a museum that is open to tours.
- Fossil Country Frontier Museum – The museum, located in Kemmerer, features artifacts and information about the area's history.
- Fossil Island Golf Club – Fossil Island Golf Club is a public nine-hole golf course owned by the City of Kemmerer.
- Herschler Triangle Park – Herschler Triangle Park, named after former Wyoming legislator, governor, and Kemmerer resident, Edgar Herschler, is situated near Kemmerer's historic district and is the location of the annual Oyster Ridge Music Festival (see below), and other smaller city-sponsored events.
- Oyster Ridge Music Festival – The Oyster Ridge Music Festival is an annual 2-day outdoor music concert that takes place in Herschler Triangle Park on the last weekend in July. Estimated daily attendance exceeded 4,000 (approximately 1,000 nonresidents) in 2021.

Kemmerer Municipal Airport

The Kemmerer Municipal Airport, located just north of Kemmerer, is a small airport available for public use. The airport is unattended and averaged 61 departures and landings per week in 2022 (Reference 2.4-1).

Migrant Workers

The United States (U.S.) Department of Agriculture 2017 Census of Agriculture (Reference 2.4-110) was consulted to determine the potential for migrant farm workers. The following was found:

- Lincoln County, Wyoming: number of farms = 3; number of migrant workers = (D)

(D) in Lincoln County means there were only three farms (likely ranches) and the worker data were withheld to avoid disclosing data for individual farms.

Also, representatives from the University of Wyoming, Lincoln County Extension (Reference 2.4-39) and the Wyoming Department of Workforce Services (Reference 2.4-79, Reference 2.4-80, and Reference 2.4-81) were interviewed. These agency representatives indicated that there are no crop farms or livestock ranches within 10 miles (16 kilometers) of the

Kemmerer Unit 1 Site. There are, however, traditional livestock trails which are used by local ranchers to “run” their livestock (mostly sheep) from winter to summer ranges and back. Those ranchers employ migrant workers as sheepherders to run the livestock.

Sheep from two local ranching operations are herded through the 10-mile (16-kilometer) radius from May 1 to June 30 for “lambing” season. This activity requires a total of about 15 sheepherders. From October 1 to December 1, both ranchers run their sheep through the 10-mile (16-kilometer) radius on their return home from their summer ranges. This activity requires a total of approximately 10 sheepherders. These two sheep herds have been observed on both sides of US 189, in and around the site.

2.4.2 Community Characteristics

Community characteristics for the economic region include: economy; government and taxes; transportation; land use; aesthetics, recreation, and tourism; housing; public water and wastewater; police, fire, and medical; and education. Distinctive communities are addressed in Sections 2.5, Environmental Justice, and 2.6, Historic and Cultural Resources.

Lincoln, Uinta, and Sweetwater Counties and their municipalities comprise the economic region for this project and the study area for most of the following discussion. However, some resource areas are examined using alternate study areas. Alternate study area examples include visual resources, which are assessed within the site’s viewshed, and recreation resources, which are assessed within the 10-mile (16-kilometer) vicinity of the site.

2.4.2.1 Economy

Wyoming has a long history of energy-related booms and busts. In the 1970s, a national energy crisis caused a large surge in oil and coal production in the State (Reference 2.4-38). The State’s population increased by 52 percent at that time. By the early 1980s, the boom had diminished, and the State’s economy stagnated for the next two decades. In the 2000s, the State experienced another surge in energy production in the form of natural gas production (fracking) (Reference 2.4-38). Since then, the natural gas boom has faded, to some extent, and the State has begun exploring renewable energies like solar and wind.

In addition to the State’s mineral asset mining and energy production industries, there is a relatively large tourism industry built on the State’s natural beauty and assets like Yellowstone National Park, Grand Teton National Park, Jackson Hole, and Fossil Butte Monument, among others.

The southwestern region of the State, with deposits of coal, oil, gas, and trona (the raw material for soda ash production), has experienced a similar economic history. Kemmerer is home to PacifiCorp’s Naughton Power Plant, which is fossil fueled, and the nearby Kemmerer Operations, LLC, coal mine supporting the plant. Rock Springs is home to PacifiCorp’s Jim Bridger Power Plant, which is also fossil fueled. There are industrial facilities producing natural gas in and around the southwest region, and most trona deposits are found in the Green River area.

The economic region's principal economic centers include: Kemmerer and Diamondville[4] (Lincoln County), Evanston (Uinta County), and Green River and Rock Springs (Sweetwater County). Rock Springs is the largest city in the economic region, and Evanston is the largest city within the demographic region (Table 2.4-3).

The northern part of Lincoln County is beyond commuting distance of the site and has economic links to the tourism industry generated by Grand Teton National Park, Yellowstone National Park, Jackson Hole, and several national forests. Much of the housing in the northern half of the county is for seasonal, recreational, or occasional use (i.e., vacation housing) (Table 2.4-26). The southern part of the county, within commuting distance of the site, is dominated by open plains, grazing and rangelands, and the industrial facilities of the Kemmerer and Diamondville area. The county's southern economy has significant dependence on the energy industry through mineral mining and power production (Reference 2.4-158). Kemmerer and Diamondville are located at the intersection of US 189 and US 30. Approximately 30 miles (30 kilometers) south of the proposed site, US 189 intersects with I-80. County residents refer to the Kemmerer and Diamondville area as “the county's economic engine” (Reference 2.4-158).

Uinta County, located south of Lincoln County, is a 90-minute drive from Salt Lake City and has economic linkages to the city. The City of Evanston is located along the I-80 corridor, which travels from Salt Lake City to eastern Wyoming and beyond. The Uinta-Wasatch-Cache National Forest is just west of Uinta County in eastern Utah (Reference 2.4-63).

Sweetwater County, located east of Lincoln and Uinta Counties, contains the two largest cities in the economic region: Green River and Rock Springs. Both cities are located outside of the 50-mile (80-kilometer) radius along I-80. Most Sweetwater County residents (about 84 percent) live in one of these two cities (Table 2.4-3 and Table 2.4-4).

Table 2.4-8 presents labor force, employment, and unemployment trends in the economic region as calculated by the U.S. Bureau of Labor Statistics. In 2021, the economic region labor force totaled 37,795 persons, representing about 13 percent of the total Wyoming labor force. The labor force in the economic region decreased at an average annual rate of -1.1 percent between 2011 and 2021, while the State's labor force decreased at an average annual rate of -0.4 percent over the same period. The economic region labor force is concentrated in Sweetwater County, which accounts for 51 percent of the total, followed by Lincoln and Uinta Counties with 25 and 23 percent. In 2021, 1,892 persons in the economic region were unemployed, representing an average annual decline of -3.5 percent from 2011, when unemployment reached 2,698. The 2021 annual unemployment rate in the economic region was 5.0 percent, and the unemployment rate in the economic region's individual counties ranged from 3.8 percent in Lincoln County to 5.6 percent in Sweetwater County, compared to 4.5 percent for Wyoming. Lincoln County is the only county in the economic region to experience growth in both its labor force and employment during this period. The County also had the largest decrease in its unemployment rate from 8.3 percent in 2011 to 3.8 percent in 2021.

4. The City of Kemmerer and Town of Diamondville are adjacent to one another and are commonly considered one economic unit.

The Bureau of Economic Analysis reports employment data by industry (as defined by the North American Industrial Classification System [NAICS]). Table 2.4-9 presents regional and State employment, by industry, for 2019 and 2020. In 2020, local government provided 14.9 percent of jobs in the economic region, while mining, quarrying, and oil and gas extraction provided 11.4 percent.[5] Retail trade and construction provided approximately 10.8 and 8.6 percent of jobs. Accommodation and food services, healthcare, and social assistance were also important industries.

At the State level, local government, retail trade, accommodation and food services, and healthcare and social assistance were the largest providers of jobs, at 11.6, 9.6, 8.2, and 7.9 percent. Real estate, rental, and leasing, and construction were also important industries. Mining, quarrying, and oil and gas extraction provided only 5.3 percent of jobs at the State level.

Notably, wage and salary employment (jobs) in Uinta County, Sweetwater County, and the State of Wyoming declined, from 2019-2020. This could be due, in part, to the socioeconomic effects of the COVID-19 pandemic. Only Lincoln County remained relatively unchanged, increasing by nine jobs.

Table 2.4-10 lists the economic region's largest public and private employers. The largest employers in the economic region are in Uinta and Sweetwater Counties, mostly located in the cities of Evanston, Green River, and Rock Springs. The largest employers in Lincoln County (within the 50-mile region) are Westmoreland Kemmerer, Inc., (now called Kemmerer Operations, LLC (coal mine)) with about 220 employees and the South Lincoln Nursing Center with about 180 employees. Many of the companies and institutions listed in Table 2.4-10 are in local government and the healthcare, chemical, and mining industries.

In its Quarterly Census of Employment and Wages, the U.S. Bureau of Labor Statistics collects employment and wage data by NAICS industrial sector. Table 2.4-11 presents NAICS Sector 237, Heavy and Civil Engineering Construction data, for 2019 and 2021, for the economic region, Wyoming, and the U.S. As the table shows, annual average wages in the economic region counties, in 2021, ranged from $59,998 in Lincoln County to $64,536 in Sweetwater County compared to $72,502 in Wyoming and $83,590 in the U.S. From 2019 to 2021, Lincoln, Uinta, and Sweetwater Counties' annual wages in this sector changed by 28.3 percent, 2.6 percent, and -0.9 percent. Construction wages are discussed in Section 4.4.

Data were reviewed for NAICS Sector 221113, Nuclear Electric Power Generation*,* for the economic region counties, Wyoming, and the U.S. Wage information was only available at the U.S. level, where the annual average wage increased from $151,355 in 2019 to $155,840 in 2021 (Table 2.4-12). Operations wages are discussed in more detail in Section 5.4.

Wyoming is a "right-to-work" state; workers are not required to join labor unions as a condition of employment. In 2021, approximately 6 percent of the Wyoming workforce was unionized. Nationally, the greatest concentration of unionized workers is in the governmental (public) sector (Reference 2.4-13).

5. Based on 2019 data for economic region. Sweetwater County's 2020 data has been withheld by the BEA to avoid disclosure of confidential information.

The per capita personal income measure (PCPI) provides a useful means of comparing income among regions. The Bureau of Economic Analysis calculates PCPI by dividing the total personal income in an area by the area population. Table 2.4-13 presents PCPI for the economic region counties, Wyoming, and the U.S, in 2011 and 2021. In 2021, the economic region counties had lower PCPI values than those of Wyoming, and the U.S. Lincoln County's 2021 PCPI of $61,945 was the highest in the economic region, while Uinta County, with $44,157, had the lowest. Notably, at 5.4 percent, Lincoln County had the highest average annual PCPI growth rate in the economic region. From 2011 to 2021, Lincoln County's PCPI grew more than three times as fast as that of Sweetwater County and almost seven times as fast as that of Uinta County.

2.4.2.2 Government and Taxes

2.4.2.2.1 Government

Wyoming's local government is composed of counties, municipalities, school districts, and special districts. Municipalities use one of three forms of government: mayor and council, city manager, or commission (Reference 2.4-113).

Lincoln County is governed by a three-member board of county commissioners (Reference 2.4-58). Lincoln County has nine incorporated communities: Afton, Alpine, Cokeville, Diamondville, Kemmerer (county seat), LaBarge, Opal, Star Valley Ranch, and Thayne (Reference 2.4-134 and Reference 2.4-157). Of those, Kemmerer is the largest. The City of Kemmerer has a mayor-council form of government. The mayor and six city council members are elected at-large, and they hire a city administrator to run daily operations (Reference 2.4-43).

Uinta County is governed by board of three county commissioners (Reference 2.4-94). Uinta County has four incorporated communities: Bear River, Evanston (county seat), Lyman, and Mountain View (Reference 2.4-134 and Reference 2.4-157). Evanston, the largest city in Uinta County, is governed by a mayor and six city council members (Reference 2.4-27).

Sweetwater County is governed by a board of five county commissioners (Reference 2.4-89). Sweetwater County has six incorporated communities: Bairoil, Granger, Green River (county seat), Rock Springs, Superior, and Wamsutter (Reference 2.4-134 and Reference 2.4-157). The City of Rock Springs, Sweetwater County's largest municipality, is governed by a mayor and eight city council members (Reference 2.4-77).

2.4.2.2.2 Taxes

The Wyoming government fiscal year (FY) is from July 1 through June 30 (Reference 2.4-135). Wyoming operates on a biennial budget cycle (Reference 2.4-142). Most State and local taxes are authorized in Article 15 of the Wyoming Constitution and Title 39 of the Wyoming Statutes (with limited exceptions) (Reference 2.4-142).

Below is a list of the most project-relevant statutes:

- Chapter 13 – Ad valorem (property) taxes
- Chapter 14 – Mine produce taxes (severance taxes)
- Chapter 15 – Sales taxes (Statewide and local optional sales taxes)

- Chapter 16 – Use taxes (Statewide and local optional use taxes)
- Chapter 17 – Fuel taxes
- Chapter 23 – Nuclear reactor electricity production taxes

Wyoming government operations and K-12 education equalization programs (Section 2.4.2.7) are funded by five primary sources: sales and use taxes, severance taxes, Federal mineral royalties, property taxes, and investment income. Source revenues are deposited into the State's General Fund and Budget Reserve Account (Reference 2.4-142). Table 2.4-14 presents the sources and revenues for Wyoming's General Fund and Budget Reserve Account for Fiscal Years 2019–2021. The largest sources of revenue for State general operations are sales and use taxes. Other important sources are mineral severance taxes and royalties. In FY 2021, sales and use tax revenues totaled $493,101,908, or 29.2 percent of total General Fund and Budget Reserve Account revenues.

Local governments receive tax revenues from both State and local taxation. Most State revenue distributed to local governments is generated by sales and use taxes, Federal mineral royalties, severance taxes, fuel taxes, and lodging taxes. Most local government revenue is generated by sales and use taxes and property taxes (Reference 2.4-142). Property taxes are the primary source of revenue for most counties' general funds, school districts, and special districts (e.g., hospital districts, irrigation districts, community college districts), while sales and use taxes are the primary source of revenue for most municipal governments (Reference 2.4-142).

Table 2.4-15 and Table 2.4-16 present FY 2021 government revenues for Lincoln County and the City of Kemmerer. In Lincoln County, property taxes are the largest source of revenues at $7,271,821 or 26.6 percent of total revenues. Sales and use taxes are the third largest source at $6,150,208. In Kemmerer, sales and use taxes are by far the largest source of revenues, accounting for $1,689,508 or 42 percent of total revenues.

Several tax revenue categories will be affected by construction and operation of Kemmerer Unit 1. Among those are sales and use taxes on construction- and operations-related purchases and personal purchases made by project-related workers, real property taxes related to the construction and operation of the plant, and real property taxes paid by in-migrating project-related workers. The following sections describe the primary tax categories impacted by the project and their applications in the State of Wyoming; Lincoln, Uinta, and Sweetwater Counties; and the City of Kemmerer.

Corporate and Individual Income Taxes

There are no individual or corporate income taxes in Wyoming (W.S. 39-12-101).

Sales, Use, and Lodging Taxes

Sales and Use

W.S. 39-15-201 through 211 and W.S. 39-16-201 through 211 provide authorization for the collection of sales and use taxes (Reference 2.4-154). Sales taxes are imposed on the gross receipts from sales of tangible personal property and select services, including receipts by public utilities, certain interstate carriers, food services, lodging and entertainment facilities, cigarettes and other tobacco products, and alcoholic beverages. The use tax is levied upon property purchased outside of Wyoming for storage, use, or consumption in Wyoming (Reference 2.4-154). Sales and use taxes are collected by vendors and remitted to the Wyoming Department of Revenue (WDOR) (Reference 2.4-142).

Wyoming imposes a four percent, Statewide, sales and use tax, of which 69 percent is directed to the State General Fund, and the remainder is distributed to the county of origin (Reference 2.4-142). The distribution between each county and its municipalities is determined using a population-based formula (Reference 2.4-135).

With voter approval, counties have the option to levy a maximum of 2 percent in sales and use tax for general purposes and a maximum of 2 percent for specific purposes, but the local tax rate cannot exceed 3 percent (W.S. 39-15-204). If a county has imposed a general purpose or specific purpose tax, the board of county commissioners may adopt a resolution to authorize cities and towns within the county to propose a municipal tax, with certain restrictions (Reference 2.4-154; W.S. 39-15-203 and W.S. 39-15-204). Optional general purpose tax revenue, less administrative costs, is returned to the county of origin and distributed between the county and its municipalities using the same population-based formula (Reference 2.4-135). Optional specific purpose tax revenue is returned to the county or municipality of origin (Reference 2.4-135).

Table 2.4-17 presents current local sales and use tax rates for the counties and primary cities in the economic region. All of these counties and cities collect a general-purpose county tax of 1 percent in addition to the State’s 4 percent sales and use tax. There are no municipalities in the economic region that impose their own sales and use tax. Table 2.4-18 presents sales and use tax collection data for the economic region and State for selected fiscal years. Lincoln County sales and use tax collections grew at an average annual rate of 2 percent per year from 2011 to 2021, while Wyoming’s sales and use tax collections grew at an average annual rate of 1.4 percent for the same period. Uinta County collections also climbed, albeit, at a slower rate (0.7 percent average annual increase), while Sweetwater County collections experienced a significant decrease, at an average annual decline of -2.9 percent.

For the period, July 1, 2020, to June 30, 2021, the State distributed the following sales and use tax revenues to Lincoln County, Kemmerer, and Diamondville (Reference 2.4-130):

- Lincoln County – $5,958,816
- Kemmerer – $1,689,508
- Diamondville – $468,813

Lodging Tax

Lodging taxes are excise taxes assessed on lodging services in the State. Lodging services include hotels, motels, tents, campers, trailers, mobile homes, and other mobile accommodations. The taxes are assessed on all sleeping accommodations lasting less than 30 days and are in addition to sales tax. The taxes are collected by vendors and remitted to the WDOR (Reference 2.4-154).

W.S. 39-15-104(h) and 39-15-111 authorize the WDOR to impose up to 5 percent in lodging taxes. Three percent of the tax is distributed to the Wyoming Tourism Account to be used for the operation of the Wyoming Office of Tourism and the Wyoming Tourism Reserve Account. The remaining 2 percent is collected in and distributed to each county or municipality that does not have its own lodging tax. The distribution amounts are in proportion to the revenue collected by the counties and their municipalities (Reference 2.4-154).

W.S. 39-15-204, 203(a)(ii) and W.S. 39-15-101, 103 authorize local jurisdictions that do not already have a lodging tax in place to levy up to 2 percent on all sleeping accommodations (Reference 2.4-154). Local lodging tax collections, less State administrative costs, are distributed to the local taxing jurisdictions. At least 90 percent of local lodging tax proceeds must be used to promote tourism (W.S. 39-15-211(a)(ii)(B)(I)).

Table 2.4-17 presents local lodging tax rates in the economic region, in 2022. Table 2.4-19 presents lodging tax collections for the counties and municipalities of the economic region in fiscal years 2019–2021.

Property Taxes

W.S. 39-11-105 and W.S. 39-13-101 through 39-13-111 provide authorization for the collection of property taxes (Reference 2.4-154). Property taxing jurisdictions include the State, counties, cities, schools, and special districts (Reference 2.4-154). Each jurisdiction establishes a budget that informs its mill levy for the year. Levies are imposed as defined by Wyoming statutes. Taxes are distributed based on the assessed valuation of the property within the geographical boundary of each taxing jurisdiction (Reference 2.4-154).

County tax assessors assess the value of most property, but the WDOR assesses the values of mines, rail car companies, public utilities, pipelines, and telecommunications companies. County treasurers collect the taxes (except for rail car company taxes which are remitted directly to the WDOR) and distribute collections to the taxing jurisdictions (Reference 2.4-154).

Real and personal property are assessed using fair market value, less exemptions and exclusions. Fair market value is determined by using one or more of the three following appraisal methods: sales comparison or market value; cost (replacement, reproduction, or historical); and income capitalization (WDOR Rules). Agricultural land is taxed based on the land's productive capability under normal conditions (Reference 2.4-127). The assessed or taxable value of property is defined as a ratio of fair market value. Current assessment ratios, based on property type, are as follows:

- Minerals and mine products – 100 percent
- Industrial property, real and personal – 11.5 percent
- All other property (including agricultural), real and personal – 9.5 percent (Reference 2.4-154)

Mill[6] levies are applied to the assessed (taxable) value of a property to calculate the tax.

For State government operations, Wyoming can assess up to 4 mills on the State's total assessed value, but these mills have not been levied since 1969, the year the legislature passed its mineral severance tax (W.S. 39-13-104).

By State law, Wyoming is responsible for maintaining a public education system that is complete and uniform across the State (Wyoming Constitution, Article 7 §§ 1, 9). To that end, the State generates funding for two education equalization programs, the School Foundation Program (SFP) and the School Capitalization Construction (SCC) program. For the SFP, the State can collect a total of 12 mills and is based on the assessed value of all property in the State. The amount of funding each school district receives from the SFP is a function of the school finance system's funding model as well as the characteristics of the district's schools, staff, and students (Reference 2.4-142). In FY 2021, over $235 million in revenues was collected for this program (Reference 2.4-131). The SCC program revenues are provided by Federal mineral royalties; State mineral royalties, leases, or bonuses; and a coal lease bonus (Reference 2.4-142). Distributions from the SCC program are based on need (Reference 2.4-142). Section 2.4.2.7.4 presents additional details about these programs.

County governments can assess up to 12 mills on the taxable value of property in the county (Reference 2.4-142). Cities and towns are limited to 8 mills on the property located within municipal limits. For schools, the county can collect a total of 6 mills on property in the county. A school district must levy 25 mills on the property within the district (Reference 2.4-142). (The largest single source of revenue for K-12 education is local property taxes as permitted by State statute or constitution. Special district levy maximums depend on the type of special district.[7]

Table 2.4-20 presents tax levy data for Lincoln, Uinta, and Sweetwater Counties for tax years 2011 and 2019–2021. In Lincoln County, average mill levies increased from 2011 to 2021, while total revenues decreased over the same period. In both Uinta and Sweetwater Counties, average mill levies and total revenues decreased over the 10-year period. Table 2.4-21 presents school district revenue sources for the 2019–2020 and 2020–2021 school years for the school districts most likely to host the plant and most of the operations workforce's children. Local property tax revenues represent the largest source of operating revenue funding for these school districts.

Approximately 334 acres (135 hectares) of land have been acquired for construction of the nuclear power plant. The site was formerly part of a larger parcel (# 20160210001700) owned by PacifiCorp. In 2021; the assessment ratio for the parcel was 9.5 percent (all other property, including agricultural). The total mill levy was 65.13 mills, representing eight taxing jurisdictions:

- Lincoln County School #1: 46.40
- Lincoln County: 12

6. Mill means $1 of taxes for every $1,000 of assessed value. A mill is applied to the assessed value of property to determine the tax due.

7. Pursuant to W.S. 39-13-104(e) and (f), special districts include hospital (6 mill max.), cemetery (3 mill max.), fire protection (3 mill max.), sanitary and improvement (1 mill max.), museum (1 mill max.), solid waste removal (3 mill max.), weed and pest (1 mill max.), water and sewer (8 mill max.), water conservancy (1 mill max.), rural health care (4 mill max.), senior citizen services (2 mill max.), flood control (12 mill max.), and rural county (1 mill max.) districts (Reference 2.4-142).

- South Lincoln Hospital: 4.0
- South Lincoln Special Cemetery District: 0.967
- Weed and Pest: 0.905
- South Lincoln Fire: 0.555
- Kemmerer Senior Ctr: 0.30
- Lincoln Conservation: 0

At 46.4 mills, the Lincoln County School District #1 levy represented approximately 71 percent of the total mill levy. At 12 mills, the Lincoln County levy represented approximately 18 percent of the total mill levy. The remaining taxing jurisdictions' mill rates represented significantly smaller percentages of the total.

Actual property taxes paid by PacifiCorp for this land are unavailable because the WDOR assesses PacifiCorp's property holdings across the State as one unit. Thus, for this analysis, the total mill rate (65.13) was applied to the land's 2021 assessed value, for an approximation of the taxes paid on behalf of the 334 acre (135 hectare) property, and resulted in an annual estimated payment of approximately $207.

<u>Other Applicable and Relevant Taxes and Fees</u>

Business (or Corporate) License Tax

W.S. 17-16-1630 authorizes the Wyoming Secretary of State to collect an annual fee from all business entities organized within Wyoming or that have obtained the right to transact business there. The fee is based on the assessed valuation of capital, property, and assets located and employed in the State. The fee is $60.00 or 0.02 percent of the total assessed valuation, whichever is greater. Nonprofit fees are $50. Business license revenues are part of the State General Fund (Reference 2.4-154).

Public Utilities Assessment

W.S. 37-2-106 through 37-2-109 authorize the WDOR to collect, from public utilities, a tax based on their annual intrastate gross operating revenues. The taxes collected are used to defray the costs of WPSC operations. The tax is derived by determining the percentage of annual aggregate public utility gross operating revenues that is represented by the WPSC's annual budget. The resulting percentage, capped at 0.3 percent, is applied to individual utility revenues for the preceding calendar year. The rate for fiscal year 2020 was 0.27 percent (Reference 2.4-154). In FY 2021, WPSC appropriations totaled $7,841,327 (Reference 2.4-149).

Minerals Severance Tax (Excise Tax)

In Wyoming, mineral production is an important source of tax revenue. W.S. 39-14-101 through 39-14-711 authorize the WDOR to impose taxes on the mining and production of minerals (Reference 2.4-154). Mining property is subject to both property and severance taxes. Property taxes are presented earlier in this section. Wyoming statutes define the severance tax as a form of excise tax that is imposed on the present and continuing privilege of removing, extracting, severing, or producing any mineral in the State (W.S. 39-14-101 (a)(ix)). The valuation of mineral production, for severance taxes (and property taxes), is based on gross production (W.S. 39-11-101(a)(xvii)(A)). In 2021, the taxation of uranium mining provided Wyoming's counties with receipts of $43,941 from property taxes and $27,236 from severance taxes (Reference 2.4-131). In FY 2021, total mineral severance tax revenues in Wyoming, including those from uranium and all other minerals extracted, were $258.4 million, representing about 15 percent of Wyoming General Fund revenues (Table 2.4-14).

Production of Electricity from Nuclear Reactors Tax (Excise Tax)

W.S. 39-23-101 through 39-23-111 authorize the WDOR to impose taxes on the sale of electricity from nuclear reactors. The tax rate is 5 dollars per megawatt hour and is paid by the entity that sells the electricity. An exemption is extended to advanced nuclear reactors that are operated in accordance with W.S. 35-11-2101. Beginning in 2035, advanced nuclear reactor owners that qualify for this exemption will also be required to purchase at least 80 percent of their uranium from mines in the United States to continue to qualify for the exemption. Percentages are determined on a monthly basis. Payments are deposited into the State's General Fund.

Impact Assistance Payment Program

Wyoming statutes in Title 35, Chapter 12, provide for financial assistance for local governments that host major construction projects within their boundaries. This is administered through the WDEQ's Industrial Siting Division. The Division's Industrial Siting Council oversees the provision of economic impact assistance payments that are designed to assist local governments in mitigating construction project impacts to their community resources.

With input from affected counties and their municipalities, the Wyoming Industrial Citing Council determines the size of an impact assistance payment. House Bill 47 defines the maximum impact assistance payment amount, as a percentage of project materials costs, as follows (Reference 2.4-143):

- For industrial facilities with total estimated materials costs of $350,000,000 or less, the maximum allowable percentage is 2.25 percent, except that the Council may increase the maximum allowable percentage to 2.76 percent if the Council specifically finds that 2.25 percent is insufficient to mitigate the identified impacts.
- For industrial facilities with total estimated materials costs greater than $350,000,000 but less than $850,000,000, the maximum allowable percentage is 2 percent.
- For industrial facilities with total estimated materials costs of $850,000,000 or more, the maximum allowable percentage is 1.5 percent.

None of the maximum payments exceed 2.76 percent of a construction project's total estimated material costs. The amount, 2.76 percent, represents the State's share of the four percent sales and use taxes generated by the project (4 percent of 69 percent is 2.76 percent). In essence, the State returns part, or all, of its share of the sales and use taxes generated by the project to the communities that are most impacted by the project. These funds are transferred from the State's General Fund to the county treasurer, who distributes the funds to the county and municipalities based on a ratio decided by the Industrial Siting Council (Reference 2.4-131, and WDEQ Rules, Chapter 1).

2.4.2.3 Transportation

The 50-mile (80-kilometer) region surrounding the proposed Kemmerer Unit 1 Site is served by a transportation network of U.S. highways, State and county roads, one Interstate highway, and freight rail lines. The 50-mile (80-kilometer) region does not have waterways and ports within its transportation network, so the discussion below on waterways and ports looks beyond the 50-mile (80-kilometer) region. The region is also home to only small airports, so the discussion below also looks beyond the 50-mile (80-kilometer) region.

2.4.2.3.1 Roads

Roads in the region consist of U.S. highways, State routes, and CRs. Figure 2.4-3 shows the road and highway transportation system in the region. Commuters and deliveries will access the Kemmerer Unit 1 Site via one entrance from US 189. US 189 travels north-south through Lincoln and Uinta counties, connecting the site to US 30 to the north in Lincoln County and I-80 to the south in Uinta County. State routes and county highways intersect these major roadways and connect the cities and towns and outlying areas in the counties to the U.S. highway system.

US 30 and US 189 connect the proposed site with the urban and residential areas of Kemmerer and Diamondville. US 30 also provides access to the recreational areas of Fossil Butte and Bear Lake within the region. I-80 runs east-west through Uinta County. Intersections along I-80 provide access to the city of Evanston southwest of the US 189 interchange and the city of Lyman and the towns of Fort Bridger and Urie south and east of the US 189 interchange. Farther east, I-80 enters Sweetwater County and provides access to the cities of Green River and Rock Springs which lie outside of the 50-mile (80-kilometer) region. West of Evanston, I-80 provides access to Salt Lake City, Utah, and I-15, both of which lie outside of the 50-mile (80-kilometer) region.

The roadway access routes are presented in Table 2.4-22. The routes are those of Lincoln, Sweetwater, and Uinta counties that provide access to the proposed site for commuters and deliveries of materials and equipment. A more detailed discussion of roadway characteristics and traffic volume is provided in Section 2.8.

2.4.2.3.2 Railroads

The railroad lines within the 50-mile (80-kilometer) region are owned and operated by Union Pacific (Reference 2.4-156). Figure 2.4-3 shows the railroad lines in Lincoln and Uinta counties. The Union Pacific railroad system branches at Granger in western Sweetwater County with the northern branch running east-west through Lincoln County and the southern branch running northeast-southwest through Uinta County (Reference 2.4-96). The Union Pacific railroad line through Lincoln County has spurs in the vicinity, and the Skull Point Spur is adjacent to the northern boundary of the Kemmerer Unit 1 Site.

There is no passenger rail service within the 50-mile (80-kilometer) region. The nearest passenger rail service is provided by Amtrak's California Zephyr route which passes through Utah south of the proposed site with the nearest station being Salt Lake City (Reference 2.4-3, Reference 2.4-4).

2.4.2.3.3 Navigable Waterways and Ports

There are no navigable waterways or ports within the 50-mile (80-kilometer) region. There are no plans to use inland waters for transport. International sourced materials and equipment could arrive via the seaports along the western U.S. coast and then be shipped overland to the site. The Port of Portland in Oregon and the Port of Los Angeles and Port of Long Beach in California are the three closest major seaports at 812 to 832 miles (1,300 to 1,340 kilometers) from the project site.

2.4.2.3.4 Airports

The are no airports in the region offering commercial passenger service. There are four public airports within the 50-mile (80-kilometer) region. The closest is the Kemmerer Municipal Airport, a public airport operated by the City of Kemmerer which is approximately 7.2 miles (11.6 kilometers) north of the site. The Kemmerer Airport is a general aviation airport with three runways. The weekly average for aircraft operations for July 2021–June 2022 was 61 (Reference 2.4-2).

Other airports within the 50-mile (80-kilometer) region are also general aviation airports. The Evanston-Uinta County Airport southwest of the site has a weekly average of aircraft operations of 106 (Reference 2.4-2). The Fort Bridger Airport south of the project site has a weekly average of 52 operations (Reference 2.4-2). The Afton Municipal Airport northwest of the site has annual average aircraft operations of 22 to 25 per day (Reference 2.4-2 and Reference 2.4-25). These airports are shown on Figure 2.4-3.

The nearest major airport is the Salt Lake City International Airport which is about 145 miles (233 kilometers) southwest from the site. This airport provides commercial and freight service.

International airfreight cargo will have to be transloaded at a major airport hub and shipped via truck to the site. For international shipments inbound from Asia, the first port of entry will be either Los Angeles International Airport, San Francisco International Airport, or Seattle-Tacoma International Airport.

2.4.2.4 Land Use

Local land use plans and zoning for the counties in the economic region are as follows:

2.4.2.4.1 Lincoln County

Lincoln County contains approximately 2.62 million acres (1.06 million hectares) of land, about 1.8 million of which are managed by a Federal or State agency. In northern Lincoln County, much of the public land is within the Bridger-Teton National Forest managed by the U.S. Forest Service. In southern Lincoln County, where the Kemmerer Unit 1 Site is located, most of the public land is under Bureau of Land Management (BLM) management (Reference 2.4-52). Lincoln County has zoning classifications of public for the Federal, State, and Lincoln County-owned and administered lands. The land outside of the public land and the incorporated area of Kemmerer and Diamondville are zoned as industrial, mixed uses, recreational, or rural (Reference 2.4-54). Most of southern Lincoln County outside of the public lands is zoned as rural. Land west and south of Kemmerer encompassing the Naughton Power Plant and Kemmerer Mine are zoned industrial (Reference 2.4-53, Reference 2.4-56). In addition, land extending south of Naughton Power Plant along the western side of US 189 has been zoned industrial since at least 2008 (Reference 2.4-53). In 2022, Lincoln County rezoned land on the eastern side of US 189 (various sections of T19N R116W and T20 R116W) from rural to industrial to be consistent with the current land uses and zoning within the immediate vicinity as well as to promote future development (Reference 2.4-56, Reference 2.4-50, Reference 2.4-51).

A constraint on industrial, commercial, and residential development within the county is the large amount of Federal land. North and west of Kemmerer and Diamondville are contiguous Federal lands. The area south and west of Kemmerer and Diamondville is less constrained because the Federal lands and private lands form a checkerboard pattern providing more developable land (Reference 2.4-56).

2.4.2.4.2 Sweetwater County

Sweetwater County encompasses about 6.5 million acres (2.6 million hectares) of land with about 73 percent being Federally owned. The county has 13 communities with most concentrated along the I-80 and Union Pacific rail corridors. The City of Green River is the county seat, and Rock Springs is the largest city (Reference 2.4-85). While much of the land in the county is under Federal management, primarily BLM, the I-80 corridor has a higher concentration of privately held land (Reference 2.4-35).

The county’s zoning resolution classifies the unincorporated areas of Sweetwater into agricultural, residential (several classes), commercial and recreational services, retail business, commercial, industrial (light and heavy), and mineral development (Reference 2.4-87). The County has a Growth Management Plan agreement with the cities of Green River and Rock Springs for more directed growth and for providing public utilities around the cities and the I-80 corridor between the cities (Reference 2.4-86).

While Sweetwater County has development constraints due to the large Federal land ownership, the growth management zone and public utility districts around Green River and Rock Springs provide commercial and residential opportunities.

2.4.2.4.3 Uinta County

Uinta County is largely rural and has four incorporated municipalities: Bear River, Evanston, Lyman, and Mountain View (Reference 2.4-92). Evanston is the largest city and the county seat. Much of the land within Uinta County is managed by BLM. In northern Uinta County, the BLM managed lands form a checkerboard pattern like in southern Lincoln County. East and south of Lyman and Mountain View, BLM lands are largely contiguous (Reference 2.4-91).

The county’s zoning provisions classify land outside of the incorporated areas as Agricultural Resource Development, commercial, industrial, residential and commercial, or residential. Nearly all of the land is classified Agricultural Resource Development (Reference 2.4-92 and Reference 2.4-93). Residential use of Agricultural Resource Development classified land is not incidental to the agricultural use and when subdivision of land is not involved (Reference 2.4-93). Residential development where public water and sewer is not available is limited to one dwelling per acre (Reference 2.4-93). Uinta County, as a policy, encourages residential development within urbanizing areas or adjacent to existing communities where community services (e.g., public and private utilities) can be efficiently provided or easily accessible (Reference 2.4-90).

Constraints on commercial and residential development within the county are the large amount of Federal land and the county zoning provisions and policy promoting development at the few, small urban and urbanizing areas.

2.4.2.5 Aesthetics, Recreation, and Tourism

The aesthetics and recreational facilities and opportunities in the 50-mile (80-kilometer) region are discussed in this section.

2.4.2.5.1 Aesthetics

The 50-mile (80-kilometer) region is primarily rangeland with about 1 percent developed or urban land. The region has national forests near the edge of the 50-mile (80-kilometer) radius. The region also has a national monument, Fossil Butte, and two national wildlife refuges (Section 2.1.1.3).

No sensitive visual resources, such as residential subdivisions or public parks, have been identified in the proposed Kemmerer Unit 1 vicinity. The topography of the vicinity is shown in Figure 2.1-5. The proposed project site and transmission and water supply corridors are within the Cumberland Flats, a gently rolling terrain, with ridges to the east, Oyster Ridge, and the west. The gently rolling terrain along the Cumberland Flats and its low rangeland vegetation offers full and partial views of the surrounding area. Most of the Kemmerer and Diamondville area is on the opposite side of the eastern ridge and the ridge obstructs a view of the Cumberland Flats. No sensitive visual resources, such as residential subdivisions or public parks, are within full or partial view. The Naughton Power Plant is also within the Cumberland Flats and portions of the plant and the adjacent Kemmerer Operations, LLC, coal mine can be seen from the surrounding land at similar elevation as well as the surrounding ridges. Because the topography surrounding the project site is gently rolling rangeland, there is little to no screen for the proposed facilities from US 189.

Most of the recreational opportunities discussed below in Section 2.4.2.5.2 are in Kemmerer and thus on the opposite side of the ridge that obstructs the view of the Cumberland Flats. Within the Cumberland Flats is public land and one Hunter Management Area (HMA) that would offer the opportunity for hunting as discussed in Section 2.4.2.5.2. Thus, the Kemmerer Unit 1 construction activities could be visible, or partially visible, to hunters on these lands. Section 2.6.2.2 details the cultural resources identified at the site and macro-corridors. Within the site and macro-corridors study area, three non-archaeological resources were identified. Eight archaeological historic properties were identified as visually sensitive cultural resources within 5 miles (8 kilometers) of the site and macro-corridors.

2.4.2.5.2 Recreation and Tourism

Recreation activities within the demographic and economic regions include fishing, hunting, climbing, boating, river rafting, snowmobiling, ice climbing, cross-country and alpine skiing, biking, swimming, golfing, camping, and hiking. Tourism activities include visiting museums, touring historic buildings, districts, and trails, fossil hunting, and attending special events (Reference 2.4-158).

Most of the land in Lincoln County is Federally owned and managed for public use. Major Federal holdings include those of the U.S. Forest Service, BLM, Cokeville Meadows National Wildlife Refuge (U.S. Fish and Wildlife Service), Fossil Butte National Monument (National Park Service), and Fontanelle Reservoir (Bureau of Reclamation) (Reference 2.4-158). The history and archaeology of this area includes evidence of Native American inhabitants, explorers, trappers, settlers, miners, and railroad workers. The area is commonly visited by tourists traveling to Yellowstone National Park and other parks and attractions to the north (Reference 2.4-158).

The remainder of this section characterizes recreation and tourism opportunities within the 10-mile (16-kilometer) vicinity of the Kemmerer Unit 1 Site. Major recreation and tourism sites and activities within the 10-mile (16-kilometer) vicinity are listed below. There are no National parks, State parks, or wildlife habitat management areas within a 10-mile (16-kilometer) radius of the Kemmerer Unit 1 Site. There are, however, numerous public lands and one HMA that can be used for hunting (see below). Figure 2.4-4 presents Federal and State lands and recreational areas within or near the 10-mile (16-kilometer) vicinity.

<u>Fossil Butte National Monument and Visitor Center</u>

Fossil Butte National Monument, located just outside the 10-mile (16-kilometer) radius of the Kemmerer Unit 1 Site (Figure 2.4-4), occupies a less than 1 percent section of a pre-historic lake (Fossil Lake) which contains aquatic and terrestrial fossils from the Eocene epoch (Reference 2.4-69).

Covering about 13 square miles (3,400 hectares), the monument is managed and protected by the National Park Service 2015. Visitors can view fossil exhibits, engage in summer paleontology programs, hike, and drive scenic byways (Reference 2.4-70). Also, there is an early 20th century fossil hunter’s cabin (Haddenham’s Cabin) that is listed on the National Register of Historic Places (Reference 2.4-20). In 2021, the park hosted 21,153 visitors, with a peak daily use of 295 visitors (July) (Reference 2.4-20). The Monument does not have a maximum capacity for visitors (Reference 2.4-20). The Visitor’s Center building has a maximum capacity of 195 people in adherence with local building and fire codes (Reference 2.4-20).

Additionally, there are several private commercial fossil quarry operations in the area where visitors can dig for fossils for a fee (Reference 2.4-68). One example is Warfield Fossil Quarries, a family-owned group of quarries in Warfield Springs, near Kemmerer, where the public can dig for fossils for a fee (Reference 2.4-137).

JC Penney Historic District National Historic Landmark

In 1902, James Cash Penney, Jr. founded the first J.C. Penney store, located in Kemmerer. The district is composed of several properties, including the Golden Rule Store (the first in the J.C. Penney department store chain) and J.C. Penney's house (Reference 2.4-152). The store is still operating and the house, a National Register of Historic Places site (Reference 2.4-152), is a museum which is open to tours. The district is a National Historic Landmark, as designated by the National Park Service's National Historic Landmarks Program (Reference 2.4-71). The Museum does not track visitor numbers, but the summer months are busiest (Reference 2.4-82).

Fossil Country Frontier Museum

This museum, located in downtown Kemmerer, features information and artifacts about the area's history. Exhibits include an underground mine replica, fossils, and bootlegging stills (Reference 2.4-31). The museum does not currently track visitor numbers, and there is no stated maximum capacity (Reference 2.4-74). The museum has limited hours based on the availability of staff. Currently, the museum is open Thursday through Saturday, 10 a.m. to 3 p.m.

Fossil Island Golf Club

Fossil Island Golf Club is a public nine-hole golf course owned by the City of Kemmerer (Reference 2.4-32). The club has a maximum daily capacity of about 200 golfers. During their busiest days in the summer (usually weekends), the club can approach maximum capacity (Reference 2.4-9).

Herschler Triangle Park and Others

Herschler Triangle Park is named after former Wyoming legislator, governor, and Kemmerer resident, Edgar Herschler (Reference 2.4-153). The Park is situated near Kemmerer's historic district and is the location of the annual Oyster Ridge Music Festival (see below) and other city-sponsored events (Reference 2.4-44). In addition to Herschler Triangle Park, there are several other small neighborhood parks available for resident use, including the Archie Neil Park and outdoor pool, Piz Park, Lions Club Park, a baseball complex, and a couple of "tot lots" (Reference 2.4-45).

Oyster Ridge Music Festival

The Oyster Ridge Music Festival is an annual 2-day outdoor music concert that takes place in Herschler Triangle Park, on the last weekend in July. The organization supporting the festival is a private not-for-profit venture, and the concert is free. Attendance exceeded 4,000 per day in 2021 (Reference 2.4-73).

Local Hunting and Fishing Locations

Fishing locations within 10 miles (16 kilometers) of the site include the Kemmerer Community Pond, Diamondville Community Pond, and informal locations along Hams Fork (Reference 2.4-138). There are no boat ramps at the ponds or on the part of Hams Fork within the 10-mile (16-kilometer) region.

Hunting is permitted on most public lands, as long as Federal or State agency regulations are observed (Reference 2.4-139). Within the 10-mile (16-kilometer) region, most public land is owned by the State and the BLM (Figure 2.4-4). Hunting is also permitted in one HMA (managed by the Wyoming Game and Fish Department) called the Bear River Divide HMA (Figure 2.4-4) (Reference 2.4-140). The Wyoming Game and Fish Department issues permission slips to hunt the Bear River Divide HMA and all hunters must obey the rules of the private landowners whose land is within the HMA boundaries. For specific species, permission slips are unlimited (Reference 2.4-141).

RV Parks within 10 Miles

Table 2.4-23 presents data for the RV parks located within the 10-mile (16-kilometer) region. The Housing section of Section 2.4 provides RV park and campground data for the economic region. There are four RV parks, with a combined total of 131 RV sites in the 10-mile (16-kilometer) region. Utilization rates range between 60 and 100 percent during the summer months and approach 0 percent in the winter.

2.4.2.6 Housing

Housing data in the following section are divided into two major categories, permanent housing (for permanent residents) and temporary housing (for transient workers, visitors, etc.). Housing is presented for the economic region (Lincoln, Uinta, and Sweetwater Counties), with emphasis on those municipalities where construction and operation workers are expected to stay and live.

2.4.2.6.1 Permanent Housing

Most housing in the economic region is concentrated in the largest municipalities of each county: Kemmerer and Diamondville (Lincoln County), Evanston (Uinta County), Green River (Sweetwater County), and Rock Springs (Sweetwater County). Housing data are presented by county and municipality.

Municipalities in Lincoln and Sweetwater Counties that are beyond daily commuting distance of the site are not included in this analysis because project workers are not anticipated to live or stay in these areas. Although Green River and Rock Springs are relatively distant from the project site, some workers may choose to reside there based on their size, amenities, and access to I-80, especially if housing or infrastructure shortages are encountered in Lincoln and Uinta Counties.

Housing data are summarized by county and municipality in Table 2.4-24, which presents total estimated numbers of housing units[8] in 2020 and average annual growth rates for the past decade. In 2020, there were 38,470 housing units in the economic region, representing an average annual increase of 0.6 percent and an overall growth rate of 5 percent (2076 units), from 2010.

8. The USCB defines a housing unit as a house, apartment, mobile home or trailer, group of rooms, or single room occupied or intended to be occupied as separate living quarters.

Counties

Table 2.4-25 presents more detailed housing characteristics for the counties in the economic region. Over 51 percent of the total number of units in the economic region were in Sweetwater County (19,842), and the remainder were roughly split between Lincoln and Uinta Counties at 9,55 units and 9,077 units. Most housing in the economic region counties has been built since 1970 (76.1 percent).

Of the 38,470 otal units in the economic region in 2020, 19.8 percent were vacant (7,607 units) (Table 2.4-25). Vacancy rates for homeowners ranged from 1.3 percent in Uinta County to 2.8 percent in Lincoln County. Vacancy rates among rental units were substantially higher, ranging from 5.6 percent in Lincoln County to 28.8 percent in Sweetwater County (Table 2.4-25).

Table 2.4-26 presents county and municipality vacancy data in more detail. Of the 7,607 vacant units in the economic region, 1,847 (24.3 percent) were for rent; 438 (5.8 percent) were for sale; 1,673 (22.0 percent) were for seasonal, recreational, or occasional use; 30 (less than 1 percent) were for migrant workers; and more than a third (38.9 percent, 2,960 units) were considered “other vacant.” “Seasonal, recreational, or occasional use” units are generally considered vacation units. “Other vacant” units are those that do not fall into any of the other categories in the table. Examples include units held for occupancy by a caretaker or janitor and units held for personal reasons of the owner (legal, remodel, long absences).

Table 2.4-27 presents annual residential building permit data for the counties in the economic region. From January 1, 2010, to December 31, 2021, Lincoln County issued 1,338 residential building permits, Uinta County issued 463, and Sweetwater County issued 1,213. Most of permits issued in Lincoln and Uinta Counties (97 percent and 95 percent) were for single-family homes. The share was smaller in Sweetwater County where single-family homes accounted for only 79 percent of total permits issued (Table 2.4-27).

Municipalities

Table 2.4-28 presents housing characteristics for selected municipalities in the economic region, in 2020. The municipalities selected are the largest cities in each county (Kemmerer, Evanston, Green River, and Rock Springs) and the towns in Lincoln County (Diamondville, LaBarge, and Cokeville) that are within daily commuting distance of the site. The inclusion of the towns is useful in calculating the portion of Lincoln County housing that will be available to Kemmerer Unit 1 workers. Viewed by municipality, housing unit totals ranged from 221 in Cokeville to 10,634 in Rock Springs. Most housing units in the 7 municipalities have been built since 1970.

Kemmerer and Diamondville together had 1,890 housing units, of which 294 were mobile homes (15.6 percent of total) (Table 2.4-28). Cokeville had 221 units, of which 39 were mobile homes (17.6 percent of total). LaBarge had 260 units, of which 104 were mobile homes (40 percent of total). Evanston had 5,402 units, of which 804 were mobile homes (14.9 percent of total); Green River had 5,153 housing units, of which 642 were mobile homes (12.5 percent of total); Rock Springs had 10,634 housing units, of which 1,317 were mobile homes (12.4 percent of total) (Table 2.4-28).

Of the 1,890 units in Kemmerer and Diamondville, 283 were vacant (15.0 percent); Cokeville had 221 units, 37 of which were vacant (16.7 percent); LaBarge had 260 units,132 of which were vacant (50.8 percent); Evanston had 5,402 units, 775 of which were vacant (14.3 percent); Green River had 5,153 units, 783 of which were vacant (15.2 percent); and Rock Springs had 10,634 units, 2,257 of which were vacant (21.2 percent). Vacancy rates for homeowners varied from 1.1 percent in Rock Springs to 15.8 percent in LaBarge. With the exceptions of Kemmerer, Diamondville, and Cokeville, vacancy rates among rental units were substantially higher. Rental vacancy rates ranged from 0 percent in Diamondville and Cokeville to 34.8 percent in LaBarge (Table 2.4-28). Table 2.4-26 presents vacancy data for each municipality in more detail. In 2020, there were 277 housing units available for sale and 1,633 units for rent in the economic region, which includes the Lincoln and Sweetwater County municipalities within daily commuting distance of the site, and all of Uinta County.

Proposed New Housing in Kemmerer and Diamondville and Uinta County

City officials in Kemmerer have indicated that there are a number of new housing projects being proposed that could provide additional housing for workers during the construction stage of the Kemmerer Unit 1 project (Reference 2.4-64 and Reference 2.4-5). Two of the largest projects, Gateway Development (112 acres) and Canyon Road Development (291 acres), are planned residential developments that have the potential to provide the following housing (Reference 2.4-21):

- ~200 single family homes
- ~700 townhomes, condominiums, or apartments
- 1-2 hotels
- 1 mobile home and RV park

Both developments would be located near downtown Kemmerer. The owners of the projects are currently advancing through Kemmerer’s planning and zoning process. Land use and zoning changes are expected (Reference 2.4-21).

Another proposed project in Kemmerer is the Foothills Mobile Home and RV Park expansion. Currently, there are 50 mobile homes, 51 RV lots, and nine cabins. The owner plans to expand to 122 mobile homes in total. The owner also states that there is additional acreage on his property to develop 218 more spaces or lots if there is the demand (Reference 2.4-16).

Also in Kemmerer are a fourplex and several other single family home construction projects with plans for 50 units or less in each (Reference 2.4-64).

In Evanston (Uinta County), there are plans for the construction of a 125-space RV park and the remodeling of two existing hotels. In total, about 200 additional units could be available to the Project (Reference 2.4-5).

2.4.2.6.2 Temporary Housing

Seasonal, Recreational, or Occasional Use

According to the USCB, “seasonal, recreational, or occasional use” housing units are vacant units used, or intended for use, only in certain seasons or for weekends or other occasional use throughout the year. Seasonal units include those used for summer or winter sports or recreation, such as beach cottages and hunting cabins. Seasonal units also may include quarters for such workers as herders and loggers. Interval ownership units, sometimes called shared-ownership or timesharing condominiums, also are included in this category (Reference 2.4-98).

In 2020, there were 1,673 housing units for seasonal, recreational, or occasional use in the economic region: 1,289 in Lincoln County, 110 in Uinta County, and 274 in Sweetwater County (Table 2.4-26). Notably, most of Lincoln County’s 1,289 seasonal, recreational, or occasional use units are not located in the Kemmerer and Diamondville area. They are in the northern part of the county, far outside of the economic region. They support the recreation and tourism industries of the national parks (Grand Teton and Yellowstone), Jackson Hole, and several national forests. The municipalities with the most seasonal, recreational, or occasional use units in Lincoln County (within a daily commute of the site) are Kemmerer, Diamondville, Cokeville, and LaBarge, with a combined total of 86 units, more than half of which are located in LaBarge (Table 2.4-26). In Sweetwater County, Green River had none and Rock Springs had 10.

Seasonal, recreational, and occasional use units, informally referred to as “vacation” units, are generally not considered available for construction workers. The units tend to be more expensive and available for shorter periods of time (i.e., a week or month at a time). In general, this type of housing will not be relied on for the construction phase of the project.

Hotels and Motels

Hotel and motel data for each county in the economic region are presented in Table 2.4-29. The hotel and motel rooms in Lincoln and Sweetwater Counties only include those located in municipalities within a daily commute of the project site. In 2022, there were a total 3,309 hotel or motel rooms in the three-county economic region. Only 313 of those were in Lincoln County. Table 2.4-30 presents monthly hotel and motel occupancy rates for the region, from 2014 through 2022. Over the 9-year period, average monthly occupancy rates ranged from 31.7 percent in December to 67.3 percent in July. For all counties, there is a gradual increase in occupancy rate from the winter months to the summer months.

Recreational Vehicle Parks and Campgrounds

There are numerous RV parks or campgrounds with full hookups (water, sewer, and electricity) for private RVs in the economic region. Table 2.4-31 presents RV park and campground locations and capacities for the Lincoln and Sweetwater municipalities within commuting distance of the site, and all of Uinta County. There are, at least, 1,942 RV and tent sites in the three-county region (210 sites in the Lincoln County municipalities nearest the site, 199 sites in Uinta County, and 1,533 sites in Green River and Rock Springs in Sweetwater County).

Also, in addition to developed campsites, the U.S. Department of Agriculture Forest Service and the BLM allow “dispersed camping,” camping away from developed camping and recreation facilities. Dispersed campers must observe the dispersed camping rules and regulations issued by these Federal agencies (Reference 2.4-10). For example, campers are allowed on BLM land for a period not to exceed 14 days within a 28 consecutive day period (Reference 2.4-10).

Housing Values

Table 2.4-25 and Table 2.4-28 present 2020 real estate inventories for each county and municipality in the economic region, by value of owner-occupied units. The largest number of Lincoln County’s housing inventory was in the category of “$300,000 to $499,999.” The largest number of Uinta County’s inventory was in the category of “$150,000 to $199,999,” and the largest number of Sweetwater County’s inventory was in the category of “$200,000 to $299,999.” The median value of all owner-occupied units in the economic region counties was $211,177 (Table 2.4-25). The median values in the municipalities in the economic region ranged from $106,800 in Diamondville to $221,800 in Green River (Table 2.4-28).

2.4.2.7 Public Services and Community Infrastructure

Public services and community infrastructure categories include: public water supply, public wastewater treatment systems, law enforcement, fire protection and emergency medical services, emergency management, and medical services.

2.4.2.7.1 Public Water Supply

Public water supply systems in Wyoming fall into one of three categories: community public water systems (towns, cities, mobile home parks, private subdivisions); transient non-community public water systems (campgrounds, restaurants, highway rest areas, motels, hotels); and non-transient non-community public water systems (mining and industrial operations, schools and churches) (Reference 2.4-26). The focus of this analysis is community public water supply systems.

In the economic region, potable water is supplied by communities, independently or in partnership. Table 2.4-32 presents water source and capacity data for the major public water suppliers in the three counties. The Kemmerer and Diamondville Water & Wastewater Joint Powers Board (KDWWJPB) and the Green River, Rock Springs, Sweetwater County Joint Powers Water Board (GRRSSCJPWB) are examples of community partnerships.

All three public water suppliers in the region use surface water as their primary source. Only the City of Evanston uses wells in addition to surface water sources. Two of the three water suppliers sell excess water to neighboring communities and special districts (Reference 2.4-155). Currently, there is excess capacity in all of the major public water supply systems in the economic region (Table 2.4-32).

The KDWWJPB, a political division of the State of Wyoming, manages the water and wastewater treatment plants for Kemmerer and Diamondville. The Kemmerer and Diamondville water treatment plant and distribution facilities draw water from Hams Fork. The water is treated, cleaned, and pumped through the distribution system for domestic, commercial, industrial, and fire protection use (Reference 2.4-41). The water treatment plant currently serves about 3,600 residents and has 3.9 million gallons per day (15 million liters per day) of excess production capacity (Table 2.4-32).

The City of Evanston manages its water treatment and distribution departments. The Town draws water from the Bear River, Sulphur Creek Reservoir, and 5 wells. The water is treated, cleaned, and pumped through the distribution system for use (Reference 2.4-155). The water treatment plant currently serves about 13,000 residents and has 1.5 million gallons per day (5.7 million liters per day) of excess production capacity (Table 2.4-32).

The GRRSSCJPWB is a political division of the State of Wyoming that manages these communities' water treatment plant (located in Green River). The GRRSSCJPWB provides potable water to the cities of Green River and Rock Springs, the special service districts of White Mountain, Ten Mile, Clearview, and James Town—Rio Vista, and an industrial water supplier to Simplot Phosphates (Reference 2.4-36). The water treatment plant and distribution facilities draw water from the Green River and clean, treat, and pump it through the distribution system for use. The water treatment plant currently serves about 40,000 residents and has 8 million gallons per day (30 million liters per day) of excess production capacity (Table 2.4-32).

The Safe Drinking Water Act requires States to prepare an Intended Use Plan (IUP) for capitalization grant applications to the Safe Drinking Water Act's Drinking Water State Revolving Loan Fund (DWSRLF). The IUP describes how a State will use the DWSRLF to meet Safe Drinking Water Act objectives (Reference 2.4-117). In Wyoming's FY 2022 Drinking Water IUP, the State presents a prioritized list of public water suppliers that are applying for DWSRLF funds because they have "expressed interest in the DWSRLF, are planning capital improvement projects, have been identified as serious public health risks, have received notices of Safe Drinking Water Act violations, or have been issued administrative orders" (Reference 2.4-117).

Table 2.4-33 presents the major public water supply systems in the economic region that have planned upgrades included on the State's FY 22 IUP priority list. They are listed in priority rank order. The KDWWJPB has two projects; one project is an upgrade of facilities to address a trihalomethane violation (a regulated water contaminant formed as a byproduct of chlorine disinfection (Reference 2.4-18)), and the other project is a replacement of deteriorated water mains. The remaining seven projects are repairs, expansions, or upgrades of the Green River and Rock Springs public water supply system. The City of Evanston has no planned upgrades.

2.4.2.7.2 Public Wastewater Treatment Systems

Wastewater is the domestic sewage from homes, communities, farms, businesses, and manufacturing facilities. It also includes industrial waste from manufacturing and other industrial sources. Wastewater treatment in the region is provided by local jurisdictions and primarily regulated by the Wyoming Department of Environmental Quality. Table 2.4-34 presents the major public wastewater treatment facilities in the economic region and their capacity information. Currently, there is excess capacity in all of the major public wastewater treatment systems.

The KDWWJPB manages Kemmerer and Diamondville's wastewater treatment plant. According to the plant's Wyoming Pollutant Discharge Elimination System permit, the facility is a secondary treatment system utilizing an extended aeration oxidation ditch. Raw influent travels through mechanical course screening and grit removal before being pumped into an aeration basin. Effluent from the aeration ditch travels to secondary clarifiers. Clear water from the clarification process goes through chlorination, a contact basin, dichlorination, and is discharged to the Class 2AB Hams Fork (Reference 2.4-115). The wastewater treatment plant serves approximately 3,300-3,600 customers and has an excess flow capacity of less than 0.3-0.75 million gallons per day (1-2.8 million liters per day) (Reference 2.4-62).

The plant is over 42 years old and needs upgrades and replacements (Reference 2.4-62). The system's excess capacity is limited by aged infrastructure and severe inflow and infiltration (I&I) issues. I&I is defined as excess water that flows into sewer pipes from groundwater and stormwater. Most I&I is caused by aging infrastructure that needs maintenance or replacement. The KDWWJPB is currently addressing these issues in a variety of ways (spray-coating manhole interiors and performing smoke tests to determine if storm sewer pipes are cross connecting with sanitary sewer pipes, among others.) (Reference 2.4-62).

The KDWWJPB is currently searching for funding to address the system-wide repairs, upgrades, and expansions that are needed. No significant grants or other forms of financing for system-wide changes have been secured at this time (Reference 2.4-62). The KDWWJPB has, however, indicated that they have procured grants from Lincoln County and the State for system repairs that would greatly reduce the I&I issues. City, County, and KDWWJPB officials believe the repairs will free up 375,000 gallons per day of current wastewater processing capacity (Reference 2.4-19).

The City of Evanston manages its wastewater treatment plant. According to the plant's Wyoming Pollutant Discharge Elimination System permit, plant facilities include a mechanical treatment plant that uses coarse screening, degritting, an oxidation ditch, final clarification, and ultraviolet disinfection. The treated effluent discharges to Yellow Creek (Class 2C water), a tributary of the Bear River (Class 2AB water). The effluent flows approximately 3.5 stream miles (5.6 stream kilometers) down Yellow Creek before confluence with the Bear River. During the summer months, much of the plant effluent is diverted and used for irrigation (Reference 2.4-119). The wastewater treatment plant serves approximately 12,000 customers and has an excess flow capacity of 1.53 million gallons per day (5.79 million liters per day) (Table 2.4-34).

The Town of Green River manages its wastewater treatment plant. Plant facilities consist of two pre-aeration cells, three aerated lagoons, and two polishing ponds with secondary treatment through utilization of slow sand filtration prior to final discharge into the Class 2AB Green River (Reference 2.4-33). The wastewater treatment plant serves approximately 11,000-12,000 customers and has an excess flow capacity of 0.3 million gallons per day (1 million liters per day) (Table 2.4-34).

The City of Rock Springs manages its water reclamation facility. According to the facility's Wyoming Pollutant Discharge Elimination System permit, the facility consists of two separate treatment trains, each with coarse screening, grit removal, and influent flow monitoring. Influent then enters an oxidation ditch, followed by a covered final clarifier. Final effluent is UV disinfected and discharged to Bitter Creek (Class 2C) in the Green River basin (Reference 2.4-116). The wastewater treatment plant serves approximately 23,000-24,000 customers and has an excess flow capacity of 2.05 million gallons per day (9.5 million liters per day) (Table 2.4-34).

The Clean Water Act requires States to prepare an IUP for capitalization grant applications to the Clean Water Act's Clean Water State Relief Fund. The IUP describes how a State will use the Clean Water State Relief Fund to meet Clean Water Act objectives (Reference 2.4-118). In Wyoming's FY 2022 Clean Water IUP, the State has a prioritized list of wastewater treatment facilities that are applying for Clean Water State Relief Fund funds. Table 2.4-35 presents the major public wastewater treatment facilities in the economic region that have planned upgrades included on the State's FY 22 IUP priority list. They are listed in priority rank order. The KDWWJPB has two projects. One project is a replacement of a clarifier, and the other project is a request for funds to perform a planning study of the entire wastewater treatment system, which is past its design lifespan and has collections system I&I issues. The remaining six projects are repairs, expansions, or upgrades of the Green River and Rock Springs public wastewater treatment systems. The City of Evanston has no planned upgrades on the list.

2.4.2.7.3 Law Enforcement, Fire and Medical Services

Law Enforcement

Table 2.4-36 provides 2019 law enforcement data for the economic region. The table also provides approximate ratios of residents per police officer, by county and city. Collectively, the economic region had a ratio of 300 residents per police officer. In 2019, the national average was 414 residents per police officer (Reference 2.4-28).

Fire Protection and Emergency Medical Services

Table 2.4-37 provides 2021 fire protection and emergency medical service personnel data for the fire and emergency medical service departments in the economic region. Table 2.4-37 also provides approximate ratios of residents per firefighter and residents per emergency medical service staff person. Collectively, the economic region had a ratio of 287 residents per firefighter and 735 residents per emergency medical service staff person. In January 2022, the estimated number of firefighters in the nation was 1,063,900 (Reference 2.4-112) and the 2021 population estimate of the nation was 331,893,745 (Reference 2.4-107). These data result in a ratio of 312 residents per firefighter.

Emergency Management

W.S. 19-13-101 through 19-13-414, referred to as 'The Wyoming Homeland Security Act' (Reference 2.4-148), detail the authority and responsibilities of the Wyoming Office of Homeland Security (WOHS). Under the direction of the Governor, WOHS oversees disaster preparedness and response for the State (Reference 2.4-144).

Counties and local governments are the State's "first responders" (Reference 2.4-145). Every county in the State has an emergency management coordinator (county coordinator), emergency operations center, and comprehensive Emergency Management Plan (aka "Emergency

Operations Plan" or EOP (Reference 2.4-146). Local emergency managers are responsible for planning and mitigation, preparation for emergencies, and disaster response and recovery (Reference 2.4-48).

In the event of a disaster, the county coordinator manages the county and city response and communicates with the WOHS. Should local governments require assistance, the county coordinator can request additional support from the WOHS. Should Federal assistance be required, the WOHS can contact the Federal Emergency Management Agency.

In Lincoln County, the coordinator is located at the Lincoln County Office of Emergency Management, a division of the Lincoln County Sheriff's Office (Reference 2.4-48). The Lincoln Country Office of Emergency Management is currently updating its EOP (Reference 2.4-49).

In Uinta County, the coordinator is located at Uinta County Emergency Management, a part of the Uinta County Emergency Services department (Reference 2.4-95).

In Sweetwater County, the coordinator is located at the Sweetwater County Emergency Management Agency, a section of the Sweetwater County Sheriff's Office (Reference 2.4-88).

In 2004, Wyoming passed a bill called the Wyoming Emergency Response Act (W.S. 35-9-151). The Act enabled the director of the WOHS to establish eight regional emergency response teams "for the purpose of organizing, equipping, training and responding to hazardous materials, weapons of mass destruction (terrorism) or any all-hazards incident impacting a community" (Reference 2.4-147). The regional teams are available to supplement local resources when an incident is beyond the first responders' capabilities (Reference 2.4-147). Lincoln, Uinta, and Sweetwater Counties comprise Region 4. The Region 4 Emergency Response Team is located in Rock Springs. Region 4 has a Regional Hazard Mitigation Plan which analyzes hazard risks in the three-county region and recommends mitigation measures to minimize potential losses from disastrous events (Reference 2.4-57).

Medical

Table 2.4-38 presents summary information for the three major hospitals in the economic region. Together, the three hospitals had a total of 157 certified beds in 2022. Depending on the hospital, occupancy rates ranged from 5 percent to 13 percent in 2021 and 2022. Table 2.4-39 presents physician data from 2021. The economic region had 126 physicians, which equates to 660 residents per physician.

The U.S. Department of Health Resources and Services Administration maintains lists of areas, populations, and facilities that are experiencing shortages of health care services and personnel. The Health Professional Shortage Area list tracks shortages of primary, dental, and mental health care providers. A query of this list, for the economic region, is presented in Table 2.4-40. According to query results, the City of Kemmerer was short 0.4 full-time equivalent primary care providers in 2021. For the same year, eastern Uinta County was short 0.2 full-time equivalent primary care providers and all of Sweetwater County was short 2.7 full-time equivalent primary care providers. The southwest region of Wyoming is considered a "High Needs Geographic Health Professional Shortage Area," with respect to mental health. The region was short 2.7 full-time equivalent mental health providers.

2.4.2.7.4 Education

K Through 12

Wyoming's K through 12 education system is primarily funded by State and local property taxes. By State law, Wyoming is responsible for maintaining a public education system that is complete and uniform across the State (Wyoming Constitution, Article 7 §§ 1, 9) (Reference 2.4-142). To that end, the State generates funding for two education equalization programs, the SFP and the SCC program.

School Foundation Program

Through the SFP, the State guarantees that school districts are appropriately funded to meet their operational and instructional obligations each year ("guarantee"). This is accomplished through the transfer of funds between the State and its school districts. The level of funding is a function of the school finance system's funding model and the characteristics of a school district's schools, staff, and students (Reference 2.4-142). Beyond the SFP, school districts can receive State funding for additional retirement contributions, out-of-State tuition, and specific State grants and programs. School districts also receive Federal funds (Reference 2.4-142).

The SFP funding model takes into account both State and local school district revenues. If a school district's "guarantee" is greater than its local revenues, the State will make up the difference through "entitlement" payments from the SFP account. If a school district's "guarantee" is less than its local revenues, the State will "recapture" the difference from the school district and deposit it into the SFP account (Reference 2.4-142). Districts can vary, from year to year, in their dependence on the state. In the 2021-2022 funding year, Lincoln County School District #1 was dependent on the State to supplement its local revenues to meet its guarantee (Reference 2.4-124).[9]

Wyoming's public education system is primarily funded through property taxes, at a total of 43 mills levied ((county-wide (6 mills), school district-wide (25 mills), and State-wide (12 mills)). In FY 2020, SFP revenues totaled $802,581,262 (Reference 2.4-142). Below is a list of the SFP account's primary revenue sources (Reference 2.4-142):

- Statewide property tax revenues (12 mills)
- Investment and lease revenue income from the Common School Account within the Permanent Land Fund
- Federal mineral royalties
- School district recapture revenues

9. Lincoln County School District #1 is mentioned here because it is expected to change from a school district dependent on the State to meet its guarantee to one that is not. The Uinta and Sweetwater County school districts are not expected to be impacted in this manner.

School Capitalization Construction Program

Wyoming is also responsible for constructing and maintaining school district buildings and facilities. The School Facility Commission and the State Construction Department's School Facilities Department oversee this program. School districts can receive funding for major maintenance and capital construction. Major maintenance projects are determined through statutory formula and capital construction projects are prioritized by the School Facility Commission (Reference 2.4-142). In FY 2020, SCC program revenues totaled $42,030,320 (Reference 2.4-142).

Below is a list of the SCC account's primary revenue sources:

- Federal mineral royalties
- Coal lease bonuses
- State mineral royalties, leases, or bonuses

School District Data for the Economic Region[10]

The public school system in Wyoming is organized into school districts. Figure 2.4-5 presents the boundaries of each school district in the three-county economic region. This section presents the facilities, enrollment, and capacity of the school districts in the economic region.

School districts in Wyoming are no longer required, by statute, to adhere to specific student-teacher ratios (Reference 2.4-34). However, the State encourages school districts to maintain a student-teacher ratio of 16:1 or less in kindergarten through grade three classrooms (W.S. 21 9-101(d)). Table 2.4-41 presents 2020-2021 enrollment numbers and student-teacher ratios for the economic region. All of the districts within the economic region have student-teacher ratios that are lower than the 16:1 standard. For the same school year, Wyoming reported a Statewide student-teacher ratio of 12.33:1 (Reference 2.4-65).

In addition to making student-teacher ratio recommendations, the State is responsible for constructing and maintaining school district buildings and facilities (W.S. 21-15-115(a)(vi)), as stated above. The School Facilities Department uses a calculation that incorporates student enrollment and building or facility size and condition to derive the maximum number of students that can be effectively served within each physical setting (Reference 2.4-151). The calculation is also used to predict future enrollment and building or facility needs. Based on calculation outputs, construction and maintenance projects are developed and prioritized (Reference 2.4-151). Districts with a projected capacity exceeding 100 percent are considered as having a "high-capacity need." Districts with a projected capacity between 90 and 100 percent are considered as having a "medium capacity need" and districts with a projected capacity below

10. It should be noted that Lincoln County School District # 2 and Sweetwater School District #1 include schools that are located outside of daily commuting distance of the site. Data for those schools are included in the district information found in Table 2.4-41; however, they've been removed from the district information found in Table 2.4-42, as Table 2.4-42 supports the seating capacity analysis. Also, there are slight differences in the way the same data are presented in the two tables in this section. This is due to source and data collection or organization differences. The two tables are generally congruent, however.

90 percent are considered as having a "low-capacity need" (Reference 2.4-151). When a school reaches a medium capacity need or higher, the School Facility Commission and School Facilities Department work with the district to determine the remedy for that school. Table 2.4-42 presents capacity data for the school districts in the economic region.

In Evanston, two of four elementary schools are over 90 percent capacity. In Green River, one of four elementary schools is over 90 percent capacity. In Rock Springs, of seven elementary schools have exceeded 90 percent capacity; five of which are over capacity. Rock Springs also has two of two high schools over 90 percent capacity (Reference 2.4-151).

For the 2020-2021 school year, school districts in the economic region (in whole or in part) had a total enrollment of 12,698 students with space available for an additional 6,270 students (Table 2.4-42). None of the schools included in Table 2.4-42 are scheduled for "remedies" to alleviate projected capacity issues because, currently, the State forecasts the enrollments of these schools to be below 90 percent of their total capacities by 2030 (Reference 2.4-151). State forecasts are largely based on historical enrollments and survivor rates. Survivor rates are the percentages of students that are retained, from one school year to the next (Reference 2.4-46).

Enrollment trends and survivor rates in WY have decreased since 2020, when the COVID-19 pandemic struck. Many students dropped out of school and did not return. Some students went to virtual school, others moved to home schooling, some dropped out, and some causes are unknown. In the years since COVID-19, students have returned to in-school settings, but enrollments are still not back to 2019 levels. As such, the State's forecasting model in the 2022 report continues to project lower enrollments by 2030 (Reference 2.4-46).

Lincoln County School District #1 (LCSD #1) and Uinta County School District #1 (UCSD #1) are the two school districts expected to be most financially impacted by the Kemmerer Unit 1 project. The boundaries of Lincoln County School District #1 contain Kemmerer and Diamondville and the Kemmerer Unit 1 Site. UCSD #1 boundaries contain the City of Evanston. Most of the construction and operations workforces will reside in the largest cities in Lincoln County (Kemmerer and Diamondville) and Uinta County (Evanston). LCSD #1 will be the recipient of Kemmerer Unit 1 property taxes. Table 2.4-21 presents 2019-2021 revenues, by source, for LCSD #1 and UCSD #1.

Postsecondary Education

There are no colleges, universities, community colleges, or trade schools within a 50-mile radius of the site. The nearest post-secondary institution to the site is the Western Wyoming Community College, located in Rock Springs. Western Wyoming Community College reported an enrollment of 4,316 students for the 2020-2021 academic year (Reference 2.4-114). During the 2016-2018 academic years, the College's enrollment approached a high of 6,000 students (Reference 2.4-114).

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Table 2.4-1 Current Population and Projections, by Sector, to 2090 (Sheet 1 of 6)

		Radial Distance (Miles)										
Sector	Year	0-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50	0-50
N	2020	15	15	15	18	264	3,929	21	46	9	1	4,332
	2030	16	16	16	19	284	4,223	22	49	9	1	4,656
	2040	17	17	17	21	305	4,540	24	53	10	1	5,005
	2050	19	19	19	22	328	4,880	26	57	11	1	5,380
	2060	20	20	20	24	353	5,246	28	61	11	1	5,784
	2070	22	22	22	26	379	5,639	30	66	12	1	6,217
	2080	23	23	23	28	407	6,062	32	71	13	1	6,683
	2090	25	25	25	30	438	6,516	34	76	14	1	7,184
NNE	2020	15	0	1	49	326	479	9	13	108	452	1,452
	2030	16	0	1	53	350	515	10	14	116	485	1,559
	2040	17	0	1	57	377	553	10	15	124	520	1,675
	2050	19	0	1	61	405	595	11	16	134	558	1,800
	2060	20	0	1	65	435	640	12	18	144	599	1,933
	2070	22	0	1	70	468	688	13	19	155	642	2,077
	2080	23	0	1	76	503	739	14	20	166	689	2,232
	2090	25	0	1	81	541	794	15	22	179	740	2,398
NE	2020	15	0	2	24	22	19	0	2	17	0	102
	2030	16	0	3	26	24	20	0	2	18	0	109
	2040	17	0	3	28	25	22	0	2	20	0	117
	2050	19	0	3	30	27	24	0	2	21	0	126
	2060	20	0	3	32	29	25	0	3	23	0	135
	2070	22	0	3	34	32	27	0	3	24	0	145
	2080	23	0	4	37	34	29	0	3	26	0	156
	2090	25	0	4	40	36	32	0	3	28	0	168

Table 2.4-1 Current Population and Projections, by Sector, to 2090
(Sheet 2 of 6)

		Radial Distance (Miles)										
Sector	**Year**	**0-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**	**0-50**
ENE	2020	15	0	0	0	4	28	86	0	12	1	147
	2030	16	0	0	0	5	30	93	0	12	1	157
	2040	17	0	0	0	5	32	100	0	12	1	168
	2050	19	0	0	0	5	35	107	0	12	1	179
	2060	20	0	0	0	6	37	115	0	12	1	192
	2070	22	0	0	0	6	40	124	0	12	1	205
	2080	23	0	0	0	7	43	133	0	12	1	220
	2090	25	0	0	0	7	46	143	0	12	1	235
E	2020	15	0	0	0	0	0	0	15	0	9	38
	2030	16	0	0	0	0	0	0	16	0	9	40
	2040	17	0	0	0	0	0	0	16	0	9	42
	2050	19	0	0	0	0	0	0	17	0	9	45
	2060	20	0	0	0	0	0	0	18	0	9	47
	2070	22	0	0	0	0	0	0	19	0	9	50
	2080	23	0	0	0	0	0	0	21	0	9	52
	2090	25	0	0	0	0	0	0	22	0	9	55
ESE	2020	15	0	0	0	0	0	0	3	166	9	192
	2030	16	0	0	0	0	0	0	3	166	9	193
	2040	17	0	0	0	0	0	0	3	166	9	194
	2050	19	0	0	0	0	0	0	3	166	9	196
	2060	20	0	0	0	0	0	0	3	166	9	197
	2070	22	0	0	0	0	0	0	3	166	9	199
	2080	23	0	0	0	0	0	0	3	166	9	200
	2090	25	0	0	0	0	0	0	3	166	9	202

Table 2.4-1 Current Population and Projections, by Sector, to 2090
(Sheet 3 of 6)

		Radial Distance (Miles)										
Sector	**Year**	**0-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**	**0-50**
SE	2020	15	0	0	0	0	0	0	88	19	0	122
	2030	16	0	0	0	0	0	0	88	19	0	123
	2040	17	0	0	0	0	0	0	88	19	0	124
	2050	19	0	0	0	0	0	0	88	19	0	125
	2060	20	0	0	0	0	0	0	88	19	0	127
	2070	22	0	0	0	0	0	0	88	19	0	128
	2080	23	0	0	0	0	0	0	88	19	0	130
	2090	25	0	0	0	0	0	0	88	19	0	132
SSE	2020	15	0	0	0	0	0	0	3,550	2,489	38	6,092
	2030	16	0	0	0	0	0	0	3,550	2,489	38	6,093
	2040	17	0	0	0	0	0	0	3,550	2,489	38	6,094
	2050	19	0	0	0	0	0	0	3,550	2,489	38	6,096
	2060	20	0	0	0	0	0	0	3,550	2,489	38	6,097
	2070	22	0	0	0	0	0	0	3,550	2,489	38	6,099
	2080	23	0	0	0	0	0	0	3,550	2,489	38	6,100
	2090	25	0	0	0	0	0	0	3,550	2,489	38	6,102
S	2020	15	15	15	16	16	18	0	34	237	95	460
	2030	16	16	16	17	17	19	0	34	237	95	467
	2040	17	17	17	18	18	21	0	34	237	95	475
	2050	19	19	19	20	20	22	0	34	237	95	483
	2060	20	20	20	21	21	24	0	34	237	95	492
	2070	22	22	22	23	23	26	0	34	237	95	502
	2080	23	23	23	25	25	28	0	34	237	95	512
	2090	25	25	25	27	27	30	0	34	237	95	523

Table 2.4-1 Current Population and Projections, by Sector, to 2090
(Sheet 4 of 6)

		Radial Distance (Miles)										
Sector	**Year**	**0-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**	**0-50**
SSW	2020	15	15	0	2	1	1	0	0	3,236	436	3,707
	2030	16	16	0	2	1	1	0	0	3,236	436	3,710
	2040	17	17	0	2	2	1	0	0	3,236	436	3,712
	2050	19	19	0	2	2	1	0	0	3,236	436	3,715
	2060	20	20	0	3	2	1	0	0	3,236	436	3,718
	2070	22	22	0	3	2	1	0	0	3,236	436	3,722
	2080	23	23	0	3	2	1	0	0	3,236	436	3,725
	2090	25	25	0	3	2	1	0	0	3,236	436	3,729
SW	2020	15	0	0	0	0	0	0	6	9,960	178	10,159
	2030	16	0	0	0	0	0	0	6	9,960	179	10,161
	2040	17	0	0	0	0	0	0	6	9,960	180	10,163
	2050	19	0	0	0	0	0	0	6	9,960	180	10,165
	2060	20	0	0	0	0	0	0	6	9,960	181	10,167
	2070	22	0	0	0	0	0	0	6	9,960	182	10,170
	2080	23	0	0	0	0	0	0	6	9,960	183	10,172
	2090	25	0	0	0	0	0	0	6	9,960	184	10,175
WSW	2020	15	0	0	22	0	0	0	32	392	14	474
	2030	16	0	0	24	0	0	0	34	428	15	516
	2040	17	0	0	25	0	0	0	36	467	16	561
	2050	19	0	0	27	0	0	0	38	509	18	611
	2060	20	0	0	29	0	0	0	40	556	19	665
	2070	22	0	0	32	0	0	0	43	607	21	724
	2080	23	0	0	34	0	0	0	46	663	23	789
	2090	25	0	0	36	0	0	0	49	723	25	859

Table 2.4-1 Current Population and Projections, by Sector, to 2090 (Sheet 5 of 6)

		Radial Distance (Miles)										
Sector	**Year**	**0-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**	**0-50**
W	2020	15	0	0	23	0	0	0	73	571	33	714
	2030	16	0	0	25	0	0	0	79	623	36	779
	2040	17	0	0	27	0	0	0	87	680	39	850
	2050	19	0	0	29	0	0	0	95	743	43	927
	2060	20	0	0	31	0	0	0	103	811	47	1,011
	2070	22	0	0	33	0	0	0	113	885	51	1,103
	2080	23	0	0	35	0	0	0	123	966	56	1,203
	2090	25	0	0	38	0	0	0	134	1054	61	1,313
WNW	2020	15	0	0	23	0	1	6	53	134	1,514	1,746
	2030	16	0	0	25	0	2	7	57	146	1,635	1,887
	2040	17	0	0	27	0	2	7	62	160	1,766	2,041
	2050	19	0	0	29	0	2	8	67	174	1,909	2,207
	2060	20	0	0	31	0	2	8	73	190	2,064	2,389
	2070	22	0	0	33	0	2	9	80	208	2,233	2,586
	2080	23	0	0	35	0	2	10	87	227	2,417	2,801
	2090	25	0	0	38	0	2	10	94	248	2,617	3,035
NW	2020	15	0	0	0	23	41	9	33	680	115	917
	2030	16	0	0	0	25	44	10	35	731	119	980
	2040	17	0	0	0	27	47	11	38	785	122	1,047
	2050	19	0	0	0	29	51	12	41	843	126	1,120
	2060	20	0	0	0	31	55	12	44	906	130	1,197
	2070	22	0	0	0	33	59	13	47	973	133	1,281
	2080	23	0	0	0	35	63	14	50	1,046	137	1,370
	2090	25	0	0	0	38	68	15	54	1,124	142	1,466

Table 2.4-1 Current Population and Projections, by Sector, to 2090
(Sheet 6 of 6)

		Radial Distance (Miles)										
Sector	**Year**	**0-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**	**0-50**
NNW	2020	15	15	15	11	31	18	17	21	57	96	295
	2030	16	16	16	12	33	19	18	23	61	100	314
	2040	17	17	17	13	36	21	20	24	66	104	335
	2050	19	19	19	14	39	22	21	26	70	108	356
	2060	20	20	20	15	41	24	23	28	76	113	380
	2070	22	22	22	16	44	26	24	30	81	118	405
	2080	23	23	23	17	48	28	26	33	87	123	431
	2090	25	25	25	18	51	30	28	35	94	129	460
Total 2020		**240**	**60**	**48**	**188**	**688**	**4,534**	**148**	**3,967**	**18,085**	**2,990**	**30,950**
Total 2030		**258**	**64**	**52**	**202**	**739**	**4,874**	**159**	**3,990**	**18,251**	**3,156**	**31,746**
Total 2040		**277**	**69**	**56**	**217**	**795**	**5,239**	**171**	**4,014**	**18,430**	**3,335**	**32,605**
Total 2050		**298**	**75**	**60**	**234**	**854**	**5,632**	**184**	**4,041**	**18,624**	**3,530**	**33,532**
Total 2060		**320**	**80**	**65**	**251**	**918**	**6,054**	**198**	**4,069**	**18,835**	**3,741**	**34,532**
Total 2070		**344**	**86**	**69**	**270**	**987**	**6,508**	**213**	**4,101**	**19,064**	**3,969**	**35,612**
Total 2080		**370**	**93**	**75**	**290**	**1,061**	**6,996**	**229**	**4,134**	**19,313**	**4,217**	**36,777**
Total 2090		**398**	**100**	**80**	**312**	**1,141**	**7,520**	**246**	**4,171**	**19,582**	**4,485**	**38,035**

Table 2.4-2 Counties Completely or Partially within the 50 Mile Region

County	State
Lincoln	Wyoming
Sublette	Wyoming
Sweetwater	Wyoming
Uinta	Wyoming
Bear Lake	Idaho
Cache	Utah
Morgan	Utah
Rich	Utah
Summit	Utah

Table 2.4-3 Key* Municipalities in the 50 Mile Region

Municipality	County	2010 Population	2020 Population
Kemmerer	Lincoln	2,656	2,415
Diamondville	Lincoln	737	520
Cokeville	Lincoln	535	502
LaBarge	Lincoln	551	394
Evanston	Uinta	12,359	11,747
Lyman	Uinta	2,115	2,135
Green River	Sweetwater	12,515	11,825
Rock Springs	Sweetwater	23,036	23,526

Sources: Reference 2.4-134 and Reference 2.4-102

*Municipalities with populations greater than 2,000 or of particular importance to the project

Table 2.4-4 Economic Region Population and Projections

	Lincoln County		Uinta County		Sweetwater County		Economic Region		Wyoming	
Year	Population	Average Annual Percent Growth	Population	Average Annual Percent Growth	Population	Average Annual Percent Growth	Population	Average Annual Percent Growth	Population	Average Annual Percent Growth
2000[a]	14,573	1.4	19,742	0.5	37,613	-0.3	71,928	0.3	493,782	0.9
2010[b]	18,106	2.2	21,118	0.7	43,806	1.5	83,030	1.4	563,626	1.3
2020[c]	19,581	0.8	20,450	-0.3	42,272	-0.4	82,303	-0.1	576,851	0.2
2030[d]	21,049	0.7	20,012	-0.2	41,610	-0.2	82,671	0.0	593,812	0.3
2040[d]	22,626	0.7	19,583	-0.2	40,958	-0.2	83,168	0.1	611,273	0.3
2050[d]	24,322	0.7	19,164	-0.2	40,317	-0.2	83,803	0.1	629,246	0.3
2060[d]	26,145	0.7	18,754	-0.2	39,686	-0.2	84,584	0.1	647,748	0.3
2070[d]	28,105	0.7	18,352	-0.2	39,064	-0.2	85,521	0.1	666,794	0.3
2080[d]	30,211	0.7	17,959	-0.2	38,452	-0.2	86,622	0.1	686,400	0.3
2090[d]	32,476	0.7	17,574	-0.2	37,850	-0.2	87,900	0.1	706,583	0.3

a. Reference 2.4-97

b. Reference 2.4-134

c. Reference 2.4-102

d. Calculated growth rate applied

Table 2.4-5 Age and Gender Data for the Demographic Region, 2020

	Idaho	Utah	Wyoming	Bear Lake County, Idaho	Cache County, Utah	Morgan County, Utah	Rich County, Utah	Summit County, Utah	Lincoln County, Wyoming	Uinta County, Wyoming	Sublette County, Wyoming	Sweetwater County, Wyoming
Age[a] or Gender												
Total population	**1,754,367**	**3,151,239**	**581,348**	**6,054**	**126,336**	**11,950**	**2,415**	**41,680**	**19,640**	**20,374**	**9,865**	**43,352**
Under 5 years	114,332	248,602	35,436	402	10,618	922	147	2,256	1,346	1,464	543	2,870
5 to 9 years	123,732	262,299	38,926	539	11,207	1,266	251	2,688	1,529	1,607	730	3,655
10 to 14 years	129,697	263,035	38,556	350	10,223	1,307	221	3,275	1,523	1,833	584	2,940
15 to 19 years	124,202	248,689	36,630	434	11,961	1,088	223	2,993	1,315	1,303	712	3,039
20 to 24 years	117,060	260,142	38,981	332	18,165	672	167	2,544	847	1,074	528	2,612
25 to 34 years	229,648	464,837	78,548	635	17,554	1,078	256	4,637	1,924	2,521	1,022	5,874
35 to 44 years	221,846	432,559	73,356	671	14,732	1,608	230	5,381	2,606	2,704	1,326	6,221
45 to 54 years	201,309	323,393	66,350	645	10,363	1,402	244	6,435	2,204	2,225	1,196	5,199
55 to 59 years	108,611	152,927	39,328	358	4,699	596	142	3,340	1,680	1,740	716	2,839
60 to 64 years	106,186	145,746	39,671	441	4,901	587	114	2,935	1,244	1,035	639	2,811
65 to 74 years	168,577	210,044	58,514	719	6,903	855	277	3,585	2,247	1,841	1,164	3,428
75 to 84 years	80,234	102,727	27,054	369	3,515	457	120	1,329	776	688	445	1,232
85 years and over	28,933	36,239	9,998	159	1,495	112	23	282	399	339	260	632
Median age (years)	36.6	31.1	38	39.4	25.4	32.6	33.0	40.2	40.1	36	39.7	35.7
Male	879,763	1,586,950	296,280	3,040	63,342	6,146	1,224	21,350	9,976	10,315	5,554	22,340
Female	874,604	1,564,289	285,068	3,014	62,994	5,804	1,191	20,330	9,664	10,059	4,311	21,012

Source: Reference 2.4-103

a. Age range is an estimate.

Table 2.4-6 50 Mile Region Household Incomes in the Past 12 Months (in 2021 Inflation Adjusted Dollars)

	Idaho	Utah	Wyoming	Bear Lake County, Idaho	Cache County, Utah	Morgan County, Utah	Rich County, Utah	Summit County, Utah	Lincoln County, Wyoming	Sublette County, Wyoming	Sweetwater County, Wyoming	Uinta County, Wyoming
Household Income												
Less than $10,000	28,187	36,609	11,557	108	1,404	74	15	471	306	26	841	305
$10,000 to $14,999	24,693	26,427	8,523	97	1,512	14	22	130	94	108	463	205
$15,000 to $19,999	25,753	26,102	8,672	96	1,158	6	14	125	107	147	458	201
$20,000 to $24,999	28,614	27,933	8,879	104	1,453	31	22	318	262	105	638	392
$25,000 to $29,999	28,106	34,900	10,047	97	2,114	23	74	303	273	304	543	293
$30,000 to $34,999	30,952	37,034	10,116	140	2,149	64	27	322	324	125	549	391
$35,000 to $39,999	28,252	34,441	8,775	72	1,786	52	16	313	258	81	526	252
$40,000 to $44,999	30,060	40,067	8,630	159	1,886	152	6	288	238	53	498	340
$45,000 to $49,999	27,652	36,983	8,289	31	1,998	80	41	327	240	17	395	210
$50,000 to $59,999	57,359	75,298	18,169	208	3,141	236	52	581	698	217	1,036	456
$60,000 to $74,999	76,548	112,196	23,853	177	4,470	276	81	1,068	906	362	1,626	783
$75,000 to $99,999	90,429	156,374	33,153	415	6,145	459	123	1,690	1,100	456	2,247	1,597
$100,000 to $124,999	65,644	122,817	25,943	227	4,463	522	73	1,199	1,045	336	1,968	1,090
$125,000 to $149,999	38,814	87,243	16,190	138	2,324	470	27	1,172	617	246	1,424	543
$150,000 to $199,999	38,881	90,896	16,818	81	2,237	492	40	1,538	565	429	1,523	359
$200,000 or more	37,157	88,331	13,039	81	2,122	553	28	3,630	350	325	794	258
Total Households:	**657,101**	**1,033,651**	**230,653**	**2,231**	**40,362**	**3,504**	**661**	**13,475**	**7,383**	**3,337**	**15,529**	**7,675**
Median Income[b]	**$63,377**	**$79,133**	**$68,002**	**60,337**	**65,670**	**112,721**	**67,396**	**116,351**	**74,835**	**82,342**	**76,668**	**75,106**

a. Reference 2.4-107

b. Reference 2.4-108

Table 2.4-7 10-Mile Radius Transients*

Workplaces	Maximum Number of Transients per Day
PacifiCorp Naughton Power Plant	42
Kemmerer Operations, LLC	91
Cowboy State Trucking, Inc.	15
South Lincoln Medical Center	42
South Lincoln Nursing Center	73
Seasonal, Recreational, or Occasional Use Units	**Maximum Number of Transients per Day**
Seasonal, Recreational, or Occasional Use	64
Hotes and /Motel	**Maximum Number of Transients per Day**
Fairview Motel	81
Antler Motel	76
Fossil Butte Motel	18
Best Western Plus Fossil Country Inn & Suites	108
Super 8 Diamondville Kemmerer	56
RV Parks	**Maximum Number of Transients per Day**
Riverside RV Park	88
Kettle Restaurant and Base Camp RV Park	34
Foothills Mobile Home and RV Park	75
Cowboy Joe's RV Park	12
Recreation and Tourism	**Maximum Number of Transients per Day**
JC Penney Historic District National Historic Landmark	40
Fossil Country Frontier Museum	100
Fossil Island Golf Club	50
Herschler Triangle Park/Oyster Ridge Music Festival	1,000
Other	**Maximum Number of Transients per Day**
Kemmerer Municipal Airport	10

Sources: Reference 2.4-1, Reference 2.4-61, Reference 2.4-111, Reference 2.4-125, Reference 2.4-17, and Reference 2.4-24

*All non-migrant worker categories

Table 2.4-8 Employment Trends

	Labor Force			Employment			Unemployment			Unemployment Rate	
	2011	2021	Average Annual Percent Change	2011	2021	Average Annual Percent Change	2011	2021	Average Annual Percent Change	2011	2021
Wyoming	302,932	290,404	-0.4	284,273	277,372	-0.2	18,659	13,032	-3.5	6.2	4.5
Lincoln County	8,641	9,514	1.0	7,921	9,154	1.5	720	360	-6.7	8.3	3.8
Uinta County	10,041	8,832	-1.3	9,380	8,389	-1.1	661	443	-3.9	6.6	5.0
Sweetwater County	23,578	19,449	-1.9	22,261	18,360	-1.9	1,317	1,089	-1.9	5.6	5.6
Economic Region	42,260	37,795	-1.1	39,562	35,903	-1.0	2,698	1,892	-3.5	6.4	5.0
Economic Region, as Percent of Wyoming	14.0	13.0		13.9	12.9		14.5	14.5			

Sources: Reference 2.4-14

Table 2.4-9 Employment by Industry (Jobs), 2019 and 2020

	Lincoln County		Uinta County		Sweetwater County		Economic Region Totals		Wyoming	
Description	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**
Total employment (number of jobs)	**11,172**	**11,042**	**11,853**	**11,233**	**27,910**	**25,301**	**50,935**	**47,576**	**408,143**	**386,291**
By Type										
Wage and salary employment	7,021	7,030	8,888	8,376	23,748	21,307	39,657	36,713	297,409	279,934
Proprietor's employment	4,151	4,012	2,965	2,857	4,162	3,994	11,278	10,863	110,734	106,357
Farm proprietors' employment	566	565	296	296	233	232	1,095	1,093	10,669	10,662
Nonfarm proprietors' employment (excludes limited partners)	3,585	3,447	2,669	2,561	3,929	3,762	10,183	9,770	100,065	95,695
By Industry										
Farm employment	706	696	401	394	290	285	1,397	1,375	14,781	14,497
Nonfarm employment	10,466	10,346	11,452	10,839	27,620	25,016	49,538	46,201	393,362	371,794
Private nonfarm employment	8,466	8,361	9,139	8,608	22,851	20,435	40,456	37,404	318,575	298,573
Forestry, fishing, and related activities	126	126	84	80	(D)	(D)	210	206	3,279	(D)
Mining, quarrying, and oil and gas extraction	682	664	352	246	4,777	(D)	5,811	910	24,851	20,296
Utilities	175	166	131	126	(D)	(D)	306	292	2,583	(D)
Construction	1,283	1,371	1,138	1,007	2,091	1,701	4,512	4,079	30,913	29,261
Manufacturing	244	241	343	336	1,424	1,360	2,011	1,937	12,380	11,806
Wholesale trade	150	144	205	180	(D)	(D)	355	324	9,476	8,729
Retail trade	1,117	1,138	1,419	1,423	2,616	2,592	5,152	5,153	37,636	37,143
Transportation and warehousing	274	284	526	508	1,467	1,255	2,267	2,047	15,661	14,837
Information	135	128	289	295	157	139	581	562	4,433	4,012
Finance and Insurance	407	389	421	396	658	643	1,486	1,428	20,474	19,675
Real Estate and Rental and Leasing	684	667	521	513	1,142	1,047	2,347	2,227	23,948	22,808
Professional, Scientific, and Technical Services	524	521	503	484	819	726	1,846	1,731	18,850	18,300
Management of Companies and Enterprises	(D)	(D)	65	56	118	84	183	140	1,926	1,695
Administrative and Support and Waste Management and Remediation Services	(D)	(D)	268	242	810	755	1,078	997	14,235	13,693
Educational Services	110	105	92	91	161	143	363	339	4,424	4,207
Health Care and Social Assistance	609	574	1,291	1,246	1,592	1,539	3,492	3,359	30,854	30,580
Arts, Entertainment, and Recreation	149	125	208	189	258	220	615	534	8,068	6,932
Accommodation and Food Services	679	624	793	725	2,380	2,190	3,852	3,539	36,361	31,696
Other Services (Except Government and Government Enterprises)	579	564	490	465	1,106	1,020	2,175	2,049	18,223	17,129
Government and Government Enterprises	2,000	1,985	2,313	2,231	4,769	4,581	9,082	8,797	74,787	73,221
Federal Civilian	113	123	73	82	222	224	408	429	7,578	7,807
Military	104	105	104	104	220	218	428	427	6,139	6,227
State and Local Government Total	1,783	1,757	2,136	2,045	4,327	4,139	8,246	7,941	61,070	59,187
State Government	121	110	487	493	248	243	856	846	14,755	14,373
Local Government	1,662	1,647	1,649	1,552	4,079	3,896	7,390	7,095	46,315	44,814

Source: Reference 2.4-7

(D) Not shown to avoid disclosure of confidential information; estimates are included in higher-level totals

Table 2.4-10 Largest Public and Private Employers in the Economic Region[a]

Employer	Type	Number of Employees	Location	County
General Chemical Corp	Chemicals	500	Green River	Sweetwater
Solvay Chemicals	Chemicals	500	Green River	Sweetwater
Tata Chemicals	Chemicals	500	Green River	Sweetwater
Tristar Constructors, Inc.	Insulation Contractors	455	Evanston	Uinta
Ciner Wyoming, LLC	Soda Ash	425	Green River	Sweetwater
Cornerstone Behavioral Health	Disability Services	410	Evanston	Uinta
Memorial Hospital - Sweetwater	Hospital	390	Rock Springs	Sweetwater
Wyoming State Hospital	Hospital	383	Evanston	Uinta
Jim Bridger Power Plant	Utility	350	Rock Springs	Sweetwater
Union Telephone	Communications	300	Mountain View	Uinta
Westmoreland Kemmerer, Incorporated (now called Kemmerer Operations, LLC)	Coal Mining and Shipping	220[b]	Kemmerer	Lincoln
Simplot Phosphates	Fertilizer Manufacturing	210	Rock Springs	Sweetwater
City of Green River	Government	200	Green River	Sweetwater
Church and Dwight Company	Soap/Detergent Manufacturers	200	Green River	Sweetwater
South Lincoln Nursing Center	Nursing and Convalescent Homes	180	Kemmerer	Lincoln
Evanston Regional Hospital	Hospital	163	Evanston	Uinta
Black Butte Coal Company	Coal Mining and Shipping	160	Point of Rocks	Sweetwater
Sweetwater School District	School District	150	Rock Springs	Sweetwater

Sources:

a. Reference 2.4-17

b. Reference 2.4-61

Table 2.4-11 Heavy and Civil Engineering Construction, North American Industrial Classification System Sector 237, 2019 and 2021

Geography	Annual Establishments	Annual Average Employment	Annual Average Weekly Wage	Annual Wages per Employee
2019				
United States	51,912	1,070,287	$1,490	$77,459
Wyoming	477	7,387	$1,316	$68,450
Lincoln County	16	88	$899	$46,758
Sweetwater County	32	628	$1,252	$65,114
Uinta County	19	481	$1,188	$61,767
2021				
United States	53,917	1,037,052	$1,607	$83,590
Wyoming	450	5,292	$1,394	$72,502
Lincoln County	18	161	$1,154	$59,998
Sweetwater County	36	430	$1,241	$64,536
Uinta County	20	422	$1,218	$63,352

Source: Reference 2.4-15

Table 2.4-12 Nuclear Electric Power Generation, North American Industrial Classification System 221113, 2019 and 2021

Geography	Annual Establishments	Annual Average Employment	Annual Average Weekly Wage	Annual Wages per Employee
2019				
United States	131	40,786	$2,911	$151,355
Wyoming	N/A	N/A	N/A	N/A
Lincoln County	N/A	N/A	N/A	N/A
Sweetwater County	N/A	N/A	N/A	N/A
Uinta County	N/A	N/A	N/A	N/A
2021				
United States	145	36,941	$2,997	$155,840
Wyoming	N/A	N/A	N/A	N/A
Lincoln County	N/A	N/A	N/A	N/A
Sweetwater County	N/A	N/A	N/A	N/A
Uinta County	N/A	N/A	N/A	N/A

Source: Reference 2.4-15

N/A = Not Available

Table 2.4-13 Per Capita Personal Income, 2010-2020

Geography	2011	2021	Average Annual Growth Percent 2011-2021
United States	$42,747	$64,143	4.1
Wyoming	$50,783	$69,666	3.2
Lincoln County	$36,589	$61,945	5.4
Uinta County	$40,668	$44,157	0.8
Sweetwater County	$47,924	$56,934	1.7

Source: Reference 2.4-8

Table 2.4-14 Wyoming General Fund and Budget Reserve Account Revenue, FY 2019-2021

Revenue Source	FY 2019	FY 2020	FY 2021	FY 2021 Percent of Total
Mineral Severance Tax[a]	$435,740,689	$314,852,603	$258,416,398	15.3
Federal Mineral Royalties	$246,624,758	$184,286,008	$170,683,739	10.1
Sales and Use Tax[b]	$518,521,625	$487,232,525	$493,101,908	29.2
Income-PWMTF[c]	$365,081,260	$243,286,175	$489,907,047	29.0
Income-Pooled Fund	$86,659,646	$78,585,082	$83,868,118	5.0
Charges-Sales and Services	$51,776,908	$62,288,592	$63,009,935	3.7
Franchise Tax	$37,470,505	$39,560,299	$48,446,992	2.9
Cigarette Tax	$13,834,653	$13,325,367	$13,028,108	0.8
Penalties and Interest	$5,111,037	$4,570,357	$4,883,799	0.3
All Other[d]	$44,460,733	$51,108,135	$61,267,808	3.6
Total Revenue	**$1,805,281,814**	**$1,479,095,143**	**$1,686,613,852**	**100**

Source: Reference 2.4-135.

Note: The Budget Reserve Account is funded by Federal mineral royalties and State severance taxes and used to supplement the General Fund.

a. Includes taxes from the 1 percent of severance tax rate directly deposited in the General Fund for FY 2019 and FY 2020.

b. Does not include revenues collected for Economic Impact Assessment payments (Reference 2.4-60).

c. PWMTF = Permanent Wyoming Mineral Trust Fund. The Fund's income includes investment earnings in excess of spending policy amount ($101.9 million in FY 2021) appropriated to the PWMTF Reserve Account. The fluctuation of income between different years is due to the amount in realized capital gains.

d. Includes miscellaneous tax revenue, license and permit fees, property and money use fees, and non-revenue receipts.

Table 2.4-15 Lincoln County Revenues and Expenditures, FY 2021

Revenues:	Dollars	Percent of Total
Property taxes	$7,271,821	26.6
Payments in lieu of taxes	$1,595,322	5.8
Sales and use taxes	$6,150,208	22.5
State gas tax	$1,139,598	4.2
Vehicle fees	$886,772	3.2
Severance tax	$522,757	1.9
Other taxes	$74,849	0.3
Nonmajor fund taxes	$76,363	0.3
Intergovernmental (primarily grants and “nonmajor funds”)	$6,635,468	24.2
Charges for services	$2,821,782	10.3
Licenses and permits	$3,690	0.0
Interest and investment income	$67,040	0.2
Miscellaneous	$131,979	0.5
Total Revenues	**$27,377,649**	**100.0**
Expenditures:	**Dollars**	**Percent of Total**
General government	$8,293,827	36.0
Public safety	$7,181,455	31.2
Public works	$3,135,503	13.6
Health and welfare	$4,092,071	17.8
Debt service	$327,300	1.4
Total Expenditures	**$23,030,156**	**100.0**

Source: Reference 2.4-55.

Table 2.4-16 Kemmerer Revenues and Expenditures, FY 2021

Revenues:	Dollars	Percent of Total
Sales and use taxes	$1,689,508	42.0
General property taxes	$133,549	3.3
Lodging taxes	$76,098	1.9
Severance taxes	$98,151	2.4
Gas taxes	$91,960	2.3
Franchise taxes	$75,295	1.9
Motor vehicle taxes	$86,614	2.2
Cigarette taxes	$13,583	0.3
Charges for services	$814,104	20.2
Licenses and permits	$44,334	1.1
Intergovernmental	$796,760	19.8
Fines and forfeitures	$26,235	0.7
Miscellaneous	$79,927	2.0
Total Revenues	**$4,026,118**	**100.0**
Expenditures:	**Dollars**	**Percent of Total**
General government	$863,882	22.7
Public safety	$733,829	19.3
Streets and highways	$1,012,845	26.7
Parks and recreation	$665,479	17.5
Sanitation	$308,216	8.1
Municipal court	$28,956	0.8
Building inspection/zoning	$9,432	0.2
South Lincoln Training and Event Center	$111,913	2.9
Debt service	$64,221	1.7
Total Expenditures	**$3,798,773**	**100.0**

Source: Reference 2.4-42

Table 2.4-17 Sales and Use and Lodging Tax Rates by Locality, April 2022

County/City	State Sales and Use Tax Rate	General Purpose County Option	Specific Purpose County Option	Statewide Lodging Tax Rate	Local Lodging Tax Rate	Total Lodging and Sales and Use Tax Rate
Lincoln County	4	1	0	3	2	10
Kemmerer	4	1	0	3	4	12
Diamondville	4	1	0	3	2	10
Uinta County	4	1	0	3	2	10
Evanston	4	1	0	3	3	11
Sweetwater County	4	1	0	3	4	12

Source: Reference 2.4-132

Table 2.4-18 Total Sales and Use Tax Collections in the Economic Region and State, FY 2011, 2019–2021[a]

County	FY 2011		FY 2019		FY 2020		FY 2021		Average Annual Percent Change, FY11 to FY21	
	Total Taxes	4 Percent Taxes	Total Taxes	4 Percent Taxes	Total Taxes	4 Percent Taxes	Total Taxes	4 Percent Taxes	Total Taxes	4 Percent Taxes
Lincoln	$21,568,367	$17,261,556	$23,492,091	$18,766,530	$21,416,242	$17,107,382	$26,355,168	$21,040,812	2.0	2.0
Sweetwater	$92,046,995	$71,942,751	$88,964,473	$71,038,987	$79,710,912	$63,648,735	$68,456,666	$54,619,476	-2.9	-2.7
Uinta	$20,944,926	$16,755,440	$20,207,437	$16,144,547	$21,195,181	$16,934,331	$22,474,796	$17,951,823	0.7	0.7
Wyoming	$853,588,045	$670,704,525	$1,018,916,734	$767,510,401	$1,016,113,236	$765,501,106	$978,476,265	$725,646,878	1.4	0.8

Sources: Reference 2.4-135 and Reference 2.4-133.

a. Includes Economic Impact Assessment payments (Reference 2.4-60)

Table 2.4-19 Lodging Tax Collections by County and City in Economic Region, FY 2019-2021

	FY 2019	FY 2020	FY 2021
Lincoln County	NA	NA	$12,021*
Cokeville	$2,448	$2,615	$3,557
Diamondville	$5,971	$5,402	$7,111
Kemmerer	$90,516	$73,597	$76,867
LaBarge	NA	NA	$552*
Uinta County	NA	NA	$1,831*
Bear River	NA	NA	$168*
Evanston	$284,727	$275,644	$252,006
Lyman	NA	NA	$834*
Mountain View	NA	NA	$227*
Sweetwater County	$67,468	$79,241	$71,126
Granger	$0	$0	$0
Green River	$136,704	$161,579	$146,042
Rock Springs	$792,067	$810,160	$756,185

Source: Reference 2.4-135

NA = Not Applicable

* Note: Beginning January 1, 2021, the State assigned a 2 percent lodging tax to all counties and municipalities in the State that did not already have one in place. (County lodging tax rates apply to the areas within county boundaries, but outside of municipality limits.) Consequently, for these localities, collections for FY 2021 only reflect the period from January 1, 2021, to June 30, 2021.

Table 2.4-20 Total Economic Region County-Wide Property Tax Levies, Tax Years 2019-2021

Year	County	Municipal	Special District	Total Education[a]	State General Fund[b]	Total	Average Mill Levy
Lincoln							
2011	$10,588,451	$649,444	$4,822,020	$43,342,687	None	$59,402,602	62.476
2019	$9,111,202	$755,240	$5,360,168	$34,197,530	None	$49,424,140	63.550
2020	$8,910,569	$798,120	$4,617,154	$33,372,925	None	$47,698,768	63.209
2021	$8,726,261	$870,521	$5,013,971	$32,579,974	None	$47,190,727	64.895
Uinta							
2011	$6,961,457	$823,052	$2,012,652	$27,486,125	None	$37,283,286	66.647
2019	$4,679,240	$927,845	$1,392,443	$17,943,969	None	$24,943,497	65.431
2020	$4,179,045	$939,335	$1,257,551	$16,054,941	None	$22,430,872	65.746
2021	$3,854,575	$1,003,446	$1,149,451	$14,855,587	None	$20,863,059	64.951
Sweetwater							
2011	$30,518,648	$2,524,555	$8,798,690	$128,830,777	None	$170,672,670	71.549
2019	$29,967,434	$2,801,365	$10,193,040	$126,958,145	None	$169,919,984	72.739
2020	$28,424,313	$2,764,261	$11,320,207	$120,319,517	None	$162,828,298	72.726
2021	$23,705,139	$2,735,934	$9,840,406	$99,100,981	None	$135,382,460	68.533

Sources: Reference 2.4-126, Reference 2.4-128, Reference 2.4-129, Reference 2.4-131

a. Includes all school district levies (including the State levy for the School Foundation Program (12 mill cap)) and bond/interest revenue.

b. The State of Wyoming levies property taxes for the School Foundation Program, only.

Table 2.4-21 School District[a] Revenue by Source

2019-2020			2020-2021		
Operating Revenue Source	**Lincoln County School District #1 (Kemmerer)**	**Uinta County School District #1 (Evanston)**	**Operating Revenue Source**	**Lincoln County School District #1 (Kemmerer)**	**Uinta County School District #1 (Evanston)**
Local	$11,187,857	$8,235,583	**Local**	$10,748,651	$6,711,417
County	$915,987	$2,133,592	**County**	$938,170	$1,942,954
State	$951,426	$33,950,971	**State**	$1,897,870	$34,227,813
Federal	$311,959	$3,730,166	**Federal**	$422,486	$5,210,602
Other	$103,000	$634,157	**Other**	$108,000	$688,625
Total	$13,470,230	$48,684,469	**Total**	$14,115,177	$48,781,410
Assessed Valuation 7/1/19	403,375,699	228,209,937	**Assessed Valuation 7/1/20**	371,011,390	203,396,040

Sources: Reference 2.4-122, Reference 2.4-123

a. These are the school districts of largest cities in Lincoln and Uinta Counties, which are the cities/school districts most likely to host the operations workforce.

Table 2.4-22 Access Routes to the Kemmerer Unit 1 Site

Route No.	Route	Usage
1	US 189 south to site entrance-Diamondville	Commuting and truck shipments from Kemmerer and Diamondville
2	US 30 to US 189 south to site entrance	Commuting and truck shipments from Kemmerer and Diamondville
3	US 30 east to US 189 south to site entrance	Commuting from Sweetwater County
4	I-80 to US 189 north to site entrance	Commuting from Sweetwater and Uinta counties and deliveries and shipments
5	SR 412 north to US 189 and north to the site entrance	Commuting from Uinta County

Table 2.4-23 RV Parks in the 10-Mile Region

RV Parks	Location	Number of Sites	Mode	Amenities	Utilization Rate
Riverside RV Park[a]	Kemmerer, WY	44	RV	Water, Electricity, Sewer Hookups	0-100 percent (higher utilization during the summer months)
Kettle Restaurant and Base Camp RV Park[b]	Kemmerer, WY	17	RV	Water, Electricity, Sewer Hookups	0-100 percent (higher utilization during June-August)
Foothills Mobile Home and RV Park[c]	Kemmerer, WY	60	RV	Water, Electricity, Sewer Hookups	0-62 percent (higher utilization during the summer months)
Cowboy Joes RV Park[d]	Diamondville, WY	10	RV	Water, Electricity, Sewer Hookups	0-60 percent (higher utilization during the summer months)

a. Reference 2.4-37

b. Reference 2.4-150

c. Reference 2.4-16

d. Reference 2.4-40

Table 2.4-24 Housing Trends in the Economic Region, 2010-2020

Geography	2010 Census	Total Housing Units 2020 Estimate*	Average Annual Percent Growth
Lincoln County	8,946	9,551	0.7
Uinta County	8,713	9,077	0.4
Sweetwater County	18,735	19,842	0.6
Economic Region Total	36,394	38,470	0.6
Kemmerer	1,265	1,459	1.4
Diamondville	363	431	1.7
Cokeville	200	221	1.0
LaBarge	290	260	-1.1
Evanston	5,111	5,402	0.6
Green River	5,002	5,153	0.3
Rock Springs	10,070	10,634	0.5

Sources: Reference 2.4-97 and Reference 2.4-103

*USCB American Community Survey 5-Year Estimates, 2016-2020

Note: Housing data from the 2020 Decennial Census were not used in this table because only housing totals were available at the time. Also, the use of ACS data in this table will enable better comparisons with the ACS housing data in the rest of this section.

Table 2.4-25 Selected Housing Characteristics in the Economic Region, Counties, 2020 (Sheet 1 of 2)

	Lincoln County		Uinta County		Sweetwater County		Economic Region Total	Percent of Total
	Estimate	**Percent**	**Estimate**	**Percent**	**Estimate**	**Percent**	**Estimate**	**Percent**
Total Housing Units	9,551	100	9,077	100	19,842	100	38,470	100.0
Occupancy Status								
Occupied Housing Units	7,348	76.9	7,789	85.8	15,726	79.3	30,863	80.2
Vacant Housing Units	2,203	23.1	1,288	14.2	4,116	20.7	7,607	19.8
Homeowner Vacancy Rate	2.8	n/a	1.3	n/a	1.5	n/a	n/a	n/a
Rental Vacancy Rate	5.6	n/a	6.6	n/a	28.8	n/a	n/a	n/a
Housing Tenure (Occupied Units)								
Owner-occupied	5,906	80.4	5,996	77.0	11,852	75.4	23,754	77.0
Renter-occupied	1,442	19.6	1,793	23.0	3,874	24.6	7,109	23.0
Units in Structure								
1-unit, detached	7,284	76.3	5,317	58.6	11,622	58.6	24,223	63.0
1-unit, attached		3.1	461	5.1	793	293	3.1	461
2 units	70	0.7	33	0.4	564	2.8	667	1.7
3 or 4 units	197	2.1	273	3.0	1,024	5.2	1,494	3.9
5 to 9 units	267	2.8	285	3.1	645	3.3	1,197	3.1
10 to 19 units	107	1.1	444	4.9	473	2.4	1,024	2.7
20 or more units	42	0.4	221	2.4	505	2.5	768	2.0
Mobile home	1,291	13.5	2,009	22.1	4,162	21.0	7,462	19.4
Boat, RV, van, etc.	0	0.0	34	0.4	54	0.3	88	0.2
Year Structure Built								
Built 2014 or later	57	0.6	59	0.6	919	4.6	1,035	2.7
Built 2010 to 2013	150	1.6	277	3.1	948	4.8	1,375	3.6
Built 2000 to 2009	2,093	21.9	953	10.5	2,542	12.8	5,588	14.5

Table 2.4-25 Selected Housing Characteristics in the Economic Region, Counties, 2020 (Sheet 2 of 2)

	Lincoln County		Uinta County		Sweetwater County		Economic Region Total	Percent of Total
Built 1990 to 1999	1,949	20.4	774	8.5	2,150	10.8	4,873	12.7
Built 1980 to 1989	1,352	14.2	3,418	37.7	3,077	15.5	7,847	20.4
Built 1970 to 1979	1,665	17.4	1,890	20.8	4,995	25.2	8,550	22.2
Built 1960 to 1969	556	5.8	378	4.2	1,130	5.7	2,064	5.4
Built 1950 to 1959	363	3.8	371	4.1	980	4.9	1,714	4.5
Built 1940 to 1949	303	3.2	159	1.8	895	4.5	1,357	3.5
Built 1939 or earlier	1,063	11.1	798	8.8	2,206	11.1	4,067	10.6
Value								
Owner-occupied Units	5,906	100.0	5,996	100.0	11,852	100.0	23,754	100.0
Less than $50,000	283	4.8	704	11.7	2,007	16.9	2,994	12.6
$50,000 to $99,999	442	7.5	690	11.5	508	4.3	1,640	6.9
$100,000 to $149,999	562	9.5	484	8.1	1,265	10.7	2,311	9.7
$150,000 to $199,999	852	14.4	1,556	26.0	1,940	16.4	4,348	18.3
$200,000 to $299,999	1,398	23.7	1,320	22.0	3,474	29.3	6,192	26.1
$300,000 to $499,999	1,829	31.0	948	15.8	2,187	18.5	4,964	20.9
$500,000 to $999,999	460	7.8	136	2.3	310	2.6	906	3.8
$1,000,000 or more	80	1.4	158	2.6	161	1.4	399	1.7
Median Value (owner-occupied units)	253,400	n/a	181,600	n/a	205,100	n/a	211,177	n/a
Median Rent (renter-occupied units)	710	n/a	685	n/a	852	n/a	781	n/a

Source: Reference 2.4-104

n/a = Not applicable

Table 2.4-26 Vacancy Status in the Economic Region, 2020*

	Total Vacant Housing Units	For Rent	Rented, Not Occupied	For Sale Only	Sold, Not Occupied	For Seasonal, Recreational, or Occasional Use[a]	For Migrant Workers	Other Vacant[b]
Lincoln County (county-level)	2,203	86	16	169	17	1,289	0	626
Uinta County (county-level)	1,288	132	62	79	15	110	0	890
Sweetwater County (county-level)	4,116	1,629	156	190	393	274	30	1,444
Economic Region Total	**7,607**	**1,847**	**234**	**438**	**425**	**1,673**	**30**	**2,960**
Percent of Total	**100**	**24.3**	**3.1**	**5.8**	**5.6**	**22.0**	**.4**	**38.9**
Kemmerer	184	15	0	30	0	24	0	115
Diamondville	99	0	7	3	0	8	0	81
Cokeville	37	0	0	9	0	4	0	24
LaBarge	132	23	0	16	0	50	0	43
Evanston	775	102	62	44	0	0	0	567
Green River	783	509	0	70	64	0	0	140
Rock Springs	2,257	954	151	70	210	10	0	862

Source: Reference 2.4-105

*Estimated numbers

a. “Seasonal, Recreational, or Occasional Use” units are vacant, those used or intended for use only in certain seasons or for weekends, or other occasional use throughout the year. Seasonal units include those used for summer or winter sports or recreation, such as beach cottages and hunting cabins. Seasonal units also may include quarters for such workers as herders and loggers. Interval ownership units, sometimes called shared-ownership or timesharing condominiums, also are included here.

b. “Other Vacant” is a vacant unit that does not fall into any of the categories specified above. Examples include units held for occupancy by a caretaker or janitor, and units held for personal reasons of the owner (legal, remodel, long absences.) (Reference 2.4-98).

Table 2.4-27 Residential Building Permit Growth in the Economic Region

Annual Total Residential Building Permits													
County	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total Permits Issued, 2010-2021**
Lincoln	49	40	28	32	68	105	144	137	148	148	184	255	1,338
Uinta	45	34	38	35	40	35	46	42	29	42	41	36	463
Sweetwater	147	122	132	103	227	84	72	105	54	68	50	49	1,213
Annual Single-Family Residential Building Permits													
County	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total Permits Issued, 2010-2021**
Lincoln	49	40	28	32	68	105	136	135	144	144	173	241	1,295
Uinta	45	34	38	31	34	35	34	42	29	42	41	36	441
Sweetwater	100	102	116	87	108	84	70	67	54	68	50	49	955

Source: Reference 2.4-136

Table 2.4-28 Selected Housing Characteristics in the Economic Region, Selected Municipalities, 2020 (Sheet 1 of 2)

	Kemmerer		Diamondville		Cokeville		LaBarge		Evanston		Green River		Rock Springs	
Subject	**Estimate**	**Percent**	**Estimate**	**Percent**	**Estimate**	**Percent`**	**Estimate**	**Percent**	**Estimate**	**Percent**	**Estimate**	**Percent**	**Estimate**	**Percent**
Total housing units	1,459	100	431	100	221	100	260	100	5,402	100	5,153	100	10,634	100
Occupancy Status														
Occupied Housing Units	1,275	87.4	332	77.0	184	83.3	128	49.2	4,627	85.7	4,370	84.8	8,377	78.8
Vacant Housing Units	184	12.6	99	23.0	37	16.7	132	50.8	775	14.3	783	15.2	2,257	21.2
Homeowner Vacancy Rate	3.0	n/a	1.2	n/a	5.8	n/a	15.8	n/a	1.3	n/a	2.1	n/a	1.1	n/a
Rental Vacancy Rate	4.5	n/a	0	n/a	0	n/a	34.8	n/a	6.6	n/a	31.7	n/a	28.6	n/a
Housing Tenure (Occupied Units)														
Owner-occupied	957	75.1	250	75.3	147	79.9	85	66.4	3,241	70.0	3,272	74.9	6,142	73.3
Renter-occupied	318	24.9	82	24.7	37	20.1	43	33.6	1,386	30.0	1,098	25.1	2,235	26.7
Units in Structure														
1-unit, detached	1,068	73.2	164	38.1	174	78.7	109	41.9	2,933	54.3	3,350	65.0	6,655	62.6
1-unit, attached	92	6.3	8	1.9	7	3.2	0	0.0	442	8.2	131	2.5	637	6.0
2 units	10	0.7	4	0.9	0	0.0	12	4.6	26	0.5	236	4.6	317	3.0
3 or 4 units	78	5.3	7	1.6	1	0.5	22	8.5	236	4.4	367	7.1	507	4.8
5 to 9 units	101	6.9	9	2.1	0	0.0	6	2.3	278	5.1	281	5.5	364	3.4
10 to 19 units	13	0.9	0	0.0	0	0.0	7	2.7	433	8.0	67	1.3	406	3.8
20 or more units	40	2.7	2	0.5	0	0.0	0	0.0	216	4.0	79	1.5	426	4.0
Mobile home	57	3.9	237	55.0	39	17.6	104	40.0	804	14.9	642	12.5	1,317	12.4
Boat, RV, van, etc.	0	0.0	0	0.0	0	0.0	0	0.0	34	0.6	0	0.0	5	0.0
Year Structure Built														
Built 2014 or later	4	0.3	0	0.0	0	0.0	0	0.0	23	0.4	230	4.5	551	5.2
Built 2010 to 2013	53	3.6	2	0		0.0	13	5.0	115	2.1	21	0.4	834	7.8
Built 2000 to 2009	116	8.0	31	7.2	9	4.1	60	23.1	383	7.1	283	5.5	1,623	15.3
Built 1990 to 1999	21	1.4	105	24.4	17	7.7	29	11.2	250	4.6	611	11.9	893	8.4
Built 1980 to 1989	241	16.5	45	10.4	23	10.4	58	22.3	2,481	45.9	1,092	21.2	1,298	12.2
Built 1970 to 1979	347	23.8	93	21.6	32	14.5	52	20.0	978	18.1	1,859	36.1	2,253	21.2
Built 1960 to 1969	122	8.4	31	7.2	10	4.5	10	3.8	260	4.8	274	5.3	567	5.3
Built 1950 to 1959	114	7.8	11	2.6	35	15.8	19	7.3	227	4.2	242	4.7	579	5.4
Built 1940 to 1949	78	5.3	10	2.3	31	14.0	7	2.7	101	1.9	225	4.4	530	5.0
Built 1939 or earlier	363	24.9	103	23.9	64	29.0	12	4.6	584	10.8	316	6.1	1,506	14.2
Value														
Owner-occupied Units	957	100.0	250	100.0	147	100.0	85	100	3,241	100.0	3,272	100.0	6,142	100.0
Less than $50,000	3	0.3	52	20.8	7	4.8	18	21.2	407	12.6	284	8.7	889	14.5
$50,000 to $99,999	199	20.8	70	28.0	41	27.9	18	21.2	430	13.3	102	3.1	191	3.1
$100,000 to $149,999	324	33.9	25	10.0	21	14.3	16	18.8	272	8.4	227	6.9	740	12.0
$150,000 to $199,999	161	16.8	52	20.8	28	19.0	16	18.8	973	30.0	660	20.2	1,144	18.6

Table 2.4-28 Selected Housing Characteristics in the Economic Region, Selected Municipalities, 2020 (Sheet 2 of 2)

	Kemmerer		Diamondville		Cokeville		LaBarge		Evanston		Green River		Rock Springs	
$200,000 to $299,999	205	21.4	40	16.0	39	26.5	17	20.0	792	24.4	1,332	40.7	1,868	30.4
$300,000 to $499,999	59	6.2	11	4.4	2	1.4	0	0.0	293	9.0	640	19.6	1,062	17.3
$500,000 to $999,999	6	0.6	0	0.0	9	6.1	0	0.0	74	2.3	27	0.8	137	2.2
$1,000,000 or more	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	111	1.8
Median Value (owner-occupied units)	143,000	n/a	106,800	n/a	154,300	n/a	110,200	n/a	169,300	n/a	221,800	n/a	205,300	n/a
Median Rent (renter-occupied units)	622	n/a	807	n/a	1,125	n/a	546	n/a	652	n/a	854	n/a	876	n/a

Source: Reference 2.4-104
n/a = Not applicable

Table 2.4-29 Hotels and Motels in the Economic Region, 2010-2020

Name of Establishment	City	Class	Rooms
Lincoln County			
Fairview Motel	Kemmerer	Economy Class	60
Best Western Plus Fossil Country Inn & Suites	Kemmerer	Upper Midscale Class	80
Antler Motel	Kemmerer	Economy Class	56
Fossil Butte Motelb	Kemmerer	Economy Class	13
Hideout Motel	Cokeville	Economy Class	14
Valley Hi Motel	Cokeville	Economy Class	21
Super 8 Diamondville Kemmerer	Diamondville	Economy Class	41
Wyoming Inn	LaBarge	Economy Class	28
Lincoln County Subtotal			313
Uinta County			
Best Western Dunmar Inn	Evanston	Midscale Class	165
Super 8 by Wyndham Evanston	Evanston	Economy Class	43
Holiday Inn Express & Suites Evanston	Evanston	Upper Midscale Class	62
Travelodge Evanston	Evanston	Economy Class	30
Quality Inn Evanston	Evanston	Midscale Class	100
Hampton Inn Evanston	Evanston	Upper Midscale Class	73
Comfort Inn Evanston I-80	Evanston	Upper Midscale Class	56
Knights Inn Evanston	Evanston	Economy Class	104
Days Inn Evanston	Evanston	Economy Class	100
Prairie Inn	Evanston	Economy Class	31
Western Inn Evanston	Evanston	Economy Class	88
Evanston Inn	Evanston	Economy Class	93
Wagon Wheel Motel	Fort Bridger	Economy Class	24
Gateway Inn	Lyman	Economy Class	48
Country Cabins Inn	Mountain View	Economy Class	19
Uinta County Subtotal			1,036
Sweetwater County			
Holiday Inn Rock Springs	Rock Springs	Upper Midscale Class	170
My Place Hotel Rock Springs	Rock Springs	Upper Midscale Class	64
Holiday Inn Express & Suites Rock Springs Green River	Rock Springs	Upper Midscale Class	79
Homewood Suites by Hilton Rock Springs	Rock Springs	Upscale Class	84
Comfort Inn & Suites Rock Springs - Green River	Rock Springs	Upper Midscale Class	57
Hampton Inn Rock Springs	Rock Springs	Upper Midscale Class	70
Cody Motel	Rock Springs	Economy Class	39
Sands Inn	Rock Springs	Economy Class	20
Super 8 Rock Springs	Rock Springs	Economy Class	49
Motel 8	Rock Springs	Economy Class	92
Quality Inn Rock Springs	Rock Springs	Midscale Class	103
Country West Motel	Rock Springs	Economy Class	32
Best Western Outlaw Inn	Rock Springs	Midscale Class	100
Baymont Inn & Suites Rock Springs	Rock Springs	Midscale Class	111
Economy Guest Village	Rock Springs	Economy Class	70
Motel 6 Rock Springs, WY	Rock Springs	Economy Class	99
Clarion Hotel Rock Springs - Green River	Rock Springs	Upper Midscale Class	149
Studio 6 Rock Springs, WY	Rock Springs	Economy Class	0
Little America Hotel Wyoming	Little America	Upscale Class	140
Super 8 Green River	Green River	Economy Class	33
Mustang Motel	Green River	Economy Class	23
Coachman Inn Motel	Green River	Economy Class	18
Travelodge Green River	Green River	Economy Class	191
Hampton by Hilton Inn & Suites Green River	Green River	Upper Midscale Class	106
Western Motel	Green River	Economy Class	31
Little Bear Motel	Green River	Economy Class	30
Sweetwater County Subtotal			**1,960**
Total			**3,309**

Source: Reference 2.4-83

Table 2.4-30 Hotel and Motel Occupancy Rates (%) for the Economic Region, 2014-2022

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Entire Year
2014	35.2	36.5	40.3	47.9	59.8	68.6	74.5	71.0	63.7	53.3	41.3	36.7	52.5
2015	37.5	37.2	40.6	45.3	52.7	69.0	75.5	70.6	66.6	53.0	40.5	33.8	52.1
2016	31.0	34.9	36.5	40.7	49.2	60.8	64.0	63.5	58.5	46.4	35.5	27.7	45.9
2017	30.6	30.8	34.1	40.4	51.6	59.8	64.8	68.8	57.2	45.7	38.4	30.7	46.2
2018	31.3	32.5	36.1	43.0	52.9	64.8	68.5	65.8	59.6	49.1	41.8	31.5	48.2
2019	32.3	34.1	37.5	40.5	59.9	62.1	70.3	66.3	60.2	49.6	37.0	30.4	48.5
2020	29.9	32.9	28.1	20.6	30.7	44.0	54.0	58.2	56.5	47.3	33.3	28.8	38.8
2021	27.6	28.0	35.1	48.1	54.3	67.0	70.4	67.0	58.7	48.6	39.0	33.6	48.3
2022	32.4	33.0	39.0	49.7	57.3	67.8	63.6	61.2	61.9	49.1	38.1	32.4	48.9
Average	**32.0**	**33.3**	**36.3**	**41.7**	**52.0**	**62.6**	**67.3**	**65.8**	**60.3**	**49.1**	**38.3**	**31.7**	**47.7**

Source: Reference 2.4-84

Table 2.4-31 RV Parks and Campgrounds in the Economic Region

RV Parks and Camping Sites	Location	Number of Sites	Mode	Amenities
Riverside RV Park[a]	Kemmerer, WY	44	RV	Water, Electricity, Sewer Hookups
Kettle Restaurant and Base Camp RV Park[b]	Kemmerer, WY	17	RV	Water, Electricity, Sewer Hookups
Foothills Mobile Home and RV Park[c]	Kemmerer, WY	60	RV	Water, Electricity, Sewer Hookups
Cowboy Joe's RV Park[d]	Diamondville, WY	10	RV	Water, Electricity, Sewer Hookups
Fontanelle Creek Recreation Area (BLM)[e]	Lincoln County, WY (near Fontanelle)	55	RV or Tent	Potable Water, Public Restrooms, Trash Receptacles
Tail Race Campground (BLM)[f]	Lincoln County, WY (near Fontanelle)	3	RV or Tent	Public Restroom
Slate Creek Campground (BLM)[g]	Lincoln County, WY (near Fontanelle)	8	RV or Tent	Not reported
Weeping Rock Campground (BLM)[h]	Lincoln County, WY (near Fontanelle)	10	RV or Tent	Public Restroom
Hideout Motel and RV Park[i]	Cokeville, WY	3	RV or Tent	Water, Electricity, Sewer Hookups
Phillips RV Park[i]	Evanston, Wy	56	RV or Tent	Water, Electricity, Sewer Hookups
Fort Bridger RV Camp[i]	Fort Bridger, WY	38	RV or Tent	Water, Electricity, Sewer Hookups
Homestead RV Park[c]	Lyman, WY	50	RV	Water, Electricity, Sewer Hookups
Lyman KOA Journey[i]	Lyman, WY	55	RV or Tent	Water, Electricity, Sewer Hookups
Little America RV Park[j]	Little America, WY	40	RV	Water, Electricity, Sewer Hookups
The Travel Camp[i]	Green River	89	RV or Tent	Water, Electricity, Sewer Hookups
Rock Springs, Green River KOA Journey[i]	Rock Springs, WY	204	RV or Tent	Water, Electricity, Sewer Hookups
Sweetwater Events Complex - RV Park[i]	Rock Springs, WY	1,200	RV	Water, Electricity, Sewer Hookups
Total		**1,942**		
Lincoln County Subtotal (portion within commuting distance)		**210**		
Uinta County Subtotal		**199**		
Sweetwater County Subtotal (Green River and Rock Springs area)		**1,533**		

a. Reference 2.4-37
b. Reference 2.4-150
c. Reference 2.4-16
d. Reference 2.4-40
e. Reference 2.4-11
f. Reference 2.4-75
g. Reference 2.4-12
h. Reference 2.4-76
i. Reference 2.4-78
j. Reference 2.4-47

Table 2.4-32 Major Public Water Suppliers[a] in the Economic Region, 2022

Public Water Supplier	Population Served	Primary Water Source	Total Capacity (million gallons per day)	Total Raw Water Storage (million gallons)	Total Treated Water Storage (million gallons)	Total Annual Water Use (million gallons)	Peak Day Water Use (million gallons)	Peak Day Use as Percent of Total Capacity (Percent)	Excess Capacity (million gallons per day)	Treatment Method
Lincoln County										
Kemmerer and Diamondville Water & Wastewater Joint Powers Board[b] (EPA PWS Number: 5600028C)	3,600	Hams Fork River	4.6	1	5.5	270	0.7	15.2	3.90	Membrane
Uinta County										
City of Evanston (EPA PWS Number: 5600150C)	13,000	Bear River and Sulphur Creek Reservoir, plus 5 wells	10	4,562	7	859	8.5	85.0	1.50	Conventional Treatment, Ultraviolet, Sodium Hypochlorite Treatment
Sweetwater County										
Green River, Rock Springs, Sweetwater County Joint Powers Water Board[c] (EPA PWS Number: 5600050C)	40,000	Green River	32	114	20.5	3,575	24	75.0	8.00	Conventional Surface Water Treatment -Ozonation; Coagulation; Filtration; Disinfection

Sources: Reference 2.4-155, Reports 2 and 3.

a. Serving populations greater than 2,000.

b. The cities of Kemmerer and Diamondville purchase water from the Kemmerer and Diamondville Joint Powers Board, a political subdivision of the State of Wyoming.

c. The Green River, Rock Springs, Sweetwater County Joint Powers Water Board (GRRSSCJPWB) is a political subdivision of the State of Wyoming. The GRRSSCJPWB provides potable water to the cities of Green River and Rock Springs, the special service districts of White Mountain, Ten Mile, Clearview, and James Town - Rio Vista as well as an industrial water supplier to Simplot Phosphates (Reference 2.4-36).

EPA PWS Number - U.S. Environmental Protection Agency Public Water System Number.

Table 2.4-33 FY 2022 Drinking Water State Revolving Fund IUP - Comprehensive Priority List - Major Public Water Suppliers in the Economic Region

Project	Rank	Rank Points	Population	Owner	EPA PWS No.	Description
Kemmerer and Diamondville TTHM	9	42	263	Kemmerer and Diamondville Water and Wastewater JPB	5600028	TTHM violations 2015. EPA administrative order 3/16. Upgrades to achieve compliance.
Green River Flaming Gorge Way Main Replacement Project (I-80 Business Route)	27	32	12,515	City of Green River	5601181	Replace old cast iron and asbestos cement water lines under Flaming Gorge Way. Approximately 1 mile of old, deteriorated, undersized water mains with some lead fittings. There have been numerous water leaks on the lines. Strong potential for cross-contamination.
Green River-Rock Springs-Sweetwater County Transmission Replacement	52	25	1,600	Green River, Rock Springs, Sweetwater County JPWB	5600050	Replace old, deteriorated and undersized transmission mains (cross-contamination potential).
Kemmerer and Diamondville Main Replacements	83	22	263	Kemmerer andDiamondville Water and Wastewater JPB	5600028	Replace old, deteriorated water mains (cross-contamination potential).
Green River Cast Iron Water Line Replacement Project	119	22	12,515	City of Green River	5601181	Replace old cast iron water lines in numerous locations within the City of Green River. (cross-contamination and lead fitting potential).
Green River-Rock Springs Transmission System Upgrades	195	5	1,600	Green River, Rock Springs, Sweetwater County JPWB	5600050	Increase capacity and provide redundancy to the pumping and transmission system for the “Windriver Service Zone” in Rock Springs. This zone delivers water to all areas north of I-80 including three districts and Reliance. A WWDC Level II study is scheduled for completion in spring or summer 2018.
Green River-Rock Springs Additional Transmission	196	5	1,600	Green River, Rock Springs, Sweetwater County JPWB	5600050	Parallel or redundant transmission mains to ensure continuous service in critical mains.
Green River Main Reconfiguration	255	2	12,515	City of Green River	5601181	Upsize and reconfigure water mains to improve balance of flow between tanks.
Green River Water Tanks Rehabilitation Project	256	2	12,515	City of Green River	5601181	Rehabilitate three old, deteriorated water tanks (cross-contamination possible). Replace the interior and exterior coatings including spot repair of corroded areas and installation of cathodic protection.

Source: Reference 2.4-117, Appendix 1.

TTHM = total trihalomethanes, a regulated water contaminant formed as a byproduct of chlorine disinfection (Reference 2.4-18)

IUP = Intended Use Plan

EPA PWS Number = U.S. Environmental Protection Agency Public Water System Number.

Table 2.4-34 FY Major Public Wastewater Treatment Facilities in Economic Region

Wastewater Treatment Facility	WYPDES Permit #	County	Population Served	Design Flow (MGD)	Average Daily Flow (MGD)	Excess Capacity (MGD)
Kemmerer and Diamondville Wastewater Treatment Plant[a]	WY0020320	Lincoln	3,300-3,600	1.43 (WYPDES) (restricted to 0.8-1.0)	0.25-0.5	Less than 0.3-0.75 Potential for freeing up 375,000 gallons per day of existing capacity[b]
Evanston Wastewater Treatment Facility[c]	WY0020095	Uinta	~12,000	2.9	1.37	1.53
Green River Wastewater Treatment Plant[d]	WY0020443	Sweetwater	11,000-12,000	1.5	1.2	0.3
Rock Springs Water Reclamation Facility[e]	WY0022357	Sweetwater	23,000-24,000	4.2	2.15	2.05

a. Reference 2.4-62 and Reference 2.4-115
b. Reference 2.4-19
c. Reference 2.4-119
d. Reference 2.4-120
e. Reference 2.4-116
MGD - Million gallons per day.
WYPDES - Wyoming Pollutant Discharge Elimination System

Table 2.4-35 FY 2022 Clean Water State Revolving Fund IUP - Comprehensive Priority List - Major Wastewater Treatment Facilities in the Economic Region

Project	Rank	Rank Points	Population	Owner	Wyoming Pollutant Discharge Elimination System Permit No.	Description
Green River Sewer Improvements	92	20	12,515	City of Green River	WY0020443	Replace or rehabilitate failing clay sewers. Install lift station as needed to address failures in inaccessible gravity mains. Install lining in sewers subject to significant infiltration. Install supervisory control and data acquisition and energy efficiency improvements at lift stations.
Green River Wastewater Treatment Facility	93	20	12,515	City of Green River	WY0020443	Periodic discharge compliance issues for ammonia and pH. Replace existing major lagoon with mechanical plant to control nutrients for projected discharge permit limits to waters with known history of hexachlorobenzenes. Replace existing end-of-life structures and failing equipment. Implement energy efficiency improvements (possible green eligible). Add disinfection.
Kemmerer and Diamondville Wastewater Treatment Facility improvements	139	0	3,393	Kemmerer and Diamondville Water and Wastewater Joint Powers Board	WY0020320	Clarifier replacement; current facilities are deteriorating and need replaced before treatment failure and National Pollutant Discharge Elimination System violations occur.
Kemmerer and Diamondville Wastewater Treatment Facility Study	140	0	3,393	Kemmerer and Diamondville Water and Wastewater Joint Powers Board	WY0020320	Wastewater Facilities Planning Study; current wastewater facility is well past the designed lifespan and the collections system has many I&I issues that need assessing.
Green River Flaming Gorge Way Sewer and Storm Replacement Project (I-80 Business Route)	156	0	12,515	City of Green River	WY0020443	Replace old, deteriorated, undersized sanitary sewer and storm sewer lines under Flaming Gorge Way. Approximately 1 mile of sanitary sewer lines with manholes, and over 1.5 miles of storm sewer lines with catch basins and manholes are to be replaced. Potential for green infrastructure improvements to storm system.
Green River Storm Sewer Master Plan	157	0	12,515	City of Green River	WY0020443	Master planning study to determine existing conditions and needed improvements for the City's storm water facilities. To include hydraulic modeling of the storm system and proposed storm water quality and quantity discharge criteria.
Rock Springs Sewer Line Rehabilitation Project	160	0	23,036	City of Rock Springs	WY0022357	Replacement or in-situ rehabilitation of various sewer lines throughout the City. Manhole and service line connections will be rehabilitated at the same time.
Rock Springs Water Reclamation Facility Biosolids Handling & Odor Control Project	161	0	23,036	City of Rock Springs	WY0022357	Construct greenhouse type structures on Wastewater Treatment Facility and install solids handling equipment to provide processing year around. This facility will produce a “Class A” sludge that can be used for many applications. Odors will be reduced significantly with this facility.

Reference 2.4-118, Attachment II

IUP = Intended Use Plan

Table 2.4-36 Law Enforcement Personnel, 2019

Agency	Total Law Enforcement Employees	Total Police Officers[a]	Total Civilians[b]	Decennial Census 2020 Population	Residents per Police Officer
Lincoln County	49	22	27	19,581	890
Kemmerer	6	6	0	2,415	403
Diamondville	4	4	0	520	130
Uinta County	49	35	14	20,450	584
Evanston	31	26	5	11,747	452
Sweetwater County	86	37	49	42,272	1,142
Green River	31	25	6	11,825	473
Rock Springs	48	41	7	23,526	574
Economic Region	304	196	108	58,736	300

Sources: Reference 2.4-28, Reference 2.4-29, Reference 2.4-30

a. Individuals who ordinarily carry a badge and a firearm and have full arrest powers.

b. Personnel such as clerks, radio dispatchers, stenographers, jailers, and mechanics.

c. 2020 population total only includes the following jurisdictions: Kemmerer, Diamondville, Uinta County, Green River, and Rock Springs.

Table 2.4-37 Fire Protection and EMS Personnel, 2021

			Firefighters					EMS Staff				
Fire Department	**County**	**Service Population***	**Full-Time**	**Part-Time**	**Volunteer**	**Total**	**Residents per Firefighter**	**Basic EMTs**	**Advanced EMTs**	**Paramedics**	**Total**	**Residents per EMS Staff Person**
Bear River Fire District/Cokeville Fire Department	Lincoln	850	0	0	12	12	71	ND	ND	ND	ND	ND
Kemmerer Volunteer Fire Department	Lincoln	5,000	0	0	27	27	185	4	2	0	6	833
LaBarge Volunteer Fire Department	Lincoln	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uinta County Fire Protection - Bridger Valley	Uinta	6,000	1	0	34	35	171	4	4	0	8	750
Uinta County Fire Protection - Evanston	Uinta	12,000	4	0	50	54	222	25	20	0	45	267
Granger Volunteer Fire Department	Sweetwater	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Green River Fire Department	Sweetwater	12,515	3	0	34	37	338	ND	ND	ND	ND	ND
Little America Holdings Fire Department	Sweetwater	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Rock Springs Fire Department	Sweetwater	24,000	33	0	0	33	727	5	23	5	33	727
Sweetwater County Fire Department	Sweetwater	5,000	4	13	7	24	208	ND	ND	ND	ND	ND
Sweetwater County Fire District #1	Sweetwater	8,000	4	0	30	34	235	7	1	0	8	1,000
Economic Region		**73,515**	**49**	**13**	**194**	**256**	**287**	**45**	**50**	**5**	**100**	**735**

Source: Reference 2.4-121

*Due to the overlap of fire department service areas, service population sums can be greater than total county populations seen in other parts of this document.

ND = No Data

EMS = Emergency Medical Service

EMT = Emergency Medical Technician

Table 2.4-38 Major Hospitals in the Economic Region

Facility Name[a]	City[a]	County	No. of Certified Beds[a,b]	Support Personnel (full-time equivalents)[a]	Percent Occupancy[b]
Evanston Regional Hospital	Evanston	Uinta	42	92	9
South Lincoln Medical Center	Kemmerer	Lincoln	16	60	5
Memorial Hospital of Sweetwater County	Rock Springs	Sweetwater	99	248	13
Economic Region			**157**	**400**	**11**

a. Reference 2.4-24

b. Reference 2.4-125

Table 2.4-39 Physician Data, 2021

County	Number of Physicians	USCB County Population Estimate, 2020	Residents per Physician
Lincoln	30	20,253	675
Sweetwater	70	42,673	610
Uinta	26	20,215	778
Economic Region	**126**	**83,141**	**660**

Source: Reference 2.4-22

Table 2.4-40 Health Professional Shortage Areas, 2021

Health Professional Shortage Area Designation	Health Professional Shortage Area Area	County	Discipline	Full-Time Equivalents Short
Geographic Health Professional Shortage Area	Kemmerer (East and West)	Lincoln	Primary Care	0.4
Geographic Health Professional Shortage Area	Eastern Uinta County (Census Tract 9572)	Uinta	Primary Care	0.2
Geographic Health Professional Shortage Area	Sweetwater County (county-wide)	Sweetwater	Primary Care	2.7
High Needs Geographic Health Professional Shortage Area	Southwest Wyoming	Lincoln, Sublette, Sweetwater, Teton, Uinta	Mental Health	2.7

Source: Reference 2.4-23

Table 2.4-41 Public Education in the Economic Region, 2020-2021[a]

School District	County	Total Number of Public Schools	Total Students, All Grades	Kindergarten Students	Grades 1-8 Students	Grades 9-12 Students	Full-Time Equivalent Teachers	Pupil/Teacher Ratio
Lincoln County School District #1	Lincoln	3	589	57	354	178	45.9	12.8
Lincoln County School District #2	Lincoln	9	2,924	203	1,787	934	204.1	14.3
Sweetwater County School District #1	Sweetwater	12	5,141	390	3,164	1,587	405.9	12. 7
Sweetwater County School District #2	Sweetwater	10	2,359	196	1,436	727	192.3	12.3
Uinta County School District #1	Uinta	8	2,645	190	1,638	817	209.7	12.6
Uinta County School District #4	Uinta	2	785	44	474	267	68.1	11.5
Uinta County School District #6	Uinta	3	719	47	434	238	56.4	12.8
Sublette County School District #9	Lincoln - Sublette	4	470	40	274	156	46.9	10.0
Total		**51**	**15,632**	**1,167**	**9,561**	**4,904**	**1,229.1**	

Source: Reference 2.4-66

a. Table numbers represent school districts, in their entirety, including the district schools falling outside of the 50-mile radius in Lincoln County and the cities of Green River and Rock Springs.

Table 2.4-42 K Through 12, Classroom Capacity and Seating Availability, July 2022

School District	County	Number of Public Schools	Total Students Enrolled, All Grades	Percent of Capacity	Excess Capacity Elementary (Seats Available)	Excess Capacity Middle (Seats Available)	Excess Capacity Junior High/High School (Seats Available)	Total Excess Capacity All Schools (Seats Available)
Lincoln County School District #1	Lincoln	3	633	37% Elementary 83% Jr & Sr High	66	NA	525	591
Lincoln County School District #2[a]	Lincoln (Cokeville schools only)	2	205	65% Elementary 28% High	54	NA	269	323
Sweetwater County School District #1[a]	Sweetwater (Rock Springs schools only)	10	4,821	97% Elementary[b] 80% Middle 95% High	88	200	78	366
Sweetwater County School District #2	Sweetwater	10	2,365	79% Elementary 66% Middle 50% High	269	296	761	1,326
Uinta County School District #1	Uinta	8	2,716	89% Elementary 58% Middle 62% High	149	466	504	1,119
Uinta County School District #4	Uinta	2	765	52% Middle 37% High	NA	471	415	886
Uinta County School District #6	Uinta	3	725	73% Elementary 39% Middle 43% High	96	380	307	783
Sublette County School District #9	Sublette/Lincoln	4	468	51% Elementary 30% Middle 26% High%	205	242	429	876
Total		**42**	**12,698**	**NA**	**927**	**2,055**	**3,288**	**6,270**

Source: Reference 2.4-151

NA = Not Applicable

a. Totals include schools where workforces are most likely to reside. Schools in Lincoln County, falling outside of the 50-mile radius, are not included in this table (with the exception of Sublette County School District #9). Schools in Sweetwater County, falling outside of the 50-mile radius, are not included in this table, unless they are located in Green River or Rock Springs.

b. Four out of seven elementary schools in Sweetwater County School District #1, located in Rock Springs, are over capacity. The remaining three elementary schools are under capacity. The net excess capacity of the seven elementary schools is 88.

Figure 2.4-1 10-Mile Vicinity with Direction Sectors

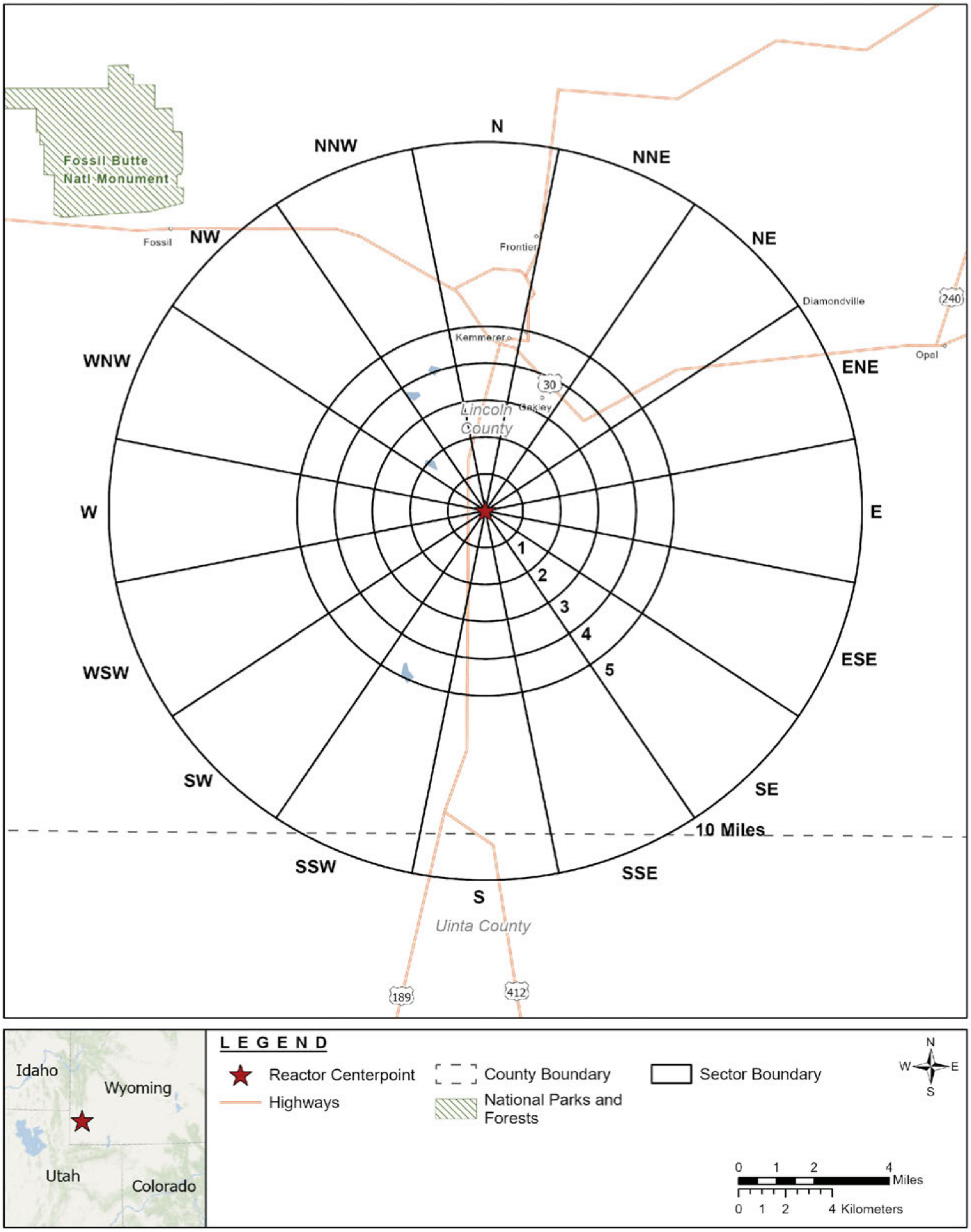


Figure 2.4-2 50-Mile Region with Direction Sectors

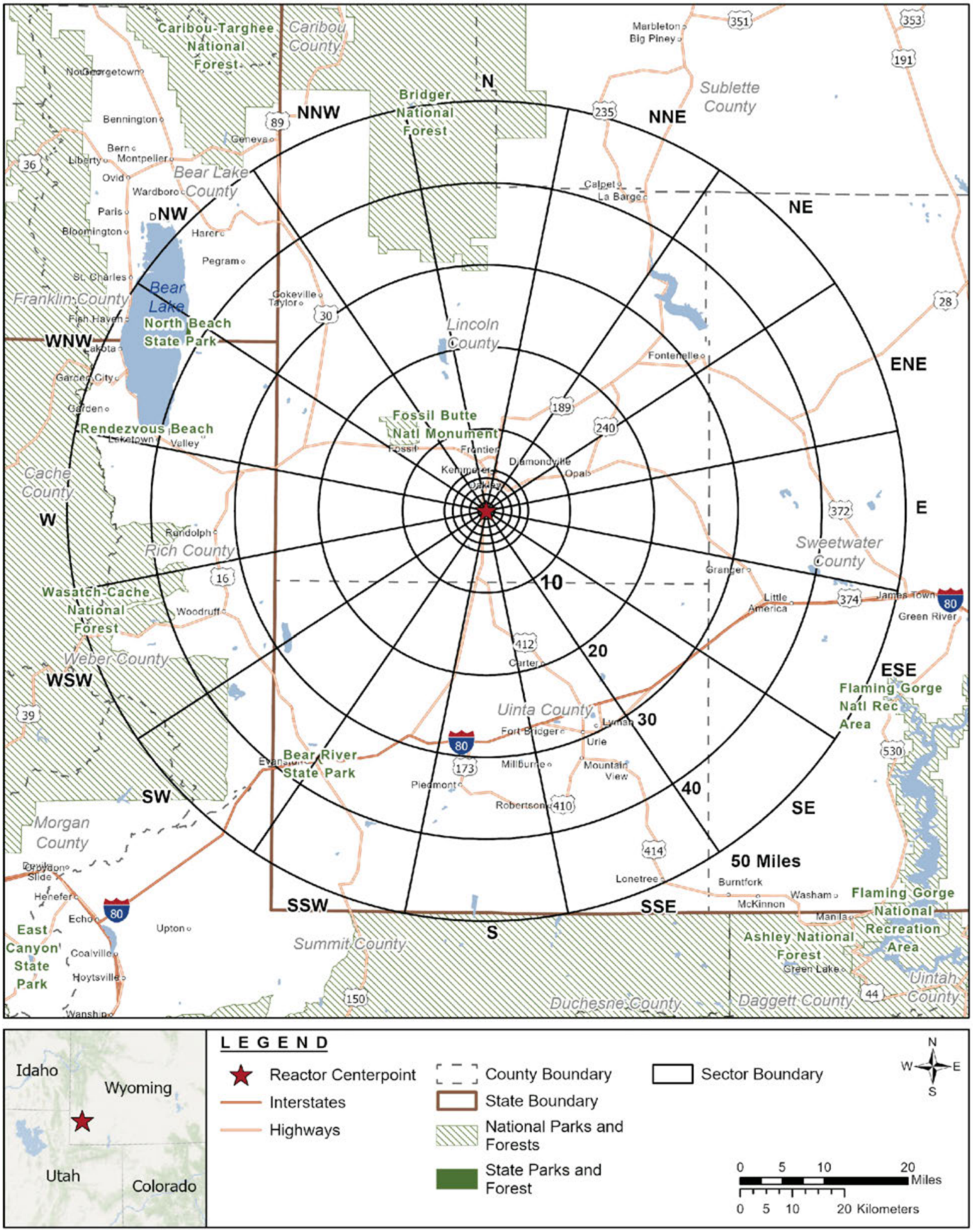


Figure 2.4-3 Access Routes to the Kemmerer Unit 1 Site

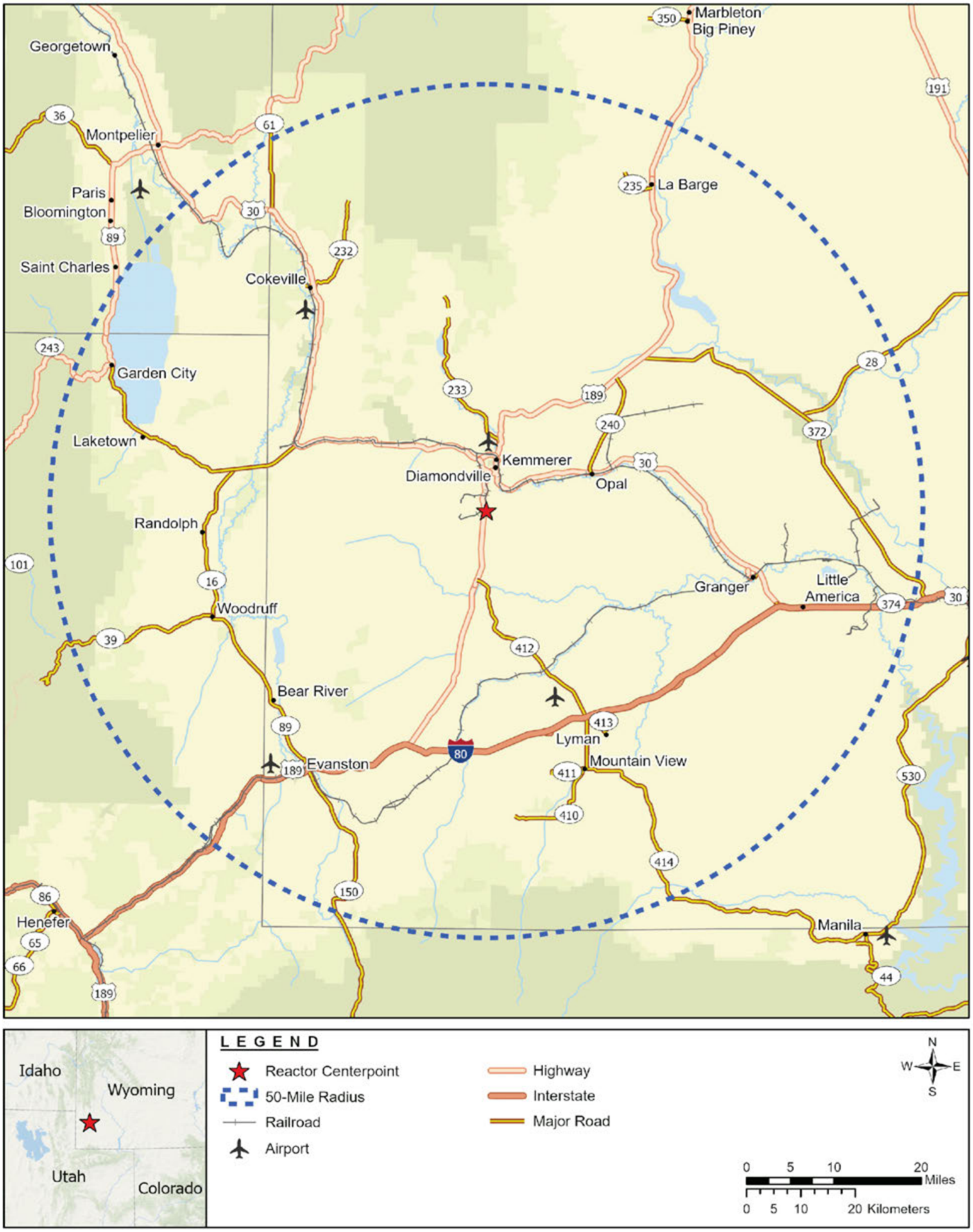


Figure 2.4-4 Federal and State Recreation Areas within or near the 10-Mile Radius

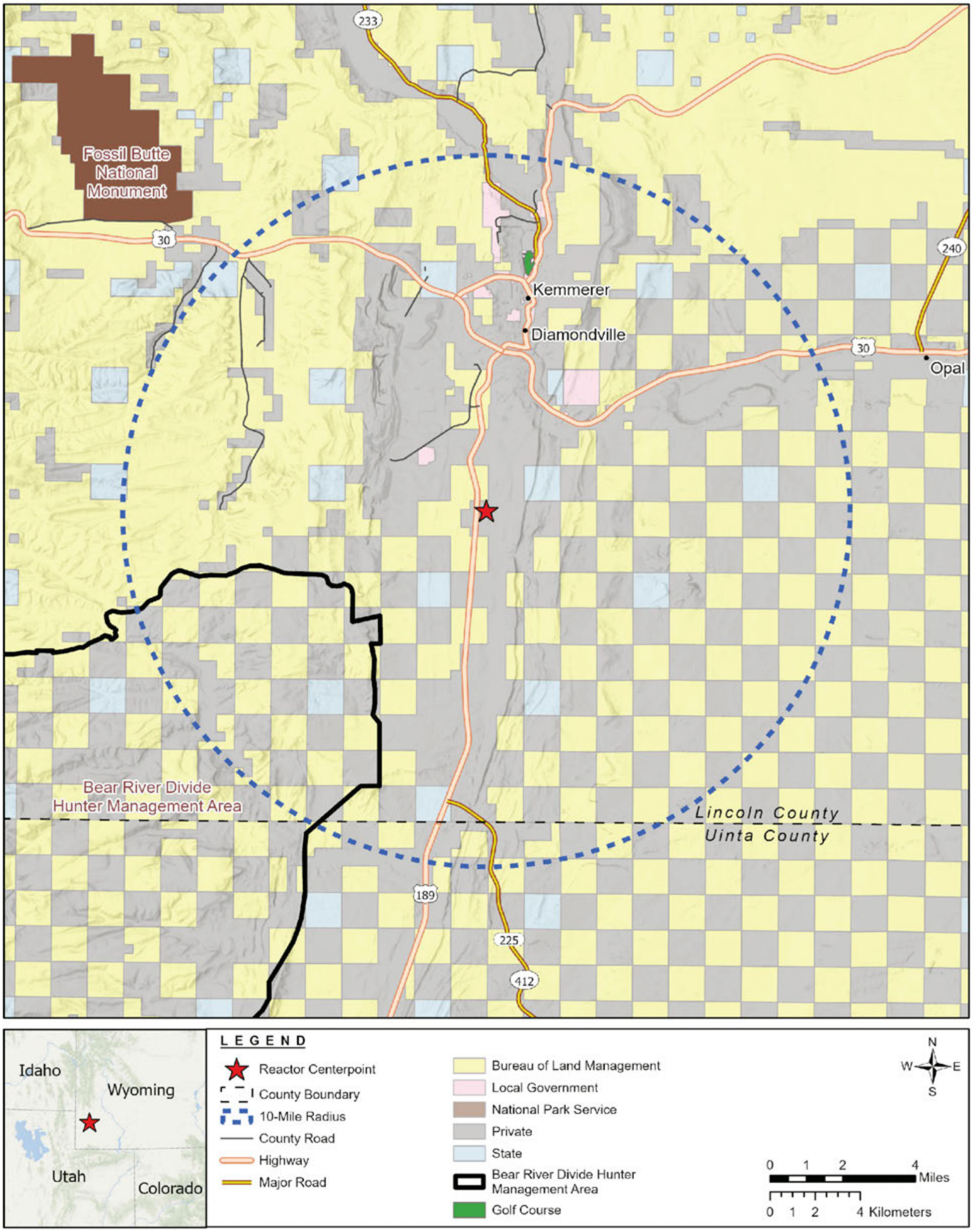
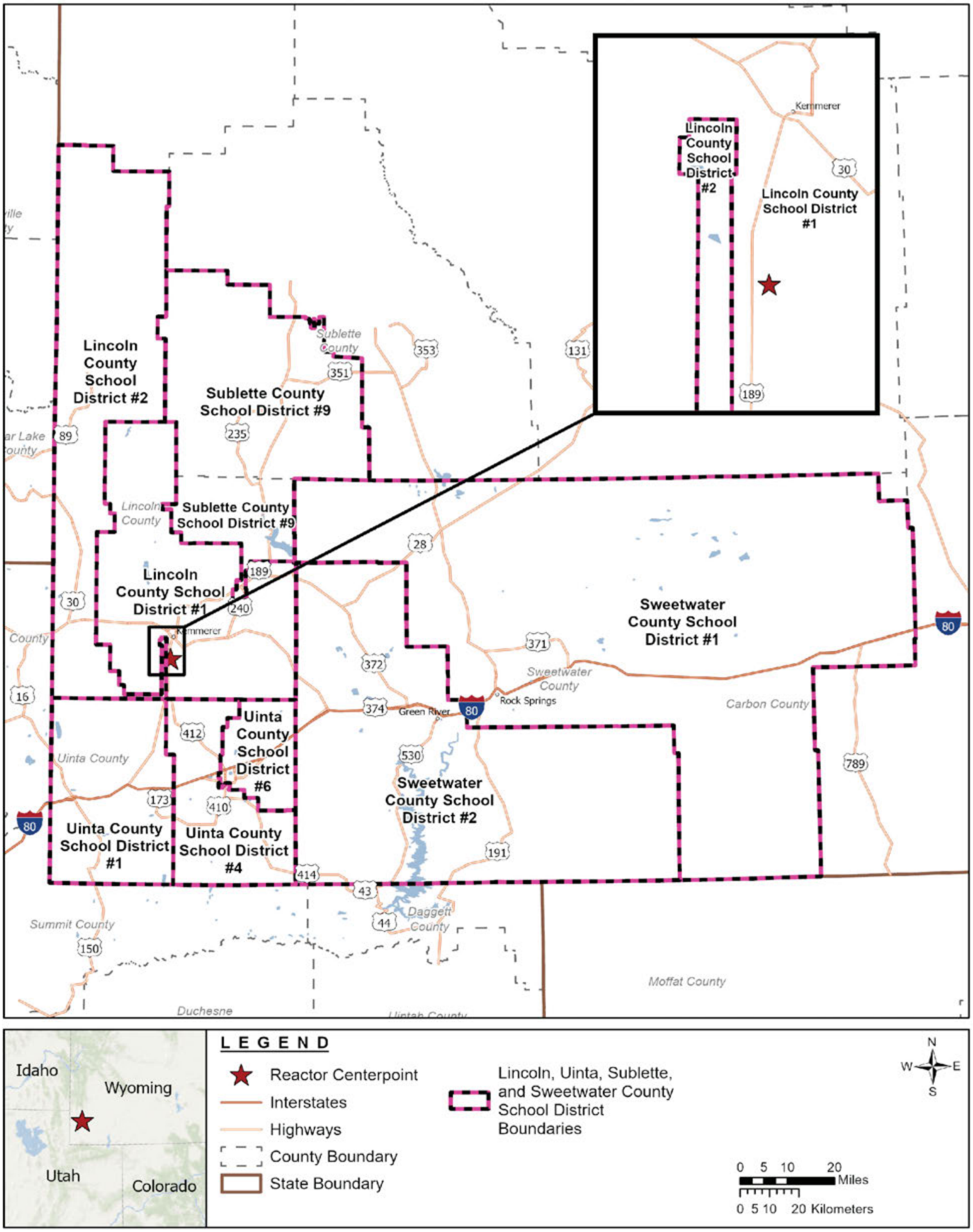


Figure 2.4-5 Public School Districts in the Economic Region



2.5 Environmental Justice

2.5.1 Methodology

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” directs Federal agencies to develop strategies for considering environmental justice in their programs, policies, and activities. Environmental justice is described in the Executive Order as identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of programs, policies, and activities on minority populations and low-income populations. The Council on Environmental Quality provides guidance to further assist Federal agencies with their National Environmental Policy Act procedures (Reference 2.5-2, Appendix A 23-34). U.S. Nuclear Regulatory Commission (NRC) policy found in 69 Federal Register 52040 outlines the treatment of Environmental Justice matters in licensing actions. As an independent agency, Council on Environmental Quality’s guidance is not binding on the NRC; however, the NRC has opted to address environmental justice and considers Council on Environmental Quality’s guidance in its procedure, “Procedural Guidance for Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues” (LIC-203, Reference 2.5-7). The NRC has also issued a paper presenting the staff’s systematic review of how agency programs, policies, and activities address Environmental Justice (SECY-22-0025). In the paper, the NRC makes several policy recommendations and commitments that could enhance and update how the staff addresses Environmental Justice.

NRC guidance in DANU-ISG-2022-01 (Appendix C) directs applicants to use Regulatory Guide (RG) 4.2, Revision 3, “Preparation of Environmental Reports for Nuclear Power Stations,” for environmental report format and content. Guidance in RG 4.2 directs applicants to review NUREG-1555 as part of an environmental justice analysis. NUREG-1555 was used in determining the minority and low-income population composition in the environmental impact area. Guidance found in LIC-203 and Interim Staff Guidance (COL/ESP-ISG-026) was reviewed to ensure agency clarifications pertinent to minority and low-income population determination were also considered. The NRC has concluded that a 50-mile (80-kilometer) radius could reasonably be expected to contain the area of potential impact and that the State is appropriate as the geographic area for comparative analysis. The NRC’s methodology identifies minority and low-income populations within the 50-mile (80-kilometer) region and then determines if these populations could receive disproportionately high and adverse impacts from the proposed action. This approach has been used for identifying the minority and low-income populations and associated impacts that could be caused by the proposed action. While this section identifies the locations of minority and low-income populations in the area surrounding the Kemmerer Unit 1 Site, the potential adverse impacts to these groups from construction and operations are identified and discussed in Sections 4.5 and 5.5.

ArcGIS® 10.8 software and U.S. Census Bureau (USCB) American Community Survey 5-Year Summary data for 2016-2020 were used to determine minority and low-income characteristics by census block group within 50 miles (80 kilometers) of the proposed site (i.e., the area of potential effects). A block group was included if any part of its occupied area fell within 50 miles

(80 kilometers) of the proposed site. A total of 35 block groups were identified within the 50-mile (80-kilometer) area. The geographic areas were defined for comparative analysis as the States of Utah, Idaho, and Wyoming.

2.5.2 Minority Populations

Minority categories are defined as: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian or other Pacific Islander; and Hispanic, Latino, or Spanish Origin ethnicity (of any race) (Reference 2.5-7).

Additionally, NRC guidance (Reference 2.5-7) states that three more minority categories should be analyzed: (1) other (races other than those listed above), (2) multiracial (two or more races), and (3) an aggregate of minorities. The guidance indicates that a significant minority population exists if either of these two conditions exists:

- The minority population of the block group or environmental impact area exceeds 50 percent. The minority population percentage of the environmental impact area is significantly greater (typically at least 20 percentage points) than the minority population percentage in the geographic area chosen for comparative analysis.

The percentage of the block group's population represented by each minority category was calculated for each of the 35 block groups within the 50-mile (80-kilometer) radius (the environmental impact area). Next, the minority category percentages were calculated for each of the three geographic comparison areas: Utah, Idaho, and Wyoming. If the percentage of any block group minority category exceeded 50 percent of the total block group population or exceeded its corresponding State percentage by more than 20 percentage points, it was identified as containing a significant minority population. Table 2.5-1 presents the minority category percentages for each State.

Table 2.5-1 and Figures 2.5-1 and 2.5-2 present the results of the analysis. One census block group within the 50-mile (80-kilometer) radius has a significant Black or African American population. It is located in Summit County, Utah, (Block Group 1, Census Tract 9642.03). A review of American Community Survey 2015–2019 survey data reveals the presence of no Black or African American populations in the block group (Reference 2.5-8), and a review of 2020 Decennial Census data also reveals the presence of no Black or African American populations in the block group (Reference 2.5-9). Additionally, the USCB instructs American Community Survey 2016–2020 users to note that 2020 data margins of error are larger than usual due to complications with data collection during the COVID-19 pandemic (Reference 2.5-16). The block group was conservatively identified as containing a significant Black or African American population based on the American Community Survey 2016–2020 data, even though other USCB data indicates it does not. One block group in Sweetwater County, Wyoming, and one block group in Summit County, Utah, have significant Hispanic, Latino, or Spanish Origin ethnicity populations (Table 2.5-1). Figure 2.5-2 presents the locations of these block groups.

Based on the two criteria established previously, no significant American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific Islander, Other, Multiracial, or Aggregate Minorities exist in the area of potential effects. In addition, there are no American Indian reservations within 50 miles (80 kilometers) of the site (Table 2.5-1).

2.5.3 Low-Income Populations

Low-income households are defined based on USCB statistical poverty thresholds (Reference 2.5-7). A block group is considered low-income if either of the following two conditions is met:

- The low-income population in the census block group or the environmental impact area exceeds 50 percent.
- The percentage of households below the poverty level in an environmental impact area is significantly greater (typically at least 20 percentage points) than the low-income household percentage in the geographic area chosen for comparative analysis.

The USCB low-income households in each census block group were divided by the total number of households for that block group to obtain the percentage of low-income households per block group. The states of Idaho, Utah, and Wyoming, the geographical areas for comparative analysis, have low-income housing percentages of 12, 9.1, and 11 (Table 2.5-1). There are no census block groups within the 50-mile (80-kilometer) radius that have significant percentages of low-income households (Table 2.5-1).

2.5.4 Migrant Populations

Seasonal agricultural (migrant) workers may make up a portion of the minority population within the 50-mile (80-kilometer) radius. Migrant worker population counts are not available from USCB, but the U.S. Department of Agriculture has collected information on farms that employ migrant labor. Table 2.5-2 presents farms that employ migrant labor in the counties which fall wholly or partially within the 50-mile (80-kilometer) region.

Additionally, interviews were conducted with representatives from the University of Wyoming-Lincoln County Extension and the Wyoming Department of Workforce Services (Reference 2.5-4, Reference 2.5-5, Reference 2.5-6, and Reference 2.5-3) to assess the presence of transient populations within a 10-mile (16-kilometer) radius of the site. The representatives of the aforementioned State entities indicated that there is little to no crop farming in the area; it is primarily livestock ranching. In addition to the ranches, there are livestock trails which are used by local ranchers to “run” their livestock (mostly sheep) from winter to summer ranges and back. Those ranchers employ migrant workers as sheepherders for running the livestock.

Within the 10-mile (16-kilometer) radius surrounding the site, sheep from two local ranching operations are herded, from May 1 to June 30, for “lambing” season. This activity requires a total of about 15 sheepherders. From October 1 to December 1, both ranchers run their sheep through the 10-mile (16-kilometer) radius on their return home from their summer ranges. This activity requires a total of about 9–10 sheepherders. Some sheep from these two herds have been observed on both sides of US 189, near the site.

2.5.5 Identifications of Potential Pathways and Communities with Unique Characteristics

Local government officials and the staff of social service agencies were contacted concerning traditional, cultural, or religious practices; physical characteristics; or unusual resource dependencies that could result in potentially disproportionate impacts to minority and low-income populations. Concentrations of minority and low-income populations not captured by the Census block group analyses would likely be captured by this survey. Contact with multiple agencies in Lincoln and Uinta Counties was attempted. Many agencies had no information concerning the activities and health issues of minority or low-income populations. Successful interviews were conducted with the Wyoming Game and Fish Department (Kemmerer and Evanston offices), several Lincoln and Uinta County Senior Citizen centers, the Wyoming Department of Family Services (Kemmerer), the Wyoming Department of Health, Women, Infants, and Children (Uinta and Lincoln Counties), Uinta County Human Services, the Turning Point/Lincoln County Self Help Center, Wyoming Department of Workforce Services (Kemmerer/Diamondville and Evanston), and a couple of service stations where hunting and fishing licenses are sold. No agency reported traditional, cultural, religious practices, physical characteristics, or dependencies, such as subsistence agriculture, hunting, or fishing, through which the minority or low-income populations could be disproportionately adversely affected by the project. Therefore, no additional pathways for transmission of impacts were found. Also, no concentrations of minority and low-income populations not captured by the Census block group analyses were found.

Sections 4.5 and 5.5 present the potential pathways and health, environmental, and socioeconomic impacts of the Kemmerer Unit 1 project to the minority and low-income populations identified in the Census block group analyses.

2.5.6 Green River and Rock Springs

The guidance in RG 4.2, NUREG-1555, LIC-203, and Interim Staff Guidance, COL/ESP-ISG-026, indicates that most socioeconomic impacts will be contained within the 50-mile (80-kilometer) demographic region. However, socioeconomic impacts from construction will extend beyond the 50-mile (80-kilometer) radius to the cities of Green River and Rock Springs, in Sweetwater County, because a portion of the construction workforce will live there (see Section 4.4). The approach used for identifying minority and low-income populations in Green River and Rock Springs was the same as that used to identify minority and low-income populations within the 50-mile (80-kilometer) radius. Results are presented in Table 2.5-3 and Figure 2.5-3, Figure 2.5-4, and Figure 2.5-5.

There are five additional block groups in Sweetwater County with populations meeting the NRC’s criteria (Table 2.5-3): one block group, east-southeast of Green River, and four block groups in and around Rock Springs. The block group near Green River has significant Aggregate Minority and Hispanic, Latino, or Spanish Origin ethnicity populations, as well as a significant number of low-income households. Two block groups in Rock Springs have significant Aggregate Minority and Hispanic, Latino, or Spanish Origin ethnicity populations; one block group has a significant Hispanic, Latino, or Spanish Origin ethnicity population; and one block group has a significant number of low-income households.

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Table 2.5-1 Number of Block Groups within 50 miles with Significant Minority or Low-income Populations

County (State)	Number of Block Groups	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or other Pacific Islander	Other	Multiracial	Hispanic, Latin, or Spanish Origin Ethnicity	Aggregate Minority	Low-Income Households
Bear Lake (Idaho)	2	0	0	0	0	0	0	0	0	0
Cache (Utah)	1	0	0	0	0	0	0	0	0	0
Morgan (Utah)	1	0	0	0	0	0	0	0	0	0
Rich (Utah)	2	0	0	0	0	0	0	0	0	0
Summit (Utah)	2	1	0	0	0	0	0	1	0	0
Lincoln (Wyoming)	6	0	0	0	0	0	0	0	0	0
Sublette (Wyoming)	1	0	0	0	0	0	0	0	0	0
Sweetwater (Wyoming)	3	0	0	0	0	0	0	1	0	0
Uinta (Wyoming)	17	0	0	0	0	0	0	0	0	0
Totals	35	1	0	0	0	0	0	2	0	0
Estimated State Percentages		**Black or African American**	**American Indian or Alaska Native**	**Asian**	**Native Hawaiian or Other Pacific Islander**	**Other**	**Multiracial**	**Hispanic, Latin, or Spanish Origin Ethnicity**	**Aggregate Minority**	**Low-Income Households**
Idaho		0.66%	1.3%	1.4%	0.18%	3.8%	4.3%	13%	19%	12%
Utah		1.2%	1.1%	2.3%	0.93%	5.1%	4.2%	14%	22%	9.1%
Wyoming		0.87%	2.3%	0.84%	0.10%	1.7%	3.9%	10%	16%	11%

Sources: Reference 2.5-10, Reference 2.5-11, and Reference 2.5-12

Table 2.5-2 Migrant Workers within the 50-Mile Region

County	State	Farms	Migrant Workers
Lincoln	WY	3	D
Sublette	WY	6	16
Sweetwater	WY	3	D
Uinta	WY	2	D
Bear Lake	ID	1	D
Cache	UT	8	37
Morgan	UT	5	24
Rich	UT	2	D
Summit	UT	7	17

Source: Reference 2.5-17

D - Withheld to avoid disclosing data for individual farms, per the USDA

Table 2.5-3 Number of Block Groups within Green River and Rock Springs Area with Significant Minority and Low Income Populations

City Name	Number of Block Groups	Black Population	American Indian or Alaska Native Population	Asian Population	Native Hawaiian or Other Pacific Islander Population	Other Population	Multiracial Population	Hispanic Ethnicity Population	Aggregate Minority Population	Low Income Households
Green River and Rock Springs	31	0	0	0	0	0	0	4	3	2

Sources: Reference 2.5-13, Reference 2.5-14, and Reference 2.5-15

Figure 2.5-1 Significant Black or African American Minority Population

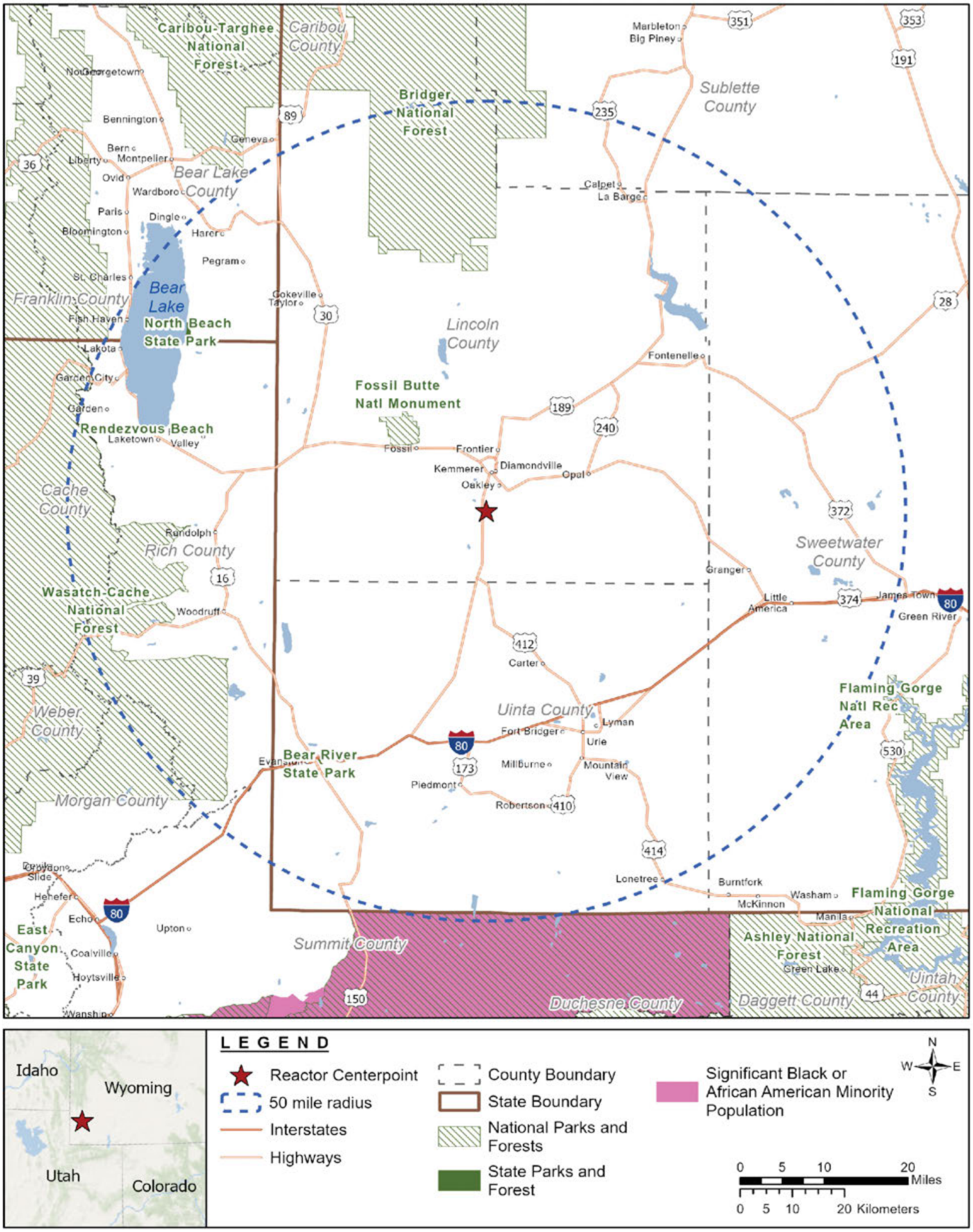


Figure 2.5-2 Significant Hispanic, Latino, or Spanish Origin Ethnicity Minority Populations

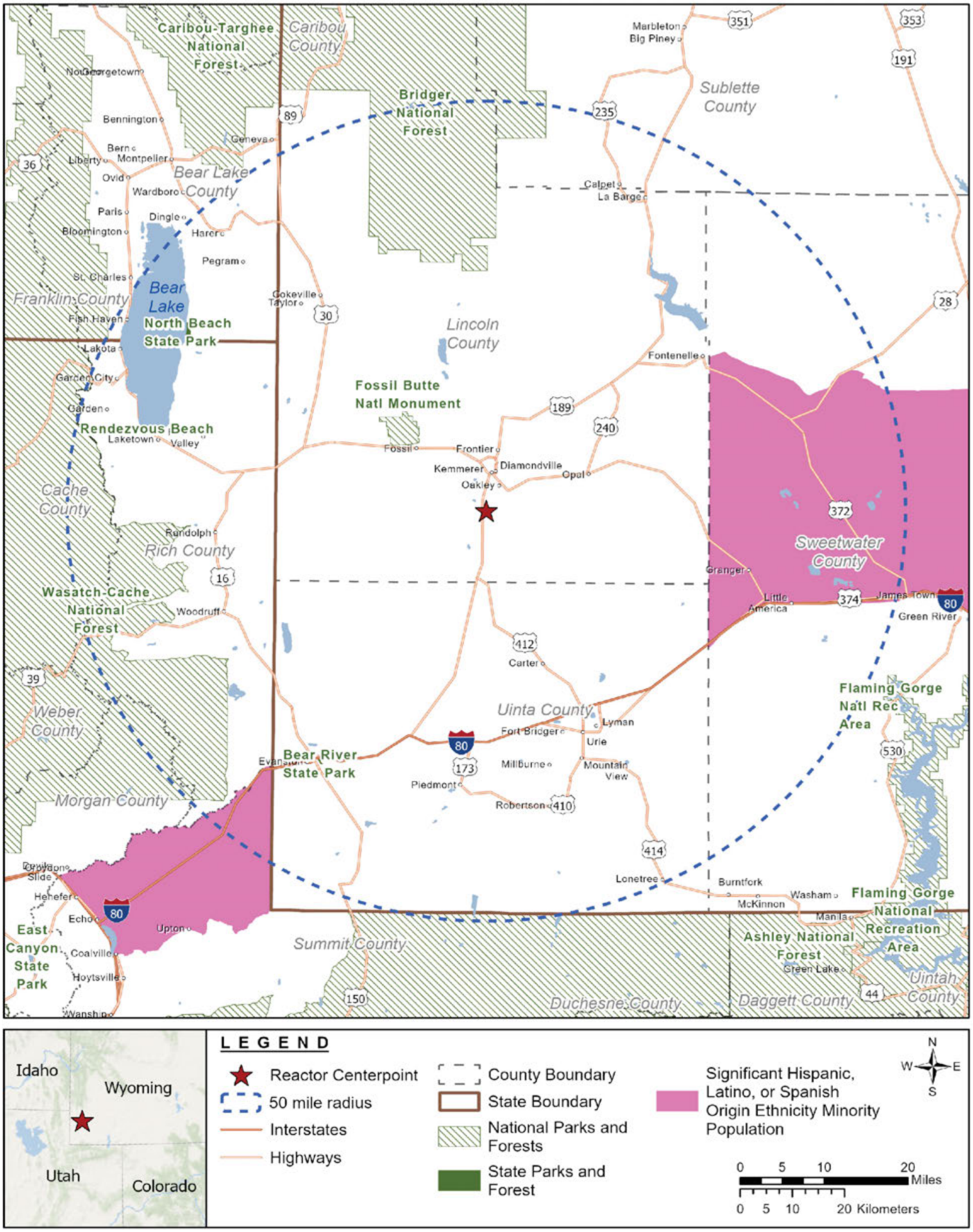


Figure 2.5-3 Significant Hispanic, Latino, or Spanish Origin Ethnicity Minority Populations - Green River and Rock Springs

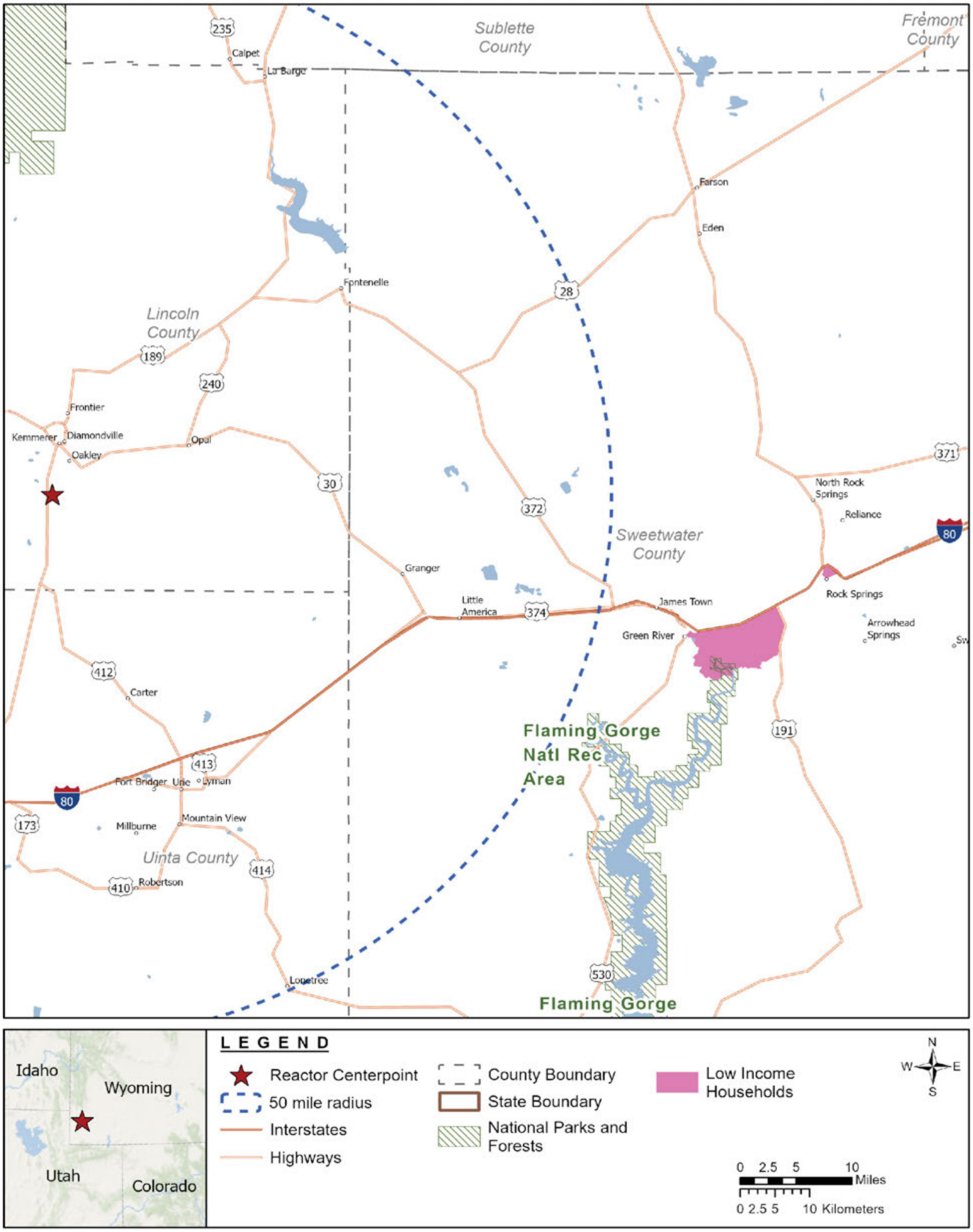


Figure 2.5-4 Significant Aggregate Minority Populations - Green River and Rock Springs

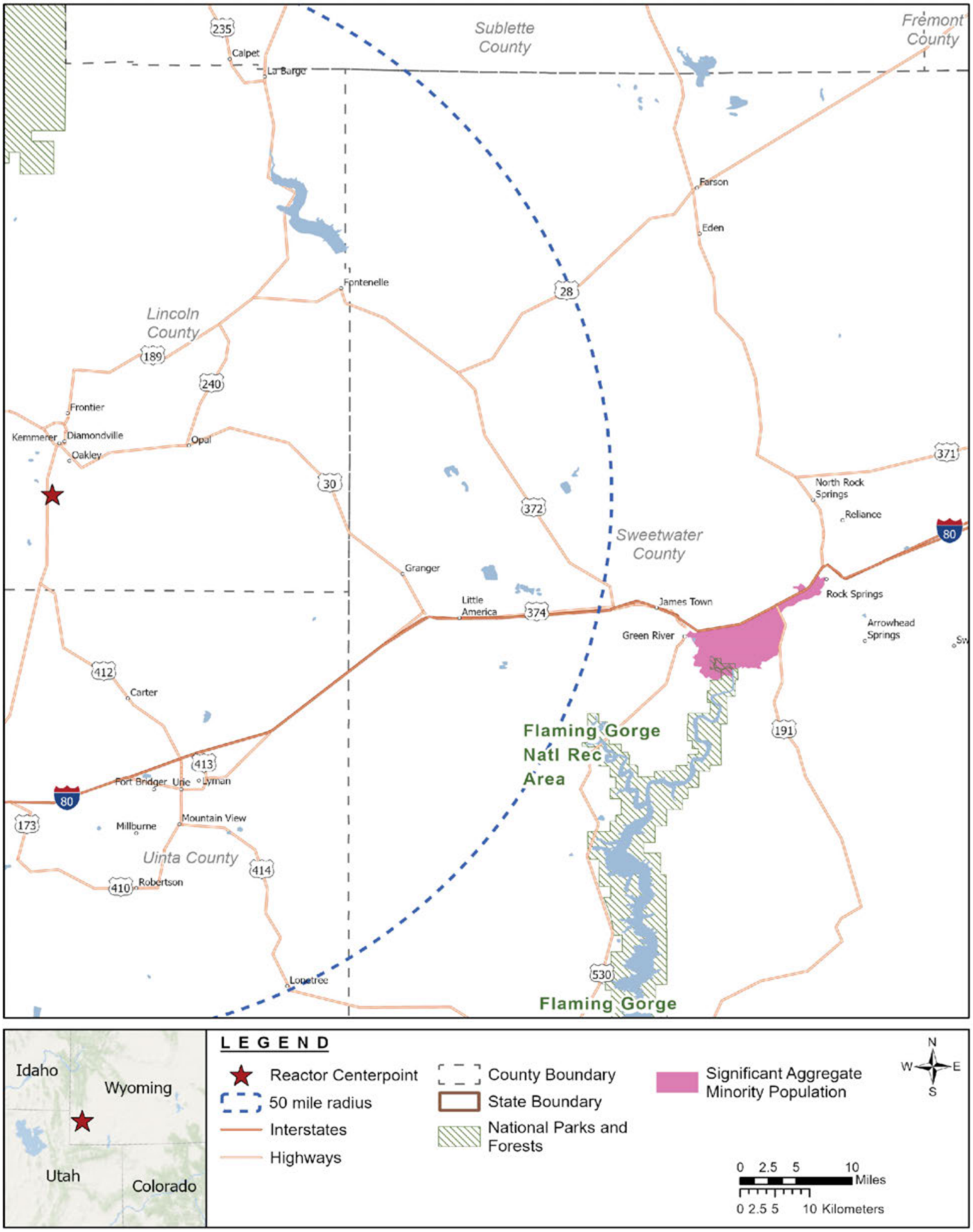
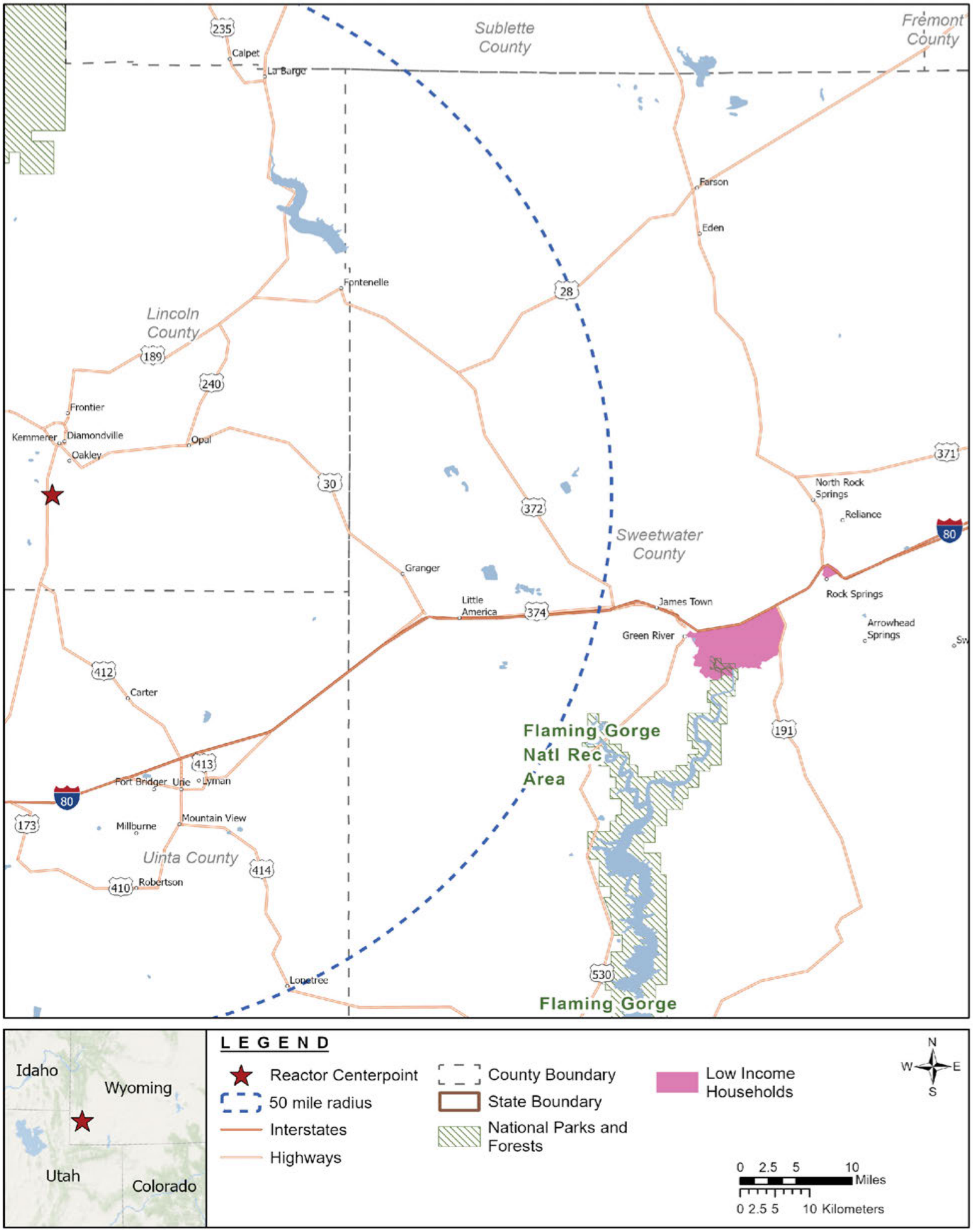


Figure 2.5-5 Significant Low-Income Households - Green River and Rock Springs



2.6 Historic and Cultural Resources

Historic and cultural resources that could potentially be affected by the Kemmerer Unit 1 Site are described in this section. Cultural and historic resources are tangible features of the environment, both natural and of human manufacture, associated with human activity either in the past or the present. They include, but are not limited to, buildings, structures, sites, objects, districts, and landscapes. They also include, but are not limited to, traditional cultural places, which are locales where the beliefs, customs, or practices of a living human community, one with continuity from generation to generation, are enacted.

The issuance of a construction permit for the site is subject to review under the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.) (NEPA). NEPA directs federal agencies to consider whether their proposed actions will have significant environmental effects and to make decisions regarding those actions informed by an understanding of their environmental consequences. The Nuclear Regulatory Commission's (NRC's) implementation of NEPA requirements in issuing licenses for domestic nuclear operations are stated in 10 Code of Federal Regulations (CFR) Part 51. Issuance of the construction permit is also subject to review and consultation under Section 106 of the National Historic Preservation Act of 1966, as amended (54 USC. § 306108). Section 106 requires that the head of a Federal agency having authority to license any undertaking shall, prior to the issuance of such license, "take into account the effect of the undertaking on any historic property" and afford the Advisory Council on Historic Preservation "a reasonable opportunity to comment with regard to the undertaking." A historic property is "any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the National Register of Historic Places (NRHP), including artifacts, records, and material remains relating to the district, site, building, structure, or object" (54 U.S.C. § 300308). The regulations that implement Section 106 are delineated in 36 CFR Part 800 and describe the process by which a Federal agency evaluates the effects of an undertaking on historic properties and identifies the parties with whom the Federal agency consults. The identified parties include, but are not limited to, the State Historic Preservation Office (SHPO) and Federally recognized American Indian tribes with a known or potential interest in the location of the undertaking. Likewise, NEPA requires Federal agencies take into account the potential effects of their actions on the cultural environment. The NRC's implementation of NEPA requirements in issuing licenses for domestic nuclear operations are stated in 10 CFR Part 51.

Wyoming statute protects archaeological deposits and ruins on State land and requires a permit from the State Board of Land Commissioners to investigate such sites (Wyoming Statute §§ 36-1-114 to 36-1-116). As presently designed, the site is situated exclusively on private lands, so no investigation permit is required. Wyoming Statute § 7-4-106 protects human burials on private and State lands in Wyoming and requires excavation only by the State archaeologist or designee. The Wyoming SHPO (Reference 2.6-27) has issued a "Protocol for Consultation, Repatriation, and Reinterment of Human Remains Originating from State and Private Lands in Wyoming" to address the requirements of Wyoming Statute § 7-4-106.

Kemmerer Unit 1 does not include use of any Federal land (Reference 2.6-14, 1, Appendix B). If the site were to include Federal land, then additional regulations will pertain to cultural resources located on that land. These regulations include the Native American Graves Protection and

Repatriation Act (25 USC. § 3001 et seq.), Archaeological Resources Protection Act (16 USC. § 470aa et seq.), American Indian Religious Freedom Act (42 USC. § 1996), and the Archaeological and Historic Preservation Act (54 USC. § 312501 et seq).

The area of potential effects (APE) is “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist” (36 CFR § 800.16(d)). Effects are alterations to the characteristics of a property that make it eligible for the National Register of Historical Places (NRHP) and may be direct, immediately related to the undertaking and unmediated by time or space, or indirect, separated in time or space from the undertaking. Typically, indirect effects are visual or auditory in nature, but there can be other types of indirect effects as well.

In its Section 106 consultations related to the site, the Department of Energy (DOE) defined both a direct effects and an indirect effects APE in concurrence with the Wyoming SHPO and participating American Indian tribes (Appendix A, Consultation Letters). For purposes of this Environmental Report, the direct and indirect APEs adopted by the DOE are recommended to the NRC as the proposed APEs, per Regulatory Guide (RG) 4.2, Revision 3, “Preparation of Environmental Reports for Nuclear Power Stations,” Section 2.6.

The direct APE for Kemmerer Unit 1 is the area subject to ground disturbances related to building activities. It includes the co-located, transmission, and water macro-corridors between the site and Naughton Power Plant. The proposed direct APE is depicted in Figure 2.6-1 and Figure 2.6-2, and is in portions of Township 20N, Range 116W, Sections 7, 8, 17, 19, and 20; Township 20N, Range 117W, Sections 1, 2, 11, and 12; and Township 21N, Range 116W, Section 32, 6th Principal Meridian.

The site’s proposed indirect APE comprises a 5-mile (8-kilometer) buffer around the proposed direct APE (Figure 2.6-3). The buffer distance was selected based on several factors, including the gently sloping, open terrain of Cumberland Flats, the maximum anticipated height of Kemmerer Unit 1 buildings and evaporation plume, and the study areas for natural resources (maximum 5 miles [8 kilometers]). Five miles (eight kilometers) is a conservative estimate of the maximum distance over which various elements of the project might be visible to an extent that might potentially be visually intrusive (see also Section 2.6.2.3). The proposed indirect APE comprises all or portions of 178 sections, as follows:

- 19N 116W 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18
- 19N 117W 1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15
- 20N 115W 6, 7, 18, 19, 30, 31
- 20N 116W 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
- 20N 117W 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36
- 20N 118W 1, 12, 13, 24
- 21N 115W 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33, 34
- 21N 116W 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36

- 21N 117 W1, 2, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36

The proposed indirect APE consists of approximately 47,081 acres (19,054 hectares) of private land and 45,704 acres (18,496 hectares) of public land. The public lands within the proposed indirect APE consist of all or portions of the following sections:

- Federal land (all controlled by the Bureau of Land Management [BLM]):
  - 19N 116W 2, 4, 6, 7, 8, 10, 12, 14
  - 19N 117W 2, 4, 10, 12, 14
  - 20N 115W 18, 30
  - 20N 116W 2, 4, 6, 10, 12, 14, 18, 19, 22, 24, 26, 28, 30, 32, 34
  - 20N 117W 3, 4, 5, 6, 7, 8, 9, 10, 15, 17, 18, 19, 20, 21, 22, 24, 26, 28, 30, 32, 34
  - 20N 118W 1, 12, 13, 24
  - 21N 115W 17, 19, 20, 28, 30, 32
  - 21N 116W 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 28, 30, 31, 33, 34
  - 21N 117W 1, 10, 11, 12, 13, 14, 15, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35
- State land:
  - 19N 116W16
  - 20N 116W16, 36
  - 20N 117W16, 36
  - 21N 116W9, 10, 15, 16, 21, 22, 36
  - 21N 117W16, 36
- Local government land:
  - 20N 116W3
  - 20N 117W12
  - 21N 115W31
  - 21N 116W2, 3, 11, 12, 13, 14, 15, 23, 24, 25, 26
- Tribal land:
  - None

2.6.1 Cultural Background

Human habitation of southwestern Wyoming began over 11,000 years ago and is now believed to have continued without any long-sustained interruptions to the present (Reference 2.6-16; SHPO 2016). This section provides an overview of the prehistory of southwestern Wyoming, specifically the area known as the Wyoming Basin, within which the site is situated. It also discusses the region's historical development, focusing on the area encompassing Lincoln, Sweetwater, and Uinta counties. It begins, however, with a discussion of data sources, summarizing how background information was collected for the proposed APE.

2.6.1.1 Data Sources

Research to date on the historic and cultural resources at and in the vicinity of the site has included checks of Wyoming SHPO online records and files, literature review, examination of historic maps and plat drawings, and a Class III cultural resource field inventories.

A review of available records for cultural resources at the site location and vicinity was conducted on February 28, 2022. The review comprised records available online through the Wyoming SHPO and Wyoming Cultural Records Office WyoTrack Geographic Information System database. The review also included a formal file search request through Wyoming SHPO (File Search No. 3653).

Online and hard-copy research was completed to develop an understanding of the archaeology, ethnography, and history of the site and vicinity. Both published sources, such as Kornfeld et al. (Reference 2.6-16) and D'Azevedo (Reference 2.6-8), and gray literature cultural resource management reports, such as Thompson and Pastor (Reference 2.6-30), were consulted.

Various online sources of historical maps and plat drawings were checked for digital versions of maps and drawings. Sources consulted included United States Geological Survey TopoView, Library of Congress Geography and Maps Division online collections, and the University of Alabama Department of Geography and the Environment maps collection.

A Class III cultural resources inventory was completed for the proposed direct APE in 2022 (Reference 2.6-14). In all, the survey covered 1,508 acres (610.3 hectares), which included not only the proposed direct APE, but also adjoining areas that were subsequently eliminated from the design of the site. Results of the survey are reported in Section 2.6.2.

2.6.1.2 Environmental Context

The natural environment of a region both constrains the lifeways of humans living within it and presents opportunities to which human groups may adapt as they seek to optimize their occupancy of a region. This section briefly describes the environmental setting within which human groups lived in the site vicinity and notes how it has changed over the past twelve or more millennia.

The site is situated at an elevation of around 6,750 feet (2,060 meters) above sea level in southwestern Wyoming. It is on a rolling alluvial plain within Cumberland Flats between Oyster Ridge to the east and an unnamed uplift to the west. North Fork Little Muddy Creek, a tributary of the Green River, forms the eastern boundary of the site area and drains it. The Green River drainage is part of the Wyoming Basin, an intermontane peninsula of the Great Plains. The Wyoming Basin lies between the Middle Rocky Mountains to the north and west, the Southern Rocky Mountains to the southeast, and the Colorado Plateau to the south. The narrow spine of the Middle Rockies to the west separates it from the Great Basin and the Columbia Plateau. As a physiographic unit, the Wyoming Basin is internally divided into at least seven constituent sub-basins, including the greater Green River Basin, and several small mountain ranges (Reference 2.6-15, 4-13).

The site is situated within the Rolling Sagebrush Steppe ecoregion (Reference 2.6-4). This ecoregion comprises an extensive portion of the western Wyoming Basin and consists of rolling plains with hills, cuestas, and mesas. Locally, vegetation consists of sagebrush, rabbitbrush, greasewood, saltbush, bunchgrasses, and various forbs. Rolling Sagebrush Steppe comprises roughly 54 percent of the proposed indirect APE, with the balance being divided between Foothill Shrublands and Low Mountains (approximately 38 percent of the proposed indirect APE), situated primarily to the west of the site, and Salt Desert Shrub Basins (approximately 8 percent), primarily to the south. The former ecoregion comprises more rugged, higher elevation terrain than that occupied by the Rolling Sagebrush Steppe, while the latter ecoregion is characterized by alkaline soils, disjunct playas, and sand dune fields (Reference 2.6-4).

Over the past eleven-plus millennia, during which humans occupied southwestern Wyoming, the climate and the environment have not been static but rather have been continuously evolving. Archaeologists and climate scientists have identified trends on a regional level that surely had local consequences.

The earliest definite human occupation of Wyoming began around 11,200 Radiocarbon Years Before Present (BP). The effects of the last glacial maximum, which covered parts of North America in ice sheets that reached as far south as approximately 40° north latitude and permitted the growth of montane glaciers in the central and southern North American Cordillera, were waning. Conditions were considerably cooler and moister than at present, and floral and faunal communities were unlike those of the present. Species of large mammals (megafauna) that were soon to become extinct were present in the region. These included mammoths, camels, and horses as well as Bison antiquus, a much larger predecessor of the modern bison (Reference 2.6-16, 34-39).

Around 10,900 BP, the Little Dryas climatic episode began. This short-lived event, manifest in paleoenvironmental evidence in both North America and Europe, brought abruptly colder and wetter conditions to the northwestern Great Plains, a region that includes the Wyoming Basin. By the end of it, most of North America's megafauna, except for bison, had disappeared. By 10,600 BP cool, wet conditions prevailed in eastern Wyoming, but the climate was apparently comparatively dry and warm to the west in Idaho and northwestern Wyoming. The millennium from 10,600 to around 9,500 BP saw increasing summer precipitation and temperatures, leading to lush grasslands ideal for grazing bison (Reference 2.6-16, 34-39).

Between 9,500 and 6,000 BP, the postglacial warming trend continued, but temperatures still averaged cooler than today. There is evidence of regional variation in climate, as well as that controlled by elevation and by extra-regional climate patterns. For example, although summer temperatures increased across the region, some areas, including comparatively low-altitude basins in central and southwestern Wyoming, experienced much drier conditions. These conditions resulted in the activation of dune fields across the region and expansion of plant communities adapted to drier conditions. In some other areas, precipitation seems to have increased. Within this broad pattern, however, was at least one pulse of cold wet climate between about 7,900 and 7,200 BP, which was triggered by the final deglaciation of northeastern North America (Reference 2.6-16, 34-39).

The episode of warm, often dry climate lasted until after 6,000 BP, and by 5,000 BP cooler and wetter conditions again prevailed, possibly with wetter summers and drier winters. Such conditions persisted until around 2,500 BP, when somewhat warmer and drier conditions, approximating those of today, prevailed. As climate reconstructions approach the present, they become more detailed due to better and more extensive data. These data show climate fluctuations on multiple time scales, and well-known episodes of Northern Hemisphere climate history such as the Medieval Warm Period and the Little Ice Age can be identified in the environmental record of the Northwestern Plains (Reference 2.6-16, 34-39).

2.6.1.3 Prehistoric Context

The Wyoming SHPO (Reference 2.6-26, Figure 1) divides the prehistory of the State into four major periods: Paleoindian, Archaic, Late Prehistoric, and Protohistoric. This model further subdivides the Archaic period into early, middle, and late subperiods, producing a basic Statewide chronology as follows:

- Paleoindian (11,700-8,000 uncalibrated radiocarbon years BP[1])
- Early Archaic (8,000-5,000 BP)
- Middle Archaic (5,000-2,500 BP)
- Late Archaic (2,500-1,500 BP)
- Late Prehistoric (1,500-200 BP)
- Protohistoric (230-150 BP)

The subdivision of Wyoming prehistory is based predominantly on the recognition of a sequence of groups of chipped stone tools (termed “cultural complexes”), each of which includes one or more diagnostic projectile point types. Their occurrence at a site or in a multicomponent stratified context is regarded as definitive as to the associated period. Aside from projectile points, technological patterns and other classes of tools are associated with a given cultural complex, but such elements may not be as diagnostic as projectile point form and manufacturing detail. The periodization of Wyoming prehistory is further supported by radiocarbon dates, whose relative abundance at any given time is also used as an approximation of the level of human activity or population density (Reference 2.6-16, 67-70; Reference 2.6-19, 235-238; Reference 2.6-30, Figures 12 to 14).

1. Different syntheses of Wyoming archaeology rely either on uncalibrated or calibrated radiocarbon dates to provide a measured, or absolute, chronology. As is well known, uncalibrated radiocarbon dates gradually deviate from actual calendrical (solar) years over the millennia, reaching a difference of around 2,000 calendar years too young by 12,000 calendar years BP (by convention, 1950 AD). The SHPO sequence relies on uncalibrated radiocarbon dates, as do other syntheses, such as Kornfeld et al. (Reference 2.6-16), Metcalf (Reference 2.6-19), and Thompson and Pastor (Reference 2.6-30), so that is the temporal framework used here. Where necessary, the uncalibrated equivalents of calibrated radiocarbon chronology, such as that utilized by Grund (Reference 2.6-10), are roughly approximated using Kornfeld et al. (Reference 2.6-16, Figure 2.1).

The earliest definite period of human occupation in Wyoming is the Paleoindian period. There is scattered, often equivocal, and generally controversial evidence in the Americas that the Paleoindian period may have been preceded by an earlier human presence, possibly beginning 25,000 years ago or earlier, but no such evidence is recorded from Wyoming (Reference 2.6-2; Reference 2.6-10,46-50; Reference 2.6-16,37, 71, 73; Reference 2.6-30,26).

Although not reflected in the SHPO (Reference 2.6-26, Figure 1) chronology cited above, archaeologists are increasingly subdividing the Paleoindian period into early, middle, and late subperiods as well (Reference 2.6-10, 75-76; Reference 2.6-16, 64-66). In Wyoming, each subperiod includes several cultural complexes, as follows:

- Early Paleoindian (Reference 2.6-16,73-84)
  - Clovis: circa (ca.) 11,240-10,890 BP (Reference 2.6-10, 81-86)
  - Goshen, ca. 11,160-9,790 BP (Reference 2.6-10, 89-92)
  - Folsom/Midland: ca. 10,930-10,380 BP (Reference 2.6-10, 98-103)
- Middle Paleoindian (Reference 2.6-16, 84-92)
  - Agate Basin: ca. 10,690 to 10,060 BP (Reference 2.6-10, 107-109)
  - Hell Gap: ca. 10,340 to 9,670 BP (Reference 2.6-10, 112-115)
  - Cody Complex (Alberta, Eden, Scottsbluff): ca. 9,750 to 8,570 BP (Reference 2.6-10, 121-130)
- Late Paleoindian (Reference 2.6-16, 92-106)
  - James Allen/Frederick: ca. 9,040-8,370 BP (Reference 2.6-10, 135-140)
  - Foothill/Mountain Complex, Angostura/Lusk Points: ca. 9,000-8,220 BP (Reference 2.6-10, 146-152)
  - Foothill/Mountain Complex, Lovell Constricted Points: ca. 8,570-7,550 BP (Reference 2.6-10, 155-157)
  - Pryor Stemmed: ca. 8,450-7,750 BP (Reference 2.6-10, 161-165)

In stratified contexts, these complexes tend to be discrete and sequential. Radiocarbon dates appear to overlap, but there is little stratigraphic evidence to support temporal overlap among the complexes.

Clovis is the earliest of three Paleoindian cultural complexes that comprise the Early Paleoindian period (Reference 2.6-10, 76-103, 175-176; Reference 2.6-16, 64-66, 73-84). These complexes appear to represent pioneer hunter-gatherer groups occupying terrain empty or largely empty of other humans. The people of these complexes were likely highly mobile; occupied territories larger than any modern hunter-gatherer group; hunted large game including mastodon, mammoth, and pre-modern bison; apparently made limited use of plant foods; and had superior skill in manufacturing stone tools. Their projectile points were lanceolate in form, had thinned and ground bases, and usually had long flakes removed along the midline from the base, known as flutes, on one or both faces. In stratified contexts, the Clovis complex is overlain by the Goshen complex, which in turn is overlain by the Folsom/Midland complex. Clovis people seem to have subsisted primarily on large game, and in Wyoming appear to have hunted mastodon both systematically and opportunistically. An extinct species of bison, pronghorns, and possibly camels were also hunted. The Goshen complex is poorly defined temporally and geographically, but the available evidence suggests a focus on bison exploitation, with limited indications of possible mastodon or mammoth hunting as well. On the plains, Folsom/Midland people appear to have specialized in bison, possibly with a broader subsistence base in foothill and mountain areas (Reference 2.6-10, 76-103, 175-176; Reference 2.6-16, 64-66, 73-84).

The Middle Paleoindian period is marked by a technological change in projectile point manufacturing, with fluting abandoned for slender unfluted lanceolate and, later, shouldered or stemmed forms, broadly referred to as “Plano” projectile points (Reference 2.6-10, 30). Middle Paleoindian cultural complexes appear to show evidence of intensification of subsistence practices over time. Archaeologists see suggestions of multi-band bison procurement at certain times of the year, represented by larger kill sites, more intensive processing of bison carcasses, and a broadening of the subsistence base beyond bison to medium and small game and to plant foods. The Middle Paleoindian period sees the first use of stemmed projectile points in the Hell Gap type and the occurrence of multiple stemmed point forms in the Cody Complex (Reference 2.6-10, 30).

The Late Paleoindian period presents a more diverse picture than the earlier portions of the Paleoindian era (Reference 2.6-10, 131-174, 178-180; Reference 2.6-16, 92-106). First, there are taxonomic difficulties resulting from limited data. A second issue complicating our understanding of the Late Paleoindian in Wyoming is that while evidence of Early and Middle Paleoindian cultural manifestations is spread across the entire State, including the Wyoming Basin, where, possibly because of site preservation factors, the evidence comes primarily from surface contexts rather than stratified sites (Reference 2.6-10, 166; Reference 2.6-30, 21), the Late Paleoindian period is more regional in character. Beginning around 10,000 BP, there were two concurrent and separate Paleoindian occupations with different and mutually exclusive subsistence strategies. The Foothill/Mountain complexes favored more hunting and gathering subsistence in foothill and mountain slope areas and were more Archaic in terms of subsistence strategies. The Cody Complex followed a part-time bison hunting way of life on the Plains as well as a forager subsistence in the foothills (Reference 2.6-16, 95).

The Late Paleoindian period of the Wyoming Basin also has an Archaic character to it (Reference 2.6-30, 24). Some sites have been radiocarbon dated to the Late Paleoindian period but lack diagnostic Paleoindian artifacts. Nonetheless, the overall character of these sites indicates that “‘Late Paleoindian’-aged peoples in the Wyoming Basin were practicing Archaic-like subsistence strategies rather than ‘orthodox’ Paleoindian lifeways focused on large game hunting” (Reference 2.6-10, 166). In Wyoming overall, several trends are evident during the Late Paleoindian period, and these trends continue from those evident earlier: “increased diet breadth, exploitation of relatively greater proportions of smaller faunal species, more intensive processing of faunal resources, increased food processing and possibly storage behaviors,” regional diversity, and probably smaller band territories (Reference 2.6-10, 178).

The Archaic period in Wyoming lasts from approximately 8,000 BP to 1,500 BP (SHPO 2016, Figure 1). In Wyoming, the term Archaic is used to refer to migratory hunting and gathering cultures operating in environmental conditions approximating those of the present (i.e., those of the mid- to late Holocene), but generally neither using the bow and arrow nor manufacturing ceramic vessels (Reference 2.6-16, 61, 64, 130; Reference 2.6-19, 241-242; Reference 2.6-30, 28). Bison procurement was important throughout the period in the Great Plains regions and probably also, but to a somewhat lesser extent, in the foothills and mountain regions (Reference 2.6-16, 215, 284-289), leading to the widespread use of the appellation Plains Archaic. In the Wyoming Basin, the Archaic period is divided in two, rather than three, subperiods, Early and Late, each of which is comprised of two phases: the Great Divide and the Opal (formerly Green River) phases of the Early Archaic and the Pine Spring and Deadman Wash phases for the Late Archaic (Reference 2.6-19; Reference 2.6-30, Figure 9).

Certain Archaic traits, such as broad-spectrum food procurement and use of plant foods, emerge in the later part of the Paleoindian period (Reference 2.6-10, 166-170, 175-180). The decisive marker for the Archaic period, however, is the appearance of new styles of projectile points, “The change from the lanceolate and stemmed projectile points of the Late Paleoindian to the side-notched types of the Early Plains Archaic was abrupt and is easily detected in the archaeological record. It also represented the finalization of an Archaic lifeway that probably began in late Paleoindian times” (Reference 2.6-16, 108).

The projectile points of the Early Archaic are described as “early side-notched,” with ground, straight to slightly concave bases. Corner-notched points, some with basal notches and some without are also found on sites of this period, and toward the end of the period, an even wider range of styles appears. Site types include rockshelters and caves, open-air camps, and bison kill and processing localities (Reference 2.6-16, 108-114). In the Wyoming Basin, early side-notched points are also diagnostic of the Early Archaic; other cultural hallmarks include fire and roasting pits, chipped and groundstone artifacts, and associated medium and small-sized faunal remains (Reference 2.6-19, 242-244; Reference 2.6-30, 29, 42).

The McKean technocomplex characterizes the Middle Plains Archaic. It is largely absent from the Wyoming Basin, which is the reason that the regional chronology omits a Middle Archaic period (Reference 2.6-30, 19). The McKean technocomplex is roughly contemporaneous with the Pine Spring Phase of the Wyoming Basin (Reference 2.6-16, 114-122; Reference 2.6-19, 244-246). The technocomplex comprises the McKean Lanceolate, Duncan, Hanna, and Mallory projectile point types, which tend to co-occur over the span of the complex, but with a gradual shift in prominence over time from the early dominance of the McKean Lanceolate to the later dominance of the Duncan, Hanna, and Mallory varieties. The McKean technocomplex is widespread across the northwestern plains and was characterized by proficient bison hunting and extensive use of plant foods. “Grinding stones (manos and grinding slabs) that appeared in terminal Paleoindian and increased during Early Plains times… become even more common” during the Middle Plains Archaic (Reference 2.6-16, 114). As with the Early Plains Archaic, site types include rockshelters and caves, open-air camps, and bison kill and processing sites; Middle Archaic housing at open-air sites included pithouses.

There are extensive continuities in subsistence and settlement pattern between the Plains Archaic and the Late Prehistoric period in Wyoming prehistory, but there are also some important differences (Reference 2.6-16, 129-135; Reference 2.6-19, 247-250; Reference 2.6-30, 54-55). The transition from the former period to the latter is marked by a reduction in projectile point sizes, thought to signify the widespread adoption of the bow and arrow as the primary hunting weapon. Late Prehistoric projectile points are typically side notched, with a basal notch added later in the period. Another development is the introduction of pottery, which is represented by various traditions including ones with affiliations to the Missouri River Basin, the Great Basin, the

Colorado Plateau, and even, occasionally, sherds of pottery originating in the American Southwest. Most striking, however, is an apparent jump in the number of dated components: “toward the end of the Late Plains Archaic the number of radiocarbon dates begins to increase rapidly, reaching a peak in the Late Prehistoric period at about 1200 to 1000 years BP and then falling off rapidly” (Reference 2.6-16, 130). This dramatic rise and fall in the number of radiocarbon dates is widely interpreted as indicating a much more extensive presence of human groups in the basins of Wyoming, suggesting several centuries of particularly favorable conditions for bison and other game in the region. In the Wyoming Basin, the Unita Phase corresponds to the spike in radiocarbon dates seen throughout the State, while the Firehole Phase marks the final episode of prehistory in the region, ending around 1500 to 1700 Anno Domini (AD) with the Protohistoric period and the beginnings of European influences across the indigenous cultures of North America (Reference 2.6-30, 54-62). During the Firehole Phase “earlier and better made pottery types are less frequently found and Intermountain Ware…, a type also referred to as ‘Shoshonean,’ becomes dominant” (Reference 2.6-19, 249). In contrast to areas to the east, south, and west, there is no evidence of agriculture in the Wyoming Basin during the Late Prehistoric period, so the period “is a continuation of Archaic stage adaptations” (Reference 2.6-19, 247).

The Protohistoric period is the time when the indigenous cultures of Wyoming indirectly experienced the influences of Europeans but were not yet in regular, direct contact. Most importantly, the Protohistoric period marks the time when the indigenous people of Wyoming acquired the horse, with the profound cultural changes in mobility, warfare, trade, subsistence, social organization, technology, and territoriality that flowed from this new form of transportation (Reference 2.6-24, Reference 2.6-25, 308-310). The Wyoming SHPO (Reference 2.6-26, Figure 1) chronology delineates a short period, spanning only 80 years from 1720 to 1800 AD and starting around the time when the indigenous people of Wyoming began to acquire horses. However, many researchers take a somewhat broader view of the timespan of the Protohistoric period and assign a beginning date of 1650 AD or earlier. Such dating cites the earliest European influences as metal artifacts and trade goods that preceded horses by many decades. Notably, there is evidence of indigenous cold working of iron and brass scrap to make projectile points and similar tools. The period ends with the beginnings of the fur trade in Wyoming, around 1800 AD (Reference 2.6-16, 135-138; Reference 2.6-19, 250; Reference 2.6-30, 62-64).

2.6.1.4 Historic Context

The Wyoming SHPO (SHPO 2016, Figure 2) divides the history of the State into eight periods, as follows:

- Early Historic (1800-1842)
- Pre-territorial (1842-1868)
- Territorial (1868-1890)
- Expansion (1890-1928)
- Depression (1929-1939)
- WWII-era (1940-1946)

- Post-WWII (1947-1950)
- Modern (1951-present)

The Early Historic period marks the era of early exploration and fur trapping by Euroamericans in the State and the first direct interaction in the State between indigenous peoples and Euroamericans. The Pre-territorial period is the time of the great westward migration of emigrants headed to Oregon, California, and Utah, a period when several hundred thousand people passed through Wyoming on various trails, but few settled in it. The Territorial period opens with the construction of the Union Pacific railroad across the State and the establishment of the Wyoming Territory. The period saw the emergence of ranching and stock-raising, with both cattle and sheep becoming important. This was also an era of conflict between Native Americans and Euroamericans, particularly in the northern portion of the State, but by the end of the period, indigenous people had been settled on reservations, opening new lands for Euroamerican occupation. During the Territorial period, Wyoming's population increased more than five-fold, from 9,118 in 1870 to 62,555 in 1890. After Statehood in 1890, Wyoming entered the Expansion period, during which the population continued to grow, reaching 225,565 in 1930, an increase of more than two and a half times its level in 1890. The era was marked by conflicts between cattle and sheep operators and between livestock interests and homesteaders. In the second decade of the twentieth century, favorable climate conditions and generous government terms encouraged a wave of homesteading. Many homesteaders moved on when conditions turned drier and more difficult in the 1920s, followed by the economic hardships of the Great Depression. From the 1890s onwards, tourism grew in Wyoming, with Yellowstone National Park, the Grand Tetons, national monuments, and national forests being major draws. During World War II, Wyoming participated in the national war effort in many ways, sending its men and women into the armed services, raising money through bond sales, participating in scrap drives, producing war materiel, and hosting military installations, prisoner of war camps, and a Japanese American internment camp. In the Post-War era, Wyoming has continued to grow, rising from 290,529 in 1950 to 576,851 in 2020. Energy production is a leading industry, as it has been for much of the twentieth century, but wind and solar projects are beginning to supplement the historically important coal, oil, and gas industries. Stock raising and tourism remain vital elements of the State's economy (Reference 2.6-20; SHPO 2016, 21-26; WEAD 2023).

This brief summary of Wyoming history provides a useful framework for discussing the historical development of the site and vicinity.

Records of the activities of trappers and explorers in what would become Lincoln County, within which the site is located, are limited Nonetheless, it is known that during the first four decades of the nineteenth century, trappers visited the region, particularly the partly wooded and better watered northern part of the county and took peltry from its streams (Reference 2.6-5). Among those trappers active in the region was Zachariah Ham, who favored the area, and who gave his name to Hams Fork, a major tributary of the Green River (Reference 2.6-13).

Wyoming's Early Historic period comes to an end with the collapse of the beaver trade around 1840, but the knowledge of the West gained by the mountain men of the fur trade era and the trails they blazed would soon guide many tens of thousands of emigrants from Independence, Missouri, westward into the Oregon and California country and to the Great Basin of Utah. Although small groups of emigrants had been moving west into Oregon since the early 1840s, the year 1846 marked the beginning of the flood tide of westward migrants moving along the Oregon, California, and Mormon trails. In open country, these trails were more travel corridors than a single fixed route. As reconstructed by the National Park Service for its National Historic Trails System, both the Oregon Trail and branches of the California Trail passed within a few miles of the site, but neither crossed the site itself. After arcing across central Wyoming and crossing the Continental Divide at South Pass in southwestern present-day Fremont County, the Oregon Trail continued across western Sweetwater County as far as Fort Bridger in present-day central Uinta County, approximately 28 miles (45 kilometers) south of the site. There it turned northwest, entered the present territory of Lincoln County, and passed approximately 8.5 miles (13.7 kilometers) southwest of the Site. One branch of the California Trail followed essentially the same route, while several other branches spread out more directly west from South Pass to avoid the long loop south to Fort Bridger. One of these branches crossed Hams Fork approximately 15 miles (24 kilometers) north of the Site (Reference 2.6-21).

The Pre-Territorial period of Wyoming history comes to an end in 1868 with the completion of the Union Pacific Railroad line across Wyoming's southern tier and the establishment of an independent Wyoming Territory, which was formed from portions of the Dakota, Idaho, and Utah territories. Extending the railroad line across Wyoming in 1868 and linking it in Utah on May 10, 1869, with the Central Pacific Railroad to complete the first transcontinental railroad essentially ended the era of wagon travel from Missouri to the West. Located south of the 42nd parallel of latitude, which is some 14 miles (23 kilometers) north of Kemmerer, the Kemmerer Unit 1 Study Area was in Spanish and Mexican territory under the terms of the Adams-Onís Treaty of 1819 and was ceded to the United States in 1848, following the Mexican War. From 1850 to 1868, the area was part of Utah Territory (Reference 2.6-18). The somewhat complex territorial history of Wyoming in which portions of the region were claimed by Spain, France, Mexico, Texas, and Britain, and then were allocated at different times to the territories of Oregon, Washington, Idaho, Utah, Nebraska, and Dakota was resolved with the formation of Wyoming Territory on July 25, 1868, followed by organization of a territorial government on April 17, 1869. The Territorial period ends with the admission of Wyoming to Statehood on July 10, 1890.

During the Territorial period, several important developments occurred in the region that was to become Lincoln County. These included the first permanent settlements in the area at Cokeville and in Star Valley in the mid-1870s and the development of the first cattle and sheep ranching operations beginning around the same time. Although the earliest agricultural censuses for the region show that cattle were more numerous than sheep, by sometime in the 1880s, sheep consistently outnumbered beef cattle in the region, reaching a differential of as much as 15 to 1 in 1930. In recent decades, sheep have decreased in importance as economic and ecological factors have caused many sheep operations to cease or convert to beef cattle (Reference 2.6-13; U.S. Department of Agriculture 2023).

Of equal importance to the emergence of stock raising as an economic pursuit was the construction of the Oregon Short Line Railway (reorganized in 1897 as the Oregon Short Line Railroad), a subsidiary of the Union Pacific Railroad. This railroad line ensured that the Union Pacific would continue to have access to a Pacific Ocean port via Portland, Oregon. Construction of the Oregon Short Line began in July 1881 at the Union Pacific mainline in Granger, Wyoming, 32.5 miles (52.3 kilometers) southeast of Kemmerer. The new railroad followed Hams Fork as far as the then future site of Kemmerer before continuing directly west. It reached the border of the

Idaho Territory by July 1882 and its terminus at Huntington, Oregon, just across the Idaho border, in November 1884 (Reference 2.6-29). From Huntington, trains continued to Portland on track leased from the Oregon Railway and Navigation Company. By the beginning of the twentieth century, the Oregon Short Line would become a major hauler of coal from the rich deposits of southern Lincoln County.

The following period in State history, the Expansion period (1890-1928), saw several important developments in the Kemmerer Unit 1 vicinity. These included the growth of coal mining, the founding of Kemmerer, and the creation of Lincoln County. The presence of extensive coal deposits in the high desert of southern Lincoln County was recognized as early as 1843, when explorer John C. Frémont noted deposits of coal near Cumberland, some 8 miles (10 kilometers) south of Kemmerer Unit 1. Later, from the late 1860s onwards, the Union Pacific Railroad began developing coal mines along its line at Carbon, Rock Springs, and Almay, Wyoming, to fuel its locomotives. A subsidiary of the railroad also briefly marketed coal to other customers, but this arrangement was soon determined to be monopolistic and ended by the U.S. Government (Reference 2.6-1; Reference 2.6-28). With the construction of the Oregon Short Line Railway, prospecting for coal took place along its route, leading to the identification of high-quality sub-bituminous coal in the ridges flanking the Kemmerer Unit 1 site. Coal mines were opened in the 1890s, and several coal camps or company towns were developed near mines; among these were Frontier and Diamondville. By ca. 1900, coal mines had been opened in the ridges on either side of Cumberland Flats, where the project is located. The town of Kemmerer, currently the seat of Lincoln County and approximately 5 miles (8 kilometers) north of the Kemmerer Unit 1 site, was founded in 1897 by Mahlon Kemmerer and Patrick Quealy and incorporated in 1899. Mahlon Kemmerer, based in New York and after whom the town was named, was the primary investor in early exploration for and development of coal resources in the area, while his partner, Patrick Quealy, was the local developer. Together, they headed the Kemmerer Coal Company, which was responsible for the great majority of mining in the area. Unlike coal camps or company towns in the area, which were situated close to the mine shafts and were owned and controlled by the mining company, the town of Kemmerer was developed as an independent town, where private individuals could purchase lots and build and own homes (Reference 2.6-5; Reference 2.6-28). Moreover, though Kemmerer and Quealy understood the importance of coal to the local economy, they, and particularly Quealy, saw coal as just part of the economy's mix, with livestock, land, and mercantile enterprises complementing one another. Kemmerer quickly grew into a prosperous town serving mining, ranching, and local business interests, with municipal services (such as a town marshal and a volunteer fire department), several stores, hotels and saloons, a bank, churches, schools, and newspapers. A local hospital and a library, among other organizations, appeared in the 1910s and 1920s (Reference 2.6-13).

Lincoln County was established on February 20, 1911, from Uinta County, one of Wyoming's original five counties, with Kemmerer selected as the county seat, and was organized in January 1913. For the first decade, county government was scattered among various offices around Kemmerer, but physically consolidated in 1925 with the construction of the present courthouse (renovated 1981) (Reference 2.6-13). In 1921, Lincoln County lost territory with the formation of Teton and Sublette counties, at which time it acquired its current borders, except for a few later minor adjustments (Reference 2.6-18).

After a brief depression following the end of the First World War, the national economy was generally prosperous until the Great Depression of the 1930s. The situation in Wyoming was different, however, and the years 1920 to 1939 are often called the Depression period in the State's history. A major reason for this extended period of lagging economic growth was that while the national economy prospered, neither the coal business nor agriculture were particularly strong economic sectors during the period, and both were essential components of Wyoming's economy (Reference 2.6-28, 50). Employment in the coal fields fell, and wages were tight. Farmers and ranchers faced low prices for their produce. The 1920s were also the period of Prohibition, and in Lincoln County, while local saloons were forced to change their business models or shut down, many people turned their hand to making moonshine. Kemmerer of the 1920s acquired the nickname "Little Chicago," because it was a center of moonshining during Prohibition. The product was high quality and was widely known as "Kemmerer Moon." Federal efforts to shut down operations in the region were often frustrated by the lack of cooperation from locals, who recognized the illegal production of spirits as economically important to the community (Reference 2.6-13).

The Second World War saw the greatest output of coal from southwestern Wyoming's coal fields, as producers scrambled to meet wartime demands. Following the war, the coal industry of southwestern Wyoming contracted because of several factors. These included the adoption of diesel locomotives, fueled by diesel oil, by the Union Pacific and other railroads and the consequent abandonment of steam locomotives, fueled by coal. This change was beginning to get underway as the Second World War began, but the demand for diesel plants to power ships and for other war needs delayed the widespread adoption of diesel locomotives. Another factor was the expansion of fuels other than coal for a wide variety of purposes, including power production and industrial processing. The consequence of decreased demand was the contraction of the coal industry and a shift from underground coal extraction to the more economical surface mining (strip mining). By the 1960s, the Kemmerer Coal Company was operating only the single open pit mine complex at Elkol, which from 1963 began to supply Naughton Power Plant, at the northern end of the Kemmerer Unit 1 Study Area, with coal (Reference 2.6-9; Reference 2.6-28).

Although many outlying coal towns and camps disappeared during the twentieth century as mines played out and economic circumstances changed, the town of Kemmerer survived as a regional node due to its mix of businesses and its role as the county seat of Lincoln County. It continues to thrive today in the Modern period of Wyoming history.

2.6.1.5 Local Land Use

Development of a project-specific understanding of land use patterns in cultural resource management studies often relies heavily on historic cartographic sources. Unfortunately, detailed, relatively small-scale mapping of most of Kemmerer Unit 1 is only available from the early 1960s, resulting in reliance on less detailed large-scale mapping for earlier periods.

A check of the BLM General Land Office Records webpage found that plat maps of T20N R117W, which encompasses much of the northwestern leg of the utility macro-corridor study area, were available online. These plat maps date to 1883 and 1911. No late nineteenth to early twentieth-century plat maps were available online for T20N R116W, which includes the site, along with the eastern leg and much of the central section of the macro-corridor, or for T21N R116W, which contains the northern end of the macro-corridor (Reference 2.6-14, 5). In the absence of General Land Office plat maps, it was necessary to refer to large-scale, Statewide maps to understand the early land use history of the Kemmerer Unit 1 Study Area. An 1883 compilation of General Land Office plat maps (Holt 1883) depicts the Kemmerer Unit 1 Study Area as undeveloped as of the early 1880s with no major roads or trails depicted as crossing it (Figure 2.6-4).

As noted in the previous section, rail service to the Kemmerer area began in 1882 with the construction of the Oregon Short Line Railroad (originally, Railway) through the area. After 1900, a branch line and several spurs served coal mines in the Kemmerer Unit 1 vicinity (Table 2.6-1). The branch line, completed early in 1901, ran from the mainline of the Oregon Short Line Railroad approximately 15 miles (24 kilometers) south to Cumberland, a coal town or camp established by the Union Pacific Railroad in 1901 to mine coal near Cumberland Gap, where Little Muddy Creek cuts through Oyster Ridge on the east side of Cumberland Flats. According to Smith (Reference 2.6-28, 17, 107), Cumberland was "one of the most prosperous coal camps in the inter-mountain West." It produced a total of 14.1 million tons of coal from 1901 until it closed in 1930. Several other mines, operated by the Kemmerer Coal Company, were opened along the Cumberland branch rail line, including the Glencoe, Radiant, Lincoln Star, Blazon, and Brilliant No. 8 mines (Reference 2.6-28, 22, 103-104; Reference 2.6-33). A few years after completing the Cumberland Branch, the Oregon Short Line Railroad extended a spur from it approximately 4 miles (6 kilometers) across Cumberland Flats to the Elkol Mine, which was operating by 1912 and was the progenitor after 1950 of the Elkol open pit mine that supplies coal to the Naughton Power Plant (Oregon Short Line Railroad Company 1916, 49; Reference 2.6-28). Much later, probably in the 1960s, another 4-mile (6-kilometer) spur from the Cumberland branch line was constructed across the flats to the Skull Point Mine. Although roughly 60 percent of the Cumberland Branch was eventually abandoned as the mines along it closed from the 1930s to the 1960s, the Elkol and Skull Point spurs remain active. A portion of the abandoned Cumberland Branch is near the eastern boundary of the Kemmerer Unit 1 site, while a short section of the Skull Point Spur runs along the northwestern boundary of the site. The macro-corridor within which the transmission and water lines will be located crosses the still-active section of the Cumberland Branch just north of Glencoe Junction.

In addition to railroads, Kemmerer Unit 1 vicinity was also served by roads from at least the early twentieth century. As noted, no sources are available to reliably trace the growth of the road network, but by the 1920s, State maps begin to depict highways as well as railroad lines. Early maps, such as Hammond (Reference 2.6-11) overprinted approximations of major roads on existing railroad maps (Reference 2.6-17). More accurate and detailed road touring atlases soon followed, such as Clason Map Company (Reference 2.6-6). A road approximating the alignment of present-day US 189 on the western side of the site was extant by 1922, and in 1927 it is shown as a graded earth road (Reference 2.6-11; Reference 2.6-6).

Aside from railroad lines and roads passing through or adjacent to the site study area and coal mining in the nearby ridges flanking Cumberland Flats, the Kemmerer Unit 1 Study Area and vicinity was evidently undeveloped throughout the twentieth century. The area was used as rangeland for sheep and cattle, but no permanent structures were erected within it.

2.6.1.6 Native American Ethnography

The project area falls within the region dominated by the Eastern Shoshone during the early to mid-nineteenth century (Reference 2.6-25). Linguistic and archaeological evidence indicates that Shoshonean people entered western Wyoming by around 1500 AD, having originated in the southern Sierra Nevada Mountains around 1 AD and expanded rapidly across the Great Basin after about 1000 AD (Reference 2.6-38). In the two centuries after their arrival in Wyoming, the Shoshones expanded onto the northwestern Plains, and with their adoption of the horse for transportation, hunting, and warfare, dominated the region through much of the eighteenth century. Toward the end of the century, weakened by the spread of European diseases, defeated by their traditional enemies, the Blackfeet, and under pressure from the Arapaho and Sioux who were themselves being pushed westward by the expansion of Euroamerican populations, the Shoshones had withdrawn into Wyoming. In the Wyoming Basin, throughout the early and middle decades of the nineteenth century, though the Shoshone were "the principal group… the Comanche (close relatives of the Shoshone), Flathead, Crow, Arapaho, Gros Ventre, Cheyenne, and the Sioux are known to have encroached on the territory for raiding, hunting, or trade" (Reference 2.6-19, 250).

Shimkin presents a detailed discussion of Eastern Shoshone cultural ecology during the period ca. 1825 to 1880 (Reference 2.6-23; summarized in Reference 2.6-25, 308-310, 316-320). He interprets Eastern Shoshone land use as comprising three types of regions: foci or population nodes; routes; and hinterlands. Foci were locations where families and bands aggregated during certain periods of the year. Routes were the main travel corridors both between foci and into other sections of the tribal territory. Hinterlands were areas into which families and bands might disperse during certain periods of the seasonal round, and they were also areas that might contain particular resources, such as fossil shells from the general vicinity of Kemmerer (Reference 2.6-23, map 9). The nearest node to the site during the middle nineteenth century was Fort Bridger, about 28 miles (45 kilometers) to the south. No routes passed through the site but were situated as near as approximately 20 miles (32 kilometers) to the east and 10 miles (16 kilometers) to the southwest (Reference 2.6-23, map1).

In Shimkin's view the Eastern Shoshone "were essentially meat and fish eaters," with plant foods playing a subsidiary role (Reference 2.6-23, 279). He divides the diet into three categories, according to relative importance:

> *Staples* were the bison, fish (especially trout), elk, beaver, and mule deer. *Major but occasional* supplies were the antelope, jack rabbit, mountain sheep, marmot (woodchuck, rockchuck), and sage hen. *Accessories* were the Virginia deer, moose, bear, duck, goose, cottontail, badger, snowshoe rabbit, ground squirrel, and wood rat. The bobcat or lynx, mink, otter, and weasel had value as fur, but were not eaten. A few persons (in the Green River country particularly) ate lampreys, ants, locusts, crickets, and owls (Reference 2.6-23, 265).

The spring and fall saw aggregations as tribal bison hunts took place on the Shoshone River plains, along the Wind River, or elsewhere (Reference 2.6-23, Table 4; 1986b, Figure 2). The periods after the spring and before the fall bison hunts were also a traditional time for raiding and warfare against other tribes. Another tribal aggregation occurred in summer during the trade fair intertribal rendezvous at Fort Bridger. After the rendezvous, the Eastern Shoshone dispersed into family groups to take care of family business, such as visiting western kin, making marriage alliances, or getting salt or fossil shells. Winter would be a period of band-level groupings in wintering places with good potential for game and some protection from the worst of winter weather. The winter diet included occasional bison, elk, beaver, and pemmican of dried bison meat and grease, sometimes mixed with berries. Winter was the time of greatest food insecurity for both the Shoshone and their horses (Reference 2.6-23).

These patterns persisted for more than 50 years, gradually coming to an end with the establishment of the Eastern Shoshone on the Wind River Reservation in 1868 and the collapse of buffalo herds by the 1880s. The Arapaho joined the Eastern Shoshone at Wind River in 1876, and the early decades of reservation life were hard on the Shoshone, but in time, they and their culture adapted to their new circumstances (Reference 2.6-25).

2.6.2 Historic and Cultural Resources at the Site and in the Vicinity

Cultural resource investigations of the 1,508-acre (610.3-hectare) study area were performed in 2022 and 2023 (Reference 2.6-14). The introduction to Section 2.6 defines the proposed direct effects APE as those areas within which building Kemmerer Unit 1 will potentially result in ground disturbance. The proposed direct effects APE covers 887 acres (359 hectares). Since the cultural resource investigations were conducted before the design was finalized, the area investigated as the initial direct effects APE was larger than the final, proposed APE, allowing identification of constraints on the project and avoidance if possible. This area of investigation is referred to as the Kemmerer Unit 1 Study Area to differentiate it from the proposed direct effects APE (Figure 2.6-1 and Figure 2.6-2). The proposed indirect effects APE covers a 5-mile (8-kilometer) radius around the site (144 square miles [373 square kilometers]), a region within which the above-ground elements of Kemmerer Unit 1 and its ancillary facilities and infrastructure could result in visual effects to cultural resources (Figure 2.6-3).

2.6.2.1 File Check of Existing Cultural Resource Data

The identified projects included roads, pipelines, fences, oil wells, waterlines, mining, telephone lines, a sewage plant, a power plant, fiber-optic cable, a corral, an industrial park, a reservoir, and a weather tower; and projects related to seismic line surveys, mine reclamation, a NRHP nomination, and a rock sale. One-hundred ninety-seven of these identified projects consisted of Class III surveys, and the remainder consisted of Class II surveys, along with monitoring, testing, and mitigation/excavation investigations. Twelve projects intersected portions of the proposed direct effects APE, representing investigations completed between 1974 and 2021 (Table 2.6-3). All 12 previous cultural resource inventories extended beyond the limits of the proposed direct effects APE.

As of the file search, 550 cultural resources had been documented within the proposed direct and indirect effects APE (Table 2.6-4). The resources were a diverse mix of prehistoric-era and historic-era localities of varying density, composition, and area. They included historic sites and buildings associated with the towns of Glencoe, Kemmerer, Oakley, Diamondville, Frontier, and Elkol. Other localities included historic campsites, trash scatters and dumps, cairns, mines, railroads, cabins, prospects, and roads; and prehistoric camps, lithic scatters, fire-cracked rock scatters, rock art, quarries, and occupation sites. A total of 70 localities were eligible for the

NRHP, 334 were not eligible for the NRHP, five were listed in the NRHP, and 141 were unevaluated. Nine archaeological sites were within the proposed direct effects APE (Reference 2.6-14:9-37).

2.6.2.2 Class III Cultural Resource Inventory of Proposed Direct Effects APE

A Class III cultural resource inventory of the study area, including the proposed direct effects APE, was completed in 2022 (Figure 2.6-1) (Reference 2.6-14). In keeping with standard practice in Wyoming, the inventory did not differentiate between archaeological sites and architectural resources but treated all inventoried elements as cultural resources. The inventory included just two non-archaeological resources, both of which were active railroad corridors 48LN2697, the Cumberland Branch of the Union Pacific Railroad, and 48LN8979, the Skull Point Spur of the Cumberland Branch. Resource 48LN2697 included both active and abandoned segments of railroad line within the study area, while a third inventoried linear cultural resource, 48LN8978, the Glencoe Spur of the Cumberland Branch, consisted only of an abandoned railroad line.

The inventory was conducted over four field events, April 26 to May 3, 2022; May 10 to May 17, 2022; July 23 and 24, 2022; and October 19, 2022. A total of 1,508 acres (610.3 hectares) of private land was inventoried. A team of three archaeologists, accompanied by TCSs from the Northern Arapaho Tribe, Comanche Nation, and Arapaho Tribe of Oklahoma, performed the inventory.

Due to the relatively sparse vegetation and the generally limited potential in the inventoried area for the formation of thick sediment packages during the past 12,000 years, the primary survey method was systematic surface inspection. The survey area was covered by a sagebrush community that typically obscured 10 to 35 percent of the ground surface. Wind erosion and sheetwash have tended to prevent the accumulation of substantial thicknesses of sediments, so most archaeological sites in the area are comprised just of surface scatters of artifacts. The inventory was accomplished using pedestrian transects spaced no further than 100 feet (30 meters) apart and oriented parallel within the study area, depending on topography. TCSs typically walked between archaeologists when on transect; however, they were also free to inspect areas outside the transects as needed. Between each transect, judgmental inventory was completed by archaeologists to inspect high potential cultural resource locations like cut banks and aeolian deposits. Surface finds were marked with temporary pin flags, and when an artifact or feature was encountered the surrounding area was systematically examined for additional finds.

Cultural resources encountered during the inventory were documented per Wyoming SHPO standards and evaluated for the NRHP. No artifact collection was conducted for the inventory. Prehistoric archaeological sites were defined as a minimum of 15 or more spatially associated artifacts within an area no greater than 100 feet (30 meters) in diameter or the occurrence of at least a single feature, such as a cluster of heat-altered rocks (HAR). Historic archaeological sites were defined as a minimum of 50 spatially associated artifacts within a 100-foot (30-meter) diameter area. (An exception to the historic site definition was an artifact scatter composed of individual fragments originating from a single object such as a broken bottle, which would not be categorized as a site.) Archaeological sites were documented on Wyoming Cultural Properties

Forms. All archaeological localities not meeting these definitions were documented as isolated resources (IRs). IRs were recorded using Wyoming Isolated Resource Forms, GPS-located, and photographed. The distribution of temporary pin flags marking the locations of surface finds of artifacts and features was used to define site boundaries. Site boundaries and the locations of features, tools, and potentially diagnostic artifacts were mapped by GPS. After mapping, the pin flags were removed.

In addition to identifying and recording cultural resources and IRs, each was evaluated for its potential eligibility to the NRHP utilizing the criteria for evaluation found at 36 CFR 60.4:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or

B. that are associated with the lives of persons significant in our past; or

C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. that have yielded, or may be likely to yield, information important in prehistory or history.

IRs typically lack significance under Criteria A, B, C, and D because they are small and represent a narrow and transient range of activities that yield limited information and have limited research value. In Wyoming, IRs do not warrant further research or management beyond recordation.

To assist in NRHP evaluations of archaeological sites within the study area, auger probe testing was utilized within sites that appeared to have the potential to retain intact subsurface components. Tetra Tech used a ratcheting bucket hand auger measuring 120 centimeters (47 inches) in length with a 7-centimeter (2.75-inch) diameter bucket. Individual auger probe tests were completed to the full length of the probe unless they encountered an obstruction, such as a rock. All excavated material was sifted through a 3-millimeter (0.125-inch) screen to collect cultural resource evidence. Tetra Tech documented each probe on a standard form and included versions with each site form. Once completed, all excavated material was returned to the excavated hole.

The cultural resource inventory of the study area resulted in revisits to ten previously recorded cultural resources, including documentation of one new segment of a previously recorded resource, documentation of 40 new sites, and identification of 133 IRs (Table 2.6-5; map included in Karpinski and Karpinski [2023]). The ten revisited sites were documented during the field inventory and evaluated for NRHP eligibility. In all, cultural resources inventoried as sites comprised 26 prehistoric resources, 11 historic resources, and 13 multicomponent resources with both prehistoric and historic components. The recorded IRs include 46 prehistoric, 70 historic, and 17 multicomponent isolates.

Among the previously recorded sites that were revisited, evidence of the Hams Fork Lithic Landscape (48LN3203) manifested itself within the study area as a diffuse and dispersed scatter of secondary lithic raw material deposits of quartzite and various cherts, specifically within the northern portion of the proposed site for the Kemmerer Unit 1 plant and in the northeast portion of the macro-corridor. In these areas, primary and secondary flakes of quartzites and cherts were noted every 6 to 10 feet (2 to 3 meters) (Table 2.6-5).

Three of the previously recorded sites (Site 48LN735, 48LN798, and 48LN799) appear to have been destroyed by subsequent development, and no evidence of them was observed at their reported locations. The three sites had previously been determined by the Wyoming SHPO as not eligible for inclusion in the NRHP. Based on observations made in 2022 at four revisited, previously recorded sites (Sites 48LN801, 48LN802, 48LN2335, and 48LN2939), there is agreement with SHPO's previous determinations that they are not eligible for inclusion in the NRHP (Table 2.6-5).

The remaining two revisited, previously recorded resources (Sites 48LN740 and 48LN2697) had been determined by SHPO as eligible for inclusion in the NRHP. At Site 48LN740, the 2022 survey auger probe testing encountered evidence of intact subsurface cultural resource components in the west central portion of the site, demonstrating that the site remains NRHP-eligible under Criterion D. Site 48LN2697, the Cumberland Branch rail line, is eligible its entirety under Criterion A for the significant role it played in the historical development and operation of the historic-era coal mining on Cumberland Flats and along Oyster Ridge to the east. Within the study area, the resource has one previously recorded segment (48LN2697_3, a still-active portion of the line) and one newly recorded segment (48LN2697_4, an abandoned segment of the line) that occur in the study area of the 2022 inventory. It was recommended both segments of 48LN2697 are categorized as non-contributing elements of the overall historic property due to loss of integrity (Table 2.6-5).

Two of the 40 newly identified archaeological sites were recommended as eligible for inclusion in the NRHP. At Site 48LN8940, auger probe testing encountered evidence of intact subsurface cultural resource components in the eastern portion of the site, indicating potential eligibility under Criterion D. It was also concluded that the newly documented site 48LN8978 (the Glencoe Spur rail line) was recommended eligible for inclusion in the NRHP under Criterion A. The segment (48LN8978_1) within the study area, however, was recommended as non-contributing to the site's NRHP eligibility due to loss of integrity. The remaining 38 newly identified sites were recommended as not eligible (Table 2.6-5).

The Class III inventory recorded 155 prehistoric artifacts, including flakes, unifaces, bifaces and biface fragments, projectile points, and a small number of other items such as mano and metate fragments among 46 prehistoric IRs and 17 multicomponent (prehistoric and historic) IRs. It also recorded 514 historic artifacts, of which 258 (50 percent) were metal cans and another 153 (30 percent) were bottles, bottle fragments, and other vessel glass. The remaining 103 (20 percent) included glass insulator fragments, a few ceramics, architectural debris, metal containers such as buckets, bowls, and basins, and other items. The documented IRs are cultural manifestations with limited information potential and are therefore recommended as not eligible for inclusion on the NRHP.

2.6.2.3 Class III Cultural Resource Inventory of Proposed Indirect Effects APE

As noted, the indirect effects APE consists of a 5-mile (8-kilometer) buffer around the direct APE and covers 144 square miles (373 square kilometers). The current Wyoming SHPO database records 310 known resources within the indirect APE. Analysis of this data, discussed in Section 4.6, has identified 10 archaeological resources in the indirect APE that may have a view of the proposed facilities and for which setting is a defining factor in establishing their eligibility for listing in the NRHP (Table 2.6-6). As noted in Section 2.6.1.4, no emigrant trail routes associated with the western migration of the 1840s to 1860s are situated within the indirect APE, as the nearest route segment, comprising branches of the Oregon and California trails, passed approximately 8.5 miles (13.7 kilometers) southwest of the site (Reference 2.6-21).

2.6.3 Consultation

Agency and tribal consultation are the responsibility of the Federal agency, and the NRC is required to take the lead on consulting with the SHPO, Tribal Historic Preservation Officers, American Indian Tribes (on a government-to-government basis), and interested parties as outlined in 36 CFR 800; consultation is not the responsibility of applicants. However, applicants are expected to engage with these parties to gather sufficient information pertinent to the NHPA Section 106 review process to assist the NRC in the timely completion of its NHPA Section 106 compliance requirements (NRC 2018, 49-51).

Outreach activities were initiated with American Indian tribes and the Wyoming SHPO in late autumn 2021 and these activities continued into autumn 2022. The DOE’s Office of Clean Energy Demonstration (OCED) has entered into a cooperative agreement with TerraPower, LLC, and is proposing to provide Federal funding to TerraPower, LLC, in support of the development of the Natrium Reactor and associated facilities. DOE has responsibilities under Section 106 and NEPA to conduct reviews of potential Project effects and impacts to cultural resources and the environment. OCED is in the process of completing an environmental assessment for construction and operation of the Sodium Test and Fill Facility (TFF). DOE will complete a NEPA review for the preconstruction activities for Kemmerer Unit 1 that will occur prior to completion of NRC’s NEPA review and Section 106 consultation. DOE assumed the role of lead Federal agency for these phases of the proposed project. OCED initiated formal consultations with American Indian tribes and the Wyoming SHPO. The following paragraphs summarize the outreach activities and OCED’s formal Section 106 consultations.

2.6.3.1 American Indian Tribes

TerraPower

Eleven Federally recognized American Indian tribes with potential historical interests in the cultural resources of the site and vicinity were initially identified and later added a twelfth tribe to the group it sought to engage. The 12 tribes are:

- Apache Tribe of Oklahoma
- Cheyenne and Arapaho Tribes, Oklahoma
- Comanche Nation, Oklahoma

- Confederated Tribes of the Goshute Reservation, Nevada and Utah
- Crow Tribe of Montana [added September 2022]
- Eastern Shoshone Tribe of the Wind River Reservation, Wyoming
- Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
- Northern Arapaho Tribe of the Wind River Reservation, Wyoming
- Northwestern Band of the Shoshone Nation
- Shoshone-Bannock Tribes of the Fort Hall Reservation
- Skull Valley Band of Goshute Indians of Utah
- Ute Indian Tribe of the Uintah & Ouray Reservation, Utah

Outreach began via a letter dated December 1, 2021, describing the project and inviting engagement. One tribe, the Northern Arapaho, responded to the letter, stating that they would like to participate in the Class III archaeological inventory and welcoming a meeting. Subsequently, virtual meetings were held with the Northern Arapaho Business Council (January 18, 2022), the Eastern Shoshone Business Council (January 25, 2022), and the Wind River Intertribal Council (February 2, 2022) to introduce the project in greater detail and address questions from tribal representatives.

On April 12, 2022, a virtual tribal meeting was held to describe the project, explain the cultural resources protection measures put in place to date, and present upcoming opportunities for tribes to be involved in resource identification. Two tribes participated in the meeting, the Cheyenne and Arapaho Tribes of Oklahoma and the Northern Arapaho Tribe, and a third, the Eastern Shoshone Tribe, provided an observer.

Shortly after the tribal meeting, the first of three invitations was issued to all potentially interested tribes for TCSs to participate in the Class III field inventory. These invitations were issued on April 15, 2022, for the first two field episodes, April 26 to May 3 and May 10 to May 17, 2022; July 7, 2022, for the third episode, July 23 to July 24, 2022; and September 29, 2022, for the fourth episode on October 19, 2022. TCSs from three tribes (Northern Arapaho Tribe, Comanche Nation, and Arapaho Tribe of Oklahoma) participated in the fieldwork portion of the inventory.

Following the third episode of fieldwork in July 2022, a draft report on the Class III cultural resources inventory was completed. On August 23, 2022, the draft report was made available to the tribes electronically, with a request for comments within 30 days. Several tribes downloaded the draft document, but only one, the Comanche Nation of Oklahoma, responded, indicating they had no cultural resources concerns.

During summer 2022, an offer was made for in-person meetings with each of the potentially interested tribes at a location convenient to each to discuss the project. One tribe, the Northern Arapaho, accepted this invitation, and on September 2, 2022, representatives of TerraPower, LLC met with tribal representatives on the Wind River Indian Reservation. Topics discussed included job opportunities during the building phase and during construction and operations at the completed Kemmerer Unit 1, the need for training, and the treatment of cultural properties.

On October 18, 2022, a Tribal Summit at the site was organized to meet with project representatives and provide potentially interested tribes with an opportunity to examine it in person. Three tribes chose to participate, the Eastern Shoshone Tribe, the Northern Arapaho Tribe, and the Northwestern Band of the Shoshone Nation.

OCED

In May 2023, OCED began its environmental assessment scoping period and Section 106 consultations for the TFF. OCED developed a list of tribes with ancestral ties to the site area that will be consulted under Section 106 and government-to-government consultation processes. This includes two additional tribal entities to those previously identified:

- Crow Creek Sioux Tribe of the Crow Creek Reservation, South Dakota
- Northern Ute (White River Band), Utah

On March 15, 2023, OCED sent letters to tribes notifying them of the initiation of formal Section 106 consultation and inviting their participation. The letters also specifically asked for comment on the proposed direct effects APE. OCED received no responses from any tribe regarding the proposed direct effects APE.

DOE received a response from the Comanche Nation on June 21, 2023, in response to the Notice of Scoping for the environmental assessment which stated that the location of the site was cross referenced with the tribes site files where an indication of “no properties” was identified.

On June 16, 2023, OCED distributed copies of a revised Class III cultural resources inventory report to the 14 American Indian tribes. No comments were received on the report after 30 days. This letter also invited the tribes to participate in the fieldwork for the visual resource survey, which was conducted during the week of July 10, 2023. OCED completed phone calls to all tribes following delivery of the report and received a response from the Shoshone-Bannock Tribe with interest in visiting the site. OCED arranged a field visit the week of August 21, 2023.

2.6.3.2 Wyoming SHPO

TerraPower

The Wyoming SHPO was notified about the site by letter on January 26, 2022, from TerraPower, LLC. The SHPO acknowledged receipt of the letter and assigned a project review number, DBPR_WY_2022_101, in its response of February 15, 2022. As with contacts with tribes, the outreach to the SHPO was informational in character and did not constitute formal Section 106 consultation, which is the responsibility of the involved Federal agency or agencies.

OCED

On March 15, 2023, OCED initiated formal consultation with the Wyoming SHPO by letter (Appendix A, Consultation Letters).

The letter suggested development of a programmatic memorandum of understanding to define roles and responsibilities for completing the Section 106 process; indicated that the NEPA process will not be used to substitute for Section 106 but noted that the public participation aspects of both processes will be coordinated; provided a list of American Indian tribes being invited to consult on the project; and requested SHPO comment on the proposed direct effects APE. On June 6, 2023, the SHPO responded to this letter and concurred with the proposed direct effects APE.

From May 25 to June 14, 2023, OCED accepted public comments on the scope of an EA for the TFF. On June 6, 2023, the Wyoming SHPO responded with a letter of comment noting the need for OCED to complete a Section 106 review in accordance with 36 CFR 800.

OCED held an in-person meeting with the Wyoming SHPO in Cheyenne on July 11, 2023. During this meeting OCED introduced the project and explained its role in assessing effects under Section 106 and NEPA. OCED proposed a phased approach to Section 106 consultations in order to maintain the site's schedule, and the Wyoming SHPO agreed to this approach. The four areas of consultation are:

1. Proposed seismic site characterization activities
2. Use of existing access road across Site 48LN740
3. Construction and operation of the TFF
4. Preconstruction activities for Kemmerer Unit 1 site that will take place prior to the completion of NRC's NEPA review

As of late February 2024, submittal of the Class III inventory report for the TFF (# 3) is pending.

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Table 2.6-1 Railroad Lines in the Project Vicinity

SHPO Designation	Name	Description	Location Relative to Project	Build Date	Current Status	Sources
48LN2327	Oregon Short Line Railroad	Union Pacific mainline from Granger, WY, to Huntington, OR	Kemmerer vicinity, north of project.	1881-1884	Active	Julian and Fossil (Reference 2.6-13); Strack (Reference 2.6-29)
48LN2697	Cumberland Branch UP	~15.45-mile* (24.886-kilometer) (branch line from Moyer or Moyer Junction to the now abandoned Union Pacific Railroad coal camp of Cumberland	Macro-corridor crosses active section between ~MP 5.13 and ~MP 5.37. Abandoned section between ~MP 6.86 and ~MP 7.87 occupies eastern edge of Project Area	1900-1901	Active to ~MP 6.61; abandoned in stages by 1974 south of ~MP 6.61	Oregon Short Line Railroad Company (Reference 2.6-22:49); United States Geological Survey (Reference 2.6-33, 1974)
48LN8978	Glencoe Spur	~2.2-mile (3.5-kilometer) spur from ~MP 4.90, just north of Glencoe Junction (~MP 5.37) to the now abandoned coal camp of Glencoe	East of Project.	Probably 1900-1901	Abandoned by 1953	Century Company (Reference 2.6-3); Cram (Reference 2.6-7); United States Geological Survey (Reference 2.6-32)
Not Inventoried to Date	Elkol Spur	~4.15-mile (6.68-kilometer) spur from Glencoe Junction (~MP 5.37)	West and south of macro-corridor.	1908	Active	Oregon Short Line Railroad Company (Reference 2.6-22, 49)
48LN8979	Skull Point Spur	~4.15-mile (6.68-kilometer) spur from active end of Cumberland Branch (~MP 6.61) to mine at Skull Point	~MP 0.29 to ~MP 0.50 of spur forms northwestern boundary of TFF area.	ca. 1977	Active	Karpinski and Karpinski (Reference 2.6-14, 161); United States Geological Survey (Reference 2.6-33, 1979)

*Distances and mile posts (MP) measured on United States Geological Survey 7.5-minute quadrangle maps in Google Earth.

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
(Sheet 1 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_1988_56	Skull Point Seismic Lines A, B, & C	Class III Survey	Indirect
DBI_WY_1992_847	Hams Fork Road PREB - 1202(10)	Class III Survey	Indirect
DBI_WY_1992_848	Hams Fork Road PREB - 1202(10)	Class III Survey	Indirect
DBI_WY_1994_926	Pittsburg and Midway Coal Mining Company Drill Holes (WYW-055246).	Class II Survey	Indirect
DBI_WY_1996_163	A Class III Cultural Resource Inventory of Three Miscellaneous Inventory Areas Associated with the Northwest Pipeline Corporation Expansion II Project, Lincoln County, Wyoming	Class III Survey	Indirect
DBI_WY_1996_820	New Access Road to Warfield Quarry (WYW-128429)	Class III Survey	Indirect
DBI_WY_1996_1219	Cumberland Allottees Fence System (W47 96 142)	Class III Survey	Indirect
DBI_WY_1997_535	Cumberland Flats Fence Construction (W47 97 069)	Class III Survey	Indirect
DBI_WY_1997_537	Cumberland Flats Fence Construction (W47 97 069)	Class III Survey	Indirect
DBI_WY_1997_662	A Class III Cultural Resource Survey of the Davidson Pit Kemmerer-Granger, WYDOT Project CMP-PO-012-1(94) Lincoln County, Wyoming	Class III Survey	Indirect
DBI_WY_1997_1198	Hallwood Petroleum Inc., Elkol Federal #1-14 Well and Access (BLM No. (WYW-140929/W4797131)	Class III Survey	Indirect
DBI_WY_1998_2040	P&M Coal Mining Company, Waterline Project (04798262)	Class III Survey	Indirect
DBI_WY_1998_2041	P&M Coal Mining Company, Utility Right of Way, Buried Water Line (04798262)	Class III Survey	Indirect
DBI_WY_1999_33	Results of the 1980 and 1981 Cultural Resources Inventories and Testing of the Kemmerer Coal Company North Block Permit Area	Class III Survey	Indirect
DBI_WY_1999_34	Report of Archaeological Survey - Kemmerer Coal Co Project: Phase I	Class III Survey	Indirect
DBI_WY_1999_73	Skull Point Mine and Plant	Class II Survey	Indirect
DBI_WY_1999_89	Report of Archaeological Survey Kemmerer Coal Company Project: Phase 1	Class III Survey	Direct
DBI_WY_1999_93	Twin Creek Mining Area	Class II Survey	Indirect
DBI_WY_1999_101	Mountain States Telephone and Telegraph Company Right-of-way Application for a Buried Telephone and Telegraph Line	Class III Survey	Indirect
DBI_WY_1999_885	WY-042-7 108 Road Access	Class II Survey	Indirect
DBI_WY_1999_886	Temporary Use Permit (WY-042-77-58) Road Right-of-Way - Oil and Gas Well	Class III Survey	Indirect
DBI_WY_1999_1080	Access	Class III Survey	Indirect
DBI_WY_1999_1081	Resurvey True #1 Fed 11-10A	Class III Survey	Indirect
DBI_WY_1999_1082	True Fed 11-20A Monitor	Monitor / Trench Inspection	Indirect
DBI_WY_1999_1236	Skull Point Mine	Class III Survey	Indirect
DBI_WY_1999_1240	3 Drill Holes	Class III Survey	Indirect
DBI_WY_1999_1333	Sewage Treatment Plant And Pipeline	Class III Survey	Indirect
DBI_WY_1999_1338	Opal Painter Res-Ryckman Ck Plan	Class III Survey	Indirect
DBI_WY_1999_1943	Overthrust Ext	Class III Survey	Indirect
DBI_WY_1999_1950	SCPF-012-1(21) Kemmerer Bypass	Monitor / Trench Inspection	Indirect
DBI_WY_1999_1951	Kemmerer Bypass	Class III Survey	Indirect
DBI_WY_1999_1985	RW 20715	Class III Survey	Indirect
DBI_WY_1999_2158	1-18 URC Anderson-Fed	Class III Survey	Indirect
DBI_WY_1999_2416	Elkol-Sorenson Mine Expansion	Class III Survey	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
(Sheet 2 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_1999_2713	Skull Point Mines Drill Sites	Class III Survey	Indirect
DBI_WY_1999_2798	Transmission Line	Class III Survey	Direct
DBI_WY_1999_3016	Class I Cultural Resource Inventory: Section 18 T18N R105W, Sweetwater County, Wyoming	Class III Survey	Indirect
DBI_WY_1999_3474	RW 22704	Class III Survey	Indirect
DBI_WY_1999_3667	Naughton Steam Electric Project	Class III Survey	Indirect
DBI_WY_1999_3684	South Block Expansion	Class III Survey	Indirect
DBI_WY_1999_3694	Overthrust Belt Inventory	Class II Survey	Indirect
DBI_WY_1999_4186	Field Check 41 FMC Drill Holes	Class II Survey	Indirect
DBI_WY_1999_4187	Forty-One Drill Holes	Class III Survey	Indirect
DBI_WY_1999_4696	Mapco Monitoring	Monitor / Trench Inspection	Indirect
DBI_WY_1999_5393	New Route Transmission Pipeline Monitor	Monitor / Trench Inspection	Indirect
DBI_WY_1999_5534	An Intensive Cultural Resource Survey of the Amoco CEI Water Haul Road, Lincoln and Uinta Counties, Wyoming	Class III Survey	Indirect
DBI_WY_1999_6025	Whitney Canyon Project-Sulfur Transmission	Class III Survey	Indirect
DBI_WY_1999_6042	Sulfur Haul Road	Class III Survey	Indirect
DBI_WY_1999_6177	Whitney Canyon Project Access	Class III Survey	Indirect
DBI_WY_1999_6377	Sulphur Transportation Pipeline	Class III Survey	Indirect
DBI_WY_1999_6387	R/W 25581 Buried Cable 21N116W34	Class III Survey	Indirect
DBI_WY_1999_6410	Kemmerer-Bon Rico 25Kv Powerline	Class III Survey	Direct
DBI_WY_1999_6789	Amoco & Chevron 25 Kv Line	Class III Survey	Indirect
DBI_WY_1999_6790	Naughton-Skull Valley Tap to Che	Class III Survey	Indirect
DBI_WY_1999_7095	Skull Point Mine Expansion Area	Class II Survey	Indirect
DBI_WY_1999_7110	Sulphur Terminal Pipeline Realignment	Class III Survey	Indirect
DBI_WY_1999_7111	Sulphur Terminal Gas & H_2O Line	Class III Survey	Indirect
DBI_WY_1999_7117	Archaeological Excavations at LN797, Lincoln County, Wyoming	Data Recovery Action (excavation, mitigation)	Indirect
DBI_WY_1999_7118	Elkol-Sorenson South Block Mine	Class III Survey	Indirect
DBI_WY_1999_7130	Archeological Investigations of the Kemmerer-South Highway Wyoming Project SCPF-011-2(3) Lincoln County, Wyoming	Class III Survey	Direct
DBI_WY_1999_7894	FED 1-8S	Class III Survey	Indirect
DBI_WY_1999_7895	FED 1-17S	Class III Survey	Indirect
DBI_WY_1999_8588	A Cultural Resource Inventory of the Fossil Butte 14.4KV Line in Lincoln County, Wyoming	Class III Survey	Indirect
DBI_WY_1999_8752	FED 1-35 QQ	Class III Survey	Indirect
DBI_WY_1999_8753	FED 1-23 QQ	Class III Survey	Indirect
DBI_WY_1999_8822	STP-011-2(4) Weber Pit Haul Road	Monitor / Trench Inspection	Indirect
DBI_WY_1999_8823	SCPF-011-2(4) Weber Pit Haul Road	Monitor / Trench Inspection	Indirect
DBI_WY_1999_9340	David Nelson 25Kv Line	Monitor / Trench Inspection	Indirect
DBI_WY_1999_9714	FED 4-6	Monitor / Trench Inspection	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs (Sheet 3 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_1999_9748	Cumberland-Hams Fork Overview	Literature Review (file search)	Indirect
DBI_WY_1999_9826	1-14 Elkol	Monitor / Trench Inspection	Indirect
DBI_WY_1999_10073	Cultural Resource Survey of AML Site 3-26	Monitor / Trench Inspection	Indirect
DBI_WY_1999_10496	34-15 Huckabay Fed	Monitor / Trench Inspection	Indirect
DBI_WY_1999_10540	Gemini Corp Fed 2-6	Monitor / Trench Inspection	Indirect
DBI_WY_1999_10716	Skull Point Mine Testing Section 30	Testing	Indirect
DBI_WY_1999_10717	A Cultural Resources Survey (Class III) of Section 3, T19N R117 W, Lincoln County, Wyoming	Monitor / Trench Inspection	Indirect
DBI_WY_1999_10747	13-13 Fossil Ridge W/A	Monitor / Trench Inspection	Indirect
DBI_WY_1999_11042	An Archaeological Inventory in the Hodges Pass Area of the Overthrust Belt in Western Wyoming	Monitor / Trench Inspection	Indirect
DBI_WY_1999_11047	Kemmerer Mine Expansion	Monitor / Trench Inspection	Indirect
DBI_WY_1999_11073	Amoco Hwy 189 Access	Monitor / Trench Inspection	Indirect
DBI_WY_1999_11075	5 Monitor Wells-Naughton Power Plant	Monitor / Trench Inspection	Indirect
DBI_WY_1999_11294	Overburden Spoil Pile	Monitor / Trench Inspection	Indirect
DBI_WY_1999_11775	Naughton-Chappell Creek Powerline	Monitor / Trench Inspection	Direct
DBI_WY_1999_12015	Oriel Ridgerunner Fed 18-1	Monitor / Trench Inspection	Indirect
DBI_WY_1999_15556	WYCAL Pipeline Project	Monitor / Trench Inspection	Indirect
DBI_WY_1999_15622	SMP-SF-011-2(10) Snowfences	Monitor / Trench Inspection	Indirect
DBI_WY_1999_15822	A Class III Cultural Resource Inventory of a Proposed Reroute for the Northwest Pipeline System Expansion Project, Kemmerer South Segment 22, Lincoln County, Wyoming	Monitor / Trench Inspection	Indirect
DBI_WY_1999_15823	Phase 2 Cultural Resource Investigations for the Northwest Pipeline Corporation Expansion II Project, Muddy Creek North and Kemmerer North Loops, Lincoln County, Wyoming	Testing	Indirect
DBI_WY_1999_16088	Naughton Power Plant Pipeline Inspection	Monitor / Trench Inspection	Indirect
DBI_WY_1999_16089	Naughton Power Plant Gas Pipeline	Class III Survey	Indirect
DBI_WY_1999_16699	Naughton Pipeline	Monitor / Trench Inspection	Indirect
DBI_WY_1999_17749	Addendum to Class III Cultural Resource Inventory and Reinspection of Previously Recorded Sites Along a Proposed US West Communications Fiber Optic Cable Line Between Evanston and Kemmerer, Uinta and Lincoln Counties, Wyoming	Class III Survey	Indirect
DBI_WY_1999_17750	Class III Cultural Resource Inventory and Reinspection of Previously Recorded Sites Along a Proposed US West Communications Fiber Optic Cable Line Between Evanston and Kemmerer, Uinta and Lincoln Counties, Wyoming	Class III Survey	Direct
DBI_WY_1999_18526	Bon Rico 25Kv Powerline Tap to Air	Class III Survey	Indirect
DBI_WY_1999_19560	Twin Creek Gravel Pit & Access Rd	Class III Survey	Indirect
DBI_WY_1999_20065	Fossil Well and Pipeline	Class III Survey	Indirect
DBI_WY_1999_20579	Loma Linda University Paleontology Dig	Class III Survey	Indirect
DBI_WY_1999_20735	Cumberland Allotment Reservoir Pits	Class III Survey	Indirect
DBI_WY_1999_20828	Opal & Anschutz Supply Lat. Sys.	Class III Survey	Indirect
DBI_WY_1999_20865	5 Prehistoric Site Monitors (NWP)	Monitor / Trench Inspection	Indirect
DBI_WY_1999_20866	Phase 1 NWP Expansion 2 N Loops	Class III Survey	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs (Sheet 4 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_1999_21488	Haul Road & Powerline Corridor	Class III Survey	Indirect
DBI_WY_1999_21625	Fossil Pipeline	Class III Survey	Indirect
DBI_WY_1999_21763	Chevron Sulfur Transport Pipeline	Class III Survey	Indirect
DBI_WY_1999_22047	Skull Point Mine Eleven Sites	Testing	Indirect
DBI_WY_1999_22266	SCPF-011-1(4) Kemmerer/Lazeart	Class III Survey	Indirect
DBI_WY_1999_22321	Cultural Resource Inventory of a Proposed Gas Processing Plant Site and Haul Road in the Bear River Divide Locality of Lincoln County, Wyoming	Class III Survey	Indirect
DBI_WY_1999_22491	Archaeological and Historical Survey of 26 Mine Reclamation Sites in Uinta and Lincoln Counties, Wyoming	Class III Survey	Indirect
DBI_WY_1999_22690	Naughton-Carter CK-FMC Tap Line	Class III Survey	Indirect
DBI_WY_1999_22953	SMP-SF-011-1(9) Kemmerer/Lazeart	Class III Survey	Indirect
DBI_WY_1999_23224	DEQ/AML #17 Sites 17-40 & 17-4	Class III Survey	Indirect
DBI_WY_1999_23264	Forest Service Horse Corral	Class III Survey	Indirect
DBI_WY_1999_23352	A Preliminary Archaeological Survey Report of Chine Butte, Red Rim and Atlantic Rim in South Central Wyoming	Class II Survey	Indirect
DBI_WY_1999_23439	FMC Application for Buried Cable and Air Sampler Right-of-Way	Class III Survey	Indirect
DBI_WY_1999_24131	Kern River Pipeline	Class III Survey	Indirect
DBI_WY_1999_24263	Phase 1 Expansion NWP Addendum	Class III Survey	Indirect
DBI_WY_1999_24268	Results of a Class III Cultural Resource Inventory Wyoming Project PREB-011-3 (12) Kemmerer-Labarge, Kemmerer-North Section, Lincoln County, Wyoming; 1991	Class III Survey	Indirect
DBI_WY_1999_24944	Fossil Pipeline Extension	Class III Survey	Indirect
DBI_WY_1999_25271	Whitney Canyon Project: Sulfur TR	Class III Survey	Indirect
DBI_WY_1999_25327	Report on the Results of an Intensive Cultural Resource Inventory Conducted for the Kemmerer Industrial Park (L/T-13-81)	Class III Survey	Indirect
DBI_WY_1999_25436	Test Excavation of Site 48LN829 and the Pipeline Trench Monitoring of Sites 48LN825 and 48LN829 in Lincoln County, Wyoming	Testing	Indirect
DBI_WY_1999_25444	Wyoming Truss Bridge Survey	Testing	Indirect
DBI_WY_1999_25592	Access-Little Round Mountain	Class III Survey	Indirect
DBI_WY_1999_25688	1-5R WELL PAD	Class III Survey	Indirect
DBI_WY_1999_25692	FED 1-19R Well Pad	Class III Survey	Indirect
DBI_WY_1999_25784	Block Survey 20N117W14	Class III Survey	Indirect
DBI_WY_1999_25858	FED 1-1314	Class III Survey	Indirect
DBI_WY_1999_26328	Historic US Post Offices in Wyoming 1900-1941 National Register of Historic Places Inventory - Nomination Form	National Register or Condition Assessment	Indirect
DBI_WY_1999_29889	BLM (Kemmerer), Biggie Rock Sale (04799181)	Class III Survey	Indirect
DBI_WY_1999_29906	Taylor Meadow Reservoir (04799253)	Class III Survey	Indirect
DBI_WY_2000_63	Twin Creek 3 Well Plugging	Class III Survey	Indirect
DBI_WY_2000_361	Three Spring Fence	Class III Survey	Indirect
DBI_WY_2000_701	Naughton Power Plant Development	Class III Survey	Indirect
DBI_WY_2000_745	Naughton-Pinedale 69kV Line Tap	Class III Survey	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
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Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2000_818	Ln County School Dis#1 Kolab	Class III Survey	Indirect
DBI_WY_2000_1008	Kemmerer Landfill Expansion	Class III Survey	Indirect
DBI_WY_2000_1127	P&M Gasline Connection	Class III Survey	Indirect
DBI_WY_2000_1344	A Cultural Resource Inventory for the Wyoming DEQ/AML Kemmerer Shafts and Adits Project: The Lincoln County Areas	Class III Survey	Indirect
DBI_WY_2000_3019	BLM’s Hatch Orphan Wells Plugging Project (04700079)	Class III Survey	Indirect
DBI_WY_2001_52	Bridger Fork Prospect 0005-0006	Class III Survey	Indirect
DBI_WY_2001_1560	Kern River Expansion Project	Class III Survey	Indirect
DBI_WY_2001_3262	Quest Buried Telecommunications Cable	Class III Survey	Indirect
DBI_WY_2001_3319	Results of a Field Inspection and Records Review Related to 48LN25, The Kemmerer Mine, Lincoln County, Wyoming	Class II Survey	Indirect
DBI_WY_2001_4295	Kerr McGee Rocky Mountain Corporation, Bear River Unit No. 11-36 Access Road (09002027)	Class III Survey	Indirect
DBI_WY_2001_4296	Kerr McGee, Rocky Mountain Corporation, Bear River Unit No. 11-16 Access Road (09002027)	Class III Survey	Indirect
DBI_WY_2002_49	Results of a Class III Cultural Resource Inventory for the Pittsburg & Midway Coal Mining Company: The Skull Point Pond	Class III Survey	Indirect
DBI_WY_2002_531	Clear Creek Fences	Class III Survey	Indirect
DBI_WY_2002_2146	Northwest Pipeline; Cathodic Protection CPS 535 Project (090-02-024)	Class III Survey	Indirect
DBI_WY_2002_2656	Supplemental Report for Cultural Resource Investigations Associated with the Oyster Ridge Reroute, Kemmerer Loop, Rockies Expansion Project, Lincoln County (04701109)	Class III Survey	Indirect
DBI_WY_2002_2657	Phase 1 Cultural Resource Investigations for the Northwest Pipeline System Rockies Displacement Expansion Project, Lincoln and Sweetwater Counties, Wyoming: Addendum Report (04701236)	Class III Survey	Indirect
DBI_WY_2002_2676	Revised Phase 1 Cultural Resource Investigations for the Northwest Pipeline System Rockies Displacement Expansion III Project, Kemmerer and Pegram Loops, Lincoln County, Wyoming (04701109)	Class III Survey	Indirect
DBI_WY_2002_3068	Samson Resources; Adaville Field Road to the Samson Resources State Unit No. 11-36 and Bear River Divide State Unit No. 12-16 Well Locations	Class III Survey	Indirect
DBI_WY_2003_184	Addendum to Cultural Resource Inventory and Reevaluation for the 2003 Kern River Expansion Project: Access Roads, Off-Right-Of-Way Facilities, and Route Deviations Lincoln and Uinta Counties, Wyoming	Class III Survey	Direct
DBI_WY_2003_242	Krep Addendum: Temporary Work Spaces	Class III Survey	Indirect
DBI_WY_2003_247	Krep Addendum 3	Class III Survey	Indirect
DBI_WY_2003_262	Kemmerer Weather Tower And Access	Class III Survey	Indirect
DBI_WY_2003_1343	Lincoln County Road #12-304 Fenceline (090-03-056)	Class III Survey	Indirect
DBI_WY_2003_2482	Northwest Pipeline Corporation System Rockies Expansion Project Pegram Loop, Lincoln County, Addendum Report 3	Class III Survey	Indirect
DBI_WY_2003_2484	Northwest Pipeline Corporation System Rockies Expansion Project Pegram Loop, Lincoln County, Addendum Report 9, Hams Fork Water Line	Class III Survey	Indirect
DBI_WY_2003_2492	Northwest Pipeline Corporation System Rockies Expansion Project Addendum Report 3	Class III Survey	Indirect
DBI_WY_2003_3851	Twin Creek Fence Project	Class III Survey	Indirect
DBI_WY_2004_298	Rocky Mountain Gas, Anadarko 21-19-19-117A Access Road	Not recorded	Indirect
DBI_WY_2004_446	Cumberland Gap Hearth Stone Association, Small Mining Permit In Lincoln County	Not recorded	Indirect
DBI_WY_2004_2102	Class III Cultural Resources Inventory of the Hams Fork 3-D Geophysical Exploration Area for PGS Onshore, Inc., Lincoln County, Wyoming	Class III Survey	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
(Sheet 6 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2004_2374	County Road 304 Snow Fence	Class III Survey	Indirect
DBI_WY_2004_2478	Anadarko NE 21-19-11A Access	Class III Survey	Indirect
DBI_WY_2004_2613	Results of an Evaluative Testing Program at 48LN25; The Pittsburg & Midway Coal Mining Co.’s Kemmerer Mine, Lincoln County, Wyoming	Testing	Indirect
DBI_WY_2004_3069	AML 17 H-1, Statewide Coal Reclamation Project, Kemmerer Area	Class III Survey	Indirect
DBI_WY_2005_498	Federal SE-26-20-117F Well and Access Road	Class III Survey	Indirect
DBI_WY_2005_679	Federal NE-2-19-117F Well and Access Road (cancelled)	Class III Survey	Indirect
DBI_WY_2005_3101	Absaroka 3-D Geophysical Exploration Project Area Class III Cultural Resources Inventory, Lincoln County, Wyoming	Class III Survey	Indirect
DBI_WY_2005_3588	South Waterfall 11-4/13-2 Wells	Class III Survey	Indirect
DBI_WY_2005_4019	Inventory Validation and Generation of Documents to Current Standards: Cultural Resource Studies for the Pittsburg & Midway Coal Mining Co.’s North Block Area	Class II Survey	Indirect
DBI_WY_2005_4891	Ignacio-Sumas Mainline Pipeline Recoating Project	Class III Survey	Indirect
DBI_WY_2006_542	Results of a Class III Cultural Resource Inventory for AML 17H: An Alternate Access Road through the Blazon Residential Area, 48LN4025	Class III Survey	Indirect
DBI_WY_2006_806	A Class III Cultural Resource Inventory of the Proposed Hunter Energy LLC Robert Barnes 24-2 Well Pad and Access Road in Lincoln County, Wyoming	Literature Review (file search), Class III Survey, Visual Contrast Rating	Indirect
DBI_WY_2006_884	Data Review Documenting Previous Adequate Cultural Inventories for Northwest Pipeline Corporation Integrity Testing Temporary Workspaces	Literature Review (file search)	Indirect
DBI_WY_2006_1535	Data Review Identifying Previous Adequate Inventories for the Hunter Energy Robert Barnes 24-2 Existing Access Road	Literature Review (file search)	Indirect
DBI_WY_2006_3106	East Kemmerer #21-4/27-2	Class III Survey	Indirect
DBI_WY_2006_3113	18” Fossil Quarry Access Road	Class III Survey	Indirect
DBI_WY_2006_3303	Bennion, Truman, Whiskey Springs	Class III Survey	Indirect
DBI_WY_2006_4848	Supplemental Inventory to the Class I and Class III Cultural Resource Inventory of the Overthrust Expansion Pipeline for Questar Overthrust Pipeline Company, Inc., Lincoln, Uinta, and Sweetwater Counties, Wyoming: Glencoe Junction Yard and Access Road, Granger Yard, Rock Springs Yard, the Overthrust Interconnect, and Access Roads	Class III Survey	Direct
DBI_WY_2007_419	A Class III Cultural Resource Inventory and Surface Evaluation of the Proposed Zemple Access Road Right-of-Way	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2007_542	Data Review of P&M’s North Block 2007 Exploration Plan	Literature Review (file search)	Indirect
DBI_WY_2007_871	Results of a Class III Cultural Resource Inventory for the All-Natural Stone Oyster Ridge Moss Rock Sale	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2007_1545	Data Review Documenting that No Historic Properties will be Affected by Authorization of Overhead Lines Crossing BLM Land for the Rocky Mountain Power South Lincoln County Landfill Powerline	Literature Review (file search)	Indirect
DBI_WY_2007_1641	A Class III Cultural Resource Inventory for BP Wind Energy North America Inc.’s Kemmerer Meteorological Tower Locations Construction Project, Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs (Sheet 7 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2007_1886	Data Review Documenting a Previous Cultural Inventory for the Mike Royall Quealy Peak Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2007_2055	Data Review for a 10 Year Lease for the South Moyer Allotment Grazing Lease Renewal	Literature Review (file search)	Indirect
DBI_WY_2007_2766	Interpretive Exhibit Row	Class III Survey	Indirect
DBI_WY_2007_2836	48LN792 Mitigation Plan	Data Recovery Plan	Indirect
DBI_WY_2007_3089	A Report of Archaeological Survey of the Naughton-Ben Lomond Powerline, Weber and Rich Counties, Utah and Uinta and Lincoln Counties, Wyoming	Class III Survey	Direct
DBI_WY_2007_4501	48LN797 Archaeological Testing	Testing	Indirect
DBI_WY_2007_5322	Hunter Energy, LCC Robert Barns 24-2 Well and Access Road. (09006345)	Class III Survey	Indirect
DBI_WY_2007_5805	AML Project 17H, Kemmerer Coal Private Lands Site Photodocumentation		Indirect
DBI_WY_2008_15	Coyote Springs Grazing Allotment Renewal (11304)	Literature Review (file search)	Indirect
DBI_WY_2008_16	Results of Cultural Resource Investigations Related to Revised APEs and an Assessment of Effect from Potential Access Road Improvements: BLM Portions of AML Project 17H; Lincoln County and Uinta County Coal	Class III Survey	Indirect
DBI_WY_2008_84	Data Review for the Elkol Grazing Allotment Permit Renewal	Literature Review (file search)	Indirect
DBI_WY_2008_135	Data Review for the Fossil Grazing Allotment Permit Renewal	Literature Review (file search)	Indirect
DBI_WY_2008_159	Data Review for the North Moyer Grazing Allotment Permit Renewal	Literature Review (file search)	Indirect
DBI_WY_2008_340	Chevron Mining, Inc.s North Block 2008 Exploration Plan	Literature Review (file search)	Indirect
DBI_WY_2008_458	Data Review for the Clark Enterprises Oyster Ridge Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2008_459	Data Review of the All Natural Stone Oyster Ridge Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2008_460	None provided	Literature Review (file search)	Indirect
DBI_WY_2008_618	Class III Cultural Resource Inventory Report for the Lincoln County Hay Hollow Gravel Pit	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2008_668	A Class III Cultural Resource Inventory Of The Northwest Pipeline Kemmerer District Cps Locations, Lincoln County, Wyoming	Class III Survey	Indirect
DBI_WY_2008_1147	Data Review for Oyster Ridge Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2008_1148	Data Review of the All Natural Stone Oyster Ridge Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2008_2000	Class III Cultural Resource Inventory Report for the Crank Companies Elkol Road Reconstruction Project	Literature Review (file search), Class III Survey	Direct

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
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Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2008_2075	Data Review for the Alexander Clark Enterprises, LLC Oakley Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2008_2127	Chevron Mining Inc.'s North Block 2008 Exploration Plan- Revised Access Road Segments	Literature Review (file search)	Indirect
DBI_WY_2008_2361	AML 17H Road Improvements	Class III Survey	Indirect
DBI_WY_2008_3568	AML Project 17H Shovel Testing	Testing	Indirect
DBI_WY_2008_4034	Class III Cultural Report Regarding AML Project 17H, Kemmerer Area BLM Sites	Class III Survey	Indirect
DBI_WY_2009_18	A Cultural Resource Survey For The Ruby Pipeline Project: Wyoming Segment, Uinta And Lincoln Counties Wyoming No. 2008-38	Literature Review (file search), Class II Survey	Indirect
DBI_WY_2009_151	Data Review for All Natural Stone's Oyster Ridge Moss Rock Sale-2009	Literature Review (file search)	Indirect
DBI_WY_2009_661	Cultural CLearance for the RigidTech BLM Wareyard Communication Site and Access Road	Literature Review (file search)	Indirect
DBI_WY_2009_761	Data Review for Trail Energy Robert Barnes 24-2C Existing Upgraded Access Road	Literature Review (file search)	Indirect
DBI_WY_2009_917	Class III Cultural Resource Inventory Report for the Idaho Power Company Rocky Mountain Power Company Gateway West Transmission Line Geotechnical Bore Holes-Kemmerer Segment Sweetwater and Lincoln Counties, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2009_928	A Cultural Resource Survey for the Ruby Pipeline Project: Wyoming Segment-Lincoln and Uinta Counties, Wyoming	Literature Review (file search), Class III Survey, Testing	Direct
DBI_WY_2009_929	None provided	Class III Survey	Indirect
DBI_WY_2009_930	A Cultural Resource Survey for the Ruby Pipeline Project: Wyoming Segment-Lincoln and Uinta Counties, Wyoming. Volume 1-Lincoln County	Class III Survey, Testing	Indirect
DBI_WY_2009_931	A Cultural Resource Survey for the Ruby Pipeline Project: Wyoming Segment, Lincoln and Uinta Counties, WY, ADDENDUM I: Lek and Bell Butte Reroutes, Staging Areas, and Associated Access Roads	Literature Review (file search), Class III Survey, Testing	Indirect
DBI_WY_2009_966	Rocky Mountain Power Condition Anchor Replacement Project	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2009_1237	Data Review for All Natural Stone's Oakley Moss Rock Sale - 2010	Literature Review (file search)	Indirect
DBI_WY_2009_1263	Data Review for the Alexander Clark Enterprises, LLC. Oakley Moss Rock Sale - 2010	Literature Review (file search)	Indirect
DBI_WY_2010_90	Data Review for Elkol Grazing Allotment Renewal	Literature Review (file search)	Indirect
DBI_WY_2010_92	Data Review: Cumberland Flats Grazing Allotment Renewal	Literature Review (file search)	Indirect
DBI_WY_2010_381	Data Review: Fossil Country Museum Mountain Bike Race	Literature Review (file search)	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
(Sheet 9 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2010_933	Ruby Pipeline Project: A Class III Cultural Resources Inventory of a Proposed Mud Disposal Area, Lincoln County, Wyoming (Addendum 8)	Literature Review (file search), Class I survey	Indirect
DBI_WY_2010_956	Data Review for the All Natural Stone Oakley Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2010_1253	Data Review for All Natural Stone's Oakley Moss Rock Sale - 2011	Literature Review (file search)	Indirect
DBI_WY_2010_2435	Department of Environmental Quality proposal to reclaim coal mines, Kemmerer North Mine Group AML Project 17H	Class III Survey	Indirect
DBI_WY_2010_2632	A Cultural Resource Survey for the Ruby Pipeline Project: Wyoming Segment-Lincoln and Uinta Counties, Wyoming.	Class III Survey	Indirect
DBI_WY_2011_67	A Class III Cultural Resource Survey, US 189 Wildlife Crossings, WYDOT Project P111010, District 3, Uinta and Lincoln Counties, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2011_210	Data Review for Trail Energy Bell Butte 11-3 Existing Access Road	Literature Review (file search)	Indirect
DBI_WY_2011_217	Data Review for Qwest Encana Plant Fiber Optic Cable	Literature Review (file search)	Indirect
DBI_WY_2011_320	Data Review for Arvid Aase Paleontological Research Quarry and Access Road.	Literature Review (file search)	Indirect
DBI_WY_2011_467	Data Review for Kasey Homes Oakley Moss Rock Sale 2011	Literature Review (file search)	Indirect
DBI_WY_2011_499	Data Review for Alexander Clark Enterprises Oakley Moss Rock Sale 2011	Literature Review (file search)	Indirect
DBI_WY_2011_603	A Class III Cultural Resource Inventory of PacifiCorp/Rocky Mountain Power Company's Proposed Qwest Tap Line Project, Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2011_654	Class III Cultural Resource Inventory for the Questar Corporation Chevron-Kemmerer Pipeline in Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2011_666	Data Review for Northwest Pipeline GP Access Road BLM Temporary Use Permit for Ignacio-Sumas Pipeline Relocation	Literature Review (file search)	Indirect
DBI_WY_2011_773	Data Review for Qwest Questar Gas Meter Telecommunication Cable	Literature Review (file search)	Indirect
DBI_WY_2011_1067	Data Review for City of Kemmerer Green Hill Existing Access Road	Literature Review (file search)	Indirect
DBI_WY_2011_1089	A Class III Cultural Resource Inventory for the Northwest Pipeline GP Ignacio-Sumas Pipeline Kemmerer Mine Relocation Project, Lincoln County, Wyoming	Class III Survey, Testing, Data Recovery Plan	Indirect
DBI_WY_2011_2110	AML17G Brilliant No. 8	Class III Survey	Indirect
DBI_WY_2011_2375	Department of Environmental Quality Updated Proposal to Reclaim Coal Mines, Kemmerer Area, Hams Fork Spoils, AML Project 17H	Class III Survey	Indirect
DBI_WY_2011_2376	Department of Environmental Quality Follow-up on the Hams Fork Spoil Remediation AML Project 17H	Class III Survey	Indirect
DBI_WY_2011_2388	Wind River Materials - Schulthess Gravel Pit (SHPO File #011JRD007)	Class III Survey	Indirect
DBI_WY_2012_20	Data Review for Chevron Coal Lease Readjustment	Literature Review (file search)	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs (Sheet 10 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2012_213	Data Review for All Natural Stone Oakley Moss Rock Sale 2012	Literature Review (file search)	Indirect
DBI_WY_2012_214	Data Review for Alexander Clark Enterprises Oyster Ridge Moss Rock Sale 2012	Literature Review (file search)	Indirect
DBI_WY_2012_245	Data Review for AML Kemmerer 17H-1 D Existing Access Road	Literature Review (file search)	Indirect
DBI_WY_2012_310	A Class III Cultural Resource Inventory For The Northwest Pipeline GP Ignacio-Sumas Pipeline Kemmerer Mine Relocation Project, Lincoln County, Wyoming - Addendum: Additional Access Road	Class III Survey	Indirect
DBI_WY_2012_578	Data Review for S&N Stone Oakley Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2012_579	Data Review for Casey Malan Oakley Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2012_623	Cultural Resource Construction Monitoring and Open Trench Inspection for the Northwest Pipeline GP Ignacio-Sumas Pipeline Kemmerer Mine Relocation Project, Lincoln County, Wyoming	Monitor / Trench Inspection	Indirect
DBI_WY_2012_782	Data Review for the All Natural Stone Oakley Moss Rock Sale	Literature Review (file search)	Indirect
DBI_WY_2012_846	Data Review for Chevron Coal Lease Readjustment	Literature Review (file search)	Indirect
DBI_WY_2012_876	Data Review for Chevron Kemmerer Mine Coal Lease Readjustment	Literature Review (file search)	Indirect
DBI_WY_2012_894	A Class III Cultural Resource Survey, Diamondville Streets, Conroy Street (CT090-1), Bridge Over Ham's Fork, WYDOT Project BROS-0C12044, Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2012_1010	Gateway West Transmission Line Project: Results of a Class III Cultural Resources Inventory of the BLM-Preferred Alternative, Access Roads, and Ancillary Facilities in Carbon, Converse, Lincoln, Natrona, and Sweetwater Counties, Wyoming	Literature Review (file search), Class III Survey, Visual Contrast Rating, Testing	Indirect
DBI_WY_2012_1079	Gateway West Transmission Line Project: Class III cultural resources inventory of areas located outside of the BLM-preferred route	Literature Review (file search), Class III Survey, Visual Contrast Rating, Testing	Indirect
DBI_WY_2012_1911	Skull Point: A Preliminary Report of 48LN317	Testing	Indirect
DBI_WY_2012_2247	Northwest Pipeline GP Ignacio-Sumas Pipeline Kemmerer Mine Relocation Project, Discovery of Site 48LN4687 (FERC Docket No. CP12-98-000)	Testing	Indirect
DBI_WY_2012_2248	Northwest Pipeline GP, Ignacio-Sumas Kemmerer Mine Relocation Project, Revised Discovery Plan	Class III Survey	Indirect
DBI_WY_2012_2555	AML Project 17G, Brilliant 8 Underground Fire, Enlarged APE (70111570000348675218)	Class III Survey	Indirect
DBI_WY_2013_33	Data Review for the Northwest Pipeline Amoco/Chevron Comm Tower	Literature Review (file search)	Indirect
DBI_WY_2013_150	Data Review for S&N Stone Oakley Moss Rock Sale 2013	Literature Review (file search)	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
(Sheet 11 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2013_252	Data Review for Heritage Stone Oakley Moss Rock Sale 2013	Literature Review (file search)	Indirect
DBI_WY_2013_590	Class III Cultural Resource Inventory Report for the Coyote Spring Development; Cultural Case # 09013067	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2013_610	Data Review for S&N Stone Oakley Moss Rock Sale 2013	Literature Review (file search)	Indirect
DBI_WY_2013_619	Data Review for the Heritage Stone Oakley Moss Rock Sale 2013 (09013117; WYW-102160-02)	Literature Review (file search)	Indirect
DBI_WY_2013_620	Permit Authorizing The Sale Of Up To 20 Tons Of Moss Rock Manually Collected	Literature Review (file search)	Indirect
DBI_WY_2013_1789	Diamondville Streets, Conroy Street Bridge Over Ham’s Fork	Class III Survey	Indirect
DBI_WY_2013_2386	Class III Cultural Resource Inventory for AML 17G, The Kemmerer Nos. 1-3 Fires	Class III Survey	Indirect
DBI_WY_2014_75	Data Review Documentation for the Proposed Conversion of Livestock and Season of Use in the Carter Lease Allotment, Lincoln, Sweetwater, and Uinta Counties, Wyoming	Literature Review (file search)	Indirect
DBI_WY_2014_138	Data Review for Qwest Westmoreland Coal Fiber Optic Cable	Literature Review (file search)	Indirect
DBI_WY_2014_141	Data Review for Pacificorp Questar Meter Station Tap Line Amendment	Literature Review (file search)	Indirect
DBI_WY_2014_155	Data Review for Twin Creek Allotment Grazing Permit Renewals	Literature Review (file search)	Indirect
DBI_WY_2014_402	Class III Cultural Resource Inventory Report for the PacifiCorp Naughton Power Plant FGD Ponds 1 & 2 Closure Project	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2014_709	Data Review for Airport Allotment Grazing Permit Renewals	Literature Review (file search)	Indirect
DBI_WY_2014_727	Authorization Of Grazing Permit Renewal Within The Airport Allotment For Same Uses Previously Authorized For A Period Of Ten Years	Literature Review (file search)	Indirect
DBI_WY_2014_729	Data Review and Clearance for the South Moyer Allotment Grazing Permit Renewal	Literature Review (file search)	Indirect
DBI_WY_2014_742	Data Review for the North Moyer Allotment Grazing Permit Renewal	Literature Review (file search)	Indirect
DBI_WY_2014_799	Data Review for Robert Fox on the Airport Allotment Grazing Permit Renewal	Literature Review (file search)	Indirect
DBI_WY_2014_1186	Twin Creeks Coal Camp and Mines	National Register or Condition Assessment	Indirect
DBI_WY_2015_29	Data Review for Westmoreland Federal Coal Lease Readjustment: Tract 98	Literature Review (file search)	Indirect
DBI_WY_2015_35	Data Review for International Pedigree Stage Stop Sled Dog Race 2015 Special Recreation Permit	Literature Review (file search)	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
(Sheet 12 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2015_60	Data Review Documentation for the North Livestock Trailing Corridors in Lincoln and Sweetwater Counties, WY (09015025)	Literature Review (file search)	Indirect
DBI_WY_2015_73	Data review for the C. H. Smith and Oil Well Reservoir Cleanouts. Cultural Case #09015044	Literature Review (file search)	Indirect
DBI_WY_2015_78	Data review for the Tunnel Hill Reservoir Cleanout. BLM KFO cultural case # 09015045.	Literature Review (file search)	Indirect
DBI_WY_2015_176	Class III Cultural Resources Inventory of the Chicken Spring Development in Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2015_250	Class III Cultural Resources Inventory of Union Pacific Railroad's Positive Trail Control Poles, Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2015_275	Class III Cultural Resources Inventory for the Lincoln County Kemmerer Landfill Expansion, Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2015_364	Data Review Addendum Documentating the North Livestock Trailing Corridors in Lincoln and Sweetwater Counties, Wyoming (BLM Cultural Case Number: 09015025a)	Literature Review (file search)	Indirect
DBI_WY_2015_501	Data review documenting the previously identified historic resources in the Bear River SFA. BLM Cultural Case No. 09016005	Literature Review (file search)	Indirect
DBI_WY_2015_576	Results of a Class III Cultural Resource Investigation for AML 17-1: The Radiant Mine, Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2015_602	Class III Cultural Resource Inventory Report for the Mid-State Consultants, Lincoln County, Sage Junction to Kemmerer Fiber-Optic Line	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2015_2107	Union Pacific Railroad, Pocatello Subdivision-Lincoln County BLM Site (File Number 0006848431)	Class III Survey	Indirect
DBI_WY_2015_2329	Westmoreland Kemmerer, Inc., Kemmerer Mine. Wedge/North Block Development Area (TFN 6 5/170)	Testing	Indirect
DBI_WY_2016_218	Class III Cultural Resources Inventory of the Chicken Springs Development Water Well in Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2016_225	Kemmerer District CPS 1230, CPS 1255, and CPS 2017	Class III Survey	Indirect
DBI_WY_2016_226	Kemmerer District CPS 1230, CPS 1255, and CPS 2017	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2016_227	Kemmerer District CPS 1230, CPS 1255, and CPS 2017	Class III Survey	Indirect
DBI_WY_2016_425	Class III Cultural Resource Inventory report for Eleven BLM Slate Creek Allotment Reservoir Repairs. BLM Cultural Case No 09045013.	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2016_573	Class III Cultural Resource Inventory Report for the BLM Salt Spring Development in Lincoln County, Wyoming. BLM Cultural Case #09015055	Literature Review (file search)	Indirect
DBI_WY_2016_1510	AML Project 17H, The Radiant Mine	Class III Survey	Indirect
DBI_WY_2016_1826	Northwest Pipeline, LLC, 2016 Cathodic Protection Station 1408	Class III Survey	Indirect
DBI_WY_2016_2058	Slate Creek Allotment Reservoir Repairs	Class III Survey	Indirect
DBI_WY_2017_55	Updated Data Review for BLM's November 2017 Oil and Gas Lease Sale	Literature Review (file search)	Indirect

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
(Sheet 13 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2017_155	A Cultural Resources File Search for Northwest Pipeline LLC's 2017 Kemmerer Repairs, Lincoln County, Wyoming (Ecologic)	Literature Review (file search)	Indirect
DBI_WY_2017_653	Kemmerer - Cokeville/Slide US 30, RM 46.50, Lincoln County, Wyoming: Results of a Cultural Resources Inventory	Literature Review (file search), Class III Survey, Testing	Indirect
DBI_WY_2018_53	Data Review for NRCS's Natural Resources Inventory Sampling Locations/Data Points	Literature Review (file search)	Indirect
DBI_WY_2018_91	Class III Cultural Resource Inventory Report for the Westmoreland Kemmerer, LLC North Gate Facilities Relocation Project Lincoln County, Wyoming (18-WAS-039)	Literature Review (file search), Class II Survey, Class III Survey, Testing	Indirect
DBI_WY_2018_159	A Class Iii Cultural Resource Inventory For Northwest Pipeline LLC's CPS 1474 AND CPS 2026Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2018_160	CPS 1474 and CPS 2026	Class III Survey	Indirect
DBI_WY_2018_305	Results Of A Class III Cultural Resource Inventory: US Highway 30, Kemmerer - Granger Jct., Kemmerer East, Opal Lincoln County, Wyoming	Class III Survey	Indirect
DBI_WY_2018_331	Data Review for the 4th Quarter Part 2 Oil and Gas Competitive Lease Sale. Cultural Case # 09018045.	Literature Review (file search)	Indirect
DBI_WY_2018_614	Data Review for BLM's 1st Quarter 2019 Oil and Gas Lease Sale	Literature Review (file search)	Indirect
DBI_WY_2018_648	Data Review Westmoreland Kemmerer Mine Coal Lease WYW-075207 Readjustment.	Literature Review (file search)	Indirect
DBI_WY_2018_716	A Class III Cultural Resource Inventory for the Wyoming Department of Transportation's Proposed Sage-Kemmerer, US 30 Relocate Project (No. N121115), Lincoln County, Wyoming	Literature Review (file search), Class III Survey, Testing	Indirect
DBI_WY_2019_1144	An Additional Class III Cultural Resource Inventory for the Wyoming Department of Transportation's Proposed Sage-Kemmerer, US 30 Relocate Project (No. N121115), Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2019_1415	Intensive Cultural Resource Inventory for the Proposed U.S. Fish & Wildlife Service North Fork Little Muddy Creek Channel Restoration Project	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2020_2	Class III Cultural Resources Inventory for All West Communications' Kemmerer to Interstate 80 Fiber Optic Project, Lincoln and Sweetwater Counties, Wyoming	Literature Review (file search), Class III Survey, Testing	Indirect
DBI_WY_2020_374	Class III Cultural Resource Inventory Report for the Union Wireless Company, Oyster Ridge Communications Site in Lincoln County, Wyoming (20-WAS-062)	Literature Review (file search), Class III Survey	Indirect
DBI_WY_2021_33	Results of a Class III Cultural Resource Inventory for AML 17.6B-BRS-5b: Cumberland Subsidence	Class III Survey	Indirect
DBI_WY_2021_256	Results of a Literature Review for the Abandoned Mine Land Division's Diamond 1 Project	Literature Review (file search)	Indirect
DBI_WY_2021_326	Clear Creek Expansion Project, Uinta and Lincoln Counties, Wyoming: Class III Cultural Resources Survey Report	Literature Review (file search), Class III Survey	Direct

Table 2.6-2 Previous Cultural Resource Surveys in the Direct and Indirect APEs
(Sheet 14 of 14)

Wyoming Investigation Number	Report Title	Type of Activity	Within/Outside Physical APE
DBI_WY_2021_444	Class III Cultural Resources Inventory Report for the Orphaned Well Fossil #1 Plug and Abandonment (T21 North, R117 West, Sections 14, 15, 23) Lincoln County, Wyoming	Literature Review (file search), Class III Survey	Indirect

Source: Data comes from WyoTrack Search No. 3563, February 22, 2022, and the WyoTrack database.

Table 2.6-3 Previous Cultural Resource Surveys in the Direct APE/Study Area

Wyoming Investigation Number	Project	Fieldwork Date	Field Organization	Client	Survey Type	Location	Identified Resources in Study Area
DBI_WY_2007_3089	Naughton - Ben Lomond Powerline	1974	No Data	Utah State University	Class III	1.67 km/1.04 mi N-S linear corridor in W section of macrocorridor, T20N R117W S2 and S11	None
DBI_WY_1999_89	Kemmerer Coal Co Project:Phase I	1975	World Wide Survey	Kemmerer Coal Co.	Class III	300 x 480 m (14.4 ha / 35.6 ac) patch at W elbow of macrocorridor, T20N R117W S11	None
DBI_WY_1999_2798	Transmission Line	1979	No Data	Utah Power and Light	Class III	2.96 km/1.84 mi N-S linear corridor in W section of macrocorridor, T21N R116W S32, T20N R117W S2 and S11	None
DBI_WY_1999_6410	Kemmerer-Bon Rico 25Kv Pwrln	1981	Brigham Young University	Utah Power and Light	Class III	N-S linear corridor crosses study area in two locations: (A) 0.40 km/0.25 mi in central section of macrocorridor, T20N R116W S7; (B) 0.95 km/0.59 mi near western edge of Site, T20N R116W S19.	None
DBI_WY_1999_7130	SCPF-011-2(1) Kemmerer South Hwy ROW	1982	Office of the Wyoming State Archaeologist	Wyoming Department of Transportation	Class III	N-S linear corridor crosses study area in two locations: (A) 1.18 km/0.73 mi in central section of macrocorridor, T20N R116W S7; (B) 1.66 km/1.03 mi near western edge of Site, T20N R116W S19.	48LN735; 48LN740
DBI_WY_1999_17750	US West Fiber Optics Cable Line	1994	TRC Environmental Corp.	US West Communications	Class III	1.11 km/0.69 mi N-S linear corridor in central section of macrocorridor, T20N R116W S7	48LN2939
DBI_WY_1999_11775	Naughton-Chappell Creek Pwrln	1995	Brigham Young University	Utah Power and Light	Class III	0.85 km/0.53 mi E-W linear corridor at N end of macrocorridor, T21N R116W S32	None
DBI_WY_2003_184	Kern River Expansion; Addendum	2001	Alpine Archaeological Consultants	Williams Northwest Pipeline, LLC	Class III	~154 x 310 m (4.8 ha / 11.8 ac) patch on E-W segment of macrocorridor near E elbow, T20N R116W S7.	None
DBI_WY_2006_4848	Overthrust Expansion Pipeline	ca. 2006	SWCA	Nat. Resource Grp and Questar Overthrust Pipeline Co.	Class III	~95 x 425 m (4 ha / 10 ac) patch on E-W segment of macrocorridor near E elbow, T20N R116W S7.	48LN735; 48LN2697
DBI_WY_2008_2000	Elkol Road Reconstruction	2009	Western Archaeological Services	Crank Co.	Lit. Review (file search),Class III Survey	0.55 km/0.34 mi NE-SW linear corridor in central section of macrocorridor, T20N R117W S12	None
DBI_WY_2009_928	Ruby Pipeline Project	2008-2009	Environmental Planning Group (EPG)	No Data	Lit. Review (file search),Class III Survey,Testing	310 x 420 m (13.02 ha / 32.17 ac) patch on E-W segment of macrocorridor near E elbow, T20N R116W S7.	None
DBI_WY_2021_326	Clear Creek Expansion Project	2020-2021	AECOM	Private Party	Lit. Review (file search),Class III Survey	235 x 345 m (8.1 ha / 20 ac) patch on E-W segment of macrocorridor near E elbow, T20N R116W S7.	None

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
(Sheet 1 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN19	P - lithic scatter	Unevaluated	Indirect
LN20	P - lithic scatter	Unevaluated	Indirect
LN21	H - structure	Unevaluated	Indirect
LN22	P - artifact scatter	Unevaluated	Indirect
LN23	P - artifact scatter	Unevaluated	Indirect
LN24	P - lithic scatter	Unevaluated	Indirect
LN25	P - lithic scatter	Eligible, Criterion D; unknown integrity	Indirect
LN26	P - artifact scatter	Unevaluated	Indirect
LN27	P - lithic scatter	Unevaluated	Indirect
LN28	P - lithic scatter	Unevaluated	Indirect
LN29	P - artifact scatter	Unevaluated	Indirect
LN30	H - Elkol Townsite	Unevaluated	Indirect
LN31	P - lithic scatter with possible Hearth Feature	Not Eligible	Indirect
LN41	H - J.C. Penney House	Listed, Criterion B; no integrity of setting	Indirect
LN103	P - artifact scatter	Not Eligible	Indirect
LN132	P - lithic scatter with possible Hearth Feature	Unevaluated	Indirect
LN134	P - lithic scatter	Not Eligible	Indirect
LN147	P - lithic scatter	Unevaluated	Indirect
LN159	P - lithic scatter	Not Eligible	Indirect
LN160	H - Twin Creeks Mines	Eligible, Criteria A, B, and D; unknown integrity	Indirect
LN163	P - lithic scatter	Not Eligible	Indirect
LN164	P - lithic scatter with hearth features and fire-cracked rock concentrations	Not Eligible	Indirect
LN167	P - open camp site	Eligible, Criterion D; unknown integrity	Indirect
LN210	H - building	Eligible (no site form); unknown integrity	Indirect
LN218	H - J.C. Penney H - District Landmark	Listed, Criteria A and B; unknown integrity	Indirect
LN219	H - coal fields	Unevaluated	Indirect
LN244	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN245	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN246	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN257	P - lithic scatter	Not Eligible	Indirect
LN259	P - open camp site	Unevaluated	Indirect
LN295	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN298	H - cairn	Unevaluated	Indirect
LN299	H - cairn	Unevaluated	Indirect
LN317	P - rock art with artifact scatter and fire-cracked rock	Eligible, Criterion D; unknown integrity	Indirect
LN329	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN331	P - lithic scatter	Not Eligible	Indirect
LN332	P - lithic scatter	Unevaluated	Indirect
LN358	P - lithic scatter	Not Eligible	Indirect
LN359	P - lithic scatter	Unevaluated	Indirect
LN388	P - lithic scatter	Not Eligible	Indirect
LN389	Not recorded	Unevaluated	Indirect
LN390	P - lithic scatter with fire-cracked rock	Unevaluated	Indirect
LN393	P - artifact scatter and fire-cracked rock	Eligible, Criterion D; unknown integrity	Indirect
LN394	P - lithic scatter	Unevaluated	Indirect
LN395	P - lithic scatter	Unevaluated	Indirect
LN396	P - artifact scatter	Unevaluated	Indirect
LN397	H - cairn	Unevaluated	Indirect
LN398	H - cairn	Unevaluated	Indirect
LN402	P - lithic scatter	Not Eligible	Indirect
LN403	P - lithic scatter	Not Eligible	Indirect
LN404	P - lithic scatter	Not Eligible	Indirect
LN408	P - lithic scatter with hearth features	Not Eligible	Indirect
LN409	P - lithic scatter	Not Eligible	Indirect
LN410	P - lithic scatter with hearth features	Not Eligible	Indirect
LN411	P - lithic scatter with fire-cracked rock	Unevaluated	Indirect
LN412	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN413	P - lithic scatter	Not Eligible	Indirect
LN414	P - lithic scatter	Not Eligible	Indirect
LN415	P - lithic scatter	Unevaluated	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
(Sheet 2 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN416	P - lithic scatter	Not Eligible	Indirect
LN417	P - lithic scatter	Not Eligible	Indirect
LN418	P - lithic scatter	Not Eligible	Indirect
LN419	P - lithic scatter	Not Eligible	Indirect
LN420	P - lithic scatter	Not Eligible	Indirect
LN421	P - lithic scatter	Not Eligible	Indirect
LN422	P - lithic scatter	Not Eligible	Indirect
LN423	P - lithic scatter	Not Eligible	Indirect
LN433	H - cairn	Unevaluated	Indirect
LN445	H - camp	Not Eligible	Indirect
LN446	H - camp	Not Eligible	Indirect
LN447	M/C - historic sheepherder camp and prehistoric lithic scatter	Not Eligible	Indirect
LN448	P - lithic scatter with stone circle	Not Eligible	Indirect
LN449	M/C - prehistoric lithic scatter and historic trash scatter	Not Eligible	Indirect
LN542	P - lithic scatter	Not Eligible	Indirect
LN543	P - artifact scatter with fire-cracked rock	Eligible, Criterion D; unknown integrity	Indirect
LN544	P - lithic scatter	Not Eligible	Indirect
LN545	P - lithic scatter	Not Eligible	Indirect
LN562	H - sheepherder camp	Not Eligible	Indirect
LN563	H - sheepherder camp	Not Eligible	Indirect
LN564	H - shed	Not Eligible	Indirect
LN565	H - artifact scatter and sheep camp	Not Eligible	Indirect
LN566	H - artifact scatter	Not Eligible	Indirect
LN567	H - railway and artifact scatter (Moyer Junction)	Not Eligible	Indirect
LN568	H - artifact scatter and sheep camp	Not Eligible	Indirect
LN569	H - artifact scatter and sheep camp	Not Eligible	Indirect
LN570	H - sheepherder camp	Not Eligible	Indirect
LN571	H - sheepherder camp	Not Eligible	Indirect
LN572	M/C - historic sheepherder camp and prehistoric lithic scatter	Not Eligible	Indirect
LN573	P - artifact scatter with fire-cracked rock	Eligible, Criterion D; unknown integrity	Indirect
LN574	H - sheepherder camp	Not Eligible	Indirect
LN575	H - artifact scatter	Not Eligible	Indirect
LN576	H - sheepherder camp	Not Eligible	Indirect
LN577	P - lithic scatter	Not Eligible	Indirect
LN578	H - sheepherder camp	Not Eligible	Indirect
LN579	M/C - prehistoric camp and historic trash scatter	Eligible, Criterion D; unknown integrity	Indirect
LN580	H - sheepherder camp	Not Eligible	Indirect
LN581	P - lithic scatter	Not Eligible	Indirect
LN582	P - lithic scatter	Not Eligible	Indirect
LN583	P - lithic scatter	Not Eligible	Indirect
LN584	M/C - prehistoric lithic scatter and historic sheepherder camp	Not Eligible	Indirect
LN639	P - fire-cracked rock concentration	Unevaluated	Indirect
LN640	M/C - prehistoric lithic scatter and historic artifact scatter and sheep camp	Unevaluated	Indirect
LN641	P - lithic scatter	Not Eligible	Indirect
LN642	P - lithic scatter with fire-cracked rock	Unevaluated	Indirect
LN643	M/C - prehistoric lithic scatter and historic artifact scatter	Unevaluated	Indirect
LN644	P - lithic scatter	Unevaluated	Indirect
LN660	H - Kemmerer Main Post Office	Listed, Criterion C; integrity of setting	Indirect
LN679	P - lithic scatter	Not Eligible	Indirect
LN680	P - lithic scatter	Not Eligible	Indirect
LN688	P - lithic scatter	Not Eligible	Indirect
LN689	P - camp and petroglyphs	Unevaluated	Indirect
LN690	H - sheepherder camp	Unevaluated	Indirect
LN691	M/C - prehistoric lithic scatter with fire-cracked rock and historic artifact scatter and sheep camps	Unevaluated	Indirect
LN692	H - artifact scatter and cairn	Not Eligible	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
(Sheet 3 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN693	M/C - prehistoric lithic source and historic artifact scatter and sheep camp	Not Eligible	Indirect
LN694	P - artifact scatter with hearth features	Not Eligible	Indirect
LN695	M/C - prehistoric artifact scatter with hearth features and historic artifact scatter and sheep camps	Eligible, Criterion D; unknown integrity	Indirect
LN696	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN697	M/C - prehistoric lithic scatter with rock alignment and historic artifact scatter and sheep camp	Not Eligible	Indirect
LN698	P - lithic source	Not Eligible	Indirect
LN699	M/C - prehistoric lithic scatter with fire-cracked rock and historic artifact scatter and sheep camp	Not Eligible	Indirect
LN700	M/C - prehistoric artifact scatter with fire-cracked rock and historic artifact scatter and sheep camp	Unevaluated	Indirect
LN701	P - open camp site	Unevaluated	Indirect
LN717	P - artifact scatter with fire-cracked rock	Eligible, Criterion D; unknown integrity	Indirect
LN718	H - artifact scatter	Unevaluated	Indirect
LN719	P - lithic scatter	Not Eligible	Indirect
LN721	P - petroglyph	Not Eligible	Indirect
LN722	M/C - prehistoric and historic rock shelters	Unevaluated	Indirect
LN725	H - sheepherder camp	Not Eligible	Indirect
LN726	H - artifact scatter	Not Eligible	Indirect
LN735	P - lithic and fire-cracked rock scatter	Not Eligible	Direct
LN736	H - artifact scatter	Not Eligible	Indirect
LN737	M/C - prehistoric lithic scatter with hearth features and fire-cracked rock concentrations; and historic artifact scatter and sheep camp	Not Eligible	Indirect
LN738	P - lithic scatter	Not Eligible	Indirect
LN739	P - lithic scatter with hearth features and fire-cracked rock concentrations	Not Eligible	Indirect
LN740	M/C - prehistoric artifact scatter with fire-cracked rock, and historic scatter and sheep camp	Eligible, Criterion D; unknown integrity	Indirect
LN741	M/C - prehistoric lithic scatter with fire-cracked rock, historic mine	Eligible, Criterion D; unknown integrity	Indirect
LN773	M/C - Prehistoric and historic rock piles	Eligible, Criterion D; integrity of setting	Indirect
LN774	P - lithic scatter	Not Eligible	Indirect
LN775	M/C - Prehistoric lithic scatter and historic camp	Not Eligible	Indirect
LN776	P - lithic scatter	Not Eligible	Indirect
LN777	P - lithic scatter	Not Eligible	Indirect
LN784	P - lithic scatter	Not Eligible	Indirect
LN785	M/C - Prehistoric lithic scatter and historic debris	Eligible, Criterion D; unknown integrity	Indirect
LN787	M/C - Prehistoric lithic scatter and historic debris	Eligible, Criterion D; unknown integrity	Indirect
LN792	P - lithic scatter with fire-cracked rock	Unevaluated	Indirect
LN793	H - artifact scatter and sheep camp	Not Eligible	Indirect
LN794	M/C - prehistoric lithic scatter, historic artifact scatter and sheep camp	Unevaluated	Indirect
LN795	P - artifact scatter with fire-cracked rock	Unevaluated	Indirect
LN796	P - lithic scatter	Unevaluated	Indirect
LN797	P - artifact scatter with fire-cracked rock	Unevaluated	Indirect
LN798	P - flake scatter	Unevaluated	Direct
LN799	H - sheepherder camp	Unevaluated	Direct
LN800	P - lithic scatter	Unevaluated	Indirect
LN801	M/C - historic sheepherder camp and prehistoric isolate	Unevaluated	Direct
LN802	H - sheepherder camp	Unevaluated	Direct
LN803	H - sheepherder camp	Unevaluated	Indirect
LN804	H - sheepherder camp	Unevaluated	Indirect
LN805	H - sheepherder camp	Unevaluated	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
(Sheet 4 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN806	M/C - prehistoric lithic source; and historic artifact scatter and sheep camp	Unevaluated	Indirect
LN807	P - lithic scatter with fire-cracked rock	Unevaluated	Indirect
LN808	M/C - prehistoric lithic source with fire-cracked rock concentrations, and historic artifact scatter and sheep camp	Unevaluated	Indirect
LN809	H - artifact scatter and sheep camp	Unevaluated	Indirect
LN810	P - lithic scatter with hearth features	Unevaluated	Indirect
LN811	M/C - prehistoric lithic scatter with fire-cracked rock; and historic artifact scatter and sheep camp	Unevaluated	Indirect
LN812	M/C - prehistoric lithic scatter with fire-cracked rock; and historic artifact scatter and sheep camp	Unevaluated	Indirect
LN813	P - lithic source	Unevaluated	Indirect
LN814	P - lithic source	Unevaluated	Indirect
LN821	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN822	P - lithic scatter with fire-cracked rock	Not Eligible	Indirect
LN823	P - lithic source and artifact scatter with fire-cracked rock	Not Eligible	Indirect
LN825	P - lithic scatter with fire-cracked rock concentration	Unevaluated	Indirect
LN826	P - artifact scatter with fire-cracked rock	Unevaluated	Indirect
LN827	P - artifact scatter	Unevaluated	Indirect
LN828	P - artifact scatter	Unevaluated	Indirect
LN829	P - artifact scatter with hearth features	Unevaluated	Indirect
LN842	H - artifact scatter	Unevaluated	Indirect
LN884	P - lithic scatter	Not Eligible	Indirect
LN885	H - sheepherder camp	Not Eligible	Indirect
LN886	P - lithic scatter	Not Eligible	Indirect
LN887	P - lithic and fire-cracked rock scatter	Not Eligible	Indirect
LN888	M/C - historic artifact scatter and prehistoric lithic scatter	Not Eligible	Indirect
LN889	M/C - prehistoric lithic scatter with historic artifact scatter	Not Eligible	Indirect
LN890	P - lithic scatter	Not Eligible	Indirect
LN891	P - lithic scatter	Not Eligible	Indirect
LN893	P - lithic scatter	Not Eligible	Indirect
LN894	H - hearth and artifact scatter	Not Eligible	Indirect
LN902	H - coal mine	Not Eligible	Indirect
LN903	H - sheepherder camp	Not Eligible	Indirect
LN904	H - sheepherder camp	Not Eligible	Indirect
LN908	H - sheepherder camp	Not Eligible	Indirect
LN947	H - Hamm's Fork Cutoff, Oregon Trail variant	Eligible, non-contributing segment; no integrity of setting	Indirect
LN954	M/C - prehistoric lithic scatter and historic Blazon Mine	Eligible, Criteria A and D; integrity of setting	Indirect
LN961	H - Conroy Mine	Unevaluated	Indirect
LN965	H - Town of Diamondville	Unevaluated	Indirect
LN966	H - Diamondville Cemetery	Unevaluated	Indirect
LN967	H - Elkol Mine	Unevaluated	Indirect
LN975	H - Structure	Eligible, Criterion D; unknown integrity	Indirect
LN976	H - Frontier No 3 Mine	Unevaluated	Indirect
LN977	H - Glencoe Mine and Townsite	Unevaluated	Indirect
LN979	H - Hamsfork Cemetery	Unevaluated	Indirect
LN980	H - Hams Fork (Stat) Cemetery	Unevaluated	Indirect
LN983	H - building	Unevaluated	Indirect
LN984	H - Catholic Church	Unevaluated	Indirect
LN985	H - Corner Restaurant	Unevaluated	Indirect
LN986	H - Structure	Unevaluated	Indirect
LN987	H - Kemmerer Hotel	Listed, Criteria A and C; integrity of setting	Indirect
LN988	H - Lincoln Co Courthouse	Listed, Criteria A and C; integrity of setting	Indirect
LN989	H - Methodist Church	Unevaluated	Indirect
LN990	H - Nurses Home	Unevaluated	Indirect
LN991	H - Westfall Building	Unevaluated	Indirect
LN993	H - Lincoln Star Mine	Unevaluated	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
(Sheet 5 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN1000	H - Moyer Junction Tunnel	Eligible, Criteria A and C; integrity of setting	Indirect
LN1003	H - Oakley Mine	Eligible, Criteria A, C, and D; integrity of setting	Indirect
LN1005	H - Phillip homestead cabin	Unevaluated	Indirect
LN1008	H - Radiant Mine	Eligible, Criterion D; integrity of setting	Indirect
LN1090	P - campsite	Not Eligible	Indirect
LN1104	P - lithic procurement	Not Eligible	Indirect
LN1168	P - campsite	Unevaluated	Indirect
LN1170	P - campsite	Unevaluated	Indirect
LN1174	P - lithic scatter and fired rock	Not Eligible	Indirect
LN1175	P - lithic scatter and fired rock	Not Eligible	Indirect
LN1176	P - lithic scatter	Not Eligible	Indirect
LN1203	P - campsite	Unevaluated	Indirect
LN1204	P - campsite	Unevaluated	Indirect
LN1205	H - sheepherder camp	Unevaluated	Indirect
LN1230	P - lithic scatter	Unevaluated	Indirect
LN1231	H - sheepherder camp	Unevaluated	Indirect
LN1256	H - Oasis Club	Not Eligible	Indirect
LN1257	H - Miyake Building	Eligible, Criterion C; integrity of setting	Indirect
LN1265	P - campsite	Unevaluated	Indirect
LN1266	P - campsite	Unevaluated	Indirect
LN1269	H - sheepherder camp	Unevaluated	Indirect
LN1272	H - Glencoe Mine	Eligible, Criteria A and D; integrity of setting	Indirect
LN1273	H - mine	Eligible, Criteria A and D; integrity of setting	Indirect
LN1276	H - coal mine	Not Eligible	Indirect
LN1314	P - lithic quarry	Unevaluated	Indirect
LN1367	P - lithic scatter	Not Eligible	Indirect
LN1368	M/C - prehistoric lithic scatter and historic sheepherder camp	Not Eligible	Indirect
LN1369	P - lithic scatter and possible campsite	Eligible, Criterion D; unknown integrity	Indirect
LN1370	P - lithic scatter	Not Eligible	Indirect
LN1371	P - lithic scatter	Not Eligible	Indirect
LN1372	P - lithic scatter	Not Eligible	Indirect
LN1373	M/C - prehistoric lithic scatter and sheepherder camp	Not Eligible	Indirect
LN1374	P - lithic scatter	Not Eligible	Indirect
LN1375	P - lithic quarry	Not Eligible	Indirect
LN1376	M/C - prehistoric lithic scatter and historic sheepherder camp	Not Eligible	Indirect
LN1377	M/C - prehistoric lithic scatter and historic mine shaft	Not Eligible	Indirect
LN1378	H - Conroy Railroad	Not Eligible	Indirect
LN1379	M/C - prehistoric lithic scatter and historic trash scatter	Not Eligible	Indirect
LN1380	P - lithic scatter	Not Eligible	Indirect
LN1381	P - lithic scatter	Not Eligible	Indirect
LN1382	P - lithic scatter	Not Eligible	Indirect
LN1383	P - campsite with associated lithic scatter	Eligible, Criterion D; unknown integrity	Indirect
LN1384	P - campsite	Not Eligible	Indirect
LN1385	P - lithic scatter	Not Eligible	Indirect
LN1386	P - lithic scatter	Not Eligible	Indirect
LN1387	P - campsite	Not Eligible	Indirect
LN1388	P - lithic scatter	Not Eligible	Indirect
LN1389	P - quarry and camp	Not Eligible	Indirect
LN1390	P - campsite	Not Eligible	Indirect
LN1391	P - lithic scatter	Not Eligible	Indirect
LN1392	P - lithic quarry and camp	Not Eligible	Indirect
LN1393	P - lithic scatter	Not Eligible	Indirect
LN1394	P - camp and lithic scatter	Not Eligible	Indirect
LN1395	P - lithic scatter	Eligible, Criterion D; unknown integrity	Indirect
LN1396	P - campsite	Eligible, Criterion D; unknown integrity	Indirect
LN1397	P - campsite	Eligible, Criterion D; unknown integrity	Indirect
LN1470	P - campsite	Unevaluated	Indirect
LN1471	P - campsite	Unevaluated	Indirect
LN1472	P - campsite	Unevaluated	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
(Sheet 6 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN1473	P - campsite	Unevaluated	Indirect
LN1474	P - campsite	Unevaluated	Indirect
LN1475	M/C - prehistoric open campsite and historic sheepherder camp	Unevaluated	Indirect
LN1476	M/C - prehistoric open campsite and historic sheepherder camp	Unevaluated	Indirect
LN1477	P - campsite	Not Eligible	Indirect
LN1478	M/C - prehistoric open campsite and historic sheepherder camp	Unevaluated	Indirect
LN1479	M/C - prehistoric open campsite and historic sheepherder camp	Unevaluated	Indirect
LN1480	P - campsite	Unevaluated	Indirect
LN1481	P - campsite	Unevaluated	Indirect
LN1482	P - campsite	Unevaluated	Indirect
LN1483	P - campsite	Unevaluated	Indirect
LN1484	P - campsite	Unevaluated	Indirect
LN1485	P - campsite	Unevaluated	Indirect
LN1486	P - lithic scatter	Unevaluated	Indirect
LN1487	P - campsite	Unevaluated	Indirect
LN1488	P - campsite	Unevaluated	Indirect
LN1489	P - campsite	Unevaluated	Indirect
LN1490	P - campsite	Unevaluated	Indirect
LN1491	P - campsite	Unevaluated	Indirect
LN1492	P - campsite	Unevaluated	Indirect
LN1493	P - campsite	Unevaluated	Indirect
LN1563	P - lithic scatter	Not Eligible	Indirect
LN1565	P - quarry	Unevaluated	Indirect
LN1585	H - camp/trash dump	Not Eligible	Indirect
LN1586	M/C - prehistoric lithic scatter/procurement and historic trash scatter	Unevaluated	Indirect
LN1587	P - lithic scatter	Not Eligible	Indirect
LN1588	P - lithic scatter	Not Eligible	Indirect
LN1606	H - bridge	Not Eligible	Indirect
LN1608	H - bridge	Not Eligible	Indirect
LN1609	H - bridge	Not Eligible	Indirect
LN1610	H - bridge	Not Eligible	Indirect
LN1611	H - bridge	Not Eligible	Indirect
LN1612	H - bridge	Not Eligible	Indirect
LN1613	H - bridge	Not Eligible	Indirect
LN1619	H - bridge	Not Eligible	Indirect
LN1662	M/C - prehistoric lithic scatter and historic herder camp site	Not Eligible	Indirect
LN1701	M/C - prehistoric and historic site -- no details; form not on file	Eligible -- form not on file	Indirect
LN1702	P - campsite	Not Eligible	Indirect
LN1703	P - lithic scatter	Not Eligible	Indirect
LN1704	P - campsite	Eligible -- form not on file; unknown integrity	Indirect
LN1705	M/C - prehistoric and historic site -- no details; form not on file	Not Eligible	Indirect
LN1706	P - camp	Not Eligible	Indirect
LN1707	P - unknown type, form not on file	Eligible -- form not on file; unknown integrity	Indirect
LN1708	P - unknown type, form not on file	Eligible -- form not on file; unknown integrity	Indirect
LN1709	P - campsite	Eligible -- form not on file; unknown integrity	Indirect
LN1710	P - campsite	Not Eligible	Indirect
LN1711	P - campsite	Not Eligible	Indirect
LN1712	P - campsite	Not Eligible	Indirect
LN1713	M/C - prehistoric campsite with historic artifact scatter	Not Eligible	Indirect
LN1714	P - lithic scatter	Not Eligible	Indirect
LN1715	M/C - prehistoric campsite with historic artifact scatter	Eligible -- form not on file; unknown integrity	Indirect
LN1716	P - campsite	Not Eligible	Indirect
LN1717	M/C - prehistoric campsite with historic artifact scatter	Not Eligible	Indirect
LN1718	P - campsite	Not Eligible	Indirect
LN1719	P - camp	Eligible (no site form); unknown integrity	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
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Site Number	Site Type[a]	Eligibility	APE Section
LN1720	P - campsite	Not Eligible	Indirect
LN1745	H - bridge	Not Eligible	Indirect
LN1833	P - camp	Eligible, Criterion D; unknown integrity	Indirect
LN1868	M/C - prehistoric open camp and petroglyphs; and historic emigrant rock carvings and historic trash	Not Eligible	Indirect
LN1966	P - lithic scatter	Not Eligible	Indirect
LN1967	P - campsite	Not Eligible	Indirect
LN2039	M/C - prehistoric lithic scatter with historic artifact scatter	Not Eligible	Indirect
LN2052	H - bridge	Not Eligible	Indirect
LN2053	H - bridge	Not Eligible	Indirect
LN2244	H - dump	Not Eligible	Indirect
LN2245	H - artifact scatter	Not Eligible	Indirect
LN2247	H - Kem-Sub Branch Railroad	Unevaluated	Indirect
LN2250	H - 1925 General Land Office trail	Not Eligible	Indirect
LN2310	H - artifact scatter	Not Eligible	Indirect
LN2311	P - stone circle	Unevaluated	Indirect
LN2312	M/C - historic oil field work camp/prehistoric open camp	Eligible, Criterion A; unknown integrity	Indirect
LN2313	M/C - prehistoric camp and historic oil well	Eligible, Criterion D; unknown integrity	Indirect
LN2314	P - camp	Not Eligible	Indirect
LN2315	M/C - prehistoric camp and historic artifact scatter	Eligible, Criterion D; unknown integrity	Indirect
LN2316	P - camp	Not Eligible	Indirect
LN2317	P - camp	Not Eligible	Indirect
LN2318	P - camp	Eligible, Criterion D; unknown integrity	Indirect
LN2319	P - camp	Not Eligible	Indirect
LN2320	P - camp	Not Eligible	Indirect
LN2327_1, _9, _25, etc.	H - Oregon Shortline Railroad	Eligible, Criterion A (segment 25 contributing); unknown integrity	Indirect
LN2335	P - small camp	Not Eligible	Indirect
LN2336	P - small camp	Not Eligible	Indirect
LN2383	H - Bridge	Not Eligible	Indirect
LN2434	P - fire cracked rock scatter	Not Eligible	Indirect
LN2469	P - Blacks Fork Lithic Landscape	Not Eligible	Indirect
LN2484	P - open occupation	Eligible (no site form); unknown integrity	Indirect
LN2504	H - Frontier townsite	Eligible, Criteria A and C; unknown integrity	Indirect
LN2583	P - open occupation	Not Eligible	Indirect
LN2584	P - open occupation	Not Eligible	Indirect
LN2587	H - Hall Coal Mine	Not Eligible	Indirect
LN2588	H - adit	Not Eligible	Indirect
LN2632	H - Diamondville #1 Mine	Not Eligible	Indirect
LN2652	M/C - prehistoric open occupation and lithic scatter, and historic sheep camp	Not Eligible	Indirect
LN2654	P - open camp	Eligible, Criterion D; unknown integrity	Indirect
LN2655	P - open camp	Not Eligible	Indirect
LN2656	P - open camp	Not Eligible	Indirect
LN2657	H - scatter	Not Eligible	Indirect
LN2658	H - sheepherder camp	Not Eligible	Indirect
LN2667	P - open camp	Not Eligible	Indirect
LN2681	H - trash dumps	Not Eligible	Indirect
LN2682	H - trash scatter	Not Eligible	Indirect
LN2683	P - open camp	Not Eligible	Indirect
LN2684	P - open camp	Not Eligible	Indirect
LN2685	M/C - prehistoric open camp and historic trash scatter	Not Eligible	Indirect
LN2686	P - open camp	Not Eligible	Indirect
LN2687	P - open camp	Not Eligible	Indirect
LN2688	P - open camp	Not Eligible	Indirect
LN2689	M/C - prehistoric open camp and scattered historic trash	Not Eligible	Indirect
LN2690	M/C - prehistoric open camp and historic trash scatter and cairn	Unevaluated	Indirect
LN2691	P - open camp	Unevaluated	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs (Sheet 8 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN2692	M/C - historic coal mine and prehistoric open camp	Not Eligible	Indirect
LN2693	H - telephone line	Not Eligible	Indirect
LN2694	M/C - prehistoric open cam and historic trash scatter	Not Eligible	Indirect
LN2695	P - open camp	Not Eligible	Indirect
LN2696	P - open camp	Not Eligible	Indirect
LN2697	H - Cumberland Branch Union Pacific Railroad	Eligible, Criterion A; integrity of setting	Direct
LN2698	M/C - prehistoric lithic reduction locality and open camp, and historic trash scatter	Not Eligible	Indirect
LN2699	M/C - historic depression and trash scatter and prehistoric debris scatter	Not Eligible	Indirect
LN2700	H - Kemmerer-Evanston Highway	Eligible, Criterion A, not contributing segment	Indirect
LN2701	H - road	Not Eligible	Indirect
LN2702	P - camp	Not Eligible	Indirect
LN2705	H - U.S. Highway 30	Not Eligible	Indirect
LN2731	M/C - prehistoric camp and historic trash scatter	Not Eligible	Indirect
LN2732	P - camp	Not Eligible	Indirect
LN2733	P - camp	Not Eligible	Indirect
LN2734	P - camp	Not Eligible	Indirect
LN2735	M/C - prehistoric camp and historic rock foundation	Eligible, Criterion D; unknown integrity	Indirect
LN2736	M/C - prehistoric camp and historic cairns	Eligible, Criterion D; unknown integrity	Indirect
LN2737	M/C - prehistoric camp and historic trash scatter	Not Eligible	Indirect
LN2739	H - Kemmerer-Cumberland Highway	Eligible, Criterion A; integrity of setting	Indirect
LN2751	P - unknown	Not Eligible	Indirect
LN2827	M/C - prehistoric camp and historic trash scatter	Not Eligible	Indirect
LN2828	H - trash scatter	Not Eligible	Indirect
LN2829	P - camp	Not Eligible	Indirect
LN2830	M/C - prehistoric camp and historic foundation	Not Eligible	Indirect
LN2831	P - camp	Not Eligible	Indirect
LN2832	P - camp	Not Eligible	Indirect
LN2833	P - camp	Eligible, Criterion D; unknown integrity	Indirect
LN2834	P - camp	Not Eligible	Indirect
LN2835	P - camp	Not Eligible	Indirect
LN2836	P - camp	Not Eligible	Indirect
LN2837	H - section corner marker	Not Eligible	Indirect
LN2864	P - camp	Not Eligible	Indirect
LN2931	P - camp	Not Eligible	Indirect
LN2932	P - camp	Not Eligible	Indirect
LN2933	M/C - prehistoric lithic scatter and historic trash scatter	Not Eligible	Indirect
LN2934	P - lithic scatter	Not Eligible	Indirect
LN2935	M/C - historic trash scatter and prehistoric isolate	Not Eligible	Indirect
LN2936	H - trash scatter	Not Eligible	Indirect
LN2937	P - camp	Not Eligible	Indirect
LN2938	H - cairn	Not Eligible	Indirect
LN2939	P - camp	Not Eligible	Direct
LN2940	M/C - historic hearth and prehistoric isolate	Not Eligible	Indirect
LN2941	M/C - prehistoric lithic scatter and historic isolated find	Not Eligible	Indirect
LN2942	P - camp	Not Eligible	Indirect
LN2943	P - lithic scatter	Not Eligible	Indirect
LN3063	P - unknown	Eligible (no site form); unknown integrity	Indirect
LN3203	P - Hams Fork Lithic Landscape	Not Eligible	Direct
LN3218	H - structure	Not Eligible	Indirect
LN3292	M/C - prehistoric lithics, ceramics, and bone and historic artifacts	Eligible, Criterion D; unknown integrity	Indirect
LN3293	P - artifact scatter	Not Eligible	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
(Sheet 9 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN3295	P - fire cracked rock scatter	Not Eligible	Indirect
LN3296	H - trash scatter/stockherding camp	Not Eligible	Indirect
LN3381	H - structure	Eligible (no site form); unknown integrity	Indirect
LN3711	H - Kemmerer Power Plant	Eligible, Criterion A; unknown integrity	Indirect
LN3746	P - artifact scatter	Not Eligible	Indirect
LN3765	P - flakes and cores	Eligible, Criterion D; no integrity of setting	Indirect
LN3766	H - unknown site	Not Eligible	Indirect
LN3767	H - debris with feature	Not Eligible	Indirect
LN3768	P - camp	Not Eligible	Indirect
LN3769	H - debris with feature	Not Eligible	Indirect
LN3833	H - debris	Not Eligible	Indirect
LN3888	H - Kemmerer Warehouse	Not Eligible	Indirect
LN3963	P - camp	Unevaluated	Indirect
LN3964	P - lithics and fire cracked rock	Unevaluated	Indirect
LN3965	H - sheep camp	Unevaluated	Indirect
LN3966	P - lithics and fire cracked rock	Unevaluated	Indirect
LN4001	H - structure	Unevaluated	Indirect
LN4002	H - structure	Not Eligible	Indirect
LN4007	H - scatter	Not Eligible	Indirect
LN4008	H - scatter	Not Eligible	Indirect
LN4009	H - culvert	Not Eligible	Indirect
LN4011	P - camp	Eligible, Criteria A and D; no integrity of setting	Indirect
LN4012	M/C - prehistoric lithic scatter and historic culvert	Not Eligible	Indirect
LN4014	H - Oakley Mine	Not Eligible	Indirect
LN4016	H - mine	Unevaluated	Indirect
LN4017	H - mining portal	Unevaluated	Indirect
LN4018	H - dump	Not Eligible	Indirect
LN4023	H - Blazon Service Mine	Not Eligible	Indirect
LN4024	H - coal mine	Not Eligible	Indirect
LN4025	H - Blazon residential area	Eligible, Criteria A and D; unknown integrity	Indirect
LN4026	H - Blazon Railroad spur	Eligible, Criteria A and C; integrity of setting	Indirect
LN4028	P - campsite	Not Eligible	Indirect
LN4065	H - coal mine	Unevaluated	Indirect
LN4066	M/C - historic No. 3 Mine and prehistoric isolate	Not Eligible	Indirect
LN4067	H - artifact scatter	Not Eligible	Indirect
LN4068	M/C - historic coal mine and prehistoric lithic scatter	Not Eligible	Indirect
LN4069	H - Pacific Coal Mine	Unevaluated	Indirect
LN4070	M/C - prehistoric and historic artifact scatter	Not Eligible	Indirect
LN4071	M/C - historic mine and prehistoric camp	Eligible, Criterion D; no integrity of setting	Indirect
LN4072	M/C - historic mine and prehistoric multiple use area	Not Eligible	Indirect
LN4073	M/C - historic mine and prehistoric resource utilization area	Not Eligible	Indirect
LN4074	M/C - prehistoric lithic scatter and historic residential	Not Eligible	Indirect
LN4185	H - debris scatter	Not Eligible	Indirect
LN4188	M/C - historic debris scatter and prehistoric isolate	Not Eligible	Indirect
LN4193	M/C - prehistoric lithic scatter with historic debris	Not Eligible	Indirect
LN4194	H - debris scatter	Not Eligible	Indirect
LN4195	M/C - prehistoric lithic scatter with historic debris	Eligible, Criterion D; integrity of setting	Indirect
LN4197	H - debris scatter	Not Eligible	Indirect
LN4198	H - dump	Not Eligible	Indirect
LN4199	H - debris scatter	Not Eligible	Indirect
LN4200	P - lithic scatter	Not Eligible	Indirect
LN4205	H - debris scatter	Not Eligible	Indirect
LN4235	H - road	Not Eligible	Indirect
LN4244	P - camp	Not Eligible	Indirect
LN4245	P - camp	Not Eligible	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
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Site Number	Site Type[a]	Eligibility	APE Section
LN4246	P - camp	Not Eligible	Indirect
LN4334	P - lithic and groundstone scatter	Not Eligible	Indirect
LN4373	P - lithic scatter	Not Eligible	Indirect
LN4377	P - fire-altered rock	Not Eligible	Indirect
LN4428	H - Glencoe Townsite	Eligible, Criterion A; no integrity of setting	Indirect
LN4429	P - lithic scatter	Not Eligible	Indirect
LN4430	Unknown	Not Eligible	Indirect
LN4431	Unknown	Not Eligible	Indirect
LN4455	H - artifact scatter	Not Eligible	Indirect
LN4456	H - cairn	Not Eligible	Indirect
LN4457	H - cairn	Not Eligible	Indirect
LN4458	H - cairn	Not Eligible	Indirect
LN4459	H - cairn	Not Eligible	Indirect
LN4460	H - cairn	Not Eligible	Indirect
LN4477	P - camp	Eligible, Criterion D; integrity of setting	Indirect
LN4522	P - lithic scatter	Not Eligible	Indirect
LN4534	P - camp	Not Eligible	Indirect
LN4543	H - The Turning Point (women's help center)	Eligible (no site form); unknown integrity	Indirect
LN4579	H - Oakley Townsite, Japanese Neighborhood	Eligible, Criteria A and D; unknown integrity	Indirect
LN4580	H - cairn	Not Eligible	Indirect
LN4642	H - debris scatter	Not Eligible	Indirect
LN4643	H - Cumberland No. 3 Mine Buildings and Townsite	Eligible, Criteria A and D; unknown integrity	Indirect
LN4648	H - debris scatter	Not Eligible	Indirect
LN4649	M/C - prehistoric camp and historic trash scatter	Not Eligible	Indirect
LN4650	P - camp	Not Eligible	Indirect
LN4651	H - debris scatter	Not Eligible	Indirect
LN4662	H - trash scatter	Not Eligible	Indirect
LN4663	H - debris scatter	Not Eligible	Indirect
LN4664	H - Hodges Pass/Moyer Junction Railroad Camp	Not Eligible	Indirect
LN4665	P - camp	Not Eligible	Indirect
LN4666	M/C - prehistoric camp and historic rock feature	Not Eligible	Indirect
LN4667	P - camp	Eligible, Criterion D; unknown integrity	Indirect
LN4668	M/C - prehistoric open camp and historic mine	Not Eligible	Indirect
LN4669	H - coal prospect	Not Eligible	Indirect
LN4670	P - lithic scatter	Not Eligible	Indirect
LN4671	M/C - prehistoric camp and historic trash scatter	Not Eligible	Indirect
LN4675	M/C - prehistoric lithic scatter and historic debris scatter	Not Eligible	Indirect
LN4676	H - Twin Creek Mine no. 2	Not Eligible	Indirect
LN4687	P - artifact scatter	Not Eligible	Indirect
LN4689	H - bridge	Not Eligible	Indirect
LN4735	P - camp	Eligible, Criterion D; no integrity of setting	Indirect
LN4741	P - camp	Not Eligible	Indirect
LN4742	P - camp	Not Eligible	Indirect
LN4743	P - camp	Not Eligible	Indirect
LN4758	H - debris scatter	Not Eligible	Indirect
LN4759	Unknown	Not Eligible	Indirect
LN4760	Unknown	Not Eligible	Indirect
LN4761	Unknown	Not Eligible	Indirect
LN4762	Unknown	Unevaluated	Indirect
LN4832	P - lithic scatter	Not Eligible	Indirect
LN4866	P - artifact scatter	Not Eligible	Indirect
LN4876	H - debris scatter	Unevaluated	Indirect
LN4877	H - debris scatter	Unevaluated	Indirect
LN4878	H - debris scatter	Unevaluated	Indirect
LN4879	H - debris scatter	Unevaluated	Indirect
LN4880	H - debris scatter	Unevaluated	Indirect

Table 2.6-4 Recorded Cultural Resources in the Direct and Indirect APEs
(Sheet 11 of 11)

Site Number	Site Type[a]	Eligibility	APE Section
LN8898	P - artifact scatter	Not Eligible	Indirect
LN8921	H - Fossil #1 well	Not Eligible	Indirect
LN8922	H - bromine dry well and debris scatter	Not Eligible	Indirect
LN8923	H - Dandy #37 Mine	Eligible, Criterion D; integrity of setting	Indirect
LN8924	H - Hoxsey Oil Co. Claim	Not Eligible	Indirect
UT2604	H - Adin Brown Ditch (site mis-plotted on WyoTrack)	Not Eligible	Indirect

[a] M/C = Multicomponent; H = Historic; P = Prehistoric.

Source: Data comes from WyoTrack Search No. 3563, February 22, 2022, and the WyoTrack database.

Table 2.6-5 Identified Cultural Resources, Direct APE/Study Area (Sheet 1 of 7)

Site No.	Previously Recorded?	Periods	Description	Setting	Artifacts	Features	Subsurface Potential?	NRHP Recommendation
48LN735	Yes	Prehistoric: Archaic period	Low density lithic and HAR scatter with deflated heaths; originally reported to cover 300 x 800 m - 240,000 sq m	Undulating plain	No artifacts observed on 2022 revisit	No features observed on 2022 revisit	No	Not eligible - destroyed/ exhausted
48LN740	Yes	Prehistoric: Early Archaic - Late Prehistoric. Historic: late 1800s - late 1900s	Artifact scatter; 260 x 528 m - 136,984 sq m	Undulating alluvial plain	Middle Archaic to Late Prehistoric projectile points (6 total, not all diagnostic), 9 bifaces (mostly fragmentary), 3 modified flakes, 3 manos, 1 hammerstone, and 106 obsidian, chert, and quartzite flakes. ~200 pieces scattered health-altered rock. Various types of metal cans (12), vessel glass (40), misc. historic objects (4)	19 clusters of 10 to 100 pieces of HAR in areas of 0.06 to 2.25 sq m; one bison wallow	Yes	Eligible - Criterion D
48LN798	Yes	Prehistoric	Low density lithic scatter; originally reported to cover 40 x 42 m - 1,680 sq m	Gentle slope - excavated spoil pile area	No artifacts observed on 2022 revisit	No features observed on 2022 revisit	No	Not eligible - destroyed/ exhausted
48LN799	Yes	Historic: 1920s	Sheepherder camp - various historic artifacts (cans, bottle, etc.); originally reported to cover 49 x 74 m - 3,636 sq m	Undulating plain - excavated spoil pile area	No artifacts observed on 2022 revisit	No features observed on 2022 revisit	No	Not eligible - destroyed/ exhausted
48LN801	Yes	Historic: 1900 - 1950	Historic scatter - possible sheepherder camp; 39 x 65 m - 2,559 sq m	Hilltop plain	Various types of metal cans (15), vessel glass (26), misc. historic objects (3)	None	No	Not eligible
48LN802	Yes	Historic: 2 components - artifact concentration, 1910-1920s; general scatter, 1940s-1960s	Historic scatter - possible sheepherder camp and general scatter; 91 x 166 m - 15,125 sq m	Small ridge	Various types of metal cans (29), vessel glass (2), misc. historic objects (3), plus contents of one feature (see right)	One concentration of historic artifacts, 4 x 4 m, including metal cans (23), vessel glass (12), and other items (3)	No	Not eligible
48LN2335	Yes	Prehistoric	Artifact scatter, 145 x 200 m - 29,122 sq m	Slope of knoll	One projectile point fragment, 21 mostly fragmentary bifaces, one each uniface, nodule, and mano; 114 pieces obsidian, chert, and quartzite debitage	1 cluster of 25 HAR in an area of 0.56 sq m	No	Not eligible
48LN2697_3	Overall, yes; this segment, no	Historic to Modern: 1900 to present	Active railroad alignment, 16 x 438 m - 7,017 sq m	Cumberland Flats bottoms	Active railroad grade	Active railroad grade with fill prism, gravel roadbed, ties, steel rails, etc.	No	WY-SHPO has determined 48LN2697 overall is eligible under Criterion A, but consultant recommends this segment as non-contributing due to loss of historic integrity.

Table 2.6-5 Identified Cultural Resources, Direct APE/Study Area (Sheet 2 of 7)

Site No.	Previously Recorded?	Periods	Description	Setting	Artifacts	Features	Subsurface Potential?	NRHP Recommendation
48LN2697_4	Overall, yes; this segment, no	Historic to Modern: 1900 to ca. 1970	Abandoned railroad bed, 15 x 1981 m - 31,704 sq m	Cumberland Flats bottoms	Very low-density scatter of metal cans (20), vessel glass (50), ceramics (20), railroad spikes (20), wood ties, and metal posts	Abandoned railroad bed prism, possibly with gravel roadbed removed. Remnants of a trestle over North Fork Little Muddy Creek at southern end of documented segment	No	WY-SHPO has determined 48LN2697 overall is eligible under Criterion A, but consultant recommends this segment as non-contributing due to loss of historic integrity.
48LN2939	Yes	Prehistoric	Low density lithic scatter with features, 21 x 138 m - 2,952 sq m	Rolling plain	Very low-density lithic scatter comprising one complete biface and two flakes	Two clusters of HAR, one consisting of ~15 HAR over 0.56 sq m; the other consisting of ~10 HAR over 0.25 sq m	No	Not eligible
48LN3203	Yes	Prehistoric	Hams Fork Lithic landscape-widespread diffuse scatter of flakes and tested clasts	Rolling plain	Surface exposure of Quaternary deposits of pebbles and cobbles of quartzite and various cherts derived from the Hams Fork Conglomerate Member of the Evanston formation, with a diffuse scatter at varying densities of primary and secondary flakes and tested clasts	None	No	Not eligible
48LN8940	No	Prehistoric: Late Archaic. Historic: early to late 1900s	Artifact scatter, 190 x 319 m - 60,974 sq m	Low ridge next to ephemeral stream with stabilized sand shadows	One Late Archaic and one non-diagnostic projectile point, 7 fragmentary and complete bifaces, cores, scraper and 2 utilized flakes, mano, and 76 pieces of obsidian, chert, and quartzite debitage. Various types of metal cans (7) and vessel glass (16); 2 miscellaneous items	13 clusters of HAR ranging from ~15 to ~50 pieces and covering from 0.3 to 2.7 sq m	Yes	Eligible - Criterion D
48LN8941	No	Prehistoric	Artifact scatter with features, 43 x 82 m - 3,563 sq m	Edge of Cumberland Flats	One complete biface, two utilized flakes, and four pieces of debitage	3 clusters of ~30 to ~50 pieces of HAR, covering from 1.8 to 3.7 sq m	No	Not eligible
48LN8942	No	Prehistoric	Artifact scatter with feature, 20 x 27 m - 555 sq m	Base of Oyster Ridge	One utilized flake, one metate, one piece of debitage	One cluster of ~20 pieces of HAR covering 1.6 sq m	No	Not eligible
48LN8943	No	Prehistoric	Artifact scatter with feature, 13 x 63 m - 827 sq m	Edge of ephemeral wash	One projectile point fragment and one flake	One cluster of ~7 pieces of HAR covering 0.06 sq m	No	Not eligible
48LN8944	No	Prehistoric: Middle Archaic	Artifact scatter with features, 24 x 49 m - 1,242 sq m	Undulating plain	One projectile point and five pieces of debitage	Two clusters of ~20 to ~30 pieces of HAR covering 0.8 to 1.7 sq m	No	Not eligible

Table 2.6-5 Identified Cultural Resources, Direct APE/Study Area (Sheet 3 of 7)

Site No.	Previously Recorded?	Periods	Description	Setting	Artifacts	Features	Subsurface Potential?	NRHP Recommendation
48LN8945	No	Prehistoric	Artifact scatter with features, 12 x 27 m - 332 sq m	Slope of small ridge	Four pieces of debitage	Three clusters of ~15 to ~20 pieces of HAR, covering 1.6 to 2.5 sq m	No	Not eligible
48LN8946	No	Historic: early to late 1900s	Artifact scatter with feature, 21 x 55 m - 1,172 sq m	Small ridge between washes	One tobacco tin, one brown bottle base, and 20 fragments of hand painted porcelain	One cluster of ~50 pieces of HAR, covering 2.3 sq m	No	Not eligible
48LN8947	No	Prehistoric with historic isolate	Artifact scatter with feature, 16 x 29 m - 491 sq m	Base of Oyster Ridge	Four pieces of prehistoric debitage and one 20th-century tobacco tin	One cluster of ~15 pieces of HAR, covering 1 sq m	No	Not eligible
48LN8948	No	Prehistoric with historic isolate	Artifact scatter with features, 61 x 123 m - 7,509 sq m	Base of Oyster Ridge	One core and 35 pieces of chert and chalcedony debitage, with one 20th-century tobacco tin and two pieces of clear bottle glass	Five clusters of ~10 to ~100 pieces of HAR, covering 1 to 4 sq m; three small piles of flakes, possibly from artifact surface collecting	No	Not eligible
48LN8949	No	Prehistoric. Historic: mid-1800s to late 1900s	Artifact scatter with feature, 44 x 86 m - 3,826 sq m	Ridge top	One fragmentary projectile point, one fragmentary and one complete biface, six pieces of obsidian and chert debitage; various types of cans, vessel glass fragments, and several miscellaneous historic artifacts	One rectangular depression of undetermined function	No	Not eligible
48LN8950	No	Prehistoric	Artifact scatter with features, 44 x 52 m - 2,368 sq m	Floodplain of North Fork Little Muddy Creek	One fragmentary projectile point, one biface fragment, and 16 pieces of chert and quartzite debitage	Eight clusters of 10 to 23 pieces of HAR, covering 0.4 to 1.9 sq m	No	Not eligible
48LN8951	No	Historic: mid-1800s to late 1900s	Artifact scatter, 77 x 111 m - 8,585 sq m	Low finger ridge	~110 metal cans and can fragments of various types, clear glass vessel fragments, various other artifacts (shoe soles, boot, vessels, bolts, architectural debris, automotive debris, etc.)	None	No	Not eligible

Table 2.6-5 Identified Cultural Resources, Direct APE/Study Area (Sheet 4 of 7)

Site No.	Previously Recorded?	Periods	Description	Setting	Artifacts	Features	Subsurface Potential?	NRHP Recommendation
48LN8952	No	Historic: mid-1800s to early 1900s	Artifact scatter with features, 176 x 304 m - 53,708 sq m	Alluvial flat of North Fork Little Muddy Creek	Various types of metal cans (38), vessel glass (122), whiteware sherds (100), scattered non-feature architectural materials, miscellaneous other items	1 cluster ~30 pieces of HAR covering ~1.9 sq m; 1 concentration of cans, earthenware sherds, and vessel glass fragments; 1 rectangular depression (~13.2 x 31.5 m); 9 brick concentrations, generally scatters or mounds of ~50 to ~1,000 disarticulated bricks covering 36 to 400 sq m-probable debris piles from structures located elsewhere.	No	Not eligible
48LN8953	No	Historic: mid-1800s to early 1900s	Artifact scatter, 49 x 60 m - 2,980 sq m	North Fork Little Muddy Creek floodplain	Various types of metal cans (8), vessel glass (66), whiteware sherds (31), and 8 other miscellaneous items	None	No	Not eligible
48LN8954	No	Prehistoric	Artifact scatter with feature, 13 x 43 m - 605 sq m	Cumberland Flats	One complete early-stage biface	One cluster of ~10 HAR covering 0.8 sq m	No	Not eligible
48LN8955	No	Prehistoric	Artifact scatter with feature, 88 x 148 m - 13,101 sq m	Cumberland Flats	One uniface, three fragmentary and one complete biface, one metate fragment, two tested cobbles, and 30 pieces of chert and quartzite debitage	Cluster of four sandstone cobbles in an area of 0.25 by 0.25 m, possibly pointing to Quealy Peak, 9 miles (10 kilometers) away	No	Not eligible
48LN8956	No	Prehistoric: Late Prehistoric	Artifact scatter with feature, 28 x 52 m - 1,516 sq m	Undulating plain	One projectile point fragment and two complete bifaces	One cluster of ~10 HAR covering 0.5 sq m	No	Not eligible
48LN8957	No	Prehistoric	Artifact scatter with feature, 28 x 35 m - 1,016 sq m	North Fork Little Muddy Creek floodplain	11 pieces of chert debitage and ~10 fragments of scattered non-feature HAR	One cluster of ~5 HAR covering 1 sq m	No	Not eligible
48LN8958	No	Prehistoric	Artifact scatter, 98 x 120 m - 11,874 sq m	North Fork Little Muddy Creek floodplain	One fragmentary projectile point, two scrapers, five mostly fragmentary bifaces, two utilized flakes, ~10 pieces of scattered HAR, and 13 pieces of chert and quartzite debitage.	None	No	Not eligible

Table 2.6-5 Identified Cultural Resources, Direct APE/Study Area
(Sheet 5 of 7)

Site No.	Previously Recorded?	Periods	Description	Setting	Artifacts	Features	Subsurface Potential?	NRHP Recommendation
48LN8959	No	Prehistoric: Late Prehistoric. Historic: late 1800s to mid-1900s	Artifact scatter with feature, 60 x 74 m - 4,503 sq m	Low ridge	One projectile point, five biface fragments, one knife, one mano, one metate fragment, seven pieces of quartzite and chert debitage. Historic artifacts comprise 5 cans of various types and 5 pieces of glass from a single vessel.	One cluster of ~10 HAR covering 0.7 sq m	No	Not eligible
48LN8960	No	Prehistoric	Artifact scatter, 42 x 48 m - 2,083 sq m	Slope of low ridge	16 pieces of randomly distributed chert and quartzite debitage	None	No	Not eligible
48LN8961	No	Prehistoric	Artifact scatter with features, 14 x 45 m - 633 sq m	North Fork Little Muddy Creek floodplain	One chert flake and ~10 pieces of scattered HAR	Two clusters of ~6 pieces of HAR each covering 0.14 to 0.25 sq m - both in a shallow wash	No	Not eligible
48LN8962	No	Prehistoric. Historic: mid-1800s to 1920s	Artifact scatter with feature, 56 x 68 m - 3,887 sq m	Undulating plain	One fragmentary projectile point, one fragmentary biface, and one quartzite flake. Historic artifacts comprise various types of cans, vessel glass, earthenware ceramic sherds, and one horseshoe.	One cluster of ~20 pieces of HAR covering 2.5 sq m.	No	Not eligible
48LN8963	No	Prehistoric	Artifact scatter, 22 x 48 m, 1,097 sq m	Undulating plain	Two fragmentary bifaces and 16 pieces of obsidian, chert, and quartzite debitage	None	No	Not eligible
48LN8964	No	Prehistoric	Artifact scatter with features, 28 x 48 m - 1,407 sq m	North Fork Little Muddy Creek floodplain	One chert flake	Three clusters of ~5 to ~10 HAR covering 0.06 to 0.5 sq m	No	Not eligible
48LN8965	No	Prehistoric. Historic: mid-1800s to 1920s	Artifact scatter, 58 x 88 m - 5,127 sq m	Low rise	Two fragmentary projectile points, two fragmentary bifaces, and 37 pieces of chert and quartzite debitage. Historic artifacts comprise 9 cans of various types and 5 pieces of vessel glass	None	No	Not eligible
48LN8966	No	Prehistoric: Late Prehistoric	Artifact scatter, 44 x 62 m - 2,763 sq m	North Fork Little Muddy Creek floodplain	Three diagnostic projectile point fragments, one biface fragment, one core, and 17 chert and quartzite flakes	None	No	Not eligible
48LN8967	No	Prehistoric. Historic: 1900 to present	Prehistoric artifact scatter with historic isolate, 44 x 57 m - 2,549 sq m	Alluvial plain	One core, one complete and one fragmentary biface, 23 pieces of quartzite and chert debitage, and two crushed hole-in-top cans	None	No	Not eligible
48LN8968	No	Prehistoric	Artifact scatter, 61 x 97 m - 6,032 sq m	Small knoll and adjoining wash	One projectile point fragment, two scrapers, one mano (GS-01), and 11 pieces of obsidian, chert, and quartzite debitage	Collector’s pile of chert and quartzite primary and secondary flakes in a 10 cm square area	No	Not eligible

Table 2.6-5 Identified Cultural Resources, Direct APE/Study Area (Sheet 6 of 7)

Site No.	Previously Recorded?	Periods	Description	Setting	Artifacts	Features	Subsurface Potential?	NRHP Recommendation
48LN8969	No	Prehistoric	HAR feature, 1 x 3 m - 5 sq m	Low ridge	None	One cluster of ~5 pieces of HAR in a 0.25 sq m area	No	Not eligible
48LN8970	No	Historic: early 1900s to 1960s	Artifact scatter, 15 x 21 m - 321 sq m	Floodplain	13 cans of various types, ~120 pieces of vessel glass and whole bottles, 2 shoe soles, 1 screw top lid	None	No	Not eligible
48LN8971	No	Prehistoric	Artifact scatter with feature, 12 x 25 m - 313 sq m	North Fork Little Muddy Creek floodplain	One chert flake	One cluster of ~8 pieces of HAR in a 0.6 sq m area	No	Not eligible
48LN8972	No	Prehistoric: Middle Archaic. Historic: mid-1800s to early 1900s	Artifact scatter with features, 118 x 164 m - 19,519 sq m	Low ridge	One non-diagnostic and one diagnostic projectile point fragment, six mostly fragmentary bifaces, two cores, one retouched flake, and 48 obsidian, chert, and quartzite debitage. Historic artifacts comprise 10 cans of various types and one piece of vessel glass.	Eight clusters of ~6 to ~30 pieces of HAR in areas of 0.2 to 3.2 sq m.	No	Not eligible
48LN8973	No	Prehistoric. Historic: mid-1800s to late 1900s	Artifact scatter, 88 x 101 m - 8,916 sq m	Ridge top	Two flakes and one metate. Historic artifacts comprise 48 cans of various types in generally deteriorated condition, one whole bottle and 11 glass fragments, and other miscellaneous items, including three horseshoes and four other items	None	No	Not eligible
48LN8974	No	Prehistoric	Artifact scatter with feature, 15 x 41 m - 656 sq m	Shallow wash	Three flakes-obsidian and chert	One cluster of ~20 pieces of HAR in a 1.3 sq m area	No	Not eligible
48LN8975	No	Prehistoric	Cultural feature, 9 x 11 m - 110 sq m	Undulating plain	None	Seven pieces of sandstone laid in the form of an X in a 0.5 x 0.5 m area, possibly representing a map marker oriented to Quealy Peak, 9 miles (10 kilometers) away	No	Not eligible
48LN8976	No	Prehistoric. Historic: mid-1800s to late 1900s	Artifact scatter with feature, 226 x 332 m, 75,147 sq m	Cumberland Flats bottoms, adjacent to Site 48LN 2697_4 (abandoned Cumberland Branch rail-road line)	Two chert flakes and one sandstone metate. Historic artifacts comprise ~160 scattered and highly deteriorated metal cans and fragments of various types, 14 vessel glass fragments, and other miscellaneous items	Small historic period animal pen with chute	No	Not eligible

Table 2.6-5 Identified Cultural Resources, Direct APE/Study Area (Sheet 7 of 7)

Site No.	Previously Recorded?	Periods	Description	Setting	Artifacts	Features	Subsurface Potential?	NRHP Recommendation
48LN8977	No	Prehistoric. Historic: 1920s	Historic artifact scatter with prehistoric isolate, 80 x 191 m, 15,475 sq m	Slope adjacent to Site 48LN 2697_4 (abandoned Cumberland Branch rail-road line)	One chert biface. Historic artifacts comprise 50 hole-in-cap cans (1840s to 1920s), 11 can fragments, 39 pieces of vessel glass, earthenware sherds, and other miscellaneous items	None	No	Not eligible
48LN8978_1	No	Historic to Modern: ca. 1900 to 1950	Abandoned railroad bed, 15 x 915 m - 13,725 sq m	Cumberland Flats bottoms	Sparse abandoned railroad ties	Abandoned railroad bed prism, possibly with gravel roadbed removed.	No	WY-SHPO has determined 48LN8978 overall.is eligible under Criterion A, but consultant recommends this segment as non-contributing due to loss of historic integrity.
48LN8979	No	Modern era: ca. 1977 to present	Active rail line, 15 x 350 m w/in surveyed area - 5,250 sq m	Cumberland Flats	Active railroad line, including subgrade prism, railbed, tracks, ties, etc.	Active railroad line, reconstructed 1990	No	Not eligible

Abbreviations: HAR – Heat-altered rock; m – Meter; sq m – Square meter. Source of table: Karpinski and Karpinski 2023

Table 2.6-6 Visually Sensitive Historic Properties Within A 5-Mile Radius of the Direct APE

Site Number	Site Description	Landowner
48LN317	Prehistoric rock art and camp	Private
48LN773	Prehistoric and historic rock cairns and artifact scatter	BLM and private
48LN1272	Glencoe Mine	Private
48LN1273	Lincoln Star Mine	Private
48LN2627_14	Oregon Shortline Railroad	BLM
48LN2739_1 and _2	Kemmerer to Cumberland Highway	Private
48LN4011*	Prehistoric artifact scatter and historic townsite (Glencoe)	Private
48LN4026	Blazon Railroad Spur	Private
48LN4428*	Historic Glencoe townsite	Private

* The contributing portion of 48LN4011 was re-recorded in 2006 as 48LN4428. The visual assessment was conducted from the same location for both sites.

Figure 2.6-1 Direct APE and Study Area Plotted on USGS Quadrangle Map Base

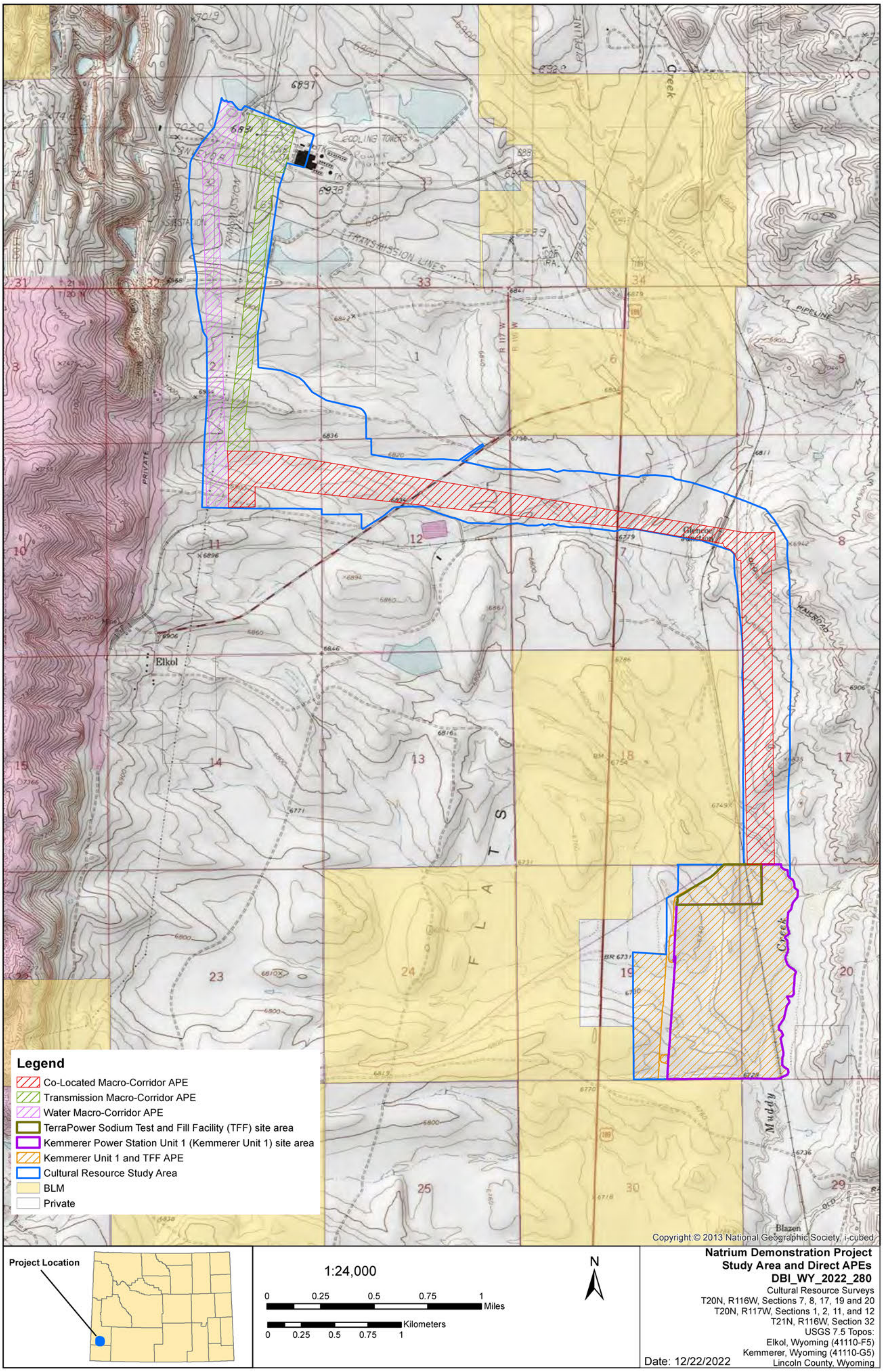


Figure 2.6-2 Direct APE and Study Area Plotted on Aerial Photograph Base

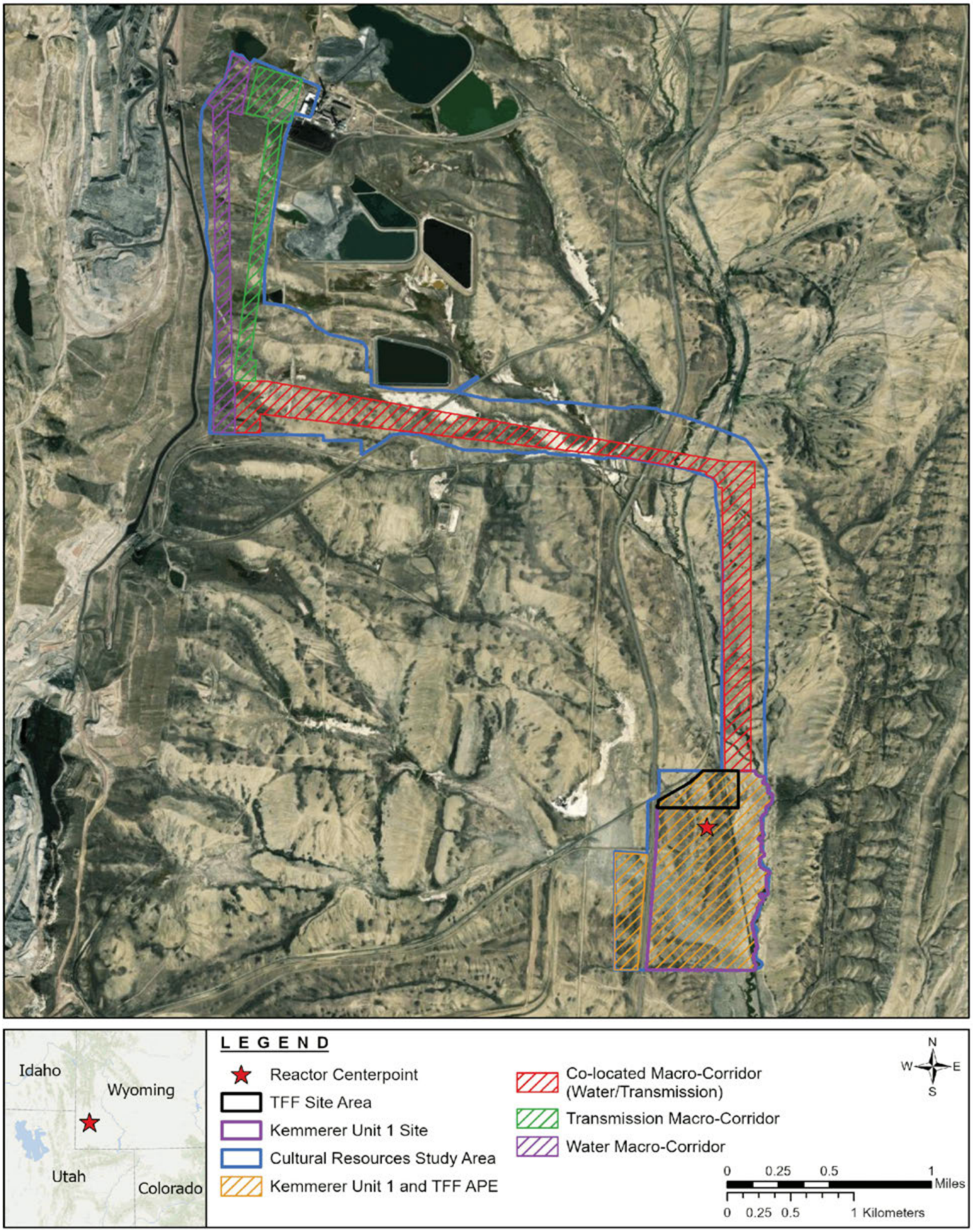


Figure 2.6-3 5-Mile Buffer Comprising Indirect (Visual Effects) APE

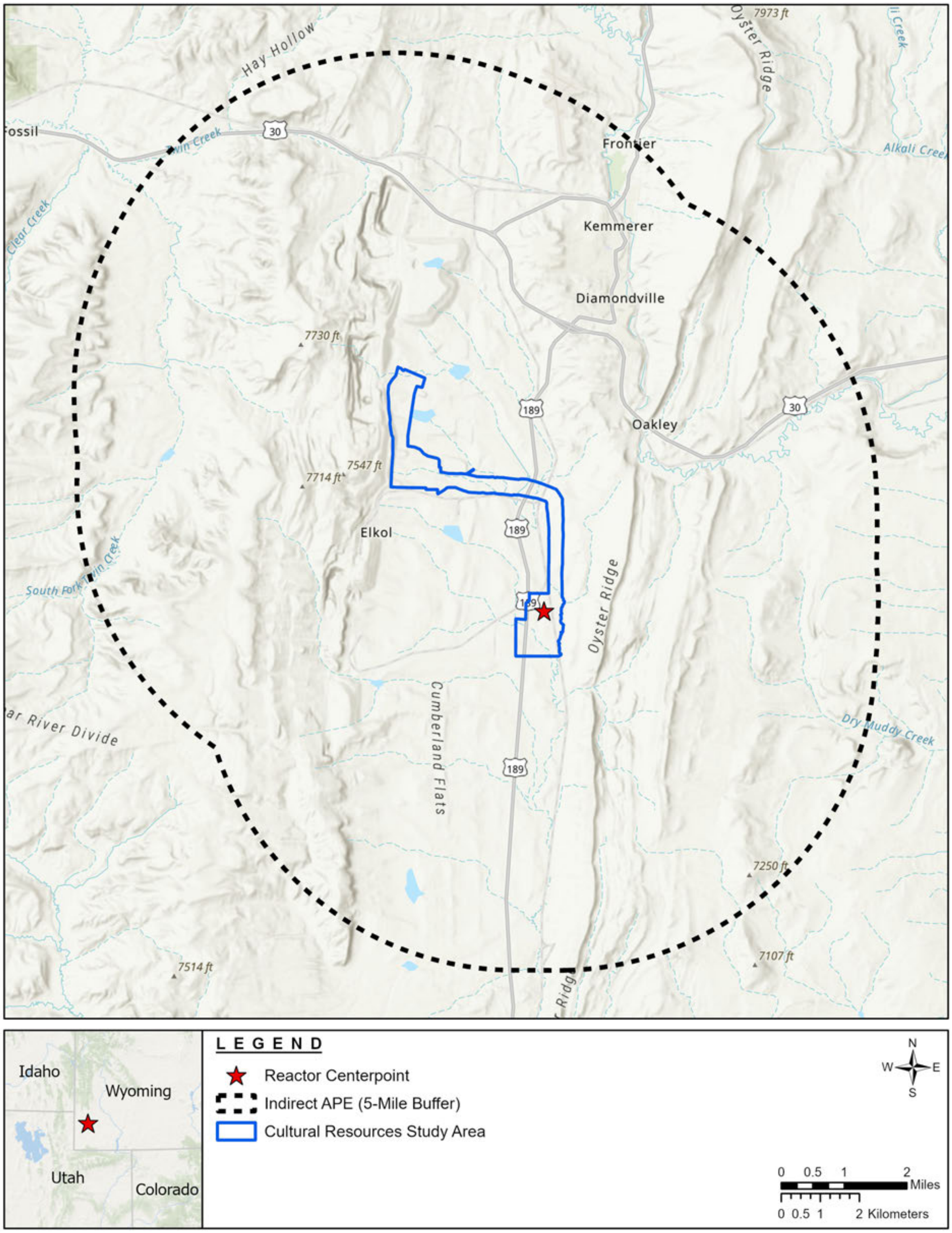
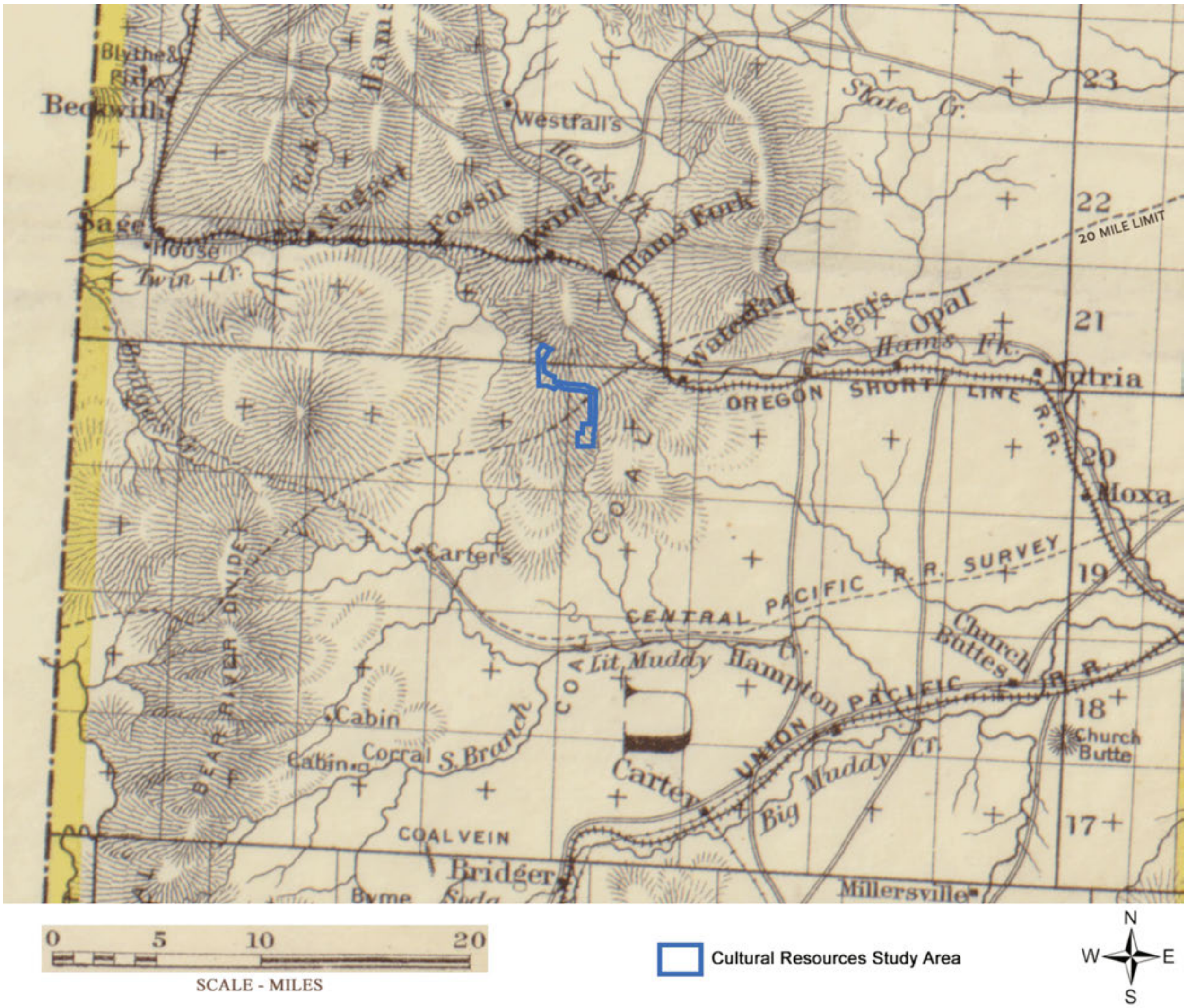


Figure 2.6-4 Direct APE Study Areas Plotted on Detail of Holt's New Map of Wyoming (Reference 2.6-12)



2.7 Air Resources

The regional and local climatological, meteorological, and air quality characteristics applicable to Kemmerer Unit 1 are described in this section. Site-specific meteorological information for use in evaluating building and operational impacts is provided.

2.7.1 Climate

Sources of climatological data used to characterize various aspects of the climate representative of the region around the Kemmerer Unit 1 Site are identified in this section.

2.7.1.1 Regional Climatology

The climate within the region of Kemmerer Unit 1, a radius of approximately 50 miles (80 kilometers), is described in this section. A summary of the regional meteorological conditions that provide a basis for the design and operating conditions of Kemmerer Unit 1 is also included. A climatological summary of normal and extreme values of relevant meteorological parameters is presented for the first-order National Weather Service (NWS) stations or Automated Surface Observing Systems (ASOS) stations.

2.7.1.1.1 Data Sources

Several sources of data are used to characterize local and regional climatological conditions pertinent to Kemmerer Unit 1. Global Historical Climatology Network daily and Local Climatological Data first-order stations were considered and evaluated. Station selection varied with respect to the parameter evaluated based on requisite data availability and coverage.

A detailed evaluation was performed which assessed meteorological stations within 50 miles (80 kilometers) of Kemmerer Unit 1 to determine the representativeness and applicability for use in determining extreme weather values. The objective of selecting nearby, offsite climatological monitoring stations is to demonstrate that the mean and extreme values measured at those locations are reasonably representative of conditions that might be expected to be observed at Kemmerer Unit 1. The evaluation determined that Evanston-Uinta County Burns Airfield Station was the most representative station for the determination of dry bulb and wet bulb temperatures. The Wyoming Kemmerer 2N and Wyoming Evanston 1E Cooperative Observer Program stations were used to perform the design-basis snow loads.

Data acquired by the NWS at Kemmerer Municipal Airport, Kemmerer, Lincoln, Wyoming, Automated Weather Observing System-3PT and from seven other nearby locations in the network of cooperative observer stations were used to evaluate precipitation, thunderstorm, and lightning capabilities as compiled and summarized by the National Climatic Data Center. These climatological observing stations are located in Lincoln, Teton, Sublette, and Sweetwater Counties in Wyoming, Bear Lake County in Idaho, and Cache County in Utah.

Table 2.7-1 identifies the specific stations used for extreme weather precipitation events and climate data and lists their approximate distance and direction from the Kemmerer Unit 1 reactor center point. Similarly, Figure 2.7-1 provides the station locations relative to Kemmerer Unit 1 used for regional weather data.

The identification of stations to be included was based on the following general considerations:

- Proximity to the site (i.e., within the nominal 50-mile [80-kilometer] radius indicated above, to the extent practicable)
- Topographical characteristics
- Terrain elevation
- Land use (urban versus rural)
- Adequacy of data collection (long, contiguous data sets with limited gaps)

If an overall precipitation or temperature condition was identified for a station located within a reasonable distance beyond the nominal 50 miles (80 kilometers), and that event was considered to be reasonably representative for the site, such stations were also included, regardless of directional coverage.

Data sources used in describing the climatological characteristics of the region, include:

- Water Resources Data System and State Climate Office (Reference 2.7-17)
- National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information State Climate Summaries 2022: Wyoming (Reference 2.7-6)
- Local Climatological Data Station Details. Evanston Uinta Co Burns Field, Wyoming U.S., Weather-Bureau-Army-Navy (WBAN):04111 NOAA (Reference 2.7-13)
- Global Historical Climatology Network Daily

2.7.1.1.2 General Climate

Kemmerer Unit 1, located in the southwestern portion of Wyoming at 6,947 feet (2,117 meters) in elevation, falls under the Köppen climate classification of Dfb (warm-summer humid continental), which is in a region influenced by both continental and mountainous influences (Reference 2.7-2). Since the mountain ranges lie in a general north-south direction, they are perpendicular to the prevailing westerlies; therefore, the mountain ranges provide effective barriers which force the air currents moving in from the Pacific Ocean to rise and drop much of their moisture along the western slopes. Wyoming is considered semi-arid east of the mountains. The prevailing westerly winds can bring weather systems and moisture from the Pacific Ocean, while the Rocky Mountains to the west block some of these systems, resulting in a rain shadow effect.

Kemmerer, Wyoming, experiences a semi-arid climate with distinct seasonal variations. According to information from the Water Resources Data System & State Climate Office (Reference 2.7-18) and NOAA National Centers for Environmental Information State Climate Summaries 2022 for Wyoming (Reference 2.7-6), high-pressure systems often bring fair weather, clear skies, and calm conditions to Kemmerer. These systems are associated with descending air and typically result in dry conditions. Low-pressure systems, on the other hand, can bring more variable and dynamic weather. They are associated with rising air and often lead to cloudiness, precipitation, and sometimes thunderstorms. Frontal systems, such as cold fronts and warm fronts, can influence weather patterns in Kemmerer. Cold fronts may bring cooler temperatures and precipitation, while warm fronts can bring milder temperatures and the potential for rain.

Wyoming has a relatively cool climate because of its elevation. Above 6,000 feet (1,829 meters), the temperature rarely exceeds 100 degrees Fahrenheit (38 degrees Celsius). The warmest parts of Wyoming are the lower portions of the Big Horn Basin, the lower elevations of the central and northeast portions, and along the east border. Temperatures in Wyoming have risen about 2.5 degrees Fahrenheit (1.4 degrees Celsius) since the beginning of the 20th century. Kemmerer experiences a wide range of temperatures throughout the year. Winters are typically cold, with temperatures often dropping below freezing. Summers are warm, with temperatures reaching the 80s Fahrenheit (upper 20s to low 30s Celsius) and occasionally higher.

The region tends to have low humidity levels, especially during the summer months. This low humidity can contribute to dry conditions and is typical of semi-arid climates.

Precipitation in Kemmerer is relatively low, and the area can be prone to drought conditions. Most precipitation occurs during the spring and early summer, with occasional thunderstorms. Winters are drier, with snowfall being the primary form of precipitation. Wyoming, like the rest of the Great Plains, is susceptible to droughts, which are occasionally severe. From 1999 to 2008, large portions of the State experienced drought conditions. The State then experienced several years of above average precipitation until 2012, which was Wyoming’s driest year since historical records began in 1895. By October 2012, almost 90 percent of the State was in “severe” drought (the U.S. Drought Monitor’s third-highest category of drought severity).

2.7.1.1.3 Regional Topography

The regional topography is not expected to influence meteorological instrumentation at Kemmerer Unit 1. The area around the plant out to 5 miles (8 kilometers) is relatively flat. The nearest ridgeline is located approximately 0.5 miles (0.8 kilometers) to the east and follows a north-south orientation. Figure 2.7-64 shows the local topography surrounding Kemmerer Unit 1. Figure 2.7-2 illustrates the terrain heights in each direction out to 50 miles (80 kilometers). The elevation does increase about 3,281 feet (1,000 meters) out towards 50 miles (80 kilometers) to the north and north-northwest of the site.

2.7.1.2 Normals, Means, and Extreme Climatological Conditions

Section 2.7.1.2 addresses the normal and period-of-record mean and extreme values for several standard weather elements representative of this climate setting (i.e., temperature, atmospheric water vapor, precipitations, and wind conditions).

2.7.1.2.1 Temperature and Humidity

The temperature and precipitation normals from 1991–2020 collected from the Evanston-Burns Field, Wyoming, first-order weather station that best represent Kemmerer Unit 1 are summarized in Table 2.7-3.

Normal daily mean temperatures are based on the mean daily maximum temperatures and the mean daily minimum temperatures across each month. The temperatures ranged from 13.6 to 82.0 degrees Fahrenheit (-10.2 to 27.8 degrees Celsius). The annual daily normal temperatures range from 21.7 to 67.5 degrees Fahrenheit (-5.7 to 19.7 degrees Celsius) and are represented in Table 2.7-3.

Table 2.7-4 and Table 2.7-5 show maximum and minimum hourly temperature data for each month of April 2022–April 2023 as obtained from the Kemmerer Unit 1 meteorological tower at the 33-foot (10-meter) sensor height.

Table 2.7-6 and Table 2.7-7 present the monthly design wet bulb temperature and the mean coincident dry bulb temperature for Kemmerer Unit 1 and Evanston, Wyoming. Table 2.7-6 presents the monthly maximum, minimum, and average dry bulb and wet bulb temperatures as well as the relative humidity obtained from the Kemmerer Unit 1 meteorological tower at the 33-foot (10-meter) sensor height. Table 2.7-7 wet bulb temperature values correspond to 0.4 percent, 2.0 percent, 5.0 percent, and 10.0 percent cumulative frequency of occurrence for the indicated month. These data were determined from the American Society of Heating, Refrigeration, and Air-Conditioning Engineers Weather Data Viewer (Reference 2.7-1). Data for Evanston, Wyoming reflect the period from 1999 to 2019.

2.7.1.2.2 Precipitation

Annual rainfall totals for the nearby observing stations based on 30-year normals are listed in Table 2.7-8. Naughton Power Plant, Big Piney, Wyoming, Evanston-Uinta County Airport-Burns Field, Wyoming, and Kemmerer, Wyoming weather monitoring stations present 30-year data that vary from 6.48 to 11.08 inches (16.46 to 28.14 centimeters). The table also presents annual precipitation data for the Kemmerer Unit 1, Naughton Power Plant, and Big Piney, Wyoming, weather stations. The local climatological data summary of normal rainfall totals for all of the stations above indicate that the seasonal maximum occurs during the month of May. Normal monthly precipitation totals ranged from 0.38 to 1.75 inches (0.97 to 4.45 centimeters) for the Evanston-Burns Field first-order station.

2.7.1.2.3 Wind Conditions

Based on a 30-year period of record, the local climatological data summary for the Big Piney Marbleton Airport station indicates that the annual prevailing wind direction is from the north-northwest approximately 12 percent of the time (Reference 2.7-18).

2.7.1.3 Severe Weather

Severe weather phenomena that affect Kemmerer Unit 1 and the region are considered in the design and operating bases. These phenomena include (but are not limited to) thunderstorms, lightning, and tornadoes.

2.7.1.3.1 Thunderstorms, Hail, and Lightning

Lincoln County has reported 22 thunderstorm wind events over the 30-year period from 1992–2022, six of which were in Kemmerer. The most damaging thunderstorms are usually those associated with the passage of a cold front or a squall line during the spring and summer. Kemmerer, Wyoming experiences thunderstorms throughout the year, but the peak season typically occurs from late spring to early fall. These storms can bring heavy rainfall, strong winds, lightning, and occasional hail. While large hailstorms are not as common as in some other regions, hailstones of varying sizes can be encountered during the peak thunderstorm season. Lincoln County, Wyoming reported 31 hail events over the 30-year period from 1992–2022, five of which occurred in Kemmerer. The most reported hailstone is 0.75 inches (1.9 centimeters) (Table 2.7-9).

Lightning is a common occurrence during thunderstorms. Thunderstorms in Kemmerer can produce frequent lightning strikes, particularly during the summer months. J. L. Marshall presented a methodology for estimating lightning strike frequencies which includes consideration of the attractive area of structures (Reference 2.7-8). His method consists of determining the number of lightning flashes to earth per year per square kilometer and then defining an area over which the structure can be expected to attract a lightning strike. Using the methods prescribed by Marshall, approximately three lightning flashes per year will occur in the vicinity of the site.

2.7.1.3.2 High Winds

No data for hurricane storms has been reported to be within 100 miles (161 kilometers) of the site based on the data from the NOAA National Centers for Environmental Information Storm Events Database, which includes NOAA's Office for Coastal Management Historical Hurricane Tracks (Reference 2.7-12). In lieu of hurricane and tropical cyclone data, high-wind event data was obtained from the NOAA National Centers for Environmental Information Storm Events Database.

A total of 485 high-wind events were recorded within a 100-mile (161-kilometer) radius of Kemmerer Unit 1 during the data collection period of 1996–2023. The first and last high wind events recorded during this data collection period occurred over 27.7 years and took place on January 1, 1996, and August 31, 2023 (Reference 2.7-11). Each event was assumed to be at its maximum intensity.

2.7.1.3.3 Tornadoes

Kemmerer experiences a relatively low frequency of tornadoes compared to the central United States The frequency and intensity of tornadoes are greatly diminished in comparison but do occur during the spring and summer months. Tornadoes have been observed during every month of the year, though approximately 50 percent of the annual total occurred during July. Tornado intensity is measured by the Enhanced Fujita Scale (EF). The weakest intensity (EF0) winds (40–72 miles per hour [18–32 meters per second]) occur more than half the time, producing minimal damage. Only two tornado events (EF1 on June 14, 1997 and EF0 on July 10, 2001) have been recorded in Lincoln County in La Barge and Opal from 1992–2022 (Reference 2.7-11). Tornadoes that form over water bodies are called waterspouts. Given Wyoming's inland location, waterspouts are uncommon.

Using 73.7 years of National Centers for Environmental Information compiled storm data, 49 tornadoes ranging in intensity from EF0 to EF2 on the Enhanced Fujita-Pearson scale, have been tracked within a 2-degree latitude and longitude area around the Kemmerer Unit 1 Site. No tornadoes with an EF3, EF4, or EF5 intensity were recorded.

2.7.1.3.4 Tropical Cyclones and Hurricanes

Tropical cyclones and hurricanes typically develop over tropical ocean waters and dissipate rapidly when passing over land masses and regions of cooler temperatures. Kemmerer Unit 1 is far from coastal areas, so the likelihood of hurricanes and tropical cyclones affecting the region is extremely low. However, remnants of tropical systems can occasionally bring increased rainfall and strong winds. High winds are assessed in Section 2.7.1.3.2.

2.7.1.3.5 Winter Precipitation

Ice Storms

Freezing rain and ice storms occur in Kemmerer, Wyoming with varying frequencies and durations from year to year. Freezing rain occurs when supercooled raindrops freeze upon contact with surfaces at or below freezing temperatures. Ice storms typically form in the winter when there is a layer of warm air aloft over a shallow layer of cold air near the surface. The probable maximum annual frequency of ice storms in Kemmerer depends on various factors and historical climate data. There have been zero ice storm events reported in Lincoln County, Wyoming over the 30-year period from 1992–2022 (Reference 2.7-12).

Snowfall and Snow Depth

Table 2.7-10 presents mean monthly and annual snowfall totals in the Kemmerer Unit 1 region. Snowfall is common November through May with stations at lower elevations experiencing five events per year on average, exceeding five inches (10-13 centimeters). Snow depths of 10–15 inches (25-38 centimeters) from a single storm can occur but are infrequent outside of the mountain areas. Due to the winds that frequently accompany snowstorms, drifts often occur which makes it difficult to accurately measure snowfall. Notable heavy snow occurred in Sheridan (north-central Wyoming) from April third through the fourth in 1955. Snowfall amounted to 39 inches (99 centimeters), water equivalent of 4.30 inches (10.9 centimeters) and blizzard conditions lasted more than 43 hours. Blizzard conditions are defined by high winds and low temperatures with snow. These conditions sometime last one to two days, but rarely does a severe blizzard last over three days.

Total annual snowfall varies considerably throughout Wyoming. Snowfall ranges from 60-70 inches (1.52-1.78 meters) at lower elevations in the east, 45-55 inches (1.14-1.4 meters) over drier portions in the southwest, 15-20 inches (0.38-0.51 meters) in the Big Horn Basin lower portion, and 30–40 inches (0.76-1.02 meters) on the sides where the Basin elevation ranges from 5,000–6,000 feet (1,524-1,829 meters). The mountains experience higher annual ranges of snowfall, well over 200 inches (5 meters). Both the Kemmerer 2N and Evanston 1E stations have the same probable maximum winter precipitation values of 8.2 inches (21 centimeters) and 7.6 inches (19 centimeters).

2.7.1.3.6 Droughts and Dust Storms

Dust storms, also known as sandstorms, occur when strong winds lift and carry loose particles of soil, dust, or sand, reducing visibility and potentially causing damage. Kemmerer, Wyoming, located in a relatively less arid region, may not experience frequent dust storms compared to more desert-like areas. The probability and frequency of dust storms in Kemmerer can vary depending on weather patterns and specific conditions. There have been zero dust storm events reported in Lincoln County, Wyoming over the 30-year period from 1992–2022 (Reference 2.7-11).

As mentioned in Section 2.7.1.1.2, the region tends to have low humidity levels, especially during the summer months. This low humidity can contribute to dry conditions and is typical of semi-arid climates. Wyoming is the fifth driest state and has been affected by moderate to severe drought since 1999. Drought is an ongoing concern in Kemmerer, and the region has experienced a range of drought events over the years. Notable droughts include the 1930s Dust Bowl Drought, which affected Kemmerer and the surrounding region that led to crop failures, dust storms, and economic hardship for many residents, and the 1950s Drought affected Kemmerer and much of the western United States with far reaching impacts on agriculture, water supplies, and ranching activities. The drought that occurred during the 20-year period in the western United States from 2000–2020 impacted Kemmerer and the western U.S with intermittent droughts, impacting water resources, agriculture, and contributing to wildfires in some instances.

2.7.1.4 Local Meteorology and Topography

Section 2.7.1.4.1 identifies the data resources used to develop the climatological descriptions and introduces information about the onsite meteorological monitoring program used to characterize the site-specific atmospheric dispersion conditions. Section 2.7.1.4.2 provides a discussion of the monthly and annual precipitation at Kemmerer Unit 1. Section 2.7.1.4.3 and Section 2.7.1.4.4 provide the average wind speed and wind direction for Kemmerer Unit 1 and a discussion on wind direction and persistence. Section 2.7.1.4.5 discusses the atmospheric stability at the site. Finally, Section 2.7.1.4.6 presents a comparative study between the Naughton Power Plant meteorological tower data and that of Kemmerer Unit 1.

2.7.1.4.1 Data Sources

In addition to nearby climatological observing stations described in Section 2.7.1.1.1, measurements from the Naughton Power Plant meteorological tower and the Kemmerer Unit 1 meteorological tower were used to characterize local climatological and dispersion conditions.

As discussed in Section 3.1, the infrastructure associated with the Naughton Power Plant, such as the Raw Water Settling Basin, PacifiCorp's intake structure on Hams Fork River, and tie-in to electric transmission lines, will be shared as practicable. As part of the pre-application meteorological monitoring program, an evaluation of the representativeness of the Naughton Power Plant meteorological data was evaluated to provide a basis for the use of the 3-year data set from the Naughton Power Plant meteorological tower. A description of each meteorological tower is provided below.

Naughton Power Plant Meteorological Tower

Naughton Power Plant has a 164-foot (50-meter) meteorological tower that collects wind speed, wind direction, and temperature at 33 feet (10 meters) and 164 feet (50 meters). Data from the Naughton Power Plant meteorological tower, used for onsite local meteorology and dispersion analyses, includes 3 years of data (2019, 2020, and 2021).

Kemmerer Unit 1 Meteorological Tower

The Kemmerer Unit 1 meteorological tower is a 197-foot (60-meter) meteorological tower that collects wind speed, wind direction, and temperature at 33 feet (10 meters) and 197 feet (60 meters). Data collection at the Kemmerer Unit 1 meteorological tower began in April 2022. Data from the Kemmerer Unit 1 meteorological tower has been compared to the Naughton Power Plant meteorological tower data.

To provide a comparison, in addition to the requisite 3 years of data collected at the Naughton Power Plant, 1 year of data collected at both the Naughton Power Plant and Kemmerer Unit 1 were analyzed (April 2022–April 2023). The data provided below includes a summary of the requisite 3 years of data at the Naughton Power Plant along with the comparative year of data validation.

Regional temperatures were collected at various stations including at the Kemmerer Unit 1 and Naughton sites, as provided in Table 2.7-69 through Table 2.7-71.

2.7.1.4.2 Precipitation

The monthly and annual percent frequency of precipitation are presented for Naughton Power Plant and Kemmerer Unit 1. A comparison of the data follows.

Naughton Power Plant

Monthly and Annual Percent Frequency of Precipitation

Table 2.7-11 presents the monthly and annual percent frequency of precipitation for Naughton Power Plant. The monthly percent frequency of occurrence of precipitation at Naughton Power Plant for the 3-year period from 2019–2021 ranged from 1.30 percent in July to 4.93 percent in May. Monthly percent frequency of occurrence of precipitation at Naughton Power Plant for April 2022–April 2023 ranged from 0.67 percent in July to 5.56 percent in April.

Annual Precipitation Wind Roses

Figure 2.7-3 through Figure 2.7-6 present 3-year annual average precipitation wind roses, graphical distributions of the direction from which the wind is blowing, at Naughton Power Plant from 2019–2021 and the period of April 2022–April 2023 for the 33-foot (10-meter) and 164-foot (50-meter) elevations. While the precipitation wind roses portray distributions of wind direction for only the hours in which precipitation was recorded, Figure 2.7-3 through Figure 2.7-6 show that the most frequent wind direction during precipitation was from the west to west-northwest.

Kemmerer Unit 1

Monthly and Annual Percent Frequency of Precipitation

Table 2.7-11 also presents the monthly and annual percent frequency of precipitation for Kemmerer Unit 1. Monthly percent frequency of occurrence of precipitation at Kemmerer Unit 1 for April 2022–April 2023 ranged from 0 percent in February to 4.7 percent in March. Additionally, from Table 2.7-8, monthly average precipitation at Kemmerer Unit 1 ranged from 0.00 inches (0.00 centimeters) in February to 0.72 inches (18.3 centimeters) in August for the April 9, 2022 to April 9, 2023 time period.

Annual Precipitation Wind Roses

Figure 2.7-7 and Figure 2.7-8 present annual precipitation wind roses at Kemmerer Unit 1 for the 33-foot (10-meter) and 197-foot (60-meter) elevations from April 2022–April 2023. The most frequent wind direction during precipitation was also from the west to west-northwest at the 10-meter level but was from the west-southwest at the 197-foot (60-meter) level.

Comparative Summary of Monthly and Annual Percent Frequency and Annual Precipitation Wind Roses for Naughton Power Plant and Kemmerer Unit 1

Although monthly values for the percent frequency of precipitation for Naughton Power Plant and Kemmerer Unit 1 vary between periods and sites, the annual values indicate that precipitation occurs only about 2 percent of the time in this region.

The most frequent wind direction during precipitation for both Naughton Power Plant and Kemmerer Unit 1 was from the west to west-northwest at the 33-foot (10-meter) level but was from the west-southwest at the 164-foot (50-meter) or 197-foot (60-meter) level. Both sites also showed a secondary peak from the north at the 33-foot (10-meter) level while the Kemmerer Unit 1 197-foot (60-meter) level showed a secondary peak from the west-northwest to north-northwest directions during the comparative period.

Comparative Local and Regional Precipitation Summary

The monthly and annual precipitation summary from Kemmerer Unit 1 for April 2022–April 2023 is presented with precipitation statistics from the Naughton Power Plant for 2019, 2020, 2021, 2019–2021, and April 2022–April 2023 and from NWS sites near Kemmerer Unit 1 in Table 2.7-8.

Comparing the Kemmerer Unit 1 monthly averages to the averages at the surrounding region indicates that overall, April 2022–April 2023 was atypical in that all sites observed greater than normal precipitation in late fall and winter and less than normal precipitation in late spring and summer. The magnitude of winter precipitation at Kemmerer Unit 1 was not as great, leading to an overall drier annual average than the surrounding sites.

Comparing Kemmerer Unit 1 and Naughton Power Plant precipitation values for April 2022-April 2023 suggests that in general the sites observed the same overall trend in rainfall with Kemmerer Unit 1 generally observing 0.1 inches (0.3 centimeters) to 0.3 inches

(0.8 centimeters) less rainfall per month than Naughton Power Plant. Months which differed by more than 0.3 inches (0.8 centimeters) include May (0.49 inches [1.2 centimeters]) and July (0.31 inches [0.79 centimeters]).

Overall, the data show that precipitation is highly variable across the region, with influences from isolated showers that may lead to a relatively large amount of precipitation recorded at one location while no precipitation at another. The 3-year period at Naughton Power Plant provides a base for an expected seasonal trend near the site; spring and fall observe higher precipitation amounts than winter, while summer brings more convective showers that generally result in a higher monthly average as well, though not in some years (July 2019, August 2020, and June 2021).

Table 2.7-10 presents mean monthly and annual snowfall totals at stations near Kemmerer Unit 1. The Kemmerer Airport is the nearest station with snowfall data available. This shows that a majority of snowfall in the region occurs during the period of November through January with amounts lessening February through April. Little to no snowfall can be expected June through September.

2.7.1.4.3 Average Wind Direction and Wind Speed Conditions

The distribution of wind direction and wind speed is an important consideration when characterizing the dispersion climatology of a site. Long-term average wind motions at the macro- and synoptic-scales (on the order of several thousand down to several hundred miles or kilometers) are influenced by the general circulation patterns of the atmosphere at the macro-scale and by large-scale topographic features (land-water interfaces such as coastal areas).

Site-specific or micro-scale (on the order of one mile [two kilometers] or less) wind conditions may reflect these larger-scale circulation effects, are influenced primarily by local and, to a lesser extent (in general), meso- or regional-scale (up to approximately 120 miles [200 kilometers]) topographic features. The average wind direction and wind speed conditions are presented below.

Average Wind Direction

Annual and seasonal wind rose plots and wind speeds for each of 16, 22.5-degree, compass sectors centered on north are presented.

Naughton Power Plant Annual and Seasonal Wind Rose Plots

Annual

Figure 2.7-9 and Figure 2.7-10 present 3-year composite wind rose plots of the Naughton Power Plant data for 2019, 2020, and 2021 using the wind speed and direction at the 33 foot (10-meter) level and the 164-foot (50-meter) level.

The 2019 annual prevailing wind direction at Naughton Power Plant at the 33-foot (10-meter) level was from the west-northwest approximately 17 percent of the time with a secondary peak from the north approximately 15 percent of the time. At the 164-foot (50-meter) level, the prevailing wind direction was also from the west-northwest approximately 19 percent of the time.

The 2020 annual prevailing wind direction at the Naughton Power Plant at the 33-foot (10-meter) level was from the west-northwest approximately 20 percent of the time with a secondary peak from the north approximately 17 percent of the time. At the 164-foot (50-meter) level, the prevailing wind direction was also from the west-northwest approximately 22 percent of the time.

The 2021 annual prevailing wind direction at Naughton Power Plant at the 33-foot (10-meter) level was from the west-northwest approximately 17 percent of the time with a secondary peak from the north approximately 16 percent of the time. At the 164-foot (50-meter) level, the prevailing wind direction was also from the west-northwest approximately 19 percent of the time.

Figure 2.7-11 through Figure 2.7-34 present monthly composite wind rose plots for the April 2022–April 2023 period at Naughton Power Plant at the 33-foot (10-meter) level and the 164-foot (50-meter) level.

Figure 2.7-35 and Figure 2.7-36 present the annual wind rose plots of the April 2022–April 2023 data for Naughton Power Plant at the 33-foot (10-meter) and the 164-foot (50-meter) level.

The April 2022–April 2023 annual prevailing wind direction at Naughton Power Plant at the 33-foot (10-meter) level was from the west-northwest approximately 18 percent of the time with a secondary peak from the north approximately 17 percent of the time. At the 164-foot (50-meter) level, the prevailing wind direction was also from the west-northwest approximately 20 percent of the time.

Seasonal

Figure 2.7-37 through Figure 2.7-44 present the Naughton Power Plant seasonal 3-year composite wind rose plots for the 2019–2021 period at the 33-foot (10-meter) level and the 164-foot (50-meter) level.

Figure 2.7-45 through Figure 2.7-52 present seasonal 1-year composite wind rose plots for the April 2022–April 2023 period for Naughton Power Plant at the 33-foot (10-meter) level and the 164-foot (50-meter) level.

Kemmerer Unit 1 Annual and Seasonal Wind Rose Plots

Annual

Figure 2.7-53 and Figure 2.7-54 present annual wind rose plots of the April 2022–April 2023 meteorological data for Kemmerer Unit 1 at the 33-foot (10-meter) and the 197-foot (60-meter) elevations.

The April 2022–April 2023 annual prevailing wind direction (the direction from which the wind blows most often) at Kemmerer Unit 1 at the 33-foot (10-meter) level is from the north-northwest, approximately 13 percent of the time. Winds from the combined sectors of southwest to west occur approximately 23 percent of the time. Conversely, winds from the northeast through east sectors occur approximately 7 percent of the time.

The annual prevailing wind direction at Kemmerer Unit 1 at the 197-foot (60-meter) level is from the north approximately 12 percent of the time. Winds from the southwest through west sectors occur approximately 24 percent of the time. Conversely, winds from the northeast through east sectors occur approximately 8 percent of the time.

There are no observations of calm winds at the lower level or at the upper level. At the 33-foot (10-meter) level, winds occur most infrequently from the east-southeast and at the 197-foot (60-meter) level, winds occur most infrequently from the southeast.

Annually at Kemmerer Unit 1, the strongest winds (greater than 8.8 meters per second or 19.7 miles per hour) are also typically from the southwest through northwest directions while the weakest winds are typically from the north-northwest and north at 33 feet (10 meters) and from the north, north-northeast, and south at 197 feet (60 meters).

Seasonal

Figure 2.7-55 through Figure 2.7-62 present seasonal 1-year composite wind rose plots for the April 2022–April 2023 period for Kemmerer Unit 1 at the 33-foot (10-meter) level and the 197-foot (60-meter) level.

The monthly wind rose plots for the Kemmerer Unit 1 Site indicate seasonal variance in wind direction but retain an overall west-northwest dominance. During the winter months (December through February), the prevailing wind direction at the 33-foot (10-meter) level was generally from the north-northwest (approximately 12 percent), though December showed a greater dominance in the west-northwest direction approximately 14 percent of the time. The same was true of December and January at the 197-foot (60-meter) level, approximately 15 percent and 13 percent of the time. February winds at the 197-foot (60-meter) level were more variable with west, north-northeast, and south directions occurring approximately 9 percent, 8 percent, and 7 percent of the time. During the spring months (March through May), April and May observed a west-northwest dominance at both levels (approximately 12 percent to 16 percent in a given direction), though March observed higher variability as south to southwest and north wind directions each occurred 7 percent to 11 percent of the time.

During the summer months (June through August), the prevailing wind direction at the 33-foot (10-meter) level was from the north-northwest, approximately 13 percent to 17 percent of the time, and at the 197-foot (60-meter) level was from the north, approximately 16 percent to 20 percent of the time. During the autumn months (September through November), the prevailing wind direction at the 33-foot (10-meter) level was from the north-northwest (19 percent), northwest (13 percent), and west-northwest (14 percent) for September, October, and November. At the 197-foot (60-meter) level, the prevailing wind directions varied more month-to-month and observed a greater dominance of northerly winds. September, October, and

November each observed most frequent winds from the north (16 percent), northwest (12 percent), and west-northwest (16 percent), with November also showing a peak in north winds approximately 12 percent of the time.

Big Piney Marbleton

Big Piney AP, Wyoming – Annual Wind Rose (2006-2015 Average) presents a multi-year average annual wind rose plot for the Big Piney Marbleton Airport for the 10-year period from 2006 to 2015 (Reference 2.7-17).

At the Big Piney Marbleton Airport, the annual prevailing wind direction for the 2006 to 2015 10-year period is from the north-northwest approximately 12 percent of the time (Reference 2.7-18). Note that the instruments used to measure wind speed and direction differ from the Kemmerer Unit 1 and Naughton Power Plant onsite meteorological towers and the NWS site due to the different needs for measurement. The NWS sites are at airports, where high wind speeds are more important than low wind speeds since they have a greater impact on aviation. At Kemmerer Unit 1 and Naughton Power Plant, wind measurements are made to determine atmospheric dispersion to aid in dose assessment; therefore, low wind speeds are more important since they will lead to less dispersion and a higher dose.

The Naughton Power Plant meteorological tower is in close proximity to the Kemmerer Unit 1 meteorological tower and is expected to be representative of Kemmerer Unit 1. The Big Piney Airport is located approximately 80 miles (130 kilometers) to the north-northeast of the Kemmerer Unit 1 Site with a comparable elevation (Reference 2.7-10). The Wyoming Range is to the west of this region and is therefore surrounded by more mountainous terrain. Large-scale winds can be expected to be similar; however, regional small-scale winds at the lower heights where these observations are taken can affect annual wind speed and direction trends. Using the 10-year average should aid in mitigating outliers due to the small-scale highly variable mountain weather.

Wind Speed Conditions

Table 2.7-12 presents monthly and annual average wind speeds at Naughton Power Plant and Kemmerer Unit 1 as well as at the Big Piney Airport, located approximately 80 miles (130 kilometers) to the north-northeast of Kemmerer Unit 1 at a similar elevation (Reference 2.7-10). The average wind speeds along with prevalent wind speed classes are presented below.

Naughton Power Plant Wind Speed And Prevalent Wind Speed Class

Wind Speed

Years 2019, 2020, and 2021

Average wind speeds for the 3-year period of 2019 through 2021 are presented in Table 2.7-12 for the Naughton Power plant. The 3-year average wind speed at Naughton Power Plant was 11.2 miles per hour (5 meters per second) at the 10-meter level and 12.5 miles per hour (5.6 meters per second) at the 164-foot (50-meter) level.

At Naughton Power Plant for the 3-year period (2019–2021), the maximum hourly wind speed measured at the 33-foot (10-meter) level was 44.3 miles per hour (19.8 meters per second); the maximum hourly wind speed measured at the 164-foot (50-meter) level was 50.1 miles per hour (22.4 meters per second).

Annually at Naughton Power Plant, the strongest winds (greater than 19.7 miles per hour or 8.8 meters per second) are typically from the southwest through northwest directions while the weakest winds (less than 2.1 meters per second or 4.7 miles per hour) are typically from the north and north-northeast directions.

April 2022 through April 2023

At Naughton Power Plant for the 1-year period (April 2022–April 2023), the annual average wind speed was 11.1 miles per hour (5.0 meters per second) at the 33-foot (10-meter) level and 12.4 miles per hour (5.5 meters per second) at the 164-foot (50-meter) level.

At Naughton Power Plant for the 1-year period (April 2022–April 2023), the maximum hourly wind speed measured at the 33-foot (10-meter) level was 37.7 miles per hour (16.8 meters per second); the maximum hourly wind speed measured at the 164-foot (50-meter) level was 43.5 miles per hour (19.4 meters per second).

Prevalent Wind Speed Class

Years 2019, 2020, and 2021

At Naughton Power Plant for 2019, the most prevalent wind speed class for the 33-foot (10-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 28 percent of the time. The most prevalent wind speed class for the 164-foot (50-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 22 percent of the time.

At Naughton Power Plant for 2020, the most prevalent wind speed class for the 33-foot (10-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 29 percent of the time. The most prevalent wind speed class for the 164-foot (50-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 22 percent of the time.

At the Naughton Power Plant for 2021, the most prevalent wind speed class for the 33-foot (10-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 29 percent of the time. The most prevalent wind speed class for the 164-foot (50-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 23 percent of the time.

April 2022 through April 2023

At Naughton Power Plant for the April 2022–April 2023 period, the most prevalent wind speed class for the 33-foot (10-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 27 percent of the time. The most prevalent wind speed class for the 164-foot (50-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 22 percent of the time.

Kemmerer Unit 1 Wind Speed And Prevalent Wind Speed Class

Wind Speed

The annual average wind speed at the 33-foot (10-meter) level at Kemmerer Unit 1 for the 1-year period of April 9, 2022–April 8, 2023 was 8.7 miles per hour (3.9 meters per second). At the 197-foot (60-meter) level, the annual average wind speed was 11.1 miles per hour (5.0 meters per second).

At Kemmerer Unit 1 for April 2022–April 2023, the maximum hourly wind speed measured at the 33-foot (10-meter) level was 38.2 miles per hour (17.1 meters per second); the maximum hourly wind speed measured at the 197-foot (60-meter) level was 45.1 miles per hour (20.2 meters per second).

Prevalent Wind Speed Class

Annually at the Kemmerer Unit 1 meteorological tower, the most prevalent wind speed class for the 33-foot (10-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 19 percent of the time. The most prevalent wind speed class for the 197-foot (60-meter) level is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 21 percent of the time.

On a seasonal basis at Kemmerer Unit 1, the most prevalent wind speed class for the 33-foot (10-meter) level during the winter, December through February, and spring, March through May, months is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 17 percent of the time during the winter and 16 percent of the time during the spring. The 4.7 to 6.7 miles per hour (2.1 to 3.0 meters per second) class is most prevalent during the summer, June through August, and autumn months, September through November, and occurs approximately 21 percent during the summer and 19 percent during the autumn.

At the 197-foot (60-meter) level, the most prevalent wind speed class is the 6.9 to 11.2 miles per hour (3.1 to 5.0 meters per second) class, which occurs approximately 15 percent during the winter months, December through February, 15 percent during the spring months, March through May, 25 percent during the summer months, June through August, and 24 percent during the autumn months, September through November.

Comparative Local and Regional Wind Speed Summary

Seasonal variations in average wind speeds at the Big Piney Airport generally agree with Naughton Power Plant and Kemmerer Unit 1, though magnitude of winds is overall lower for this station with an annual average of 6.8 miles per hour (3.0 meters per second). This could be caused by multiple factors including the elevation at which the observations are taken (unknown) and the difference in the type of measurement for aviation at the Big Piney Airport versus for atmospheric dispersion and dose assessment at the Naughton Power Plant and Kemmerer Unit 1. At all sites, April through June and October through December generally observed the strongest average wind speeds.

2.7.1.4.4 Wind Direction Persistence

Wind direction persistence is a relative indicator of the duration of atmospheric transport from a specific sector width to a corresponding downwind sector width that is 180 degrees opposite. Atmospheric dilution is directly proportional to the wind speed when other factors remain constant. When combined with wind speed, wind direction persistence and wind speed distribution further indicate the downwind sectors with more or less relative dilution potential (higher or lower wind speeds) associated with a given transport wind direction.

Table 2.7-13 and Table 2.7-14 present annual wind direction persistence summaries for the 33-foot (10-meter) and 197-foot (60-meter) measurement levels at Kemmerer Unit 1. These tables were developed using 1 year of onsite meteorological data (April 2022–April 2023).

Most of the time, approximately 42 percent, wind direction persistence events last for less than 4 hours at the 33-foot (10-meter) level and approximately 30 percent at the 197-foot (60-meter) level. Wind direction persistence events lasting 12 hours occur 70 times per year for the lower and 132 times per year for the upper measurement levels. Wind direction persistence events lasting greater than 24 hours occur once per year for the lower and upper measurement levels.

2.7.1.4.5 Atmospheric Stability

Depending on the amount of incoming solar radiation and other factors, the atmosphere may be more or less turbulent at any given time. Meteorologists have defined atmospheric stability classes, each representing a different degree of turbulence in the atmosphere. When moderate to strong incoming solar radiation heats air near the ground causing it to rise and generate large eddies, the atmosphere is considered unstable, or relatively turbulent. Unstable conditions are associated with Atmospheric Stability Classes A, B, and C. When solar radiation is relatively weak or absent, air near the surface has a reduced tendency to rise, and less turbulence develops. In this case, the atmosphere is considered stable, or less turbulent, and the stability class is E, F, or G. Stability Class D represents conditions of more neutral stability, or moderate turbulence. Neutral conditions are associated with relatively strong wind speeds and moderate solar radiation.

Atmospheric stability is determined by the delta temperature method as defined in Regulatory Guide (RG) 1.23, Revision 1, “Meteorological Monitoring Programs for Nuclear Power Plants.” This methodology classifies atmospheric stability based on the temperature change with height (degrees Celsius per 100 meters). At the Kemmerer Unit 1 meteorological tower, atmospheric stability is classified according to the difference between the temperature measurements at the 197-foot (60-meter) and 33-foot (10-meter) levels.

Table 2.7-15 through Table 2.7-62 present annual joint frequency distributions of wind speed and direction as a function of atmospheric stability. Data are derived from the meteorological towers at the Naughton Power Plant for the years of 2019, 2020, 2021, and April 2022–April 2023 and at Kemmerer Unit 1 for the year of April 2022–April 2023. Data from both the lower and upper elevations at each tower are presented in independent annual joint frequency distributions for each year of available data:

- Table 2.7-15 through Table 2.7-30 provide 3-year composite data for Naughton Power Plant for 2019–2021.
- Table 2.7-31 through Table 2.7-46 provide annual composite data for Naughton Power Plant for April 2022–April 2023.
- Table 2.7-47 through Table 2.7-62 provide annual composite data for Kemmerer Unit 1 for the period from April 2022–April 2023.

All of these tables were developed following the guidance in RG 1.23. Note that additional wind speed classes were added to provide greater coverage of the lower wind speeds that are most important for atmospheric dispersion. A comparative description is provided below.

During the 1-year period from April 9, 2022–April 8, 2023, unstable conditions at Kemmerer Unit 1 occurred about 19 percent, neutral conditions 24 percent, and stable conditions 57 percent of the time. Table 2.7-63 shows the percent stability class for both the Kemmerer Unit 1 and Naughton Power Plant meteorological sites.

Table 2.7-64 through Table 2.7-67 present 3-year, 2019–2021, atmospheric stability persistence summaries at Naughton Power Plant for the 33-foot (10-meter) and 164-foot (50-meter) measurement levels and annual (April 2022–April 2023) atmospheric stability persistence summaries at the Kemmerer Unit 1 Site for the 33-foot (10-meter) and 197-foot (60-meter) measurement levels.

Table 2.7-68 presents temperature inversion frequency statistics for Kemmerer Unit 1 for April 2022–April 2023. Stability persistence events lasting for less than 12 hours occurred 76 percent of the time and stability persistence events lasting 16 hours or less occurred 92 percent of the time. Events lasting for greater than 24 hours occurred six times with the longest of these inversions lasting 82 hours in early January 2023.

Mixing height data were acquired from the Riverton, Wyoming NWS weather monitoring station. Mixing heights determine dispersion and atmospheric stability as they provide a measurement to the level where an inversion occurs that creates a more stable atmosphere. Daily summaries for both convective and mechanical mixing heights were calculated and used as input to the Seasonal and Annual Cooling Tower Impact model that estimated cooling tower impacts on the environment, as provided in Section 5.7. Monthly and seasonal values can be extracted from these data.

2.7.1.4.6 Comparative Study

A study was completed which compared the meteorological data collected at Naughton Power Plant and Kemmerer Unit 1 meteorological towers for the period from April 9, 2022, to April 8, 2023. This year was selected because it represents the first complete year of data collected at the Kemmerer Unit 1 meteorological tower in keeping with the guidance of RG 1.23. The purpose of the comparison study was to evaluate whether Naughton Power Plant data was representative of the conditions experienced at Kemmerer Unit 1. An evaluation of the 2019, 2020, and 2021 Naughton Power Plant meteorological data showed that the Naughton Power Plant data was representative of the region, including Kemmerer Unit 1.

Each meteorological variable collected at Naughton Power Plant and Kemmerer Unit 1 meteorological tower was compared using scatter plot diagrams to calculate the correlation coefficient. The value of coefficients can range from -1 to +1 regardless of the units of the variables. A correlation value of near or equal to 0 implies little to no linear relationship between the variables. Positive coefficient value implies a positive linear relationship between the variables; that is, as one variable increases or decreases, so does the other variable. A negative coefficient value implies a negative linear relationship, which means as one variable increases, the other variable decreases. This study considered a correlation coefficient of 0.7 or higher to mean the variables are representative of each other.

The study showed that the correlation coefficients were greater than 0.7 for all variables. The lowest correlation coefficient was 0.7006 for the 33-foot (10-meter) wind direction. This is likely the result of low wind speeds which result in wind direction variability. The highest correlation coefficient was 0.9966 for 164-foot (50-meter) and 197-foot (60-meter) temperatures. Since the linear trends are the same for all variables, it can be concluded that the data collected at the two meteorological towers are representative of each other. This means that the Naughton Power Plant data can be used to supplement or replace the Kemmerer Unit 1 data. This also means that the Naughton data provides a good representation for both locations and can be used to accurately represent the meteorological conditions at Kemmerer Unit 1.

Regional and local temperature comparisons were conducted between regional weather observing stations as well as the weather stations in the local region, including at the Kemmerer Unit 1 and Naughton sites, as shown in Table 2.7-69 through Table 2.7-71 for the mean monthly, mean monthly maximum, and mean monthly minimum temperatures.

2.7.1.5 Climate Change

Climate change refers to long-term alteration in various climate parameters. One of the most notable changes in climate includes an increase in the frequency and intensity of extreme weather events, such as hurricanes, heatwaves, droughts, heavy rainfall, and flooding. These events can have significant impacts on communities and ecosystems.

Over the past century, most of Wyoming has warmed by one to three degrees Fahrenheit (0.6 to 1.7 degrees Celsius) according to a U.S. Environmental Protection Agency (EPA) 2016 study. By 2050, Wyoming is likely to have twice as many days over 100 degrees Fahrenheit (37.8 degrees Celsius) as compared to now (Reference 2.7-3, 2).

Rising temperatures increase the rate at which water evaporates (or transpires) into the air from soils, plants, and surface waters. Irrigated farmland will need more water in this condition. Less water is likely to be available in the Green River Basin because precipitation is unlikely to increase enough to make up for the additional water lost to evaporation (Reference 2.7-3, 1).

Rising temperatures, drier soils, and changing water availability are likely to present challenges for Wyoming's farms and cattle ranches. Hot weather causes cows to eat less and grow more slowly, and it can threaten their health. Although warmer and shorter winters may allow for a longer growing season, they could also promote the growth of weeds and pests and shorten the dormancy for many winter crops, which creates the potential for crop losses due to spring freezes (Reference 2.7-3, 2).

Heat waves are becoming more common, and snow is melting earlier in the spring. As the temperatures increase, less precipitation falls as snow, and more snow melts during the winter. Since the 1950s, the snowpack in Wyoming has been inversely related to the increasing temperatures. Warming of the atmosphere over Wyoming can also lead to a shifting of the tree line and decrease the extent of the alpine tundra ecosystems. The mountains in Wyoming contain approximately 1,500 glaciers, and the warming will cause these glaciers to retreat or disappear altogether. Areas that are no longer covered by glaciers may still accumulate snowpack, but the snow will no longer remain year round (Reference 2.7-3, 1). With the retreat of the glaciers and decreasing snowfall, Wyoming could be in danger of extended droughts that could also mean evaporation of water resources. These extended droughts and drier soils are likely to increase the severity, frequency, and extent of wildfires.

Wyoming, like the rest of the Great Plains, is susceptible to droughts, which are occasionally severe. From 1999 to 2008, large portions of Wyoming experienced drought conditions. The State then experienced several years of above average precipitation until 2012, which was Wyoming's driest year since historical records began in 1895. By October 2012, almost 90 percent of Wyoming was in "severe" drought, the U.S. Drought Monitor's third-highest category of drought severity. Future summer droughts, a natural part of Wyoming's climate, are expected to become more intense (Reference 2.7-6).

Drought and longer and hotter growing seasons combined with invasive grasses and overgrazing will transform sagebrush shrublands into annual grasslands that experience more frequent wildfires and no longer support native biodiversity and livestock grazing.

The drought during 2012, along with high temperatures and high winds, resulted in one of Wyoming's worst wildfire seasons, with more than 350,000 acres (142,000 hectares) burned, more than three times the yearly average for 2002–2020 of 113,000 acres (45,700 hectares). Another severe wildfire season occurred in 2020; by October 2020, about 60 percent of Wyoming was in severe drought and almost 340,000 acres (140,000 hectares) had burned. The intensity of future droughts is projected to increase, even if precipitation amounts increase. Increases in evaporation rates due to rising temperatures may increase the rate of soil moisture loss during dry spells. Future summer droughts, a natural part of Wyoming's climate, are likely to become more intense. This in turn will increase the risk of wildfires, which are projected to become more frequent and severe (Reference 2.7-6).

Higher temperatures and drought are likely to increase the severity, frequency, and extent of wildfires in Wyoming, which could harm property, livelihoods, and human health (Reference 2.7-3, 2). Based on the United States Global Change Research Program concerning global climate change, rising temperatures and decreasing snowpack will reduce water supply and soil moisture and will increase extreme heat and wildfires in the region, including Wyoming. Wyoming is projected to have an increase in very large fires from 2040-2069 relative to 1971-2000 using a Representative Concentration Pathway (RCP8.5) as high as a 400% increase (Reference 2.7-16).

2.7.2 Air Quality

The EPA has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, which are called "criteria" pollutants. These pollutants are: carbon monoxide, lead, nitrogen oxide, ozone, particulate matter, and sulfur dioxide. Units of measure for the standards are parts per million by volume, milligrams per cubic meter of air, and micrograms per cubic meter of air. Areas are either "in attainment" of the air quality standards or "in nonattainment." Attainment means that the air quality is better than the standard. Table 2.7-72 shows the NAAQS.

The portion of Lincoln County where Kemmerer Unit 1 is located is designated as "attainment" with respect to the NAAQS. The nearest "nonattainment" area is the Upper Green River Basin Ozone Nonattainment Area consisting of all of Sublette County and portions of Lincoln and Sweetwater Counties (Reference 2.7-4). Currently, for the 2008 Ozone NAAQS, the EPA designated the Upper Green River Basin as nonattainment. However, monitored ozone in the Upper Green River Basin was in attainment for the 2008 Ozone NAAQS by the attainment date of July 2015 and the Wyoming Department of Environmental Quality is assessing a pathway for submitting a request to the EPA to redesignate the Upper Green River Basin back to attainment for the 2008 Ozone NAAQS.

Estimates of yearly national and Wyoming greenhouse gas emissions are provided in Table 2.7-87 (Reference 2.7-14 and Reference 2.7-5).

Currently, the Wyoming Department of Environmental Quality is accepting grant proposals for emissions reduction projects across the State. Proposed projects must involve methods to mitigate nitrogen oxide emissions from vehicles listed within the eligible mitigation actions established in Wyoming Department of Environmental Quality's Volkswagen Mitigation Plan (Reference 2.7-20). Wyoming's emissions reduction plan provides incentives for projects that make direct emission reduction impacts in Wyoming based on Diesel Emission Reduction Act funds from the EPA, the Pinedale Anticline Project Office funds located in the Upper Green River Basin region, and the Volkswagen Settlement funds (Reference 2.7-19).

Wyoming Governor Mark Gordon, in a March 2021 State of the State address, called on the State of Wyoming to reach a goal of net negative carbon dioxide emissions through carbon capture and sequestration as well as the development of hydrogen fuel technology (Reference 2.7-7).

Class 1 Federal lands include areas such as national parks, national wilderness areas, and national monuments. These areas are granted special air quality protections under Section 162(a) of the Federal Clean Air Act. Section 51.307 from 40 CFR Part 81 requires the operator of any new major stationary source or major modification located within 62 miles

(100 kilometers) of a Class 1 area to contact the Federal land managers for that area. The nearest Class 1 Federal area is Grand Teton National Park, which is approximately 128 miles (206 kilometers) from the Kemmerer Unit 1 Site. Figure 2.7-63 shows both the Upper Green River Basin Ozone Nonattainment Area and the nearest Class 1 area.

2.7.3 Atmospheric Dispersion

Short-term dispersion estimates for use in evaluation of dose from design-basis accidents and long-term dispersion and deposition estimates for evaluation of radiological impacts from normal observations are included in Section 2.7.3.1 and Section 2.7.3.2. Section 2.7.3.2 provides estimates of annual average atmospheric dispersion factors (X/Q values) and relative dry deposition factors (D/Q values) to a distance of 50 miles (80 kilometers) from the Kemmerer Unit 1 reactor center point, including annual average release limit calculations and person-rem estimates. Section 2.7.3.3 discusses restrictive dispersion conditions.

2.7.3.1 Short-Term Dispersion Estimates

Consistent with RG 1.206, Revision 1, “Applications for Nuclear Power Plants,” estimates of atmospheric dispersion factors (X/Q values) at the site exclusion area boundary (EAB) and at the outer boundary of the low-population zone for appropriate time periods using realistic (50^{th} percentile) meteorology should be provided. Therefore, the relative X/Qs are estimated for various time periods ranging from 2 hours to 30 days.

Site-specific meteorological data covering the 3-year period of record (2019–2021) is used to quantitatively evaluate a hypothetical accident at the site.

Meteorological data is used to determine various postulated accident conditions, as specified in RG 1.145, Revision 1, “Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants.” Compared to an elevated release, a ground-level release usually results in higher ground-level concentrations at downwind receptors because of less dilution from shorter traveling distances. The NRC computer code ARCON is used to estimate relative X/Q values at the EAB and low-population zone.

2.7.3.1.1 ARCON X/Q Values

ARCON is a computer code that can be used to calculate X/Q values in support of Main Control Room habitability. RG 1.249, Revision 0, “Use of ARCON Methodology For Calculation of Accident-Related Offsite Atmospheric Dispersion Factors,” provides procedures for using the ARCON code to estimate X/Q values out to distances of 3,937 feet (1,200 meters) from sources within the Nuclear Island (NI). The ARCON dispersion algorithms are based on field measurements taken out to distances of 3,937 ft (1,200 m). Therefore, RG 1.249 is applicable to EAB and low population zone distances from source locations within the NI to a distance of 3,937 ft (1,200 m).

The ARCON model input data is presented below:

- Meteorological data: 3-years; 2019, 2020, 2023
- Type of release: Ground-level

- Wind sensor height: 33 feet (10 meters)
- Vertical temperature difference: as measured at the 33 feet (10-meter) and 197-foot (60-meter) levels of the meteorological tower
- Number of wind speed categories: 7
- Minimum Reactor Building cross-sectional area: 12,508 square feet (1,162 square meters)
- Reactor Building height: 99.7 feet (30.4 meters) above grade
- Distance from reactor centerpoint to source boundary (encompasses all potential release points): 328 feet (100 meters)
- Distance from source boundary to EAB and low population zone for all downwind sectors: Both 984 feet (300 meters)

ARCON utilizes meteorological data, building heights and cross sectional areas, terrain considerations, and the location of receptors relative to the release point to determine 95th percentile X/Qs. The 99.5th and 50th percentile X/Qs are then derived with methodology provided by RG 1.249.

ARCON 50th percentile X/Q values for the EAB and low population zone are included in Table 2.7-73.

2.7.3.2 Long-Term (Routine) Dispersion Estimates

RG 1.111, Revision 1, “Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors,” was followed to establish site atmospheric dispersion characteristics and parameters and for determining X/Q and D/Q values. The NRC-sponsored XOQDOQ computer program was used to estimate X/Q and D/Q values for continuous releases of gaseous effluents to the atmosphere. RG 4.2, Revision 3, “Preparation of Environmental Reports for Nuclear Power Stations,” requires X/Q and D/Q estimates at the EAB, nearest resident, nearest vegetable garden, nearest milk animal, and nearest meat animal. 10 CFR Part 100 requires an “exclusion area” surrounding the reactor in which the reactor licensee has the authority to determine all activities, including exclusion or removal of personnel and property.

Three-year composite (2019, 2020, 2021) joint frequency distributions of wind speed, wind direction, and atmospheric stability (see Section 2.7.1.4.5) from Naughton Power Plant were used as shown in Table 2.7-15 through Table 2.7-22. The determinations for the atmospheric stability classes are based on the vertical ∆T method as specified in RG 1.145.

XOQDOQ has the ability to correct input values for open terrain. It was determined that receptors within and including the EAB should not utilize an open terrain correction due to buildings being located on the site. Whereas, it was deemed appropriate for receptors beyond the EAB to utilize an open terrain correction due to the lack of significant geological features. A ridge to the east of the site is not considered as the direction of the highest X/Qs is south, and the open terrain correction generates more bounding X/Qs that better represent the southerly direction. Releases on site are from the NI release point, defined as a 328-foot (100 meter) radius circle, and the Energy Island (EI) release point is modeled as being at the cold salt storage tank, which is the largest release point for gaseous tritium. With the terrain correction and the two release points, a total of four XOQDOQ runs were completed. For the NI release, the Fuel Handling Building is modeled as a cross-sectional area of 400 square meters (4,306 square feet) with a building height of 65.6 feet (20 meters) above grade. The Fuel Handling Building is not modeled for EI release.

- The XOQDOQ model input data is presented below:
- Type of release: Ground-level
- Wind sensor height: 33 feet (10 meters)
- Number of wind speed categories: 7
- Distances from the release point to the nearest residence, nearest EAB boundaries, milk animals, and vegetable garden (presented in Table 2.7-74)
- EI release is modeled at the cold salt storage tank
- NI release point: 328-foot (100-meter) circle around reactor center point

The receptors of interest within 50 miles (80 kilometers) were evaluated. The distance to the nearest residence was found, and it was assumed that the nearest vegetable garden, meat, and dairy animal resided there. The nearest residence was modeled to the south, as this is the most conservative direction.

Table 2.7-75 summarizes the maximum relative X/Qs and relative dry D/Q values predicted by the XOQDOQ model for identified sensitive receptors of interest as a result of continuous releases of gaseous effluents. The listed maximum X/Q values reflect several plume depletion scenarios that account for radioactive decay: no decay and the default half-life decay periods of 2.26 and 8 days.

The maximum annual average X/Q values with no decay (along with the direction and distance to the receptor) is 1.896 sec/m^3 and occurs at the EAB in the southerly direction.

Table 2.7-76 through Table 2.7-82 summarize the annual average sector X/Q values for no decay (undepleted), 2.26-day decay (undepleted), and 8-day decay (depleted), and D/Q values for 22 standard radial distances between 0 and 50 miles (0 and 80 kilometers) and, and for 10 distance-segment boundaries between 0.5 and 50 miles (0.8 and 80 kilometers) downwind along each of the 16 standard direction radials separated by 22.5 degrees. Table 2.7-83 summarizes the predicted annual X/Q values and D/Q at the sensitive receptors.

2.7.3.3 Restrictive Dispersion Conditions

Atmospheric dispersion can be described as the horizontal and vertical transport and diffusion of pollutants released into the atmosphere. Horizontal and vertical dispersion of a pollutant along the downwind trajectory from a source is controlled primarily by wind direction variation, wind speed, and atmospheric stability.

In general, lower wind speeds represent less turbulent airflow, which is restrictive to both horizontal and vertical dispersion. Although wind direction tends to be more variable under lower wind speed conditions (which increases horizontal transport), air parcels containing pollutants often recirculate within a limited area, thereby increasing cumulative exposure.

Restrictive dispersion conditions can include topography, temperature inversions, wind patterns, atmospheric stability, weather conditions, emissions sources, geographic features, and urban development. Kemmerer Unit 1, being situated in a valley surrounded by hills and mountains, is located at a relatively high elevation, and its proximity to geological and hydrological features could cause impacts to dispersion characteristics. Ground level releases at the site will have poor dispersion conditions due to obstructions from the buildings, but dispersion conditions will be unaffected by the surrounding topography at the site as there are very small variations in elevation across the plant (approximately 27 feet or 8.2 meters). If pollutants are released at higher levels, temperature inversions and wind patterns could be influenced by the local topography. The proximity to bodies of water could create microclimates and impact local wind patterns, in addition to tall buildings, cliffs, canyons, and surrounding mountains and valleys. Valleys can also create temperature inversions where a layer of warm air traps cooler air near the surface.

2.7.4 Meteorological Monitoring

The onsite preoperational and operational meteorological monitoring programs for Kemmerer Unit 1 are described below. These monitoring programs include a description and site map showing tower locations with respect to man-made structures, topographic features, and other site features that can influence site meteorological measurements. Additionally, this section provides a description of measurements made, including elevations and exposure of instruments; instruments used, including instrument performance specifications; calibration and maintenance procedures; data output and recording systems and locations; and data processing, archiving, and analysis procedures.

The Kemmerer Unit 1 meteorological monitoring program comprises a single tower and consists of two phases, preoperational monitoring and operational monitioring:

- Preoperational Monitoring: The preoperational meteorological monitoring program for Kemmerer Unit 1 is conducted in conformance with RG 1.23 for the existing configuration.
- Operational Monitoring: The same preoperational set of existing meteorological stations may be used for the operational phase for Kemmerer Unit 1. Because the current meteorological monitoring program for Kemmerer Unit 1 is conducted in accordance with the regulatory guidance criteria, the existing system may continue to be used for Kemmerer Unit 1 during plant operation. Although the current system, including meteorological sensors, may be upgraded periodically or replaced before plant operation, the functional requirements of the operational program for Kemmerer Unit 1 are described based on the current system.

Data from the meteorological monitoring stations is used to:

- Describe local and regional atmospheric transport and characteristics
- Calculate the dispersion estimates for both postulated accidental and expected routine airborne releases of effluents
- Compare with offsite sources to determine the appropriateness of climatological data used for design considerations
- Evaluate environmental risk from the radiological consequences of a spectrum of postulated accidents
- Provide a meteorological database for evaluation of the effects from plant construction and operation, including radiological and nonradiological impacts and real-time predictions of atmospheric effluent transport and diffusion
- Develop emergency response plans, including provision for real-time meteorological data and plume trajectory dispersion modeling capabilities for dose and exposure predictions

2.7.4.1 Preoperational Meteorological Measurement Program

The preoperational meteorological measurement program for Kemmerer Unit 1 was designed and maintained in accordance with the guidance provided in RG 1.23. The operational meteorological measurement program is expected to be the same as the preoperational program.

The 2019, 2020, and 2021 period of data taken from the Naughton Power Plant meteorological tower is determined to be the best available, validated data with the least substitution. It has been determined to be representative and the tower and sensor siting is in accordance with RG 1.23. The data is generally complete, with annualized composite data recovery of 90 percent, without being older than 10 years. Archiving will be conducted consistent with RG 1.23.

2.7.4.1.1 Tower Location

The meteorological tower for Naughton Power Plant is located at 41.7576 degrees north and 110.578 degrees west, approximately 3.5 miles (5.6 kilometers) north-northwest of Kemmerer Unit 1. This tower serves as the data collection system and source of onsite meteorological data for the Naughton Power Plant. The elevation at the base of the tower is 6,902 feet (2,104 meters) above mean sea level. This elevation is about 150 feet (40 meters) higher than the elevation of Kemmerer Unit 1.

The meteorological tower for Kemmerer Unit 1 is located at 41 degrees 41 minutes and 52 seconds north and 110 degrees 33 minutes and 6 seconds west and about 0.58 miles (0.93 kilometers) southwest of the reactor center point location. The Kemmerer Unit 1 meteorological tower serves as the data collection system and source of onsite meteorological data. The elevation at the base of the tower is approximately 6,754 feet (2,059 meters) above mean sea level. The elevation at the plant is 6,758 feet (2,060 meters) above mean sea level, slightly higher than the meteorological tower.

Figure 2.7-64 shows the location of the meteorological tower as well as the topography of Kemmerer Unit 1. The meteorological tower has been sited according to the guidance provided in RG 1.23. Table 2.7-2 and Figure 2.7-2 shows the terrain heights in each direction out to 50 miles (80 kilometers).

The Naughton Power Plant meteorological tower is located on level, open terrain at a distance of at least 10 times the height of any nearby obstruction that exceeds one-half the height of wind measurement. The tower is located adjacent to the Naughton Power Plant Ash Pond Number 2. This body of water could have an impact on the low level temperatures since water heats and cools slower than land.

The Kemmerer Unit 1 meteorological tower is located on level, open terrain at a distance at least 10 times the height of any nearby obstruction that exceeds one-half the height of the wind measurement. The tower is located far enough away from Kemmerer Unit 1 structures and topographical features to avoid airflow modifications. The terrain height of the meteorological tower is approximately 4 feet (1 meter) lower than the reactor center point.

Tower Location Relative to Potential Sources of Heat and Moisture

The predominant potential source of heat and moisture in the vicinity of the 164-foot (50-meter) Naughton Power Plant tower site is Ash Pond Number 2. Because of the relatively large size of the ash pond, it is expected that the ash pond could have influence on the meteorological data monitoring, especially since the meteorological tower is located downwind from the pond. Wind directions from the west to south-southwest have a straight-line, over-pond, upwind fetch in relation to the 197-foot (60-meter) tower.

Warmer temperatures from the ash pond could increase the lower-level temperature and create thermal instability. Subsequently, a more unstable atmosphere is expected.

The ground surface surrounding the 197-foot (60-meter) Kemmerer Unit 1 tower is a grainy, light-colored material with patches of sagebrush, saltbush, and greasewood based on Section 2.3.1.1.1 which is typical of the ground cover in the area. Light-colored ground surface is a potential source of reflective heat that might influence lower-level temperature measurements.

The temperature sensors on both towers are mounted in fan-aspirated radiation shields, which are horizontal to minimize the impact of thermal radiation and precipitation.

Meteorological Tower Designs

The Kemmerer Unit 1 meteorological tower is an NRG Systems 60-meter XHD Tall Tower. Data from instruments on the tower are collected by a CR 1000X data logger, which is located in a National Electrical Manufacturers Association enclosure located at the base of the tower.

The Naughton Power Plant meteorological tower is a Rohn galvanized-steel, 164-foot (50-meter) tower with open-lattice shape and guyed. Data from instruments on the tower are collected by a CR3000 data logger at the base of the tower.

The Kemmerer Unit 1 meteorological tower is designed to be capable of withstanding wind speeds of up to 110 miles per hour (49.2 meters per second) with no ice on the tower.

Instrumentation

The Kemmerer Unit 1 meteorological tower instrumentation consists of wind speed, wind direction, and aspirated temperature sensors located at 197 feet (60 meters) and 33 feet (10 meters) above ground level. A relative humidity sensor is located at a height of 33 feet (10 meters). A tipping bucket rain gauge is located approximately 6 feet (2 meters) north of the meteorological tower. Solar radiation instrumentation is located on a cross arm at 8 feet (2.5 meters) above ground level and extending out approximately 4 feet (1 meter) from the tower on the east side.

The Naughton Power Plant meteorological tower instrumentation consists of wind speed, wind direction, aspirated temperature sensors, and vertical wind speed located at 164 feet (50 meters) and 33 feet (10 meters) above ground level. Additional temperature sensors are located at a 7-foot (2-meter) level along with a solar radiation sensor, a net radiation sensor, and a relative humidity sensor. A tipping bucket rain gauge is located at ground level near the tower.

The specifications of the instrumentation meet or exceed the accuracy and resolution requirements of RG 1.23. The instruments are positioned on the meteorological tower in accordance with the guidance of RG 1.23. Table 2.7-84 provides the current meteorological instrument accuracy and resolution and compares them with the regulatory guidance of RG 1.23.

The data logger is a micro-computer that retrieves the meteorological data and then performs 15-minute and hourly averages of the various observed parameters. The data is then transmitted via modem and cellular communications to a computer where it is stored and analyzed for discrepancies. Monthly reports detailing instrument problems and data collection percentages ensure the desired 90 percent data recovery rates are continually met for all necessary parameters.

Instrument Maintenance and Surveillance Schedules

The Kemmerer Unit 1 meteorological instruments are inspected and serviced at a frequency that assures at least a 90 percent data recovery rate for all parameters, including the combination of wind speed, wind direction, and delta temperature. Percent data recovery for the Kemmerer Unit 1 and Naughton Power Plant meteorological towers are listed in Table 2.7-85. The instrumentation specified in RG 1.23 is channel-checked on a daily, working day basis, and instrument calibrations are performed semi-annually. The meteorological tower guy wires are inspected on an annual basis, and the tower anchors are inspected once every 3 years.

System calibrations encompass the entire data channel for each instrument, including the data logger and a display located at the tower. The system calibrations are performed by either a series of sequential, overlapping, or total channel steps.

Detailed instrument calibration procedures and acceptance criteria are strictly followed during station system calibration. Calibrations verify and, if necessary, reestablish accuracies of sensors, associated signal processing equipment, and displays. Routine calibrations include obtaining both “as-found” (prior to maintenance) and “as-left” (final configuration for operation) results. The end-to-end results are compared with expected values. Any observed anomalies which may affect equipment performance or reliability are reported for corrective action. If any acceptance criteria are not met during performance of calibration procedures, timely corrective measures are initiated such as, adjusting response to conform to desired results by qualified personnel on site or returning the sensor to the vendor for calibration. Inspection, service, and maintenance, including preventive and corrective maintenance, on system components for transmitting, manipulating, and processing meteorological data for computer display or storage are performed according to the instrument manuals and plant surveillance program procedures to maintain at least 90 percent data recovery.

Data Reduction and Compilation

Hourly averaged meteorological data from Kemmerer Unit 1 are reviewed and validated according to the 10 CFR 50 Appendix B quality assurance procedures (Meteorological Programs Procedure Manual). This includes a check of each parameter against expected limits and like sensors on the pole. A proprietary program called MIDAS is used to show that the data meets or exceeds the requirements specified by RG 1.23. The data is then considered valid and certified for use in programs to generate joint frequency distributions, wind roses, wind persistence tables, and delta temperature plots. The joint frequency distributions can then be used for determining dispersion compliance and confirming design objectives are met.

The data from the Naughton Power Plant meteorological tower hourly averaged data are reviewed and validated. Each parameter is checked against expected limits and like sensors on the tower.

Information on the comparative study performed to correlate the two meteorological towers at Naughton Power Plant and Kemmerer Unit 1 is contained in Section 2.7.1.4.6.

Nearby Obstructions to Air Flow

Downwind distances from the meteorological tower to obstructions within 0.5 miles (0.8 kilometers) to air flow were determined using United States Geological Survey topographical maps. There are no obstructions to the meteorological instrumentation within 0.5 miles (0.8 kilometers) (Table 2.7-2).

From the information provided in Figure 2.7-64 and Figure 2.7-2, and with the knowledge that the base of the tower is at an elevation of approximately 6,754 feet (2,059 meters), it can be determined there are no significant nearby obstructions to airflow.

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Table 2.7-1 Meteorological Observation Stations and Climate Observing Stations With Respect to Kemmerer Unit 1

Meteorological Observation Stations			
Station Name	**Station Type**	**Distance from Kemmerer Unit 1**	**Parameters Observed**
KEVW: Evanston-Uinta County Airport	ASOS	40 miles; SW	Temperature, Dewpoint, Pressure (altimeter), Winds, Visibility, Ceiling, Clouds
KBPI: Big Piney - Miley Memorial Field Airport, Sublette, Wyoming		62 miles; NNE	
KRKS: Rock Springs - Southwest Wyoming Regional Airport, Sweetwater, Wyoming		81 miles; ESE	
KLGU: Logan - Logan-Cache Airport, Cache, Utah		65 miles; WNW	
KEMM: Kemmerer, Lincoln, Wyoming	AWOS-3PT	5 miles; NNE	
KFBR: Fort Bridger, Uinta, Wyoming		27 miles; SSE	
KAFO: Afton, Lincoln, Wyoming	AWOS-3P	68 miles; NNW	
K1U7: Bear Lake/Paris, Bear Lake, Idaho	AWOS-3	51 miles; NW	
Climate Observing Stations			
Station Name	**Station Type**	**Distance from Kemmerer Unit 1**	**Parameters Observed**
Lyman 1SW	COS	34 miles; SSE	Temperature, Vapor Pressure, Soil Temperature, Relative Humidity, Solar Radiation, Winds, Precipitation
Granger 6NW	COS	31 miles; ESE	
Farson 5S	COS	61 miles; ENE	
LaBarge 2S	COS	39 miles; NE	
Big Piney 11W	COS	55 miles; NNE	
Other Stations	**Station Type**	**Distance from Kemmerer Unit 1**	**Parameters Observed**
Kemmerer 2N	COOP	~6 miles NNE	Temperature, Precipitation
Evanston 1E	COOP	~35 miles SW	Temperature, Precipitation

ASOS = Automated Surface Observing System

AWOS = Automated Weather Observing System

COS = Climate Observing Station

COOP = Cooperative Observer Program

Table 2.7-2 Kemmerer Unit 1 Site Terrain 0-50 Miles (0-80 Kilometers)

	Distances (mi)									
	1	**2**	**3**	**4**	**5**	**5 to 10**	**10 to 20**	**20 to 30**	**30 to 40**	**40 to 50**
Direction from Kemmerer Unit 1	**Meters above Plant Grade [2,060 m]**									
North	19	49	123	123	149	197	649	754	860	1,004
North-northeast	31	87	117	191	217	334	383	383	383	482
Northeast	49	77	119	191	191	195	232	232	232	232
East-northeast	49	129	164	164	164	165	165	165	165	165
East	43	169	184	184	184	184	184	184	184	184
East-southeast	56	144	184	184	184	184	184	184	184	184
Southeast	25	114	147	183	183	183	183	183	183	522
South-southeast	0	74	92	173	173	173	173	220	360	825
South	10	10	10	15	55	139	209	209	414	813
South-southwest	10	10	10	23	43	172	216	400	408	408
Southwest	4	13	45	74	178	208	366	569	569	569
West-southwest	7	25	156	238	245	245	440	440	440	501
West	13	25	185	188	263	273	385	385	410	510
West-northwest	7	42	165	293	293	293	293	293	293	708
Northwest	19	31	63	219	297	297	389	524	524	690
North-northwest	19	19	43	56	149	229	489	540	881	940

Table 2.7-3 Summary of Normals (Temperature & Precipitation) at the Evanston-Burns Field, WY Station (1991–2020)

	Mean Temperature (degrees Fahrenheit)			Mean Precipitation (inches)
Month	Daily Max	Daily Min	Mean	
01	29.8	13.6	21.7	0.41
02	31.5	14.8	23.1	0.53
03	40.7	22.0	31.4	0.45
04	50.2	28.0	39.1	0.99
05	60.8	36.6	48.7	1.75
06	71.8	44.4	58.1	1.06
07	82.0	52.9	67.5	0.55
08	80.1	51.1	65.6	0.83
09	69.9	42.8	56.3	1.01
10	55.7	32.1	43.9	0.99
11	40.6	21.6	31.1	0.56
12	29.7	13.8	21.8	0.38
Summary	53.6	31.1	42.4	9.51

Source: Reference 2.7-13

Table 2.7-4 Kemmerer Unit 1 Maximum Hourly Temperatures (2022-2023), 10-Meter Level

	Maximum	
	°C	°F
January	1.0	33.8
February	1.1	34.0
March	3.9	39.0
April	17.1	62.7
May	24.7	76.5
June	28.9	84.0
July	32.2	90.0
August	29.8	85.6
September	33.3	92.0
October	20.2	68.3
November	12.9	55.3
December	3.8	38.8
Annual	33.3	92.0

Table 2.7-5 Kemmerer Unit 1 Minimum Hourly Temperatures (2022-2023), 10-Meter Level

	Minimum	
	°C	°F
January	-31.6	-24.9
February	-28.2	-18.8
March	-21.9	-7.4
April	-21.6	-6.9
May	-6.2	20.9
June	-1.8	28.8
July	7.9	46.3
August	5.4	41.8
September	-1.4	29.4
October	-10.3	13.5
November	-19.1	-2.3
December	-22.8	-9.1
Annual	-31.6	-24.9

Table 2.7-6 Kemmerer Unit 1 Monthly Max., Min., Avg. Temperatures (degrees Fahrenheit) and Relative Humidity (2022-2023), 10-Meter Level

	Wet Bulb			Dry Bulb			Dew Point			Relative Humidity		
	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
January	8.6	20.8	15.3	7.1	20.5	14.3	8.6	20.6	15.4	*	*	*
February	1.2	18.1	9.2	3.6	21.0	12.0	-0.3	16.3	7.9	78.2	99.3	90.6
March	7.9	22.4	15.8	8.2	24.0	16.6	7.6	21.1	14.9	81.1	99.5	92.1
April	19.0	33.1	27.4	21.2	41.6	31.1	14.9	27.1	21.7	48.3	93.5	71.5
May	30.5	42.6	38.6	32.3	54.9	45.6	24.1	33.6	29.6	34.9	83.1	58.0
June	42.0	51.0	48.4	42.0	71.9	58.6	29.3	40.3	35.3	27.6	70.7	43.1
July	46.4	57.1	53.0	52.0	82.5	69.1	28.3	45.1	37.8	14.7	67.6	36.9
August	47.8	57.5	53.4	51.8	78.5	65.5	33.3	49.5	43.1	23.5	82.5	51.7
September	37.3	50.8	43.3	41.5	72.8	57.8	19.8	38.3	30.2	15.0	73.0	47.1
October	32.3	45.3	39.8	28.0	52.7	40.7	24.6	32.4	27.9	26.3	67.6	45.8
November	13.3	26.7	20.1	14.9	31.5	23.1	11.9	22.7	17.5	63.5	97.2	81.1
December	8.3	24.7	17.1	8.7	26.2	18.0	7.7	23.3	15.9	77.0	98.7	90.8

*Insufficient data

Table 2.7-7 Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperature Values for Evanston, Wyoming (1999-2019)

Percent	Jan		Feb		Mar		Apr		May		Jun	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
0.4%	36.7°F	41.9°F	37.2°F	45.0°F	42.8°F	57.9°F	47.1°F	68.0°F	53.4°F	73.4°F	57.6°F	80.8°F
	2.6°C	5.5°C	2.9°C	7.2°C	6.0°C	14.4°C	8.4°C	20.0°C	11.9°C	23.0°C	14.2°C	27.1°C
2%	34.0°F	37.8°F	35.1°F	40.1°F	40.0°F	53.1°F	44.2°F	60.4°F	50.9°F	68.9°F	55.4°F	77.2°F
	1.1°C	3.2°C	1.7°C	4.5°C	4.4°C	11.7°C	6.8°C	15.8°C	10.5°C	20.5°C	13.0°C	25.1°C
5%	32°F	35.6°F	33.1°F	37.9°F	37.8°F	48.2°F	42.1°F	57.2°F	49.1°F	66.0°F	53.8°F	74.5°F
	0.0°C	2.0°C	0.6°C	3.3°C	3.2°C	9.0°C	5.6°C	14.0°C	9.5°C	18.9°C	12.1°C	23.6°C
10%	30.0°F	33.3°F	31.1°F	35.4°F	35.2°F	43.9°F	40.5°F	53.8°F	47.3°F	63.1°F	52.5°F	72.5°F
	-1.1°C	0.7°C	-0.5°C	1.9°C	1.8°C	6.6°C	4.7°C	12.1°C	8.5°C	17.3°C	11.4°C	22.5°C
%	**Jul**		**Aug**		**Sept**		**Oct**		**Nov**		**Dec**	
	WB	**MCDB**	**WB**	**MCDB**	**WB**	**MCDB**	**WB**	**MCDB**	**WB**	**MCDB**	**WB**	**MCDB**
0.4%	60.4°F	77.4°F	59.4°F	76.5°F	57.0°F	73.2°F	50.4°F	63.7°F	44.1°F	57.2°F	37.0°F	43.2°F
	15.8°C	25.2°C	15.2°C	24.7°C	13.9°C	22.9°C	10.2°C	17.6°C	6.7°C	14.0°C	2.8°C	6.2°C
2%	59.2°F	77.2°F	57.9°F	75.9°F	54.5°F	70.9°F	47.7°F	62.2°F	41.0°F	52.5°F	34.4°F	38.8°F
	15.1°C	25.1°C	14.4°C	24.4°C	12.5°C	21.6°C	8.7°C	16.8°C	5.0°C	11.4°C	1.3°C	3.8°C
5%	58.1°F	77.2°F	56.7°F	75.0°F	52.7°F	69.4°F	45.7°F	60.3°F	38.8°F	50.0°F	32.2°F	36.3°F
	14.5°C	25.1°C	13.7°C	23.9°C	11.5°C	20.8°C	7.6°C	15.7°C	3.8°C	10.0°C	0.1°C	2.4°C
10%	56.8°F	76.6°F	55.2°F	73.9°F	50.7°F	67.8°F	43.5°F	57.2°F	36.7°F	45.9°F	30.2°F	33.8°F
	13.8°C	24.8°C	12.9°C	23.3°C	10.4°C	19.9°C	6.4°C	14.0°C	2.6°C	7.7°C	-1.0°C	1.0°C

WB = wet bulb

MCDB = mean coincident dry bulb

Table 2.7-8 Mean Monthly and Annual Precipitation at Kemmerer Unit 1 and Surrounding Stations

	Kemmerer Unit 1		Naughton Power Plant										Big Piney, WY				Evanston-Uinta County Airport – Burns Field		Kemmerer, WY	
	4/9/22–4/8/23		2019		2020		199122020		2019–2021		4/9/22–4/8/23		4/9/22–4/8/23		1981–2010*		1991–2020		1981–2010*	
	in	*cm*	*in*	*cm*	*in*	*cm*	*in*	*cm*	*in*	*cm*	*in*	*cm*	*in*	*cm*	*in*	*cm*	*in*	*cm*	*in*	*cm*
January	0.50	1.3	0.22	0.56	0.16	0.41	0.27	0.69	0.22	0.56	0.76	1.9	0.79	2.0	0.31	0.79	0.41	1.0	0.65	1.7
February	0.00	0.0	0.33	0.84	0.10	0.25	0.21	0.53	0.21	0.53	0.11	0.28	0.33	0.84	0.35	0.89	0.53	1.3	0.63	1.6
March	0.60	1.5	1.06	2.69	0.76	1.9	0.36	0.91	0.73	1.9	0.90	2.3	0.34	0.86	0.44	1.1	0.45	1.1	0.80	2.0
April	0.56	1.4	1.29	3.28	0.25	0.64	0.16	0.41	0.57	1.4	0.87	2.2	0.14	0.36	0.53	1.3	0.99	2.5	0.91	2.3
May	0.44	1.1	2.85	7.24	0.28	0.71	2.01	5.11	1.71	4.3	0.93	2.4	0.96	2.4	0.84	2.1	1.75	4.45	1.13	2.87
June	0.52	1.3	0.59	1.5	1.80	4.57	0.23	0.58	0.87	2.2	0.33	0.84	0.19	0.48	0.79	2.0	1.06	2.69	0.96	2.4
July	0.58	1.5	0.06	0.15	0.29	0.74	2.83	7.19	1.06	2.69	0.27	0.69	0.14	0.36	0.71	1.8	0.55	1.4	0.69	1.8
August	0.72	1.8	0.37	0.94	0.14	0.36	1.45	3.68	0.65	1.7	0.60	1.5	1.28	3.25	0.69	1.8	0.83	2.1	1.00	2.54
September	0.36	0.91	1.57	3.99	0.32	0.81	1.27	3.23	1.05	2.67	0.59	1.5	1.60	4.06	0.78	2.0	1.01	2.57	1.01	2.57
October	0.06	0.15	0.10	0.25	0.43	1.1	1.55	3.94	0.69	1.8	0.12	0.30	0.10	0.25	0.53	1.3	0.99	2.5	0.83	2.1
November	0.22	0.56	0.61	1.5	0.35	0.89	0.41	1.0	0.46	1.2	0.34	0.86	0.45	1.1	0.21	0.53	0.56	1.4	0.92	2.3
December	0.18	0.46	0.54	1.4	0.29	0.74	0.33	0.84	0.39	0.99	0.33	0.83	0.53	1.35	0.30	0.76	0.38	0.97	0.82	2.1
Annual	4.91	12.5	9.59	24.4	5.17	13.1	11.08	28.14	8.61	21.9	6.15	15.6	6.85	17.4	6.48	16.5	9.51	24.2	10.35	26.29

Table 2.7-9 Hail Events in Lincoln County

County	Location	Date	Diameter (inches)
Lincoln	Afton	7/12/1995	1
	Kemmerer	6/21/1996	1
	Afton	6/5/1997	1
	Thayne	6/5/1997	1.5
	Bedford	7/19/1997	1
	Afton	7/30/1998	0.75
	Alpine	7/30/1998	0.75
	Auburn	8/18/2000	1.25
	Auburn	8/18/2000	0.75
	Kemmerer	9/13/2001	0.75
	Kemmerer	9/13/2001	1.75
	Smoot	6/18/2004	1.25
	Diamondville	6/18/2004	0.75
	Fontenelle	7/23/2004	0.75
	Thayne	6/14/2006	1
	Star Valley Ranch	8/9/2008	0.75
	Thayne	6/6/2010	0.88
	Bedford	8/15/2011	1.5
	Auburn	8/15/2011	1
	Afton Muni Airport	8/15/2011	1
	Grover	8/15/2011	1
	Star Valley Ranch	7/6/2013	1
	Afton	9/17/2013	0.88
	Diamondville	8/7/2014	0.88
	Smoot	9/18/2014	1.5
	Star Valley Ranch	6/15/2015	1.75
	Afton	6/15/2015	1
	Kemmerer	6/12/2016	1.5
	Thayne	7/4/2016	0.75
	Star Valley Ranch	7/10/2016	1
	Kemmerer	8/7/2016	0.88

Table 2.7-10 Mean Monthly and Annual Snowfall (1981-2010) at Sites Around the Kemmerer Unit 1 Site

Site		Jan	Feb	Mar	Apr	May	Jun	
Kemmerer 2N, WY	in	10.8	8.9	8.1	5.0	2.1	0.1	
	mm	274.3	226.1	205.7	127.0	53.3	2.5	
Big Piney, WY	in	NO DATA						
	mm							
Naughton Coal Plant	in	NO DATA						
	mm							
Site		Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kemmerer 2N, WY	in	0.0	0.0	0.8	2.4	10.3	13.5	62.0
	mm	0.0	0.0	20.3	61.0	261.6	342.9	1,574.8
Big Piney, WY	in	NO DATA						
	mm							
Naughton Coal Plant	in	NO DATA						
	mm							

Table 2.7-11 Monthly and Annual Percent Frequency of Precipitation Occurrence

	Average Percent Frequency of Precipitation Occurrence (hourly)		
	Kemmerer Unit 1 4/9/22-4/9/23	Naughton Power Plant 4/9/22-4/9/23	Naughton Power Plant 2019-2021
January	4.03%	3.36%	1.66%
February	0.00%	1.04%	1.72%
March	4.70%	3.23%	2.69%
April	3.33%	5.56%	2.54%
May	1.61%	2.28%	4.93%
June	1.67%	1.67%	1.85%
July	1.88%	0.67%	1.30%
August	1.61%	1.74%	1.70%
September	1.67%	2.22%	2.91%
October	0.40%	0.94%	1.66%
November	0.97%	1.53%	2.69%
December	2.15%	1.88%	1.93%
Annual	1.81%	1.96%	2.07%

Table 2.7-12 Monthly and Annual Average Wind Speed, 10-Meter Level

	Kemmerer Unit 1		Naughton Power Plant				Big Piney, WY[1]	
	4/9/22-4/8/23		4/9/22-4/8/23		2019-2021		4/9/22-4/8/23	
	mph	*m/s*	*mph*	*m/s*	*mph*	*m/s*	*mph*	*m/s*
January	8.1	3.6	10.2	4.56	10.8	4.83	5.1	2.3
February	8.2	3.7	11.4	5.10	13.4	6.00	5.4	2.4
March	7.6	3.3	9.7	4.3	9.7	4.3	5.1	2.3
April	11.4	5.10	14.0	6.26	12.5	5.59	9.0	4.0
May	11.0	4.92	14.2	6.35	11.4	5.10	9.8	4.4
June	9.7	4.3	11.5	5.14	11.1	4.96	7.9	3.5
July	8.3	3.7	10.2	4.56	10.3	4.60	7.9	3.5
August	7.4	3.3	9.5	4.2	10.8	4.83	6.7	3.0
September	6.8	3.0	9.6	4.3	10.8	4.83	6.3	2.8
October	9.2	4.1	10.7	4.78	12.3	5.50	6.7	3.0
November	8.4	3.8	11.4	5.10	10.9	4.87	6.3	2.8
December	8.4	3.8	11.2	5.01	10.7	4.78	5.4	2.4
Annual	8.7	3.9	11.1	4.96	11.2	5.01	6.8	3.0

[1] Reference 2.7-15

Table 2.7-13 Kemmerer Unit 1 Site Meteorological Persistence 2022-2023, 10-Meter Level, 1 Sector (Sheet 1 of 3)

Number of Sectors Included: 1 Width in Degrees: 22.5																
Measurement Height, m:10 Speed Sensor:1 Direction Sensor: 1																
Speed Greater than or Equal to: 5.00 mph																
Direction																
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	317	149	94	148	93	115	76	121	275	239	394	532	757	847	690	381
2	121	44	23	64	26	52	13	20	80	51	183	245	357	392	348	122
4	34	4	6	23	2	12	1	0	9	6	62	76	124	112	116	22
8	22	0	0	4	0	2	0	0	0	0	10	6	28	17	11	0
12	14	0	0	0	0	0	0	0	0	0	2	0	1	4	0	0
18	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Speed Greater than or Equal to: 10.00 mph																
Direction																
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	56	16	46	97	40	36	19	26	54	89	262	381	579	650	487	83
2	29	3	17	48	14	19	3	5	13	22	137	186	282	309	262	26
4	17	0	6	21	0	7	0	0	1	4	50	57	108	82	92	3
8	9	0	0	4	0	1	0	0	0	0	9	5	26	8	9	0
12	5	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Speed Greater than or Equal to: 15.00 mph																
Direction																
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	20	1	26	47	13	11	4	11	19	49	154	218	315	330	255	15
2	11	0	12	28	4	7	1	2	4	16	92	106	171	149	133	2
4	9	0	6	15	0	4	0	0	0	2	39	35	69	40	44	0
8	5	0	0	4	0	0	0	0	0	0	9	4	15	5	6	0
12	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0

Table 2.7-13 Kemmerer Unit 1 Site Meteorological Persistence 2022-2023, 10-Meter Level, 1 Sector (Sheet 2 of 3)

Number of Sectors Included: 1 Width in Degrees: 22.5																
Measurement Height, m:10 Speed Sensor:1 Direction Sensor: 1																
Speed Greater than or Equal to: 20.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	11	0	12	27	4	1	0	5	6	18	86	80	145	109	82	2
2	9	0	9	15	2	0	0	1	1	6	49	33	68	42	40	1
4	7	0	5	9	0	0	0	0	0	2	13	8	23	11	12	0
8	3	0	0	3	0	0	0	0	0	0	0	0	4	0	1	0
Speed Greater than or Equal to: 25.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	4	0	1	15	1	0	0	4	3	13	29	24	20	21	22	1
2	3	0	0	12	0	0	0	1	1	5	12	9	9	10	10	0
4	1	0	0	8	0	0	0	0	0	1	0	1	2	3	3	0
8	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Speed Greater than or Equal to: 30.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	2	0	1	12	0	0	0	2	0	1	5	4	4	1	5	0
2	1	0	0	10	0	0	0	1	0	0	1	2	2	0	1	0
4	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-13 Kemmerer Unit 1 Site Meteorological Persistence 2022-2023, 10-Meter Level, 1 Sector (Sheet 3 of 3)

Number of Sectors Included: 1 Width in Degrees: 22.5																
Measurement Height, m:10 Speed Sensor:1 Direction Sensor: 1																
Speed Greater than or Equal to: 35.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	0	0	0	8	0	0	0	0	0	0	0	2	0	0	0	0
2	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-14 Kemmerer Unit 1 Site Meteorological Persistence 2022-2023, 60-Meter Level, 1 Sector (Sheet 1 of 3)

Number of Sectors Included: 1 Width in Degrees: 22.5																
Measurement Height, m: 60 Speed Sensor: 2 Direction Sensor: 2																
Speed Greater than or Equal to: 5.00 mph																
Direction																
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	745	407	112	173	109	133	72	99	283	255	399	590	825	980	838	288
2	384	145	29	86	37	60	16	16	88	62	184	271	422	512	471	78
4	147	42	6	35	3	16	1	0	8	8	68	86	158	160	182	9
8	44	4	2	11	0	2	0	0	0	0	15	5	33	19	25	0
12	23	0	0	2	0	0	0	0	0	0	3	0	6	2	4	0
18	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Speed Greater than or Equal to: 10.00 mph																
Direction																
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	165	65	50	123	56	58	21	33	74	110	301	495	728	842	644	109
2	86	15	13	69	20	24	4	5	21	36	162	244	383	438	372	32
4	35	1	6	31	3	8	0	0	0	8	64	77	146	132	149	3
8	20	0	2	10	0	1	0	0	0	0	15	5	33	19	25	0
12	12	0	0	2	0	0	0	0	0	0	3	0	6	1	4	0
18	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-14 Kemmerer Unit 1 Site Meteorological Persistence 2022-2023, 60-Meter Level, 1 Sector (Sheet 2 of 3)

Number of Sectors Included: 1 Width in Degrees: 22.5

Measurement Height, m: 60 Speed Sensor: 2 Direction Sensor: 2

Speed Greater than or Equal to: 15.00 mph

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	36	6	25	77	23	21	7	17	24	59	226	346	524	522	414	47
2	22	1	7	47	6	12	0	4	3	20	125	159	274	246	238	14
4	13	0	3	26	0	5	0	0	0	6	49	45	112	59	83	2
8	9	0	0	10	0	1	0	0	0	0	11	1	28	3	13	0
12	5	0	0	2	0	0	0	0	0	0	3	0	5	0	0	0

Speed Greater than or Equal to: 20.00 mph

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	14	1	12	43	8	8	3	10	8	35	147	194	331	253	200	14
2	10	0	4	23	2	4	0	2	1	13	86	80	178	105	112	3
4	8	0	2	9	0	2	0	0	0	3	34	17	73	24	42	0
8	4	0	0	3	0	0	0	0	0	0	9	0	17	3	8	0
12	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0

Speed Greater than or Equal to: 25.00 mph

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	11	0	7	27	2	0	0	6	4	13	78	76	164	94	78	1
2	9	0	3	14	0	0	0	1	1	5	44	30	79	36	38	0
4	7	0	1	8	0	0	0	0	0	2	20	5	33	9	14	0
12	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0

Table 2.7-14 Kemmerer Unit 1 Site Meteorological Persistence 2022-2023, 60-Meter Level, 1 Sector (Sheet 3 of 3)

Number of Sectors Included: 1 Width in Degrees: 22.5																
Measurement Height, m: 60 Speed Sensor: 2 Direction Sensor: 2																
Speed Greater than or Equal to: 30.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	5	0	1	14	0	0	0	4	3	7	34	33	47	25	31	1
2	2	0	0	11	0	0	0	1	1	3	14	12	20	10	14	0
4	0	0	0	7	0	0	0	0	0	1	2	2	5	4	4	0
8	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Speed Greater than or Equal to: 35.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	3	0	0	11	0	0	0	2	0	2	13	8	9	3	5	0
2	1	0	0	9	0	0	0	1	0	0	4	3	3	1	2	0
4	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-15 Naughton Power Plant Joint Frequency Distribution 2019-2021, 10-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS10	**Direction:**	WD10	**Lapse:**	DT50_10
Stability Class:		**A**	**Delta Temperature**		Extremely Unstable		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	0	1	2	1	1	0	5
NNE	0	2	1	0	0	0	3
NE	0	3	3	0	0	0	6
ENE	0	1	10	10	4	1	26
E	0	4	32	18	8	0	62
ESE	0	8	20	2	2	0	32
SE	0	12	10	5	1	0	28
SSE	1	18	17	4	0	5	45
S	0	11	11	6	3	3	34
SSW	0	7	6	26	16	1	56
SW	0	2	4	45	76	23	150
WSW	0	0	1	3	8	9	21
W	0	1	0	3	3	0	7
WNW	0	0	2	6	5	3	16
NW	0	0	0	5	6	5	16
NNW	0	0	3	3	4	0	10
Total	1	70	122	137	137	50	517
Calm Hours not Included above for:				**Total Period**		**All Hours**	16
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	88
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	517
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-16 Naughton Power Plant Joint Frequency Distribution 2019-2021, 10-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS10	**Direction:**	WD10	**Lapse:**	DT50_10
Stability Class:		**B**	**Delta Temperature**		Moderately Unstable		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	0	7	5	0	0	0	12
NNE	0	6	4	0	0	0	10
NE	0	3	1	1	0	0	5
ENE	0	5	9	6	1	0	21
E	0	16	22	11	0	0	49
ESE	0	17	23	1	1	0	42
SE	0	22	18	1	1	1	43
SSE	1	32	9	4	1	0	47
S	2	39	18	6	2	0	67
SSW	0	14	5	8	1	1	29
SW	0	8	1	14	14	1	38
WSW	0	4	1	7	26	10	48
W	0	1	0	4	3	2	10
WNW	0	3	2	6	21	13	45
NW	0	2	1	6	9	2	21
NNW	0	3	5	5	2	1	15
Total	3	182	124	80	82	31	502
Calm Hours not Included above for:				**Total Period**		**All Hours**	16
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	88
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	502
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-17 Naughton Power Plant Joint Frequency Distribution 2019–2021, 10-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS10	**Direction:**	WD10	**Lapse:**	DT50_10
Stability Class:		**C**	**Delta Temperature**		Slightly Unstable		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	1	26	15	0	0	0	42
NNE	2	22	5	0	0	0	29
NE	0	14	2	2	1	0	19
ENE	2	16	12	17	2	0	49
E	3	22	32	15	7	1	80
ESE	4	29	25	5	1	0	64
SE	1	29	14	0	0	0	44
SSE	2	48	19	7	3	0	79
S	5	49	23	4	2	1	84
SSW	2	27	14	6	0	1	50
SW	0	17	11	13	12	2	55
WSW	1	12	12	28	35	11	99
W	0	3	9	28	42	14	96
WNW	0	10	21	74	83	40	228
NW	0	4	21	38	20	9	92
NNW	0	8	7	8	2	0	25
Total	23	336	242	245	210	79	1,135
Calm Hours not Included above for:				**Total Period**		**All Hours**	16
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	88
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	1,135
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-18 Naughton Power Plant Joint Frequency Distribution 2019–2021, 10-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS10	**Direction:**	WD10	**Lapse:**	DT50_10
Stability Class:		**D**	**Delta Temperature**		Neutral		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	34	173	88	7	1	0	303
NNE	33	90	31	11	6	0	171
NE	18	48	55	47	5	1	174
ENE	20	41	57	63	40	18	239
E	33	53	65	51	21	7	230
ESE	25	92	65	8	2	1	193
SE	35	75	39	7	0	0	156
SSE	34	126	27	9	1	0	197
S	35	141	31	13	2	1	223
SSW	33	57	28	25	14	3	160
SW	30	42	65	55	43	10	245
WSW	16	74	194	380	281	86	1,031
W	36	107	331	665	721	534	2,394
WNW	33	129	729	1,265	750	255	3,161
NW	32	123	310	246	123	21	855
NNW	32	114	93	30	2	0	271
Total	479	1,485	2,208	2,882	2,012	937	10,003
Calm Hours not Included above for:				**Total Period**		**All Hours**	16
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	88
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	10,003
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-19 Naughton Power Plant Joint Frequency Distribution 2019–2021, 10-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS10	**Direction:**	WD10	**Lapse:**	DT50_10
Stability Class:		**E**	**Delta Temperature**		Slightly Stable		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	37	286	173	13	1	0	510
NNE	46	142	66	16	1	0	271
NE	39	67	28	25	1	0	160
ENE	41	34	16	10	5	6	112
E	56	39	18	20	3	0	136
ESE	44	47	14	3	0	0	108
SE	58	67	10	1	0	0	136
SSE	60	94	7	3	0	0	164
S	36	103	28	4	1	1	173
SSW	29	54	29	11	5	3	131
SW	14	51	60	37	18	3	183
WSW	12	46	151	253	81	23	566
W	13	69	193	275	158	69	777
WNW	22	105	312	339	150	65	993
NW	28	108	313	110	24	4	587
NNW	33	159	165	23	2	0	382
Total	568	1,471	1,583	1,143	450	174	5,389
Calm Hours not Included above for:				**Total Period**		**All Hours**	16
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	88
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	5,389
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-20 Naughton Power Plant Joint Frequency Distribution 2019–2021, 10-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS10	**Direction:**	WD10	**Lapse:**	DT50_10
Stability Class:		**F**	**Delta Temperature**		Moderately Stable		
			Wind Speed (mph)				
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	68	425	314	15	0	0	822
NNE	92	325	65	3	0	0	485
NE	83	105	11	1	0	0	200
ENE	59	53	3	2	0	0	117
E	44	39	2	3	0	0	88
ESE	67	38	2	0	0	0	107
SE	42	48	5	1	0	0	96
SSE	52	76	7	1	0	0	136
S	31	62	20	1	0	0	114
SSW	11	23	15	2	0	0	51
SW	6	21	26	12	1	1	67
WSW	6	15	43	33	4	0	101
W	8	31	65	28	4	1	137
WNW	14	50	112	22	3	0	201
NW	19	84	135	31	0	0	269
NNW	32	163	155	14	0	0	364
Total	634	1,558	980	169	12	2	3,355
Calm Hours not Included above for:				**Total Period**		**All Hours**	16
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	88
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	3,355
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-21 Naughton Power Plant Joint Frequency Distribution 2019–2021, 10-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS10	**Direction:**	WD10	**Lapse:**	DT50_10
Stability Class:		G	**Delta Temperature**		Extremely Stable		
			Wind Speed (mph)				
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	57	936	1,666	74	0	0	2,733
NNE	83	1,069	556	2	0	0	1,710
NE	48	112	9	0	0	0	169
ENE	28	25	2	0	0	0	55
E	16	23	0	0	0	0	39
ESE	12	15	1	0	0	0	28
SE	18	18	0	0	0	0	36
SSE	22	26	3	0	0	0	51
S	9	22	2	0	0	0	33
SSW	8	6	4	0	0	0	18
SW	3	4	4	0	0	0	11
WSW	2	2	5	1	0	0	10
W	7	1	3	1	2	0	14
WNW	4	28	25	0	0	0	57
NW	13	38	25	7	0	0	83
NNW	37	65	135	15	0	0	252
Total	367	2,390	2,440	100	2	0	5,299
Calm Hours not Included above for:				**Total Period**		**All Hours**	16
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	88
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	5,299
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-22 Naughton Power Plant Joint Frequency Distribution 2019–2021, 10-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS10	**Direction:**	WD10	**Lapse:**	DT50_10
Stability Class:		**ALL**	**Delta Temperature**				
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	197	1,854	2,263	110	3	0	4,427
NNE	256	1,656	728	32	7	0	2,679
NE	188	352	109	76	7	1	733
ENE	150	175	109	108	52	25	619
E	152	196	171	118	39	8	684
ESE	152	246	150	19	6	1	574
SE	154	271	96	15	2	1	539
SSE	172	420	89	28	5	5	719
S	118	427	133	34	10	6	728
SSW	83	188	101	78	36	9	495
SW	53	145	171	176	164	40	749
WSW	37	153	407	705	435	139	1,876
W	64	213	601	1,004	933	620	3,435
WNW	73	325	1,203	1,712	1,012	376	4,701
NW	92	360	805	443	182	41	1,923
NNW	134	511	563	98	12	1	1,319
Total	2,075	7,492	7,699	4,756	2,905	1,273	26,200
Calm Hours not Included above for:				**Total Period**		**All Hours**	16
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	88
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	26,200
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-23 Naughton Power Plant Joint Frequency Distribution 2019–2021, 50-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS50	**Direction:**	WD50	**Lapse:**	DT50_10
Stability Class:		**A**	**Delta Temperature**		Extremely Unstable		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	0	0	1	1	1	0	3
NNE	0	2	3	0	0	0	5
NE	0	1	4	0	0	0	5
ENE	0	0	4	5	1	3	13
E	0	5	26	29	10	1	71
ESE	0	4	23	6	1	1	35
SE	0	9	10	4	1	1	25
SSE	0	13	20	4	0	4	41
S	0	11	14	3	4	6	38
SSW	0	6	5	17	12	1	41
SW	0	0	4	28	65	57	154
WSW	0	1	1	4	10	21	37
W	0	0	0	2	2	0	4
WNW	0	1	1	6	7	3	18
NW	0	0	0	4	2	8	14
NNW	0	0	3	3	5	2	13
Total	0	53	119	116	121	108	517
Calm Hours not Included above for:				**Total Period**		**All Hours**	2
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	288
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	517
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-24 Naughton Power Plant Joint Frequency Distribution 2019–2021, 50-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS50	**Direction:**	WD50	**Lapse:**	DT50_10
Stability Class:		**B**	**Delta Temperature**		Moderately Unstable		
			Wind Speed (mph)				
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	0	6	6	2	0	0	14
NNE	0	5	5	0	0	0	10
NE	0	3	3	1	0	0	7
ENE	0	2	8	7	2	0	19
E	0	12	16	12	1	0	41
ESE	1	11	24	6	0	1	43
SE	0	22	22	3	0	1	48
SSE	0	26	11	4	0	2	43
S	3	38	25	5	4	0	75
SSW	0	18	4	7	2	1	32
SW	0	5	1	6	14	7	33
WSW	0	2	1	4	24	21	52
W	0	1	0	2	0	1	4
WNW	0	3	2	6	10	25	46
NW	0	0	1	4	10	5	20
NNW	0	3	2	4	4	2	15
Total	4	157	131	73	71	66	502
Calm Hours not Included above for:				**Total Period**		**All Hours**	2
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	288
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	502
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-25 Naughton Power Plant Joint Frequency Distribution 2019–2021, 50-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS50	**Direction:**	WD50	**Lapse:**	DT50_10
Stability Class:		**C**	**Delta Temperature**		Slightly Unstable		
			Wind Speed (mph)				
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	0	20	16	1	0	0	37
NNE	1	22	6	0	0	0	29
NE	1	18	0	2	1	0	22
ENE	1	12	10	12	6	0	41
E	4	20	25	22	9	3	83
ESE	1	22	24	11	1	1	60
SE	4	27	20	3	0	0	54
SSE	3	52	13	8	2	1	79
S	3	51	26	5	4	2	91
SSW	2	22	14	7	1	1	47
SW	0	13	9	9	10	4	45
WSW	1	7	9	23	39	16	95
W	0	2	6	21	31	22	82
WNW	0	8	17	53	75	53	206
NW	1	3	16	48	36	23	127
NNW	0	5	8	13	6	1	33
Total	22	304	219	238	221	127	1,131
Calm Hours not Included above for:				**Total Period**		**All Hours**	2
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	288
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	1,131
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-26 Naughton Power Plant Joint Frequency Distribution 2019–2021, 50-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS50	**Direction:**	WD50	**Lapse:**	DT50_10
Stability Class:		**D**	**Delta Temperature**		Neutral		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	37	120	70	17	0	1	245
NNE	38	116	44	14	3	1	216
NE	31	43	35	45	15	3	172
ENE	17	45	54	60	54	32	262
E	29	46	60	48	27	27	237
ESE	23	76	68	33	6	4	210
SE	25	85	52	12	3	0	177
SSE	49	102	19	6	3	1	180
S	47	139	28	18	4	3	239
SSW	18	66	26	20	13	7	150
SW	26	50	36	40	34	33	219
WSW	8	46	119	276	252	106	807
W	18	78	243	510	616	564	2,029
WNW	18	100	514	1,201	959	544	3,336
NW	18	103	349	422	249	115	1,256
NNW	22	63	88	52	14	2	241
Total	424	1,278	1,805	2,774	2,252	1,443	9,976
Calm Hours not Included above for:				**Total Period**		**All Hours**	2
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	288
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	9,976
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-27 Naughton Power Plant Joint Frequency Distribution 2019–2021, 50-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS50	**Direction:**	WD50	**Lapse:**	DT50_10
Stability Class:		**E**	**Delta Temperature**		Slightly Stable		
			Wind Speed (mph)				
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	24	136	118	19	7	2	306
NNE	33	108	65	23	4	0	233
NE	36	61	26	37	9	1	170
ENE	24	32	12	20	12	5	105
E	21	28	20	23	12	8	112
ESE	26	34	26	9	2	0	97
SE	36	50	11	5	1	0	103
SSE	50	61	18	5	1	0	135
S	39	82	38	8	2	2	171
SSW	36	76	44	16	2	8	182
SW	21	42	40	36	29	16	184
WSW	12	54	67	174	105	35	447
W	10	67	144	290	229	88	828
WNW	16	88	236	443	263	143	1,189
NW	19	101	282	253	76	27	758
NNW	12	123	129	57	7	3	331
Total	415	1,143	1,276	1,418	761	338	5,351
Calm Hours not Included above for:				**Total Period**		**All Hours**	2
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	288
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	5,351
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-28 Naughton Power Plant Joint Frequency Distribution 2019–2021, 50-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS50	**Direction:**	WD50	**Lapse:**	DT50_10
Stability Class:		**F**	**Delta Temperature**		Moderately Stable		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	53	174	181	52	6	0	466
NNE	40	166	100	21	1	0	328
NE	35	52	20	5	2	0	114
ENE	34	19	4	5	3	0	65
E	28	20	5	1	2	0	56
ESE	29	24	3	3	0	0	59
SE	47	37	8	4	0	0	96
SSE	43	52	8	3	1	0	107
S	50	93	37	12	1	0	193
SSW	40	70	35	10	1	0	156
SW	30	41	22	15	5	6	119
WSW	17	33	29	44	21	3	147
W	26	64	61	70	15	2	238
WNW	14	76	115	104	12	0	321
NW	31	113	167	98	11	0	420
NNW	35	149	162	59	4	0	409
Total	552	1,183	957	506	85	11	3,294
Calm Hours not Included above for:				**Total Period**		**All Hours**	2
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	288
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	3,294
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-29 Naughton Power Plant Joint Frequency Distribution 2019–2021, 50-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS50	**Direction:**	WD50	**Lapse:**	DT50_10
Stability Class:		**G**	**Delta Temperature**		Extremely Stable		
Wind Speed (mph)							
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	58	520	1,036	253	2	0	1,869
NNE	89	681	650	137	0	0	1,557
NE	79	212	24	4	0	0	319
ENE	59	33	1	0	0	0	93
E	50	18	0	0	0	0	68
ESE	54	20	0	0	0	0	74
SE	53	26	1	0	0	0	80
SSE	31	34	4	0	0	0	69
S	35	50	10	2	0	0	97
SSW	17	25	18	4	0	0	64
SW	16	17	4	5	1	0	43
WSW	11	17	7	5	2	0	42
W	11	22	25	3	2	0	63
WNW	18	46	45	21	0	0	130
NW	31	92	75	31	1	0	230
NNW	38	173	198	34	2	0	445
Total	650	1,986	2,098	499	10	0	5,243
Calm Hours not Included above for:				**Total Period**		**All Hours**	2
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	288
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	5,243
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-30 Naughton Power Plant Joint Frequency Distribution 2019–2021, 50-Meter 3-Year Composite

Hours at Each Wind Speed and Direction							
Period of Record = 01/01/2019 00:00–12/31/2021 23:00							
Elevation:		**Speed:**	WS50	**Direction:**	WD50	**Lapse:**	DT50_10
Stability Class:		**ALL**	**Delta Temperature**				
			Wind Speed (mph)				
Wind Direction (from)	**0.7–3.5**	**3.6–7.5**	**7.6–12.5**	**12.6–18.5**	**18.6–24.5**	**> 24.6**	**Total**
N	172	976	1,428	345	16	3	2,940
NNE	201	1,100	873	195	8	1	2,378
NE	182	390	112	94	27	4	809
ENE	135	143	93	109	78	40	598
E	132	149	152	135	61	39	668
ESE	134	191	168	68	10	7	578
SE	165	256	124	31	5	2	583
SSE	176	340	93	30	7	8	654
S	177	464	178	53	19	13	904
SSW	113	283	146	81	31	18	672
SW	93	168	116	139	158	123	797
WSW	49	160	233	530	453	202	1,627
W	65	234	479	898	895	677	3,248
WNW	66	322	930	1,834	1,326	768	5,246
NW	100	412	890	860	385	178	2,825
NNW	107	516	590	222	42	10	1,487
Total	2,067	6,104	6,605	5,624	3,521	2,093	26,014
Calm Hours not Included above for:				**Total Period**		**All Hours**	2
Variable Direction Hours for:				**Total Period**		**All Hours**	0
Invalid Hours for:				**Total Period**		**All Hours**	288
Number of Valid Hours for this Table:				**Total Period**		**All Hours**	26,014
Total Hours for the Period:				**Total Period**		**All Hours**	26,304

Table 2.7-31 Naughton Power Plant Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:				**Speed:** WS10		**Direction:**		WD10		**Lapse:**	DT50_10	
Stability Class:				A		**Delta Temperature**		Extremely Unstable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	0	0	0	0	0	1	0	0	1
NNE	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	1	4	6	3	0	0	14
E	0	0	0	1	0	2	10	9	1	0	0	23
ESE	0	0	0	0	0	2	27	4	1	0	0	34
SE	0	0	0	0	0	4	5	1	0	0	0	10
SSE	0	0	0	1	0	7	6	3	0	0	0	17
S	0	0	0	0	0	3	9	6	0	0	0	18
SSW	0	0	0	0	1	2	8	3	4	0	0	18
SW	0	0	0	0	0	0	0	3	29	16	0	48
WSW	0	0	0	0	0	0	0	1	9	6	1	17
W	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0	0	3	0	2	5
NNW	0	0	0	0	0	0	0	1	2	0	1	4
Total	0	0	0	2	1	21	69	37	53	22	4	209
Calm Hours not Included above for:						**Total Period**				**All Hours**		0
Variable Direction Hours for:						**Total Period**				**All Hours**		0
Invalid Hours for:						**Total Period**				**All Hours**		308
Number of Valid Hours for this Table:						**Total Period**				**All Hours**		209
Total Hours for the Period:						**Total Period**				**All Hours**		8,760

Table 2.7-32 Naughton Power Plant Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS10		**Direction:**	WD10			**Lapse:**	DT50_10	
Stability Class:			B			**Delta Temperature**		Moderately Unstable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	0	0	2	0	0	1	0	0	3
NNE	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	1	1	3	1	0	0	0	6
E	0	0	0	0	0	0	2	3	0	0	0	5
ESE	0	0	1	0	0	2	7	0	0	0	0	10
SE	0	0	0	0	0	4	3	0	0	0	0	7
SSE	0	0	0	0	1	2	0	0	0	1	0	4
S	0	0	0	0	0	2	4	1	1	0	0	8
SSW	0	0	0	0	0	1	1	2	0	1	0	5
SW	0	0	0	0	0	1	0	2	7	0	0	10
WSW	0	0	0	0	0	0	0	0	3	2	1	6
W	0	0	0	0	0	0	0	0	0	1	2	3
WNW	0	0	0	0	0	0	0	0	1	2	1	4
NW	0	0	0	0	0	0	0	1	1	1	1	4
NNW	0	0	0	0	0	0	1	0	0	0	0	1
Total	0	0	1	0	2	15	21	10	14	8	5	76
Calm Hours not Included above for:						**Total Period**				**All Hours**		0
Variable Direction Hours for:						**Total Period**				**All Hours**		0
Invalid Hours for:						**Total Period**				**All Hours**		308
Number of Valid Hours for this Table:						**Total Period**				**All Hours**		76
Total Hours for the Period:						**Total Period**				**All Hours**		8,760

Table 2.7-33 Naughton Power Plant Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:**	WS10		**Direction:**	WD10		**Lapse:**	DT50_10	
Stability Class:			C			**Delta Temperature**		Slightly Unstable			
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	0	0	1	2	0	1	0	0	4
NNE	0	0	0	0	0	3	0	0	1	0	0	4
NE	0	0	0	2	1	3	3	4	1	0	0	14
ENE	0	0	0	0	1	3	1	7	0	0	0	12
E	0	0	0	0	1	6	12	5	1	0	0	25
ESE	0	0	0	0	1	7	8	1	0	0	0	17
SE	1	0	0	4	4	7	6	0	0	0	0	22
SSE	0	0	0	2	7	6	9	2	0	0	0	26
S	0	0	0	0	6	8	8	3	2	0	0	27
SSW	0	0	0	1	5	5	4	1	2	2	0	20
SW	0	0	0	0	0	4	3	2	6	3	1	19
WSW	0	0	0	0	0	4	0	2	8	7	0	21
W	0	0	0	0	0	3	1	2	6	27	0	39
WNW	0	0	0	0	0	1	2	6	24	22	16	71
NW	0	0	0	0	0	0	0	4	6	6	0	16
NNW	0	0	0	0	0	2	4	2	2	0	0	10
Total	1	0	0	9	26	63	63	41	60	67	17	347
Calm Hours not Included above for:						**Total Period**			**All Hours**		0
Variable Direction Hours for:						**Total Period**			**All Hours**		0
Invalid Hours for:						**Total Period**			**All Hours**		308
Number of Valid Hours for this Table:						**Total Period**			**All Hours**		347
Total Hours for the Period:						**Total Period**			**All Hours**		8,760

Table 2.7-34 Naughton Power Plant Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:** WS10		**Direction:** WD10			**Lapse:** DT50_10			
Stability Class:			D		**Delta Temperature**		Neutral				
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	1	12	13	34	26	3	3	0	0	92
NNE	0	1	3	8	9	16	18	4	1	0	0	60
NE	1	2	3	6	3	8	11	12	3	1	0	50
ENE	0	0	1	1	5	6	18	10	9	5	7	62
E	0	0	1	6	6	7	10	10	5	1	0	46
ESE	1	0	0	3	4	11	12	3	3	0	0	37
SE	1	1	6	13	11	8	19	1	0	0	0	60
SSE	0	1	2	17	13	16	12	3	0	0	0	64
S	2	0	3	17	21	32	23	3	4	0	0	105
SSW	0	0	3	8	6	14	6	6	5	2	0	50
SW	0	1	1	7	6	6	19	9	25	8	0	82
WSW	0	1	4	3	7	15	49	76	89	43	8	295
W	1	1	0	4	6	23	64	98	206	176	29	608
WNW	0	0	2	7	11	21	134	343	360	112	18	1,008
NW	0	0	1	5	8	26	69	92	71	17	3	292
NNW	0	0	2	3	9	17	16	8	3	0	0	58
Total	6	8	33	120	138	260	506	681	787	365	65	2969
Calm Hours not Included above for:					**Total Period**				**All Hours**		0
Variable Direction Hours for:					**Total Period**				**All Hours**		0
Invalid Hours for:					**Total Period**				**All Hours**		308
Number of Valid Hours for this Table:					**Total Period**				**All Hours**		2,969
Total Hours for the Period:					**Total Period**				**All Hours**		8,760

Table 2.7-35 Naughton Power Plant Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS10		**Direction:**		WD10		**Lapse:**	DT50_10	
Stability Class:			E			**Delta Temperature**			Slightly Stable			
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	1	7	7	22	53	65	8	1	0	0	164
NNE	0	1	5	12	20	45	30	14	1	0	0	128
NE	0	2	2	12	8	11	11	3	2	0	0	51
ENE	0	1	3	12	7	4	6	5	5	1	4	48
E	0	1	4	7	7	5	7	1	3	1	0	36
ESE	0	0	5	8	9	4	7	0	0	0	0	33
SE	0	2	5	16	12	17	7	1	0	0	0	60
SSE	0	2	7	20	23	17	11	5	1	0	0	86
S	0	1	3	21	24	27	10	2	1	0	0	89
SSW	1	0	5	7	6	19	13	10	6	1	0	68
SW	0	0	2	2	3	7	15	11	24	19	5	88
WSW	0	0	0	4	2	14	30	72	48	21	7	198
W	0	0	2	7	3	12	27	61	83	26	8	229
WNW	0	2	0	11	8	13	57	106	129	50	14	390
NW	0	2	1	2	10	20	87	65	40	9	0	236
NNW	0	2	3	4	7	40	48	13	2	0	0	119
Total	1	17	54	152	171	308	431	377	346	128	38	2,023
Calm Hours not Included above for:						**Total Period**				**All Hours**		0
Variable Direction Hours for:						**Total Period**				**All Hours**		0
Invalid Hours for:						**Total Period**				**All Hours**		308
Number of Valid Hours for this Table:						**Total Period**				**All Hours**		2,023
Total Hours for the Period:						**Total Period**				**All Hours**		8,760

Table 2.7-36 Naughton Power Plant Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:** WS10		**Direction:**	WD10			**Lapse:**	DT50_10	
Stability Class:			F		**Delta Temperature**		Moderately Stable				
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	1	5	14	37	89	115	16	0	0	0	277
NNE	1	2	6	25	32	63	55	3	0	0	0	187
NE	0	0	7	16	14	25	8	1	0	0	0	71
ENE	0	0	5	15	10	6	0	1	0	0	0	37
E	0	1	6	13	13	4	0	0	0	0	0	37
ESE	0	2	4	8	8	3	2	1	0	0	0	28
SE	0	0	2	13	9	3	1	0	0	0	0	28
SSE	0	2	4	17	14	15	2	0	0	0	0	54
S	0	3	1	13	8	10	4	0	0	0	0	39
SSW	0	0	0	3	2	8	7	0	0	0	0	20
SW	0	0	2	2	2	1	5	7	4	0	0	23
WSW	1	0	0	2	1	8	6	15	3	0	0	36
W	0	0	1	1	1	4	10	11	6	0	0	34
WNW	0	0	2	2	0	3	25	11	2	0	0	45
NW	0	0	1	7	3	13	42	12	5	0	0	83
NNW	1	0	1	12	5	25	57	5	1	0	0	107
Total	3	11	47	163	159	280	339	83	21	0	0	1,106
Calm Hours not Included above for:					**Total Period**				**All Hours**		0
Variable Direction Hours for:					**Total Period**				**All Hours**		0
Invalid Hours for:					**Total Period**				**All Hours**		308
Number of Valid Hours for this Table:					**Total Period**				**All Hours**		1,106
Total Hours for the Period:					**Total Period**				**All Hours**		8,760

Table 2.7-37 Naughton Power Plant Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS10		**Direction:**	WD10		**Lapse:**	DT50_10		
Stability Class:			G			**Delta Temperature**		Extremely Stable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	2	2	17	33	143	508	111	4	0	0	820
NNE	0	0	10	20	23	197	311	9	1	0	0	571
NE	0	0	6	7	6	20	12	0	0	0	0	51
ENE	0	0	3	9	5	5	0	0	0	0	0	22
E	0	1	1	9	7	4	0	0	0	0	0	22
ESE	0	1	1	3	3	1	0	0	0	0	0	9
SE	1	1	2	6	5	2	0	0	0	0	0	17
SSE	0	0	2	9	11	8	1	0	0	0	0	31
S	0	0	1	3	7	6	2	0	0	0	0	19
SSW	0	2	2	0	3	1	2	0	0	0	0	10
SW	0	0	0	0	2	2	2	0	0	0	0	6
WSW	0	0	0	1	2	1	0	1	0	0	0	5
W	0	0	1	1	3	1	2	0	0	0	0	8
WNW	0	0	0	2	2	3	4	1	0	0	0	12
NW	0	0	2	3	1	6	10	2	1	0	0	25
NNW	0	1	4	7	7	16	41	16	2	0	0	94
Total	1	8	37	97	120	416	895	140	8	0	0	1,722
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			308
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			1,722
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-38 Naughton Power Plant Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS10		**Direction:**		WD10		**Lapse:**	DT50_10	
Stability Class:			ALL			**Delta Temperature**						
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	4	15	50	105	322	716	138	11	0	0	1,361
NNE	1	4	24	65	84	324	414	30	4	0	0	950
NE	1	4	18	43	32	67	45	20	6	1	0	237
ENE	0	1	12	37	29	26	32	30	17	6	11	201
E	0	3	12	36	34	28	41	28	10	2	0	194
ESE	1	3	11	22	25	30	63	9	4	0	0	168
SE	3	4	15	52	41	45	41	3	0	0	0	204
SSE	0	5	15	66	69	71	41	13	1	1	0	282
S	2	4	8	54	66	88	60	15	8	0	0	305
SSW	1	2	10	19	23	50	41	22	17	6	0	191
SW	0	1	5	11	13	21	44	34	95	46	6	276
WSW	1	1	4	10	12	42	85	167	160	79	17	578
W	1	1	4	13	13	43	104	172	301	230	39	921
WNW	0	2	4	22	21	41	222	467	516	186	49	1,530
NW	0	2	5	17	22	65	208	176	127	33	6	661
NNW	1	3	10	26	28	100	167	45	12	0	1	393
Total	12	44	172	543	617	1,363	2,324	1,369	1,289	590	129	8,452
Calm Hours not Included above for:						**Total Period**				**All Hours**		0
Variable Direction Hours for:						**Total Period**				**All Hours**		0
Invalid Hours for:						**Total Period**				**All Hours**		308
Number of Valid Hours for this Table:						**Total Period**				**All Hours**		8,452
Total Hours for the Period:						**Total Period**				**All Hours**		8,760

Table 2.7-39 Naughton Power Plant Joint Frequency Distribution 2022–2023, 50-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:				**Speed:** WS50		**Direction:** WD50				**Lapse:** DT50_10		
Stability Class:				A		**Delta Temperature**		Extremely Unstable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	0	0	0	0	0	1	0	0	1
NNE	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	1	3	1	0	0	0	5
E	0	0	0	0	0	1	8	10	1	0	0	20
ESE	0	0	0	0	0	2	30	6	2	0	0	40
SE	0	0	0	0	0	3	6	3	0	0	0	12
SSE	0	0	0	0	0	4	10	3	1	0	1	19
S	0	0	0	0	1	4	8	9	0	1	5	28
SSW	0	0	0	0	0	1	6	5	3	3	4	22
SW	0	0	0	0	0	0	0	1	23	11	13	48
WSW	0	0	0	0	0	0	0	0	10	5	5	20
W	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0	0	2	1	2	5
NNW	0	0	0	0	0	0	0	1	2	0	1	4
Total	0	0	0	0	1	16	71	39	45	21	31	224
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			179
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			224
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-40 Naughton Power Plant Joint Frequency Distribution 2022–2023, 50-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:**	WS50	**Direction:**		WD50		**Lapse:**	DT50_10	
Stability Class:			B		**Delta Temperature**			Moderately Unstable			
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	0	0	2	0	0	1	0	0	3
NNE	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	1	0	0	0	0	1
E	0	0	0	0	1	1	2	3	0	0	0	7
ESE	0	0	0	0	0	1	7	0	0	0	0	8
SE	0	0	0	0	0	4	6	1	0	0	0	11
SSE	0	0	0	0	0	2	0	0	0	0	1	3
S	0	0	0	0	0	4	5	1	0	1	0	11
SSW	0	0	0	0	0	0	0	1	0	1	0	2
SW	0	0	0	0	0	0	1	2	5	2	0	10
WSW	0	0	0	0	0	0	0	0	3	2	1	6
W	0	0	0	0	0	0	0	0	0	1	3	4
WNW	0	0	0	0	0	0	0	0	1	1	2	4
NW	0	0	0	0	0	0	0	0	0	0	2	2
NNW	0	0	0	0	0	0	1	1	1	0	0	3
Total	0	0	0	0	1	14	23	9	11	8	9	75
Calm Hours not Included above for:						**Total Period**			**All Hours**		0
Variable Direction Hours for:						**Total Period**			**All Hours**		0
Invalid Hours for:						**Total Period**			**All Hours**		179
Number of Valid Hours for this Table:						**Total Period**			**All Hours**		75
Total Hours for the Period:						**Total Period**			**All Hours**		8,760

Table 2.7-41 Naughton Power Plant Joint Frequency Distribution 2022–2023, 50-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS50		**Direction:**	WD50		**Lapse:**	DT50_10		
Stability Class:			C			**Delta Temperature**		Slightly Unstable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	0	0	2	2	0	1	0	0	5
NNE	0	0	0	0	0	4	1	0	0	1	0	6
NE	0	0	1	2	1	1	2	3	0	0	0	10
ENE	0	0	0	0	0	4	2	4	0	0	0	10
E	0	0	0	0	0	3	7	4	0	0	0	14
ESE	0	0	0	2	0	10	13	2	1	0	0	28
SE	0	0	0	1	5	11	7	0	0	0	0	24
SSE	0	0	0	0	5	11	6	3	0	0	0	25
S	0	0	0	0	4	9	7	5	1	1	1	28
SSW	0	0	1	0	2	7	5	1	4	0	1	21
SW	0	0	0	0	0	4	1	5	6	3	2	21
WSW	0	0	0	0	0	2	1	0	8	9	1	21
W	0	0	0	0	0	0	2	2	4	22	4	34
WNW	0	0	0	0	0	1	1	3	18	24	21	70
NW	0	0	0	0	0	0	0	0	9	7	4	20
NNW	0	0	0	0	0	1	3	4	3	0	0	11
Total	0	0	2	5	17	70	60	36	55	67	34	348
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			179
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			348
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-42 Naughton Power Plant Joint Frequency Distribution 2022–2023, 50-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS50		**Direction:**	WD50		**Lapse:**	DT50_10		
Stability Class:			D			**Delta Temperature**		Neutral				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	1	2	7	9	27	19	1	7	0	0	73
NNE	0	0	5	10	8	21	18	5	4	0	0	71
NE	0	0	2	9	5	10	9	9	8	0	0	52
ENE	0	0	3	3	7	5	13	10	11	1	11	65
E	0	0	1	6	3	9	10	7	5	1	0	42
ESE	0	0	1	8	4	15	13	5	1	0	0	47
SE	0	2	1	11	8	7	17	6	1	0	0	53
SSE	0	2	2	18	20	14	13	3	0	0	0	72
S	0	1	2	18	22	32	23	6	4	2	0	110
SSW	0	0	2	7	6	9	6	8	5	2	0	45
SW	0	0	0	5	3	8	18	6	24	12	6	82
WSW	0	0	0	1	8	9	30	54	69	54	13	238
W	0	0	0	6	7	21	47	87	181	185	61	595
WNW	0	0	1	4	5	14	102	272	408	191	32	1,030
NW	0	1	1	5	10	19	71	103	126	40	11	387
NNW	0	0	4	4	4	14	20	4	9	2	0	61
Total	0	7	27	122	129	234	429	586	863	490	134	3,023
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			179
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			3,023
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-43 Naughton Power Plant Joint Frequency Distribution 2022–2023, 50-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS50		**Direction:**	WD50		**Lapse:**	DT50_10		
Stability Class:			E			**Delta Temperature**		Slightly Stable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	2	4	10	11	23	50	23	4	0	0	127
NNE	1	2	4	14	9	26	25	8	4	0	0	93
NE	1	1	4	11	11	18	8	6	5	1	0	66
ENE	0	1	2	14	6	11	7	11	3	1	1	60
E	1	0	8	8	4	2	5	4	2	3	0	37
ESE	0	1	0	3	5	8	6	2	0	0	0	25
SE	1	2	6	2	9	13	19	3	1	0	0	56
SSE	0	3	6	14	13	16	11	2	4	1	0	70
S	0	0	6	14	24	36	16	6	3	0	0	105
SSW	0	0	5	11	9	14	19	6	8	4	0	76
SW	0	1	3	2	2	8	10	13	19	24	19	101
WSW	0	0	3	2	5	3	19	37	65	27	13	176
W	0	0	0	6	5	14	30	46	100	38	11	250
WNW	0	1	1	4	6	25	58	108	147	75	28	455
NW	0	0	2	3	4	23	52	67	57	38	10	256
NNW	1	0	3	5	5	27	34	20	8	2	0	105
Total	5	14	57	123	128	267	369	362	430	214	82	2,058
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			179
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			2,058
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-44 Naughton Power Plant Joint Frequency Distribution 2022–2023, 50-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS50		**Direction:**	WD50		**Lapse:**	DT50_10		
Stability Class:			F			**Delta Temperature**		Moderately Stable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	1	2	8	6	41	80	22	5	0	0	165
NNE	1	2	6	17	23	36	48	3	1	0	0	137
NE	0	2	5	15	16	11	6	0	1	0	0	56
ENE	2	0	7	5	4	4	5	2	0	0	0	29
E	1	5	0	5	6	5	4	0	1	0	0	27
ESE	0	2	3	6	8	1	2	2	1	0	0	25
SE	0	3	3	17	8	7	2	0	0	0	0	40
SSE	0	3	6	8	7	9	5	2	1	0	0	41
S	0	2	6	12	10	20	18	4	0	0	0	72
SSW	0	3	8	12	7	11	10	4	1	0	0	56
SW	0	5	5	7	4	4	5	5	9	4	0	48
WSW	1	2	1	3	1	4	6	7	8	3	0	36
W	0	3	0	7	6	6	9	19	19	0	0	69
WNW	1	3	1	2	3	11	29	30	4	0	0	84
NW	0	2	0	4	6	23	40	33	8	4	0	120
NNW	0	1	2	6	9	22	62	24	3	1	0	130
Total	6	39	55	134	124	215	331	157	62	12	0	1135
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			179
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			1,135
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-45 Naughton Power Plant Joint Frequency Distribution 2022–2023, 50-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS50		**Direction:**	WD50		**Lapse:**	DT50_10		
Stability Class:			G			**Delta Temperature**		Extremely Stable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	1	0	4	13	15	82	239	167	26	0	0	547
NNE	0	1	9	16	28	136	202	84	13	0	0	489
NE	0	3	7	14	21	42	10	4	1	0	0	102
ENE	1	1	5	8	11	8	1	0	0	0	0	35
E	0	1	4	18	7	4	2	0	0	0	0	36
ESE	2	2	11	7	4	3	0	0	0	0	0	29
SE	0	2	4	3	6	4	1	0	0	0	0	20
SSE	0	5	5	10	4	8	1	0	0	0	0	33
S	0	1	2	6	6	13	7	4	1	0	0	40
SSW	0	1	1	7	1	4	2	1	1	0	0	18
SW	0	1	1	4	2	7	1	1	2	0	0	19
WSW	0	0	1	5	1	4	6	1	1	0	0	19
W	0	1	0	3	1	3	6	4	0	0	0	18
WNW	0	0	0	8	4	6	9	3	2	0	0	32
NW	0	0	0	7	9	22	31	22	3	0	0	94
NNW	0	0	2	12	14	33	97	28	1	0	0	187
Total	4	19	56	141	134	379	615	319	51	0	0	1,718
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			179
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			1,718
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-46 Naughton Power Plant Joint Frequency Distribution 2022–2023, 50-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS50		**Direction:**	WD50		**Lapse:**	DT50_10		
Stability Class:			ALL			**Delta Temperature**						
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	1	4	12	38	41	177	390	213	45	0	0	921
NNE	2	5	24	57	68	223	294	100	22	1	0	796
NE	1	6	19	51	54	82	35	22	15	1	0	286
ENE	3	2	17	30	28	33	32	28	14	2	12	205
E	2	6	13	37	21	25	38	28	9	4	0	183
ESE	2	5	15	26	21	40	71	17	5	0	0	202
SE	1	9	14	34	36	49	58	13	2	0	0	216
SSE	0	13	19	50	49	64	46	13	6	1	2	263
S	0	4	16	50	67	118	84	35	9	5	6	394
SSW	0	4	17	37	25	46	48	26	22	10	5	240
SW	0	7	9	18	11	31	36	33	88	56	40	329
WSW	1	2	5	11	15	22	62	99	164	100	33	516
W	0	4	0	22	19	44	94	158	304	246	79	970
WNW	1	4	3	18	18	57	199	416	580	291	83	1,675
NW	0	3	3	19	29	87	194	225	205	90	29	884
NNW	1	1	11	27	32	97	217	82	27	5	1	501
Total	15	79	197	525	534	1,195	1,898	1,508	1,517	812	290	8,581
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			179
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			8,581
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-47 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:** WS10			**Direction:** WD10			**Lapse:** DT60_10			
Stability Class:			A			**Delta Temperature**		Extremely Unstable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10-7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	1	0	1	1	0	0	0	0	3
NNE	0	0	0	0	0	0	0	0	1	0	0	1
NE	0	0	0	0	0	0	2	1	2	0	0	5
ENE	0	0	0	0	0	0	7	5	2	0	0	14
E	0	0	0	0	0	3	16	5	1	0	0	25
ESE	0	0	0	0	0	5	32	7	2	0	0	46
SE	0	0	0	0	1	3	4	1	0	0	0	9
SSE	0	0	0	1	0	0	3	1	1	2	2	10
S	0	0	1	0	4	2	5	3	4	3	1	23
SSW	0	0	0	1	2	2	2	3	14	6	3	33
SW	0	0	0	0	0	1	5	9	30	16	1	62
WSW	0	0	0	0	0	2	1	19	50	12	2	86
W	0	0	0	0	0	2	11	32	95	32	2	174
WNW	0	0	0	0	0	4	22	89	90	27	2	234
NW	0	0	0	1	0	1	8	41	49	16	6	122
NNW	0	0	0	0	0	1	3	4	0	1	0	9
Total	0	0	1	4	7	27	122	220	341	115	19	856
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			566
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			856
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-48 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:				Speed:	WS10		Direction:	WD10		Lapse:	DT60_10	
Stability Class:				B			Delta Temperature		Moderately Unstable			
Wind Speed (mph)												
Wind Direction (from)	0.22–0.5	0.51–0.75	0.76–1	1.10–1.5	1.60–2	2.10–3	3.10–5	5.10–7	7.10–10	10.10–13	>13.10	Total
N	0	0	0	0	0	0	2	0	1	1	0	4
NNE	0	0	0	0	0	1	2	0	0	0	0	3
NE	0	0	0	0	0	4	3	1	0	0	0	8
ENE	0	0	0	0	0	3	8	1	0	0	0	12
E	0	0	0	0	1	7	6	1	0	0	0	15
ESE	0	0	0	0	1	6	8	2	0	0	0	17
SE	0	0	0	1	1	6	2	1	0	0	0	11
SSE	0	0	0	0	1	4	2	1	0	0	0	8
S	0	0	0	1	4	25	11	2	0	0	0	43
SSW	0	0	0	0	1	4	4	4	5	1	0	19
SW	0	0	0	0	1	2	2	3	6	2	1	17
WSW	0	0	0	0	0	2	8	10	12	1	0	33
W	0	0	0	0	0	4	15	9	15	2	1	46
WNW	0	0	0	0	0	1	14	28	10	1	0	54
NW	0	0	0	0	0	0	18	16	14	1	0	49
NNW	0	0	0	0	1	4	5	1	1	0	0	12
Total	0	0	0	2	11	73	110	80	64	9	2	351
Calm Hours not Included above for:						Total Period				All Hours		0
Variable Direction Hours for:						Total Period				All Hours		0
Invalid Hours for:						Total Period				All Hours		566
Number of Valid Hours for this Table:						Total Period				All Hours		351
Total Hours for the Period:						Total Period				All Hours		8,760

Table 2.7-49 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			Speed:	WS10		Direction:	WD10		Lapse:	DT60_10		
Stability Class:			C			Delta Temperature		Slightly Unstable				
Wind Speed (mph)												
Wind Direction (from)	0.22–0.5	0.51–0.75	0.76–1	1.10–1.5	1.60–2	2.10–3	3.10–5	5.10–7	7.10–10	10.10–13	>13.10	Total
N	0	0	0	0	0	4	1	0	1	0	0	6
NNE	0	0	0	0	3	1	2	0	0	0	0	6
NE	0	0	0	0	2	2	0	0	1	0	0	5
ENE	0	0	0	0	0	5	2	0	0	0	0	7
E	0	0	0	1	2	5	2	1	1	0	0	12
ESE	0	0	0	0	2	4	4	1	0	0	0	11
SE	0	0	0	1	4	6	5	0	0	0	0	16
SSE	0	0	0	1	5	5	9	1	0	0	0	21
S	0	0	0	5	2	12	11	1	2	0	0	33
SSW	0	0	0	1	1	8	1	3	1	0	0	15
SW	0	0	0	0	1	3	4	6	7	3	0	24
WSW	0	0	0	3	1	6	3	10	7	2	0	32
W	0	0	0	0	1	3	13	15	10	1	0	43
WNW	0	0	0	1	2	4	13	18	12	1	0	51
NW	0	0	0	1	0	8	19	18	12	4	0	62
NNW	0	0	0	0	0	11	7	1	0	0	0	19
Total	0	0	0	14	26	87	96	75	54	11	0	363
Calm Hours not Included above for:						Total Period			All Hours			0
Variable Direction Hours for:						Total Period			All Hours			0
Invalid Hours for:						Total Period			All Hours			566
Number of Valid Hours for this Table:						Total Period			All Hours			363
Total Hours for the Period:						Total Period			All Hours			8,760

Table 2.7-50 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:** WS10			**Direction:** WD10			**Lapse:** DT60_10			
Stability Class:			D			**Delta Temperature** Neutral						
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	4	28	26	31	7	7	1	0	0	104
NNE	0	1	2	13	12	13	11	1	0	0	0	53
NE	0	0	0	8	5	4	21	9	11	0	1	59
ENE	0	3	2	7	2	8	17	21	11	4	13	88
E	0	0	2	3	5	6	9	11	7	1	0	44
ESE	1	1	1	4	5	3	15	6	6	0	0	42
SE	0	1	2	7	2	6	14	1	1	0	0	34
SSE	0	1	5	8	7	20	7	2	3	0	0	53
S	0	1	0	20	20	29	14	9	2	0	0	95
SSW	0	0	1	11	16	23	23	10	4	2	0	90
SW	0	1	1	8	6	12	29	31	35	16	2	141
WSW	0	0	4	3	4	14	32	54	52	16	0	179
W	0	1	2	7	6	17	73	79	70	5	3	263
WNW	0	0	1	8	8	19	83	85	78	16	0	298
NW	0	1	6	10	11	23	61	103	64	11	3	293
NNW	0	2	4	23	21	24	24	20	5	1	0	124
Total	1	13	37	168	156	252	440	449	350	72	22	1,960
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			566
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			1,960
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-51 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS10		**Direction:**	WD10		**Lapse:**	DT60_10		
Stability Class:			E			**Delta Temperature**		Slightly Stable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	4	10	19	27	47	36	2	1	0	0	146
NNE	0	3	7	14	22	32	25	3	0	0	0	106
NE	0	2	2	8	10	13	7	2	6	2	0	52
ENE	0	1	4	7	2	6	10	12	9	0	2	53
E	0	0	1	4	1	2	4	2	2	0	0	16
ESE	0	2	4	4	5	2	9	1	0	0	0	27
SE	0	2	4	5	10	11	7	5	2	0	0	46
SSE	1	2	8	15	17	20	16	3	2	0	0	84
S	0	2	4	31	32	53	34	10	0	0	0	166
SSW	0	0	3	18	23	44	22	13	2	1	1	127
SW	0	2	3	12	14	24	40	26	17	8	1	147
WSW	0	0	5	2	4	27	68	41	23	12	2	184
W	0	0	4	8	3	20	60	52	46	14	1	208
WNW	0	0	0	4	7	21	65	42	39	3	0	181
NW	0	3	4	12	11	33	51	31	22	1	0	168
NNW	0	2	7	15	24	41	40	17	2	0	0	148
Total	1	25	70	178	212	396	494	262	173	41	7	1,859
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			566
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			1,859
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-52 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:**	WS10		**Direction:**	WD10		**Lapse:**	DT60_10	
Stability Class:			F			**Delta Temperature**		Moderately Stable			
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	4	20	26	31	57	25	0	0	0	0	163
NNE	0	2	12	34	23	30	21	4	0	0	0	126
NE	0	1	3	7	11	5	2	2	0	0	0	31
ENE	0	6	2	14	0	0	1	2	1	0	0	26
E	0	0	6	9	1	3	0	0	0	0	0	19
ESE	0	0	4	7	4	2	2	0	0	0	0	19
SE	0	0	4	15	6	5	2	1	0	0	0	33
SSE	0	4	5	13	13	13	3	0	0	0	0	51
S	0	1	9	31	18	31	17	2	0	0	0	109
SSW	0	0	4	16	18	17	15	1	1	0	0	72
SW	0	2	1	6	5	11	17	15	0	0	0	57
WSW	0	0	0	7	0	5	15	13	1	0	0	41
W	0	1	4	6	1	5	23	9	0	0	0	49
WNW	0	1	3	7	4	10	23	5	0	0	0	53
NW	0	3	9	9	20	24	11	4	1	0	0	81
NNW	0	3	10	37	29	42	27	4	1	0	0	153
Total	0	28	96	244	184	260	204	62	5	0	0	1,083
Calm Hours not Included above for:						**Total Period**			**All Hours**		0
Variable Direction Hours for:						**Total Period**			**All Hours**		0
Invalid Hours for:						**Total Period**			**All Hours**		566
Number of Valid Hours for this Table:						**Total Period**			**All Hours**		1,083
Total Hours for the Period:						**Total Period**			**All Hours**		8,760

Table 2.7-53 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:**	WS10		**Direction:**	WD10		**Lapse:**	DT60_10	
Stability Class:			G			**Delta Temperature**		Extremely Stable			
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	1	13	51	161	104	84	12	1	0	0	0	427
NNE	0	5	9	30	18	16	9	0	0	0	0	87
NE	0	9	15	23	8	2	1	0	0	0	0	58
ENE	0	2	8	6	1	3	0	0	0	0	0	20
E	0	2	9	12	1	1	0	0	0	0	0	25
ESE	0	2	9	9	3	0	0	0	0	0	0	23
SE	2	0	8	16	6	4	0	0	0	0	0	36
SSE	0	1	10	11	16	9	2	0	0	0	0	49
S	1	4	15	34	22	19	7	0	1	0	0	103
SSW	0	1	10	12	8	9	2	0	0	0	0	42
SW	0	2	4	4	6	5	4	0	0	0	0	25
WSW	0	5	3	4	3	1	5	0	0	0	0	21
W	0	4	5	8	1	2	2	1	0	0	0	23
WNW	0	6	8	11	6	5	2	1	0	0	0	39
NW	1	7	15	52	27	12	4	1	0	0	0	119
NNW	0	13	62	219	168	142	20	1	0	0	0	625
Total	5	76	241	612	398	314	70	5	1	0	0	1,722
Calm Hours not Included above for:						**Total Period**			**All Hours**		0
Variable Direction Hours for:						**Total Period**			**All Hours**		0
Invalid Hours for:						**Total Period**			**All Hours**		566
Number of Valid Hours for this Table:						**Total Period**			**All Hours**		1,722
Total Hours for the Period:						**Total Period**			**All Hours**		8,760

Table 2.7-54 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 10-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:**	WS10		**Direction:**	WD10		**Lapse:**	DT60_10	
Stability Class:			ALL			**Delta Temperature**					
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	1	21	85	235	188	224	84	10	4	1	0	853
NNE	0	11	30	91	78	93	70	8	1	0	0	382
NE	0	12	20	46	36	30	36	15	20	2	1	218
ENE	0	12	16	34	5	25	45	41	23	4	15	220
E	0	2	18	29	11	27	37	20	11	1	0	156
ESE	1	5	18	24	20	22	70	17	8	0	0	185
SE	2	3	18	45	30	41	34	9	3	0	0	185
SSE	1	8	28	49	59	71	42	8	6	2	2	276
S	1	8	29	122	102	171	99	27	9	3	1	572
SSW	0	1	18	59	69	107	69	34	27	10	4	398
SW	0	7	9	30	33	58	101	90	95	45	5	473
WSW	0	5	12	19	12	57	132	147	145	43	4	576
W	0	6	15	29	12	53	197	197	236	54	7	806
WNW	0	7	12	31	27	64	222	268	229	48	2	910
NW	1	14	34	85	69	101	172	214	162	33	9	894
NNW	0	20	83	294	243	265	126	48	9	2	0	1,090
Total	7	142	445	1,222	994	1,409	1,536	1,153	988	248	50	8,194
Calm Hours not Included above for:						**Total Period**			**All Hours**		0
Variable Direction Hours for:						**Total Period**			**All Hours**		0
Invalid Hours for:						**Total Period**			**All Hours**		566
Number of Valid Hours for this Table:						**Total Period**			**All Hours**		8,194
Total Hours for the Period:						**Total Period**			**All Hours**		8,760

Table 2.7-55 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 60-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:** WS60		**Direction:** WD60				**Lapse:** DT60_10		
Stability Class:			A		**Delta Temperature**		Extremely Unstable				
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	1	0	0	1	1	0	0	0	0	3
NNE	0	0	0	0	0	0	0	0	1	0	0	1
NE	0	0	0	0	0	0	0	0	2	0	0	2
ENE	0	0	0	0	0	0	4	8	2	0	0	14
E	0	0	1	0	0	1	11	9	0	0	0	22
ESE	0	0	0	0	0	4	28	14	3	0	0	49
SE	0	0	0	0	0	3	7	1	0	0	0	11
SSE	0	0	0	0	0	2	4	1	1	0	4	12
S	0	0	0	1	2	0	3	4	3	2	2	17
SSW	0	0	0	0	3	1	2	3	9	5	6	29
SW	0	0	0	0	0	2	3	6	22	18	11	62
WSW	0	0	0	0	0	1	0	11	38	28	11	90
W	0	0	0	0	0	3	8	25	53	70	18	177
WNW	0	0	0	0	0	1	10	54	101	50	11	227
NW	0	0	0	0	1	1	7	32	52	22	13	129
NNW	0	0	0	0	0	1	3	3	2	1	1	11
Total	0	0	2	1	6	21	91	171	289	196	77	856
Calm Hours not Included above for:					**Total Period**				**All Hours**		0
Variable Direction Hours for:					**Total Period**				**All Hours**		0
Invalid Hours for:					**Total Period**				**All Hours**		570
Number of Valid Hours for this Table:					**Total Period**				**All Hours**		856
Total Hours for the Period:					**Total Period**				**All Hours**		8,760

Table 2.7-56 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 60-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS60		**Direction:**	WD60			**Lapse:**	DT60_10	
Stability Class:			B			**Delta Temperature**		Moderately Unstable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	0	0	0	3	0	0	1	1	5
NNE	0	0	0	0	0	1	2	0	0	0	0	3
NE	0	0	0	0	1	2	3	0	0	0	0	6
ENE	0	0	0	0	0	1	8	2	1	0	0	12
E	0	0	0	0	0	4	8	2	0	0	0	14
ESE	0	0	0	0	0	4	9	1	1	0	0	15
SE	0	0	0	0	2	5	4	0	0	0	0	11
SSE	0	0	0	1	0	3	0	1	1	0	0	6
S	0	0	0	1	1	20	15	2	0	0	0	39
SSW	0	0	0	0	0	9	8	2	2	1	0	22
SW	0	0	1	0	1	2	2	2	2	5	3	18
WSW	0	0	0	0	0	3	5	8	10	10	1	37
W	0	0	0	0	0	3	11	9	10	11	1	46
WNW	0	0	0	0	0	0	8	26	18	3	0	55
NW	0	0	0	0	0	1	9	17	20	4	0	51
NNW	0	0	0	0	1	2	4	2	2	0	0	11
Total	0	0	1	2	6	60	99	74	67	35	6	351
Calm Hours not Included above for:						**Total Period**				**All Hours**		0
Variable Direction Hours for:						**Total Period**				**All Hours**		0
Invalid Hours for:						**Total Period**				**All Hours**		570
Number of Valid Hours for this Table:						**Total Period**				**All Hours**		351
Total Hours for the Period:						**Total Period**				**All Hours**		8,760

Table 2.7-57 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 60-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS60		**Direction:**	WD60		**Lapse:**	DT60_10		
Stability Class:			C			**Delta Temperature**		Slightly Unstable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	0	0	0	0	1	2	0	1	0	0	4
NNE	0	0	0	0	2	2	1	1	0	0	0	6
NE	0	0	0	0	0	4	0	0	1	0	0	5
ENE	0	0	0	0	0	2	2	0	0	0	0	4
E	0	0	0	1	2	3	3	2	1	0	0	12
ESE	0	0	0	1	0	6	3	1	0	0	0	11
SE	0	0	0	0	5	6	5	0	0	0	0	16
SSE	0	0	0	2	1	7	8	2	0	0	0	20
S	0	0	0	0	0	11	15	2	1	1	0	30
SSW	0	0	0	5	0	5	4	4	2	0	0	20
SW	0	0	0	2	2	4	3	4	2	5	1	23
WSW	0	0	0	1	0	4	4	6	10	4	1	30
W	0	0	0	0	2	2	10	11	12	6	4	47
WNW	0	0	0	0	1	1	8	16	15	3	1	45
NW	0	0	0	0	1	6	19	15	16	7	2	66
NNW	0	0	0	0	1	5	13	3	2	0	0	24
Total	0	0	0	12	17	69	100	67	63	26	9	363
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			570
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			363
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-58 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 60-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:** WS60		**Direction:** WD60			**Lapse:** DT60_10			
Stability Class:			D		**Delta Temperature**		Neutral				
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	1	7	27	21	40	12	2	6	1	0	117
NNE	0	1	3	17	10	11	5	3	0	0	0	50
NE	1	0	2	3	4	6	13	15	7	6	1	58
ENE	0	0	0	10	5	9	15	20	15	10	12	97
E	0	0	0	1	4	6	9	13	8	3	0	44
ESE	0	1	1	5	5	3	14	2	10	3	0	44
SE	1	1	2	0	2	5	13	3	0	0	0	27
SSE	0	0	4	9	4	12	10	4	3	1	0	47
S	0	2	1	13	11	25	15	8	3	0	0	78
SSW	0	1	3	13	8	20	17	12	6	0	2	82
SW	0	3	3	11	6	10	16	27	25	30	15	146
WSW	0	1	0	7	7	11	25	36	58	31	14	190
W	0	1	4	2	4	5	28	67	80	60	8	260
WNW	0	1	0	2	5	7	58	102	92	48	16	331
NW	0	1	3	12	8	22	37	71	102	35	12	304
NNW	0	0	5	9	9	14	18	13	14	3	0	85
Total	2	14	38	141	113	206	305	398	429	231	80	1,960
Calm Hours not Included above for:					**Total Period**			**All Hours**			0
Variable Direction Hours for:					**Total Period**			**All Hours**			0
Invalid Hours for:					**Total Period**			**All Hours**			570
Number of Valid Hours for this Table:					**Total Period**			**All Hours**			1,960
Total Hours for the Period:					**Total Period**			**All Hours**			8,760

Table 2.7-59 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 60-Meter Annual

Hours at Each Wind Speed and Direction												
Period of Record = 04/09/2022 01:00–04/09/2023 00:00												
Elevation:			**Speed:**	WS60		**Direction:**	WD60		**Lapse:**	DT60_10		
Stability Class:			E			**Delta Temperature**		Slightly Stable				
Wind Speed (mph)												
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	1	4	3	17	16	39	57	16	1	0	0	154
NNE	1	1	8	10	13	25	24	11	3	0	0	96
NE	1	3	4	6	2	8	16	4	1	3	0	48
ENE	1	5	4	4	4	5	14	9	14	6	2	68
E	0	1	3	6	3	4	11	3	4	1	0	36
ESE	0	0	3	4	1	3	7	7	3	0	0	28
SE	0	1	2	6	4	6	5	2	5	0	0	31
SSE	0	1	1	11	5	9	5	4	2	3	0	41
S	0	3	6	22	28	31	27	10	5	0	0	132
SSW	0	1	3	10	23	22	30	12	14	2	0	117
SW	0	2	2	8	3	10	34	26	32	14	10	142
WSW	0	5	2	3	3	13	30	50	53	17	11	189
W	0	1	0	6	9	16	33	44	61	43	24	237
WNW	0	2	2	5	4	13	59	62	61	27	5	240
NW	0	1	1	1	4	14	58	52	43	21	4	199
NNW	0	0	3	11	6	31	17	19	10	3	0	100
Total	4	31	47	130	128	249	427	331	312	140	56	1,858
Calm Hours not Included above for:						**Total Period**			**All Hours**			0
Variable Direction Hours for:						**Total Period**			**All Hours**			0
Invalid Hours for:						**Total Period**			**All Hours**			570
Number of Valid Hours for this Table:						**Total Period**			**All Hours**			1,858
Total Hours for the Period:						**Total Period**			**All Hours**			8,760

Table 2.7-60 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 60-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:**	WS60		**Direction:**	WD60		**Lapse:**	DT60_10	
Stability Class:			F			**Delta Temperature**		Moderately Stable			
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	2	3	16	21	65	75	23	1	0	0	206
NNE	0	4	4	12	18	33	33	4	1	0	0	109
NE	0	3	3	6	9	6	5	2	3	0	0	37
ENE	0	0	3	8	5	4	2	1	2	0	0	25
E	0	2	4	2	2	3	2	0	0	0	0	15
ESE	0	4	0	5	0	4	1	1	0	0	0	15
SE	0	0	4	4	3	2	3	0	1	0	0	17
SSE	0	1	2	8	7	7	1	0	1	0	0	27
S	0	1	9	10	20	31	17	3	1	0	0	92
SSW	0	3	4	13	7	10	12	5	6	1	0	61
SW	1	2	3	9	4	7	8	4	15	0	0	53
WSW	0	1	4	7	8	7	12	21	16	5	0	81
W	0	2	1	3	4	7	10	19	14	4	0	64
WNW	0	1	2	2	9	8	22	21	6	0	0	71
NW	0	0	4	4	10	15	40	18	11	4	0	106
NNW	0	3	6	5	8	28	36	10	2	0	0	98
Total	1	29	56	114	135	237	279	132	80	14	0	1,077
Calm Hours not Included above for:						**Total Period**			**All Hours**		0
Variable Direction Hours for:						**Total Period**			**All Hours**		0
Invalid Hours for:						**Total Period**			**All Hours**		570
Number of Valid Hours for this Table:						**Total Period**			**All Hours**		1,077
Total Hours for the Period:						**Total Period**			**All Hours**		8,760

Table 2.7-61 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 60-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:** WS60			**Direction:** WD60			**Lapse:** DT60_10		
Stability Class:			G			**Delta Temperature**		Extremely Stable			
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	0	1	16	45	62	152	188	27	0	0	0	491
NNE	1	6	11	59	55	152	133	10	0	0	0	427
NE	2	5	12	26	24	14	2	0	0	0	0	85
ENE	1	4	6	7	5	7	3	0	0	0	0	33
E	0	7	8	9	6	5	2	0	0	0	0	37
ESE	1	3	10	9	4	6	0	0	0	0	0	33
SE	1	5	13	7	4	0	1	0	0	0	0	31
SSE	2	2	8	21	9	7	2	1	1	0	0	53
S	0	2	11	28	29	27	20	6	0	0	0	123
SSW	2	6	8	14	13	14	9	5	0	1	0	72
SW	0	6	7	11	8	9	8	2	3	0	0	54
WSW	0	6	4	3	8	9	7	8	3	0	0	48
W	0	2	6	10	7	3	3	3	3	0	0	37
WNW	0	6	4	5	4	5	8	9	1	0	0	42
NW	3	6	7	10	9	9	11	5	4	0	0	64
NNW	0	7	12	26	10	19	19	1	1	0	0	95
Total	13	74	143	290	257	438	416	77	16	1	0	1,725
Calm Hours not Included above for:						**Total Period**			**All Hours**		0
Variable Direction Hours for:						**Total Period**			**All Hours**		0
Invalid Hours for:						**Total Period**			**All Hours**		570
Number of Valid Hours for this Table:						**Total Period**			**All Hours**		1,725
Total Hours for the Period:						**Total Period**			**All Hours**		8,760

Table 2.7-62 Kemmerer Unit 1 Joint Frequency Distribution 2022–2023, 60-Meter Annual

Hours at Each Wind Speed and Direction											
Period of Record = 04/09/2022 01:00–04/09/2023 00:00											
Elevation:			**Speed:**	WS60	**Direction:**		WD60		**Lapse:**	DT60_10	
Stability Class:			ALL		**Delta Temperature**						
Wind Speed (mph)											
Wind Direction (from)	**0.22–0.5**	**0.51–0.75**	**0.76–1**	**1.10–1.5**	**1.60–2**	**2.10–3**	**3.10–5**	**5.10–7**	**7.10–10**	**10.10–13**	**>13.10**	**Total**
N	1	8	30	105	120	298	338	68	9	2	1	980
NNE	2	12	26	98	98	224	198	29	5	0	0	692
NE	4	11	21	41	40	40	39	21	14	9	1	241
ENE	2	9	13	29	19	28	48	40	34	16	14	253
E	0	10	16	19	17	26	46	29	13	4	0	180
ESE	1	8	14	24	10	30	62	26	17	3	0	195
SE	2	7	21	17	20	27	38	6	6	0	0	144
SSE	2	4	15	52	26	47	30	13	9	4	4	206
S	0	8	27	75	91	145	112	35	13	3	2	511
SSW	2	11	18	55	54	81	82	43	39	10	8	403
SW	1	13	16	41	24	44	74	71	101	72	40	498
WSW	0	13	10	21	26	48	83	140	188	95	38	665
W	0	6	11	21	26	39	103	178	233	194	55	868
WNW	0	10	8	14	23	35	173	290	294	131	33	1,011
NW	3	8	15	27	33	68	181	210	248	93	31	919
NNW	0	10	26	51	35	100	110	51	33	7	1	424
Total	20	148	287	690	662	1,280	1,717	1,250	1,256	643	228	8,190
Calm Hours not Included above for:					**Total Period**				**All Hours**		0
Variable Direction Hours for:					**Total Period**				**All Hours**		0
Invalid Hours for:					**Total Period**				**All Hours**		570
Number of Valid Hours for this Table:					**Total Period**				**All Hours**		8,190
Total Hours for the Period:					**Total Period**				**All Hours**		8,760

Table 2.7-63 Kemmerer Unit 1 and Naughton Power Plant Stability Class Distribution for April 9, 2022–April 8, 2023, and January 1, 2019–December 31, 2021 (Naughton Power Plant Only)

	Kemmerer Unit 1 4/9/2022–4/8/2023 (%)	Naughton Power Plant 4/9/2023–4/8/2023 (%)	Naughton Power Plant 1/1/2019–12/31/2021 (%)
A	10.5	2.5	2.0
B	4.3	0.9	1.9
C	4.4	4.1	4.4
D	23.9	35.1	38.5
E	22.7	23.9	20.6
F	13.2	13.1	12.6
G	21.0	20.4	20.0
Based on Valid Hours	8,194	8,452	25,867

Table 2.7-64 Naughton Power Plant 33-Foot (10-Meter) Annual Stability Persistence Summary for Jan 2019–Dec 2021

Stability Persistence (hours)/Percent																										
Stability	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**GT.24**	**Total**
A	107	43	25	13	14	4	10	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	220
	49	68	80	85	92	94	98	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
B	286	72	14	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	379
	75	94	98	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
C	536	141	39	26	11	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	758
	71	89	94	98	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
D	598	348	222	157	160	124	95	83	66	67	47	57	29	13	15	6	7	6	9	5	3	2	0	0	16	2135
	28	44	55	62	70	75	80	84	87	90	92	95	96	97	97	98	98	98	99	99	99	99	99	99	100	
E	1160	461	266	146	79	56	50	26	15	7	4	3	5	6	1	3	3	1	0	0	0	0	0	0	0	2292
	51	71	82	89	92	95	97	98	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	
F	914	386	190	101	53	28	14	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1696
	54	77	88	94	97	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
G	252	132	82	71	57	46	53	54	57	60	52	31	11	16	9	9	1	1	1	0	0	0	0	0	0	995
	25	39	47	54	60	64	70	75	81	87	92	95	96	98	99	99	99	99	100	100	100	100	100	100	100	
TOTAL	3853	1583	838	519	376	260	223	172	144	134	104	91	45	35	25	18	11	8	10	5	3	2	0	0	16	8475

Table 2.7-65 Naughton Power Plant 164-Foot (50-Meter) Annual Stability Persistence Summary for Jan 2019–Dec 2021

Stability Persistence (hours)/Percent																										
Stability	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**GT.24**	**Total**
A	107	44	25	14	14	4	9	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	221
	48	68	80	86	92	94	98	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
B	287	72	13	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	379
	76	95	98	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
C	536	140	39	26	11	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	757
	71	89	94	98	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
D	601	349	224	157	162	124	95	84	63	68	49	56	30	13	15	6	7	6	7	5	2	3	0	0	16	2142
	28	44	55	62	70	75	80	84	87	90	92	95	96	97	98	98	98	98	99	99	99	99	99	99	100	
E	1165	454	268	150	79	59	47	27	16	7	4	3	5	6	1	3	3	1	0	0	0	0	0	0	0	2298
	51	70	82	89	92	95	97	98	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	
F	915	386	190	104	55	27	14	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1700
	54	77	88	94	97	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
G	253	133	88	68	56	44	52	57	53	59	47	30	14	17	11	12	0	1	1	0	0	0	0	0	0	996
	25	39	48	54	60	64	70	75	81	87	91	94	96	97	99	100	100	100	100	100	100	100	100	100	100	
TOTAL	3864	1578	847	524	379	260	218	176	138	134	101	89	49	36	27	21	10	8	8	5	2	3	0	0	16	8475

Table 2.7-66 Kemmerer Unit 1 33-Foot (10-Meter) Annual Stability Persistence Summary for April 2022–April 2023

	Stability Persistence (hours)/Percent																									
Stability	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**GT.24**	**Total**
A	48	32	12	18	17	25	11	17	7	4	2	3	3	0	0	0	0	0	0	0	0	0	0	0	0	199
	24	40	46	55	64	76	82	90	94	96	97	98	100	100	100	100	100	100	100	100	100	100	100	100	100	
B	155	61	14	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	236
	66	92	97	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
C	206	50	13	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	274
	75	93	98	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
D	271	146	63	47	21	25	13	8	9	3	6	4	1	2	3	1	3	0	2	0	1	0	0	0	5	634
	43	66	76	83	86	90	92	94	95	96	97	97	97	98	98	98	99	99	99	99	99	99	99	99	100	
E	326	145	71	52	35	22	15	12	10	10	2	3	1	1	2	0	0	0	0	1	0	0	0	0	0	708
	46	66	77	84	89	92	94	96	97	98	98	99	99	99	99	99	99	99	99	100	100	100	100	100	100	
F	331	138	70	30	15	9	5	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	604
	55	78	89	94	97	98	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
G	78	42	25	26	25	14	16	19	20	18	10	6	5	4	3	2	1	4	0	1	1	1	0	0	0	321
	24	37	45	53	61	65	70	76	83	88	91	93	95	96	97	97	98	99	99	99	99	100	100	100	100	
TOTAL	1415	614	268	180	114	97	61	57	47	37	21	17	10	7	8	3	4	4	2	2	2	1	0	0	5	2976

Table 2.7-67 Kemmerer Unit 1 197-Foot (60-Meter) Annual Stability Persistence Summary for April 2022–April 2023

	Stability Persistence (hours)/Percent																									
Stability	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**GT.24**	**Total**
A	48	32	12	18	17	25	11	17	7	4	2	3	3	0	0	0	0	0	0	0	0	0	0	0	0	199
	24	40	46	55	64	76	82	90	94	96	97	98	100	100	100	100	100	100	100	100	100	100	100	100	100	
B	155	61	14	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	236
	66	92	97	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
C	206	50	13	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	274
	75	93	98	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
D	271	146	63	47	21	25	13	8	9	3	6	4	1	2	3	1	3	0	2	0	1	0	0	0	5	634
	43	66	76	83	86	90	92	94	95	96	97	97	97	98	98	98	99	99	99	99	99	99	99	99	100	
E	326	145	71	52	35	22	15	12	10	10	2	3	1	1	2	0	0	0	0	1	0	0	0	0	0	708
	46	66	77	84	89	92	94	96	97	98	98	99	99	99	99	99	99	99	99	100	100	100	100	100	100	
F	331	138	70	30	15	9	5	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	604
	55	78	89	94	97	98	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
G	78	42	25	26	25	14	16	19	20	18	10	6	5	4	3	2	1	4	0	1	1	1	0	0	0	321
	24	37	45	53	61	65	70	76	83	88	91	93	95	96	97	97	98	99	99	99	99	100	100	100	100	
TOTAL	1415	614	268	180	114	97	61	57	47	37	21	17	10	7	8	3	4	4	2	2	2	1	0	0	5	2976

Table 2.7-68 Temperature Inversion Frequency and Persistence, April 2022–April 2023

	Number of Observations	Percent Probability
1	57	12.31
2	57	24.62
3	26	30.24
4	38	38.44
5	21	42.98
6	15	46.22
7	19	50.32
8	7	51.84
9	12	54.43
10	17	58.10
11	33	65.23
12	52	76.46
13	19	80.56
14	28	86.61
15	8	88.34
16	18	92.22
17	7	93.74
18	7	95.25
19	6	96.54
20	5	97.62
21	2	98.06
22	3	98.70
23	0	98.70
24	0	98.70
>24	6	100.00

The longest inversion lasted 82 hours and started on 1/2/2023 at 17:00.

Third column defines the percent probability that if an inversion occurs, its duration will be less than the number of hours.specified.

Table 2.7-69 Monthly Mean Temperatures (Degrees Fahrenheit) at Kemmerer Unit 1 and Surrounding Sites

	Kemmerer Unit 1	Naughton Power Plant		Big Piney, WY		Evanston-Uinta County Airport – Burns Field	Kemmerer, WY
	4/9/22–4/8/23	4/9/22–4/8/23	2019–2021	4/9/22–4/8/23	1981–2010*	1991–2020	1981–2010*
January	14.3	15.2	19.7	5.7	11.0	21.7	15.1
February	12.0	13.8	18.8	3.9	14.6	23.1	16.8
March	16.6	17.1	27.2	9.9	27.2	31.4	26.5
April	31.3	31.4	37.7	30.2	37.1	39.1	36.3
May	45.6	44.5	46.3	43.0	45.8	48.7	45.6
June	58.6	57.5	58.0	54.5	54.9	58.1	54.2
July	69.1	68.6	66.2	65.3	61.9	67.5	61.1
August	65.5	65.1	64.4	63.8	59.6	65.6	59.7
September	57.7	58.1	54.4	55.8	49.8	56.3	50.2
October	40.7	43.1	39.1	40.9	38.2	43.9	39.0
November	23.1	23.0	31.8	19.7	23.8	31.1	25.7
December	18.0	18.3	21.0	10.2	12.6	21.8	15.4
Annual	37.5	38.1	40.4	33.6	36.5	42.4	37.2

Table 2.7-70 Monthly Mean Maximum Temperature and Annual Mean Maximum Temperature (Degrees Fahrenheit) at Kemmerer Unit 1 and Surrounding Sites

	Kemmerer Unit 1	Naughton Power Plant		Big Piney, WY		Evanston-Uinta County Airport – Burns Field	Kemmerer 2N, WY
	4/9/22–4/8/23	**4/9/22–4/8/23**	**2019–2021**	**4/9/22–4/8/23**	**1981–2010***	**1991–2020**	**1981–2010**
January	20.5	20.6	26.2	16.4	26.0	29.8	28.2
February	21.0	21.3	25.3	17.3	29.0	31.5	30.5
March	24.0	24.1	35.0	23.7	41.2	40.7	39.6
April	41.6	40.3	46.7	43.4	52.4	50.2	50.0
May	54.9	53.6	56.5	58.2	61.6	60.8	60.4
June	71.9	69.3	69.0	73.1	72.2	71.8	70.8
July	82.5	80.7	78.7	85.5	80.6	82.0	79.3
August	78.5	76.8	77.0	81.2	79.0	80.1	78.0
September	72.8	71.1	66.9	74.3	68.1	69.9	67.9
October	52.7	54.5	49.5	58.6	55.2	55.7	54.6
November	31.5	30.7	41.0	33.5	37.8	40.6	38.3
December	26.2	25.6	28.2	24.3	26.5	29.7	28.4
Annual	48.1	47.6	50.1	49.1	52.6	53.6	52.3

Table 2.7-71 Monthly Mean Minimum Temperatures (Degrees Fahrenheit) at Kemmerer Unit 1 and Surrounding Sites

	Kemmerer Unit 1	Naughton Power Plant		Big Piney, WY		Evanston-Uinta County Airport – Burns Field	Kemmerer, WY
	4/9/22–4/8/23	4/9/22–4/8/23	2019–2021	4/9/22–4/8/23	1981–2010*	1991–2020	1981–2010*
January	7.1	9.2	12.1	-4.9	-4.0	13.6	2.0
February	3.6	6.4	10.9	-9.5	0.3	14.8	3.0
March	8.2	9.5	18.8	-3.9	13.2	22.0	13.4
April	21.2	22.0	27.4	16.5	21.9	28.0	22.5
May	32.3	33.8	34.9	27.8	30.0	36.6	30.8
June	42.0	42.9	43.9	35.9	37.6	44.4	37.6
July	52.0	52.8	50.5	45.0	43.3	52.9	42.9
August	51.8	52.5	48.8	46.4	40.3	51.1	41.3
September	41.5	43.8	39.7	37.2	31.4	42.8	32.6
October	28.0	31.1	28.1	23.1	21.3	32.1	23.4
November	14.9	15.6	22.5	5.9	9.9	21.6	13.0
December	8.7	9.9	12.9	-3.9	-1.3	13.8	2.4
Annual	26.0	27.6	29.3	18.0	20.4	31.1	22.2

*Reference 2.7-15

Table 2.7-72 National Ambient Air Quality Standards
(Sheet 1 of 2)

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	Primary	8 Hours	9 ppm	Not to be exceeded more than once per year
		1 Hour	35 ppm	
Lead (Pb)	Primary and Secondary	Rolling 3 Month Average	0.15 μg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)	Primary	1 Hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	1 Year	53 ppb (2)	Annual mean
Ozone (O_3)	Primary and Secondary	8 Hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	Primary	1 Year	12.0 μg/m^3
		Secondary	1 Year	15.0 μg/m^3
		Primary and Secondary	24 Hours	35 μg/m^3
	PM_{10}	Primary and Secondary	24 Hours	150 μg/m^3

Table 2.7-72 National Ambient Air Quality Standards (Sheet 2 of 2)

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Sulfur Dioxide (SO_2)	Primary	1 Hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 Hours	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m^3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O_3 standards.

(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a State to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Table 2.7-73 ARCON 50th Percentile X/Q Values at the EAB

Direction	1 hour	2 hours	4 hours	8hours	12 hours	24 hours	96 hours	168 hours	360 hours	720 hours
East	-	-	-	-	-	2.24E-06	3.18E-06	3.46E-06	3.74E-06	4.03E-06
East-Southeast	-	-	-	-	-	2.11E-06	3.26E-06	3.43E-06	3.89E-06	4.07E-06
Southeast	-	-	-	-	-	2.31E-06	3.73E-06	3.78E-06	4.05E-06	4.30E-06
South-Southeast	-	-	-	-	-	2.29E-06	3.61E-06	3.84E-06	4.05E-06	4.24E-06
South	-	-	-	-	-	2.37E-06	3.53E-06	3.72E-06	3.96E-06	4.13E-06
South-Southwest	-	-	-	-	-	3.55E-06	4.65E-06	4.81E-06	5.00E-06	5.05E-06
Southwest	-	-	-	-	6.28E-06	7.09E-06	8.22E-06	8.51E-06	8.86E-06	8.93E-06
West-Southwest	-	-	1.63E-05	1.97E-05	1.84E-05	1.80E-05	1.70E-05	1.70E-05	1.70E-05	1.68E-05
West	-	2.33E-05	2.91E-05	3.54E-05	3.16E-05	2.79E-05	2.40E-05	2.37E-05	2.30E-05	2.29E-05
West-Northwest	-	3.68E-05	3.41E-05	3.96E-05	3.45E-05	3.02E-05	2.56E-05	2.49E-05	2.44E-05	2.43E-05
Northwest	-	4.05E-05	3.83E-05	4.16E-05	3.66E-05	3.24E-05	2.77E-05	2.71E-05	2.66E-05	2.62E-05
North-Northwest	-	4.04E-05	3.94E-05	4.25E-05	3.84E-05	3.52E-05	2.98E-05	2.94E-05	2.90E-05	2.87E-05
North	-	-	1.96E-05	2.59E-05	2.59E-05	2.98E-05	2.57E-05	2.50E-05	2.42E-05	2.39E-05
North-Northeast	-	-	-	2.13E-05	2.21E-05	2.80E-05	2.38E-05	2.33E-05	2.26E-05	2.23E-05
Northeast	-	-	-	1.29E-05	1.56E-05	1.95E-05	1.76E-05	1.74E-05	1.71E-05	1.68E-05
East-Northeast	-	-	-	-	4.90E-06	5.38E-06	5.69E-06	5.80E-06	5.83E-06	6.10E-06

Table 2.7-74 XOQDOQ Distances from the Reactor Building to Nearest Receptors Per Directional Sector

Direction	NI Release[1]						EI Release[2]					
	EAB[4]		TFF		Nearest Residence[3,7]		EAB[6]		TFF		Nearest Residence[3,5]	
	m	*mi*	*m*	*mi*	*m*	*mi*	*m*	*mi*	*m*	*mi*	*m*	*mi*
S	300	0.19			4,406	2.73	193	0.12			4,337	2.69
SSW	300	0.19					212	0.13				
SW	300	0.19					250	0.16				
WSW	300	0.19					308	0.19				
W	300	0.19					384	0.24				
WNW	300	0.19					466	0.29				
NW	300	0.19					532	0.33				
NNW	300	0.19					566	0.35				
N	300	0.19	130	0.08			559	0.35	394	0.24		
NNE	300	0.19					512	0.32				
NE	300	0.19					438	0.27				
ENE	300	0.19					357	0.22				
E	300	0.19					286	0.18				
ESE	300	0.19					234	0.15				
SE	300	0.19					204	0.13				
SSE	300	0.19					191	0.12				

Notes:

1. The NI release point is a 100 m radius circle around the centerpoint of the reactor are measured from this circle.
2. EI release is modeled at the cold salt storage tank.
3. The nearest dairy cow and vegetable garden are located at the nearest residence.

4 The EAB is modeled as a 400 m radius circle centered on the reactor.

5. The reactor centerpoint and the EI are 556 ft apart, this is subtracted from the distance to the nearest residence.
6. EAB Distances from the cold salt storage tank are shown in Appendix Q and distances are converted from feet.
7. The nearest residence is 2.8 mi from the reactor centerpoint, so the 100 m is subtracted.

Table 2.7-75 XOQ and DOQ at Locations of Interest

Location	From NI						From EI					
	Distance (mi)	Distance (m)	Undecayed Undepleted (*s/m*^{3})	Decayed Undepleted (*s/m*^{3})	Decayed Depleted (*s/m*^{3})	Deposited (*m*$^{-2}$)	Distance (mi)	Distance (m)	Undecayed Undepleted (*s/m*^{3})	Decayed Undepleted (*s/m*^{3})	Decayed Depleted (*s/m*^{3})	Deposited (*m*$^{-2}$)
EAB	0.19 S	300 S	5.128E-05	5.126E-05	4.908E-05	1.513E-07	0.12 S	193 S	1.896E-04	1.895E-04	1.838E-04	2.841E-07
Nearest Property	2.74 S	4406 S	1.380E-06	1.370E-06	1.105E-06	2.740E-09	2.69 S	4337 S	1.505E-06	1.495E-06	1.207E-06	2.842E-09
TFF	0.08 N	130 N	2.755E-05	2.754E-05	2.692E-05	8.013E-08	0.24 N	394 N	6.092E-06	6.085E-06	5.769E-06	1.662E-08

Table 2.7-76 NI 50-mile χ/Q and D/Q Values, No Decay/Undepleted

	Segment Boundary (miles)									
Direction	**.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	2.28E-05	5.36E-06	1.70E-06	8.81E-07	5.60E-07	2.59E-07	1.00E-07	5.23E-08	3.45E-08	2.53E-08
SSW	1.74E-05	4.12E-06	1.31E-06	6.79E-07	4.32E-07	2.00E-07	7.74E-08	4.05E-08	2.67E-08	1.97E-08
SW	4.99E-06	1.14E-06	3.55E-07	1.82E-07	1.14E-07	5.20E-08	1.96E-08	1.00E-08	6.54E-09	4.77E-09
WSW	3.14E-06	7.06E-07	2.15E-07	1.09E-07	6.81E-08	3.07E-08	1.13E-08	5.74E-09	3.71E-09	2.69E-09
W	2.92E-06	6.46E-07	1.94E-07	9.73E-08	6.04E-08	2.69E-08	9.78E-09	4.89E-09	3.14E-09	2.26E-09
WNW	2.97E-06	6.56E-07	1.97E-07	9.87E-08	6.13E-08	2.73E-08	9.90E-09	4.95E-09	3.17E-09	2.28E-09
NW	2.99E-06	6.62E-07	1.99E-07	9.99E-08	6.21E-08	2.77E-08	1.01E-08	5.03E-09	3.23E-09	2.33E-09
NNW	3.76E-06	8.32E-07	2.50E-07	1.26E-07	7.81E-08	3.49E-08	1.27E-08	6.38E-09	4.10E-09	2.95E-09
N	3.01E-06	6.56E-07	1.95E-07	9.71E-08	6.00E-08	2.65E-08	9.52E-09	4.72E-09	3.02E-09	2.17E-09
NNE	1.77E-06	3.86E-07	1.14E-07	5.67E-08	3.50E-08	1.54E-08	5.49E-09	2.71E-09	1.72E-09	1.23E-09
NE	1.60E-06	3.44E-07	1.01E-07	5.00E-08	3.07E-08	1.34E-08	4.73E-09	2.31E-09	1.46E-09	1.04E-09
ENE	2.88E-06	6.17E-07	1.79E-07	8.79E-08	5.36E-08	2.32E-08	7.97E-09	3.81E-09	2.37E-09	1.67E-09
E	4.71E-06	1.01E-06	2.93E-07	1.44E-07	8.75E-08	3.76E-08	1.29E-08	6.10E-09	3.78E-09	2.65E-09
ESE	7.06E-06	1.52E-06	4.41E-07	2.17E-07	1.32E-07	5.69E-08	1.96E-08	9.33E-09	5.80E-09	4.09E-09
SE	4.99E-06	1.10E-06	3.27E-07	1.64E-07	1.01E-07	4.47E-08	1.60E-08	7.89E-09	5.02E-09	3.59E-09
SSE	5.94E-06	1.35E-06	4.13E-07	2.10E-07	1.32E-07	5.95E-08	2.21E-08	1.13E-08	7.29E-09	5.29E-09

Table 2.7-77 NI 50-mile χ/Q and D/Q Values, Decayed/Undepleted

	Segment Boundary (miles)									
Direction	**.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	2.27E-05	5.34E-06	1.69E-06	8.74E-07	5.54E-07	2.54E-07	9.65E-08	4.93E-08	3.18E-08	2.28E-08
SSW	1.74E-05	4.10E-06	1.30E-06	6.72E-07	4.26E-07	1.96E-07	7.40E-08	3.76E-08	2.41E-08	1.72E-08
SW	4.97E-06	1.14E-06	3.50E-07	1.78E-07	1.12E-07	5.02E-08	1.82E-08	8.92E-09	5.55E-09	3.87E-09
WSW	3.13E-06	7.01E-07	2.12E-07	1.07E-07	6.65E-08	2.95E-08	1.05E-08	5.03E-09	3.09E-09	2.13E-09
W	2.91E-06	6.41E-07	1.91E-07	9.55E-08	5.90E-08	2.59E-08	9.05E-09	4.30E-09	2.63E-09	1.80E-09
WNW	2.96E-06	6.51E-07	1.94E-07	9.69E-08	5.98E-08	2.62E-08	9.16E-09	4.34E-09	2.64E-09	1.81E-09
NW	2.98E-06	6.57E-07	1.96E-07	9.80E-08	6.06E-08	2.66E-08	9.31E-09	4.42E-09	2.69E-09	1.85E-09
NNW	3.74E-06	8.26E-07	2.47E-07	1.24E-07	7.64E-08	3.36E-08	1.18E-08	5.63E-09	3.45E-09	2.38E-09
N	3.00E-06	6.52E-07	1.93E-07	9.56E-08	5.88E-08	2.57E-08	8.93E-09	4.24E-09	2.60E-09	1.79E-09
NNE	1.77E-06	3.83E-07	1.13E-07	5.58E-08	3.42E-08	1.49E-08	5.13E-09	2.41E-09	1.47E-09	1.01E-09
NE	1.59E-06	3.43E-07	1.00E-07	4.94E-08	3.02E-08	1.31E-08	4.49E-09	2.12E-09	1.29E-09	8.94E-10
ENE	2.87E-06	6.15E-07	1.78E-07	8.73E-08	5.31E-08	2.28E-08	7.72E-09	3.61E-09	2.20E-09	1.52E-09
E	4.71E-06	1.01E-06	2.92E-07	1.43E-07	8.67E-08	3.71E-08	1.25E-08	5.77E-09	3.50E-09	2.41E-09
ESE	7.05E-06	1.51E-06	4.39E-07	2.15E-07	1.31E-07	5.61E-08	1.90E-08	8.87E-09	5.41E-09	3.74E-09
SE	4.98E-06	1.09E-06	3.25E-07	1.62E-07	9.98E-08	4.37E-08	1.53E-08	7.34E-09	4.54E-09	3.16E-09
SSE	5.92E-06	1.34E-06	4.09E-07	2.08E-07	1.30E-07	5.80E-08	2.10E-08	1.03E-08	6.47E-09	4.55E-09

Table 2.7-78 NI 50-mile χ/Q and D/Q Values, Decayed/Depleted

	Segment Boundary (miles)									
Direction	**.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	2.04E-05	4.59E-06	1.38E-06	6.87E-07	4.23E-07	1.83E-07	6.22E-08	2.86E-08	1.70E-08	1.15E-08
SSW	1.56E-05	3.53E-06	1.06E-06	5.30E-07	3.26E-07	1.41E-07	4.80E-08	2.21E-08	1.31E-08	8.85E-09
SW	4.47E-06	9.79E-07	2.87E-07	1.41E-07	8.59E-08	3.67E-08	1.21E-08	5.40E-09	3.16E-09	2.10E-09
WSW	2.82E-06	6.05E-07	1.74E-07	8.48E-08	5.12E-08	2.16E-08	6.98E-09	3.07E-09	1.78E-09	1.17E-09
W	2.62E-06	5.53E-07	1.57E-07	7.57E-08	4.54E-08	1.90E-08	6.02E-09	2.62E-09	1.51E-09	9.90E-10
WNW	2.66E-06	5.61E-07	1.59E-07	7.68E-08	4.61E-08	1.92E-08	6.10E-09	2.65E-09	1.52E-09	9.98E-10
NW	2.68E-06	5.67E-07	1.61E-07	7.77E-08	4.67E-08	1.95E-08	6.19E-09	2.69E-09	1.55E-09	1.02E-09
NNW	3.37E-06	7.12E-07	2.03E-07	9.78E-08	5.88E-08	2.46E-08	7.84E-09	3.42E-09	1.97E-09	1.30E-09
N	2.70E-06	5.62E-07	1.58E-07	7.56E-08	4.51E-08	1.87E-08	5.89E-09	2.55E-09	1.46E-09	9.58E-10
NNE	1.59E-06	3.30E-07	9.24E-08	4.42E-08	2.63E-08	1.09E-08	3.39E-09	1.46E-09	8.32E-10	5.43E-10
NE	1.43E-06	2.95E-07	8.20E-08	3.90E-08	2.32E-08	9.50E-09	2.94E-09	1.25E-09	7.12E-10	4.64E-10
ENE	2.58E-06	5.29E-07	1.45E-07	6.86E-08	4.05E-08	1.64E-08	4.98E-09	2.09E-09	1.18E-09	7.61E-10
E	4.23E-06	8.67E-07	2.38E-07	1.12E-07	6.61E-08	2.67E-08	8.03E-09	3.34E-09	1.87E-09	1.21E-09
ESE	6.34E-06	1.30E-06	3.58E-07	1.69E-07	9.97E-08	4.04E-08	1.22E-08	5.12E-09	2.88E-09	1.86E-09
SE	4.48E-06	9.41E-07	2.66E-07	1.28E-07	7.63E-08	3.16E-08	9.95E-09	4.30E-09	2.47E-09	1.62E-09
SSE	5.32E-06	1.15E-06	3.35E-07	1.64E-07	9.92E-08	4.21E-08	1.37E-08	6.10E-09	3.56E-09	2.37E-09

Table 2.7-79 NI 50-mile χ/Q and D/Q Values, Deposited

	Segment Boundary (miles)									
Direction	**.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	6.64E-08	1.36E-08	3.55E-09	1.60E-09	9.02E-10	3.47E-10	1.00E-10	3.98E-11	2.12E-11	1.32E-11
SSW	4.02E-08	8.23E-09	2.15E-09	9.65E-10	5.46E-10	2.10E-10	6.08E-11	2.41E-11	1.29E-11	7.96E-12
SW	1.10E-08	2.26E-09	5.89E-10	2.64E-10	1.50E-10	5.75E-11	1.66E-11	6.59E-12	3.52E-12	2.18E-12
WSW	9.30E-09	1.90E-09	4.97E-10	2.23E-10	1.26E-10	4.86E-11	1.41E-11	5.57E-12	2.97E-12	1.84E-12
W	1.03E-08	2.10E-09	5.49E-10	2.47E-10	1.40E-10	5.37E-11	1.55E-11	6.15E-12	3.29E-12	2.03E-12
WNW	8.62E-09	1.77E-09	4.61E-10	2.07E-10	1.17E-10	4.50E-11	1.30E-11	5.16E-12	2.76E-12	1.71E-12
NW	8.10E-09	1.66E-09	4.33E-10	1.95E-10	1.10E-10	4.23E-11	1.22E-11	4.85E-12	2.59E-12	1.60E-12
NNW	1.08E-08	2.21E-09	5.77E-10	2.59E-10	1.47E-10	5.64E-11	1.63E-11	6.47E-12	3.46E-12	2.14E-12
N	1.09E-08	2.24E-09	5.84E-10	2.63E-10	1.49E-10	5.71E-11	1.65E-11	6.55E-12	3.50E-12	2.16E-12
NNE	7.43E-09	1.52E-09	3.98E-10	1.79E-10	1.01E-10	3.88E-11	1.12E-11	4.45E-12	2.38E-12	1.47E-12
NE	1.12E-08	2.30E-09	6.01E-10	2.70E-10	1.53E-10	5.87E-11	1.70E-11	6.73E-12	3.60E-12	2.23E-12
ENE	2.81E-08	5.76E-09	1.50E-09	6.76E-10	3.82E-10	1.47E-10	4.25E-11	1.69E-11	9.00E-12	5.57E-12
E	5.15E-08	1.06E-08	2.75E-09	1.24E-09	7.00E-10	2.69E-10	7.79E-11	3.09E-11	1.65E-11	1.02E-11
ESE	7.05E-08	1.44E-08	3.77E-09	1.69E-09	9.58E-10	3.68E-10	1.07E-10	4.22E-11	2.26E-11	1.40E-11
SE	2.88E-08	5.91E-09	1.54E-09	6.93E-10	3.92E-10	1.51E-10	4.36E-11	1.73E-11	9.23E-12	5.71E-12
SSE	1.98E-08	4.05E-09	1.06E-09	4.75E-10	2.69E-10	1.03E-10	2.99E-11	1.19E-11	6.33E-12	3.92E-12

Table 2.7-80 EI 50-mile χ/Q and D/Q Values, No Decay/Undepleted

	Segment Boundary (miles)									
Direction	**.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	2.85E-05	5.97E-06	1.81E-06	9.25E-07	5.83E-07	2.67E-07	1.02E-07	5.32E-08	3.50E-08	2.57E-08
SSW	2.19E-05	4.60E-06	1.39E-06	7.13E-07	4.50E-07	2.07E-07	7.91E-08	4.12E-08	2.71E-08	1.99E-08
SW	5.93E-06	1.24E-06	3.71E-07	1.88E-07	1.18E-07	5.32E-08	1.99E-08	1.02E-08	6.61E-09	4.81E-09
WSW	3.62E-06	7.55E-07	2.24E-07	1.12E-07	6.98E-08	3.13E-08	1.15E-08	5.80E-09	3.74E-09	2.71E-09
W	3.29E-06	6.82E-07	2.00E-07	9.96E-08	6.16E-08	2.73E-08	9.89E-09	4.93E-09	3.16E-09	2.28E-09
WNW	3.33E-06	6.91E-07	2.03E-07	1.01E-07	6.24E-08	2.77E-08	1.00E-08	4.99E-09	3.19E-09	2.30E-09
NW	3.37E-06	6.99E-07	2.05E-07	1.02E-07	6.33E-08	2.81E-08	1.02E-08	5.07E-09	3.25E-09	2.34E-09
NNW	4.24E-06	8.80E-07	2.58E-07	1.29E-07	7.97E-08	3.54E-08	1.29E-08	6.43E-09	4.13E-09	2.97E-09
N	3.33E-06	6.88E-07	2.00E-07	9.91E-08	6.10E-08	2.68E-08	9.61E-09	4.76E-09	3.03E-09	2.18E-09
NNE	1.95E-06	4.03E-07	1.17E-07	5.78E-08	3.55E-08	1.56E-08	5.54E-09	2.73E-09	1.73E-09	1.24E-09
NE	1.73E-06	3.57E-07	1.03E-07	5.08E-08	3.11E-08	1.36E-08	4.76E-09	2.32E-09	1.46E-09	1.04E-09
ENE	3.07E-06	6.34E-07	1.82E-07	8.89E-08	5.41E-08	2.33E-08	8.00E-09	3.82E-09	2.38E-09	1.68E-09
E	5.02E-06	1.04E-06	2.98E-07	1.45E-07	8.83E-08	3.79E-08	1.29E-08	6.12E-09	3.79E-09	2.66E-09
ESE	7.57E-06	1.57E-06	4.48E-07	2.19E-07	1.33E-07	5.74E-08	1.97E-08	9.37E-09	5.82E-09	4.10E-09
SE	5.54E-06	1.15E-06	3.36E-07	1.67E-07	1.03E-07	4.53E-08	1.61E-08	7.95E-09	5.05E-09	3.61E-09
SSE	6.92E-06	1.45E-06	4.30E-07	2.17E-07	1.35E-07	6.08E-08	2.25E-08	1.14E-08	7.36E-09	5.34E-09

Table 2.7-81 EI 50-mile χ/Q and D/Q Values, Decayed/Undepleted

	Segment Boundary (miles)									
Direction	**.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	2.84E-05	5.95E-06	1.80E-06	9.17E-07	5.77E-07	2.63E-07	9.87E-08	5.01E-08	3.22E-08	2.31E-08
SSW	2.19E-05	4.58E-06	1.38E-06	7.06E-07	4.44E-07	2.02E-07	7.57E-08	3.83E-08	2.45E-08	1.75E-08
SW	5.91E-06	1.23E-06	3.67E-07	1.85E-07	1.15E-07	5.14E-08	1.85E-08	9.04E-09	5.61E-09	3.91E-09
WSW	3.61E-06	7.50E-07	2.21E-07	1.10E-07	6.81E-08	3.01E-08	1.06E-08	5.08E-09	3.11E-09	2.14E-09
W	3.28E-06	6.78E-07	1.97E-07	9.78E-08	6.01E-08	2.63E-08	9.15E-09	4.34E-09	2.65E-09	1.82E-09
WNW	3.32E-06	6.86E-07	2.00E-07	9.90E-08	6.09E-08	2.66E-08	9.24E-09	4.37E-09	2.66E-09	1.82E-09
NW	3.35E-06	6.94E-07	2.02E-07	1.00E-07	6.18E-08	2.70E-08	9.40E-09	4.45E-09	2.71E-09	1.86E-09
NNW	4.22E-06	8.74E-07	2.55E-07	1.27E-07	7.79E-08	3.41E-08	1.19E-08	5.68E-09	3.47E-09	2.39E-09
N	3.32E-06	6.84E-07	1.98E-07	9.75E-08	5.98E-08	2.60E-08	9.01E-09	4.27E-09	2.61E-09	1.80E-09
NNE	1.94E-06	4.01E-07	1.16E-07	5.69E-08	3.48E-08	1.51E-08	5.17E-09	2.43E-09	1.48E-09	1.01E-09
NE	1.73E-06	3.56E-07	1.02E-07	5.02E-08	3.06E-08	1.32E-08	4.52E-09	2.13E-09	1.30E-09	8.97E-10
ENE	3.06E-06	6.33E-07	1.81E-07	8.82E-08	5.36E-08	2.30E-08	7.76E-09	3.62E-09	2.21E-09	1.53E-09
E	5.02E-06	1.04E-06	2.96E-07	1.44E-07	8.75E-08	3.73E-08	1.25E-08	5.79E-09	3.51E-09	2.41E-09
ESE	7.56E-06	1.56E-06	4.46E-07	2.18E-07	1.32E-07	5.66E-08	1.91E-08	8.91E-09	5.43E-09	3.75E-09
SE	5.53E-06	1.15E-06	3.34E-07	1.65E-07	1.02E-07	4.43E-08	1.55E-08	7.39E-09	4.56E-09	3.18E-09
SSE	6.91E-06	1.44E-06	4.27E-07	2.14E-07	1.33E-07	5.92E-08	2.13E-08	1.05E-08	6.54E-09	4.59E-09

Table 2.7-82 EI 50-mile χ/Q and D/Q Values, Decayed/Depleted

	Segment Boundary (miles)									
Direction	**.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	2.56E-05	5.12E-06	1.47E-06	7.21E-07	4.40E-07	1.89E-07	6.36E-08	2.91E-08	1.73E-08	1.17E-08
SSW	1.97E-05	3.94E-06	1.13E-06	5.56E-07	3.39E-07	1.46E-07	4.91E-08	2.24E-08	1.33E-08	8.97E-09
SW	5.32E-06	1.06E-06	3.01E-07	1.46E-07	8.85E-08	3.75E-08	1.23E-08	5.46E-09	3.19E-09	2.12E-09
WSW	3.25E-06	6.47E-07	1.81E-07	8.73E-08	5.25E-08	2.20E-08	7.07E-09	3.10E-09	1.79E-09	1.18E-09
W	2.95E-06	5.85E-07	1.62E-07	7.75E-08	4.63E-08	1.93E-08	6.09E-09	2.64E-09	1.52E-09	9.96E-10
WNW	2.99E-06	5.92E-07	1.64E-07	7.85E-08	4.69E-08	1.95E-08	6.16E-09	2.67E-09	1.53E-09	1.00E-09
NW	3.02E-06	5.99E-07	1.66E-07	7.96E-08	4.76E-08	1.98E-08	6.26E-09	2.72E-09	1.56E-09	1.02E-09
NNW	3.80E-06	7.54E-07	2.09E-07	1.00E-07	6.00E-08	2.50E-08	7.92E-09	3.45E-09	1.99E-09	1.30E-09
N	2.99E-06	5.90E-07	1.62E-07	7.71E-08	4.59E-08	1.90E-08	5.94E-09	2.56E-09	1.47E-09	9.63E-10
NNE	1.75E-06	3.46E-07	9.48E-08	4.50E-08	2.67E-08	1.10E-08	3.42E-09	1.47E-09	8.37E-10	5.46E-10
NE	1.55E-06	3.06E-07	8.37E-08	3.96E-08	2.34E-08	9.59E-09	2.95E-09	1.26E-09	7.15E-10	4.66E-10
ENE	2.75E-06	5.44E-07	1.48E-07	6.94E-08	4.09E-08	1.66E-08	5.00E-09	2.09E-09	1.18E-09	7.62E-10
E	4.51E-06	8.92E-07	2.42E-07	1.13E-07	6.67E-08	2.69E-08	8.07E-09	3.35E-09	1.88E-09	1.21E-09
ESE	6.79E-06	1.34E-06	3.64E-07	1.71E-07	1.01E-07	4.08E-08	1.23E-08	5.14E-09	2.89E-09	1.87E-09
SE	4.97E-06	9.88E-07	2.73E-07	1.30E-07	7.76E-08	3.21E-08	1.00E-08	4.33E-09	2.48E-09	1.63E-09
SSE	6.21E-06	1.24E-06	3.49E-07	1.69E-07	1.02E-07	4.30E-08	1.39E-08	6.17E-09	3.60E-09	2.39E-09

Table 2.7-83 EI 50-mile χ/Q and D/Q Values, Deposited

	Segment Boundary (miles)									
Direction	**.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	6.64E-08	1.36E-08	3.55E-09	1.60E-09	9.02E-10	3.47E-10	1.00E-10	3.98E-11	2.12E-11	1.32E-11
SSW	4.02E-08	8.23E-09	2.15E-09	9.65E-10	5.46E-10	2.10E-10	6.08E-11	2.41E-11	1.29E-11	7.96E-12
SW	1.10E-08	2.26E-09	5.89E-10	2.64E-10	1.50E-10	5.75E-11	1.66E-11	6.59E-12	3.52E-12	2.18E-12
WSW	9.30E-09	1.90E-09	4.97E-10	2.23E-10	1.26E-10	4.86E-11	1.41E-11	5.57E-12	2.97E-12	1.84E-12
W	1.03E-08	2.10E-09	5.49E-10	2.47E-10	1.40E-10	5.37E-11	1.55E-11	6.15E-12	3.29E-12	2.03E-12
WNW	8.62E-09	1.77E-09	4.61E-10	2.07E-10	1.17E-10	4.50E-11	1.30E-11	5.16E-12	2.76E-12	1.71E-12
NW	8.10E-09	1.66E-09	4.33E-10	1.95E-10	1.10E-10	4.23E-11	1.22E-11	4.85E-12	2.59E-12	1.60E-12
NNW	1.08E-08	2.21E-09	5.77E-10	2.59E-10	1.47E-10	5.64E-11	1.63E-11	6.47E-12	3.46E-12	2.14E-12
N	1.09E-08	2.24E-09	5.84E-10	2.63E-10	1.49E-10	5.71E-11	1.65E-11	6.55E-12	3.50E-12	2.16E-12
NNE	7.43E-09	1.52E-09	3.98E-10	1.79E-10	1.01E-10	3.88E-11	1.12E-11	4.45E-12	2.38E-12	1.47E-12
NE	1.12E-08	2.30E-09	6.01E-10	2.70E-10	1.53E-10	5.87E-11	1.70E-11	6.73E-12	3.60E-12	2.23E-12
ENE	2.81E-08	5.76E-09	1.50E-09	6.76E-10	3.82E-10	1.47E-10	4.25E-11	1.69E-11	9.00E-12	5.57E-12
E	5.15E-08	1.06E-08	2.75E-09	1.24E-09	7.00E-10	2.69E-10	7.79E-11	3.09E-11	1.65E-11	1.02E-11
ESE	7.05E-08	1.44E-08	3.77E-09	1.69E-09	9.58E-10	3.68E-10	1.07E-10	4.22E-11	2.26E-11	1.40E-11
SE	2.88E-08	5.91E-09	1.54E-09	6.93E-10	3.92E-10	1.51E-10	4.36E-11	1.73E-11	9.23E-12	5.71E-12
SSE	1.98E-08	4.05E-09	1.06E-09	4.75E-10	2.69E-10	1.03E-10	2.99E-11	1.19E-11	6.33E-12	3.92E-12

Table 2.7-84 Tower Instrument Specifications and Accuracies for Meteorological Monitoring Program (Preoperational and Operational)

Characteristics	Requirements*	Specifications
Wind Speed Sensor		
Accuracy	±0.2 m/s (±0.45 mph) OR ±5% of observed wind speed	±5%
Resolution	0.1 m/s (0.1 mph)	0.1 mph
Wind Direction Sensor		
Accuracy	±5 degrees	±5 degrees
Resolution	1.0 degree	1.0 degree
Temperature Sensors		
Accuracy (ambient)	±0.5°C (±0.9°F)	±0.9°F
Resolution (ambient)	0.1°C (0.1°F)	0.1°F
Accuracy (vertical temperature difference)	±0.1°C (±0.18°F)	±0.18°F
Resolution (vertical temperature difference)	0.01°C (0.01°F)	0.01°F
Relative Humidity		
Accuracy	±4%	±4%
Resolution	0.1%	0.1%
Precipitation Sensor		
Accuracy	±10% for a volume equivalent to 2.54 mm (0.1 in.) of precipitation at a rate < 50 mm/hr (< 2 in/hr)	±10%
Resolution	0.25 mm (0.01 in.)	0.25 mm
Time		
Accuracy	± 5 min	± 5 min
Resolution	1 min	1 min
Solar Radiation		
Accuracy	N/A	10 W/m^2
Resolution	N/A	1

Note:

** Accuracy and resolution criteria from Regulatory Guide 1.23, Revision 1.*

Table 2.7-85 Kemmerer Unit 1 Meteorological Percent Data Recovery

Parameter	Kemmerer Unit 1 4/9/2022–4/8/2023 (%)	Naughton Power Plant 4/9/2022–4/8/2023 (%)	Naughton Power Plant 1/1/2019–12/31/2021 (%)
Wind Speed 10-meter level*	94.9	96.9	98.8
Wind Speed 60-meter level*	94.0	98.2	98.7
Wind Direction 10-meter level*	93.8	96.5	99.2
Wind Direction 60-meter level*	93.8	99.6	98.7
Delta Temperature 60-10 meter*	94.6	99.8	99.8
Temperature 10-meter level*	94.9	99.8	99.8
Temperature 60-meter level*	94.9	99.8	99.8
Dew Point Temperature 10-meter level	66.4	100.0	100.0
Relative Humidity 10-meter level	89.9	100.0	100.0
Solar Radiation 8-meter level	93.9	100.0	100.0
Precipitation	94.9	100.0	100.0
Composite			
10 meter Wind Speed and Direction, Delta Temperature 60-10 meter	93.8	96.6	98.4
60 meter Wind Speed and Direction, Delta Temperature 60-10 meter	93.8	98.0	98.5

*Data used in further meteorological analysis.

Table 2.7-86 Monthly Maximum and Annual Maximum Wind Speed

	Kemmerer Unit 1 10m		Kemmerer Unit 1 60m		Naughton Power Plant 10m		Naughton Power Plant 50m	
	4/9/22-4/8/23		4/9/22-4/8/23		4/9/22-4/8/23		4/9/22-4/8/23	
	mph	m/s	mph	m/s	mph	m/s	mph	m/s
January	34.0	15.2	41.0	18.3	37.1	16.6	41.3	18.5
February	35.3	15.8	43.0	19.2	37.3	16.7	40.2	18.0
March	31.8	14.2	37.5	16.8	32.1	14.4	39.4	17.6
April	28.6	12.8	33.4	14.9	27.3	12.2	31.3	14.0
May	32.1	14.4	40.0	17.9	31.5	14.1	36.3	16.2
June	27.8	12.4	32.3	14.5	27.9	12.5	32.2	14.4
July	30.5	13.6	37.5	16.8	37.6	16.8	41.8	18.7
August	27.2	12.2	35.0	15.7	34.2	15.3	38.2	17.1
September	30.3	13.6	38.6	17.3	34.9	15.6	37.8	16.9
October	37.6	16.8	41.2	18.4	37.7	16.9	43.5	19.5
November	38.2	17.1	45.1	20.2	36.0	16.1	41.1	18.4
December	34.9	15.6	42.6	19.1	34.5	15.4	38.9	17.4
Annual	38.2	17.1	45.1	20.2	37.7	16.9	43.5	19.5

Table 2.7-87 Green House Gas Inventory for Kemmerer Unit 1, State of Wyoming, and the United States in Total Comparison

Location	Greenhouse Gas Emissions (millions of tons per year CO_2 Equivalent)
United States	~6,000
Wyoming	~80
Kemmerer Unit 1	~0.01*

Source: Reference 2.7-5

*Reference 2.7-14 for a typical 1000 MWe nuclear reactor

Figure 2.7-1 Meteorological Observation Stations and Climate Observing Stations

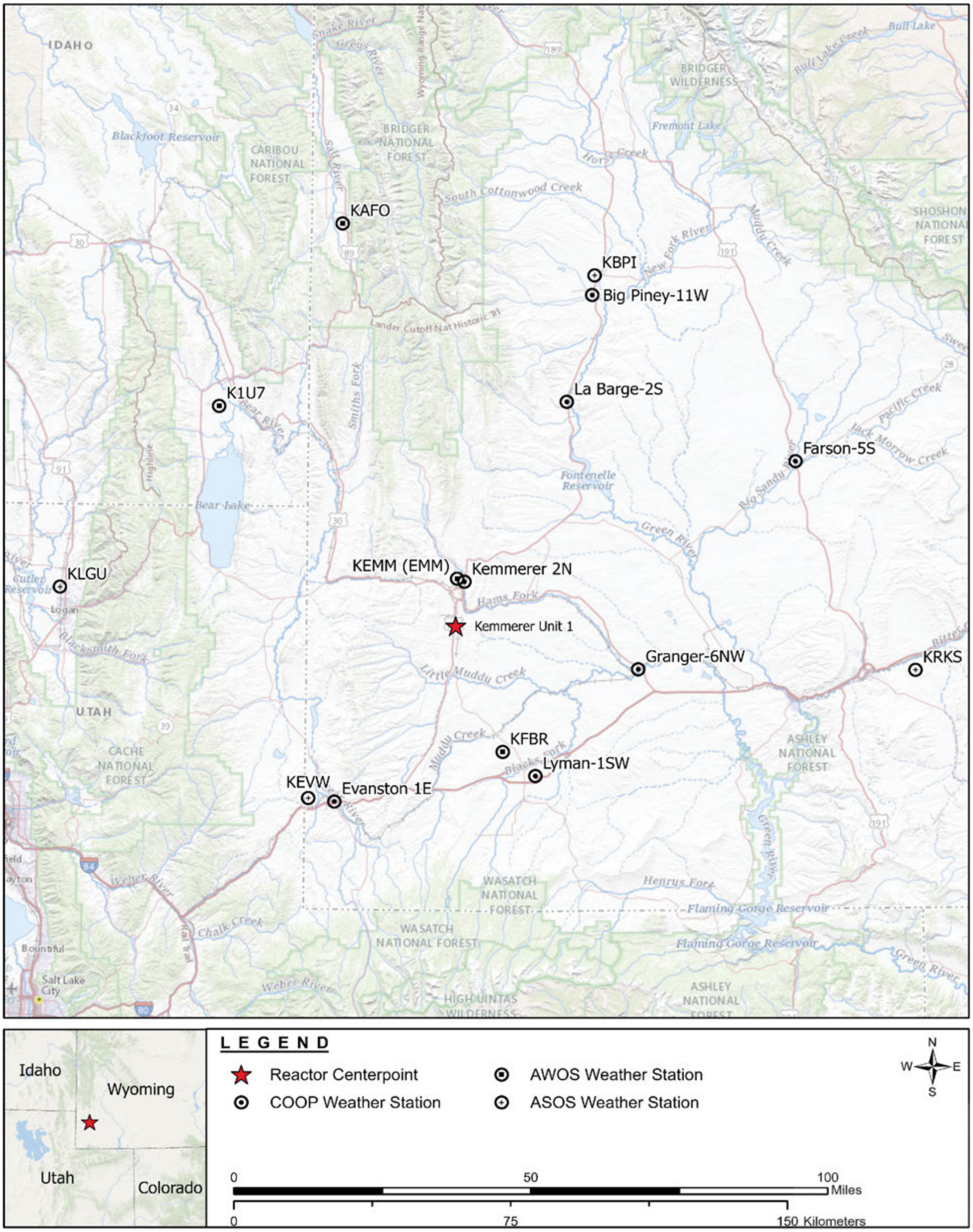


Figure 2.7-2 Detailed Topography Within 80 km (50 mi)

Figure 2.7-3 Naughton Power Plant Annual Precipitation Wind Rose 2019–2021, 10-Meter All

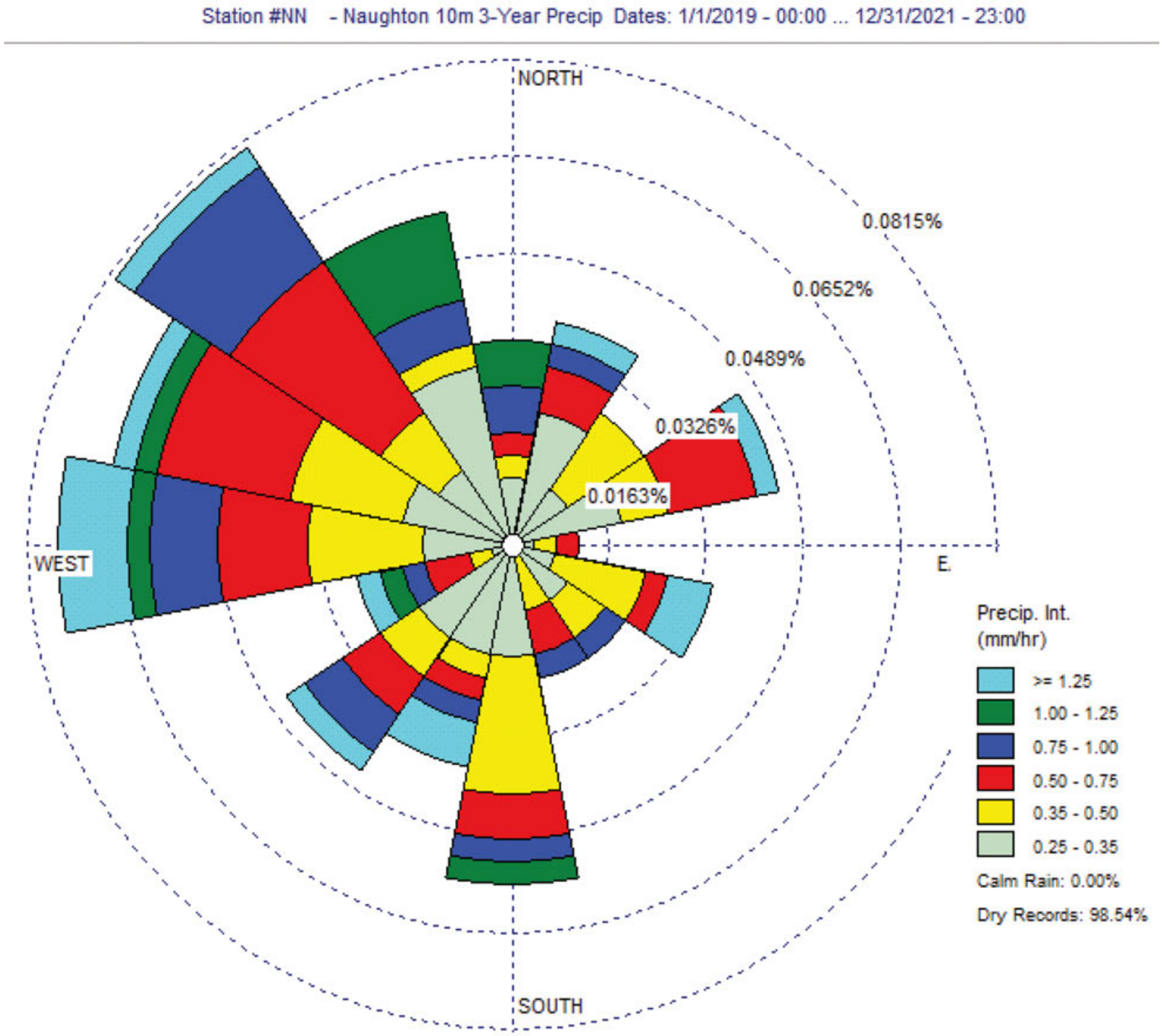


Figure 2.7-4 Naughton Power Plant Annual Precipitation Wind Rose 2019–2021, 50-Meter All

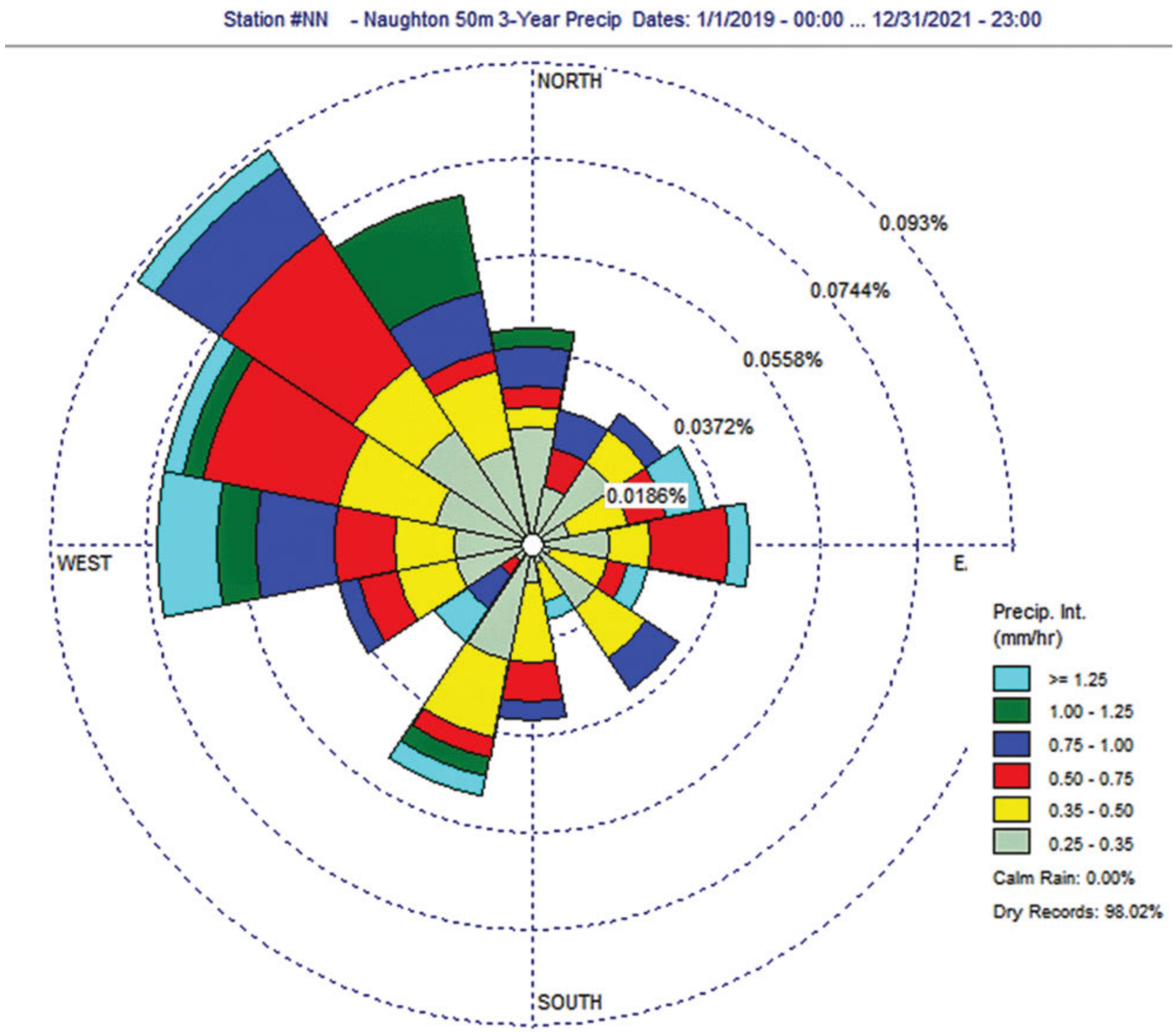


Figure 2.7-5 Naughton Power Plant Annual Precipitation Wind Rose 2022–2023, 10-Meter All

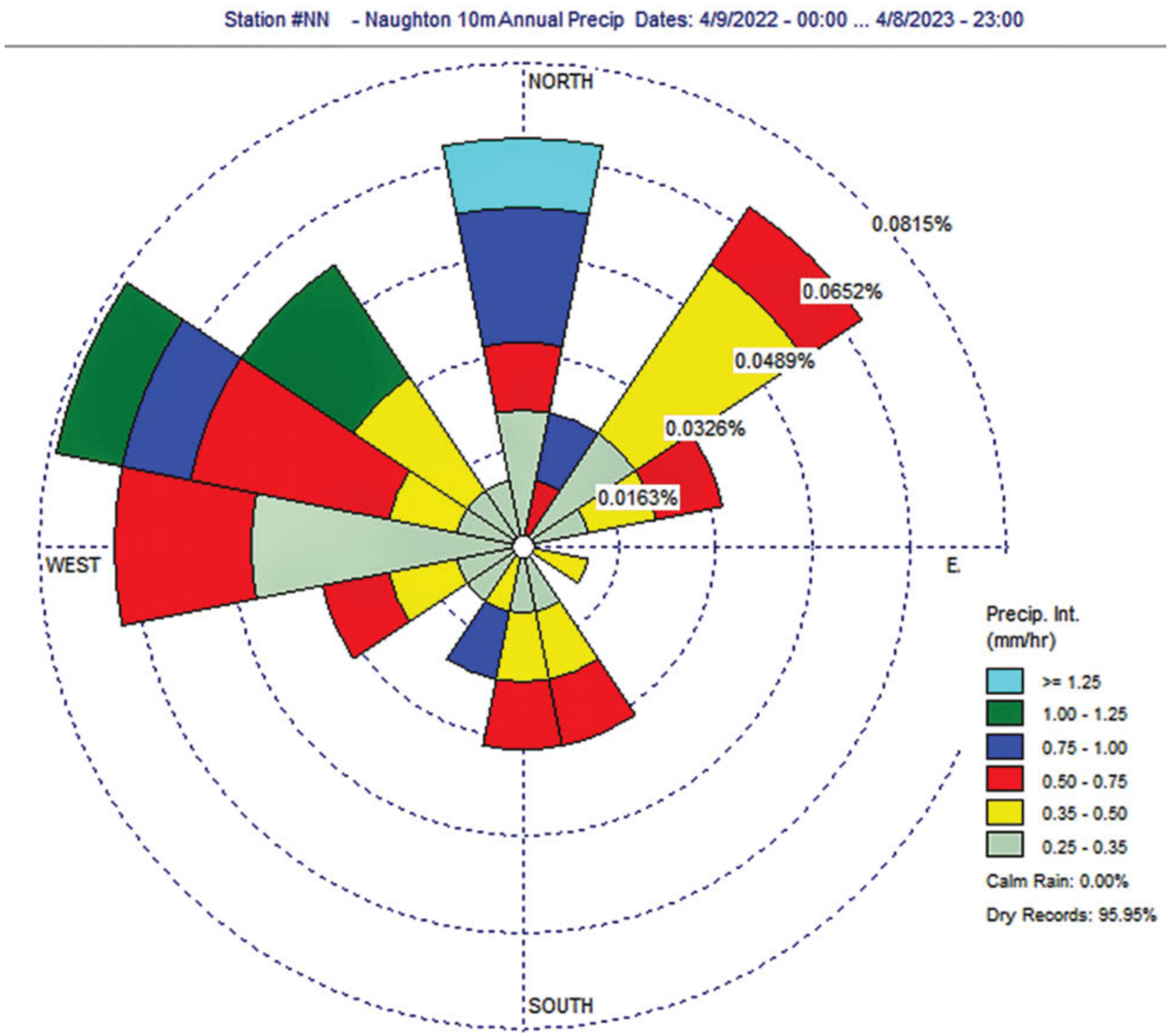


Figure 2.7-6 Naughton Power Plant Annual Precipitation Wind Rose 2022–2023, 50-Meter All

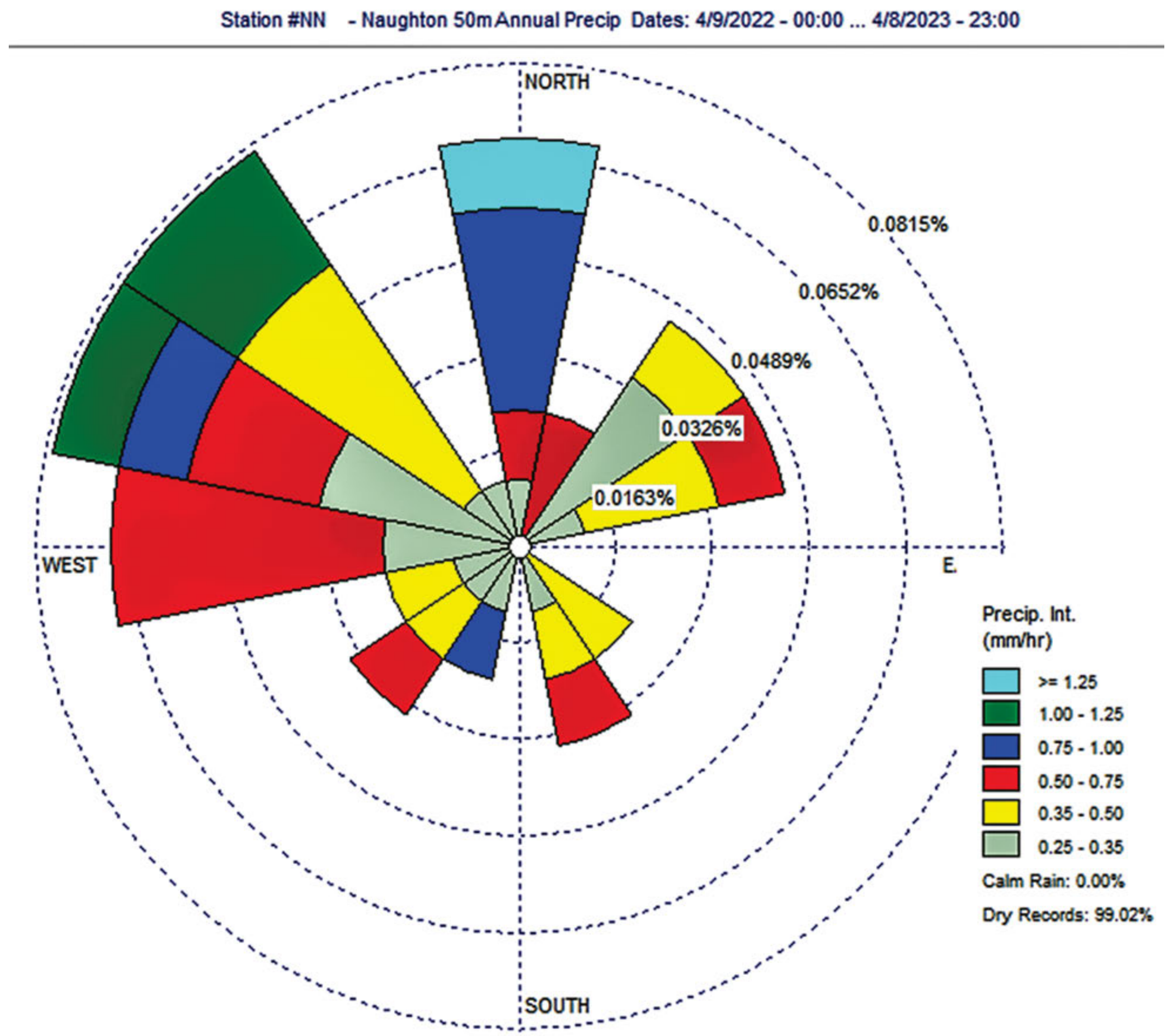


Figure 2.7-7 Kemmerer Unit 1 Annual Precipitation Wind Rose 2022–2023, 10 m

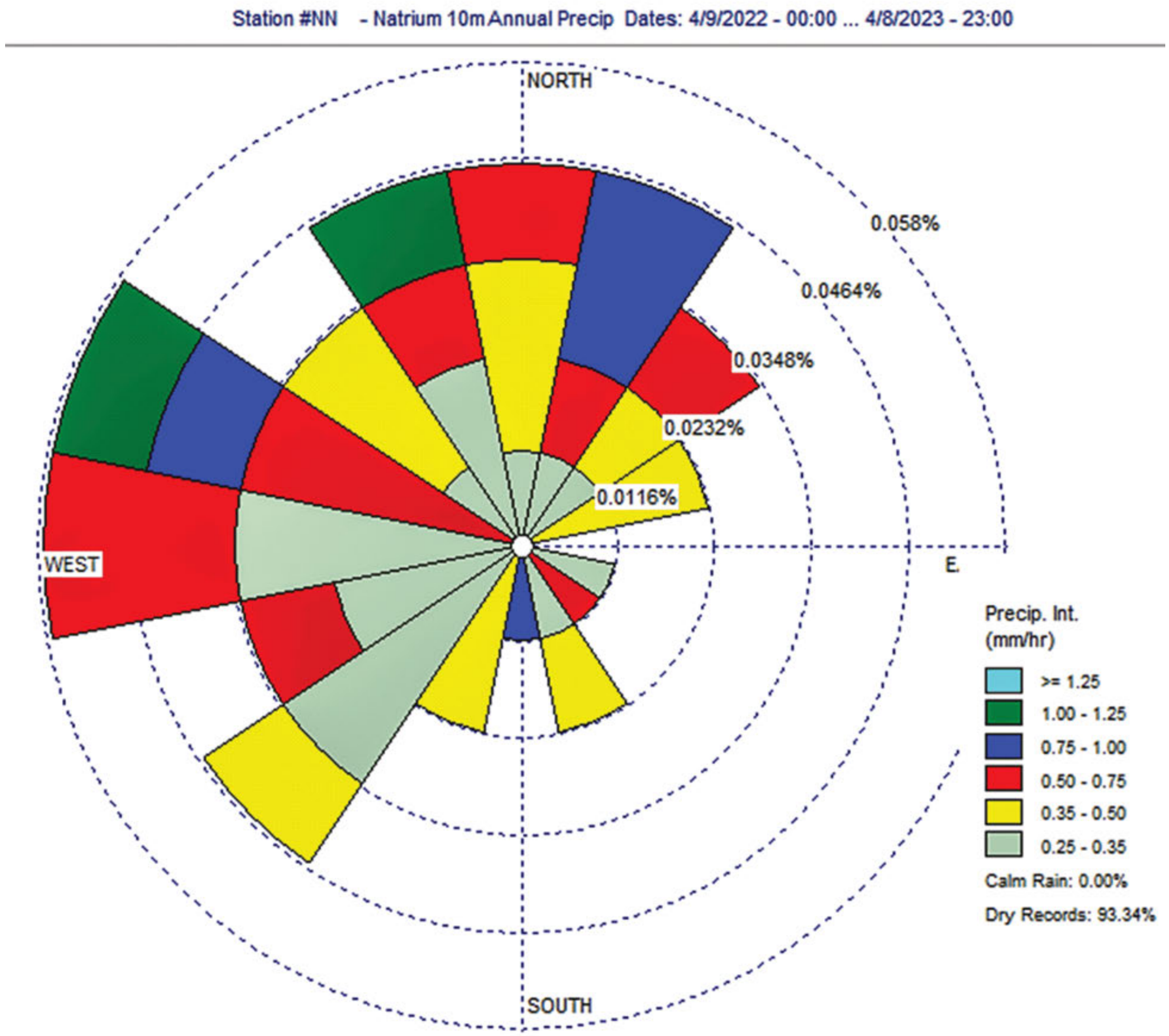


Figure 2.7-8 Kemmerer Unit 1 Annual Precipitation Wind Rose 2022–2023, 60 m

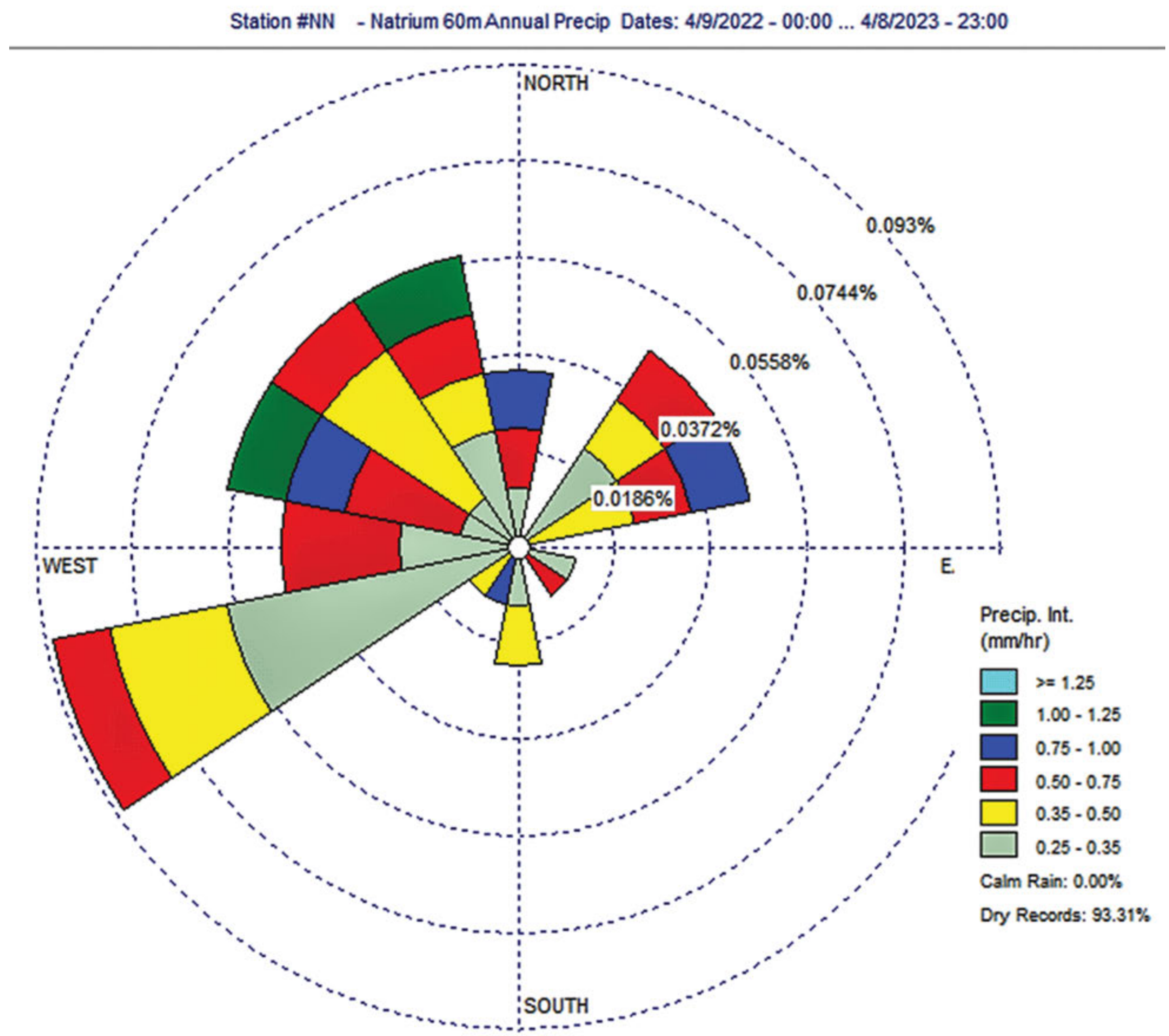


Figure 2.7-9 Naughton Power Plant Annual 3 Year Composite Wind Rose 2019-2021, 10 m

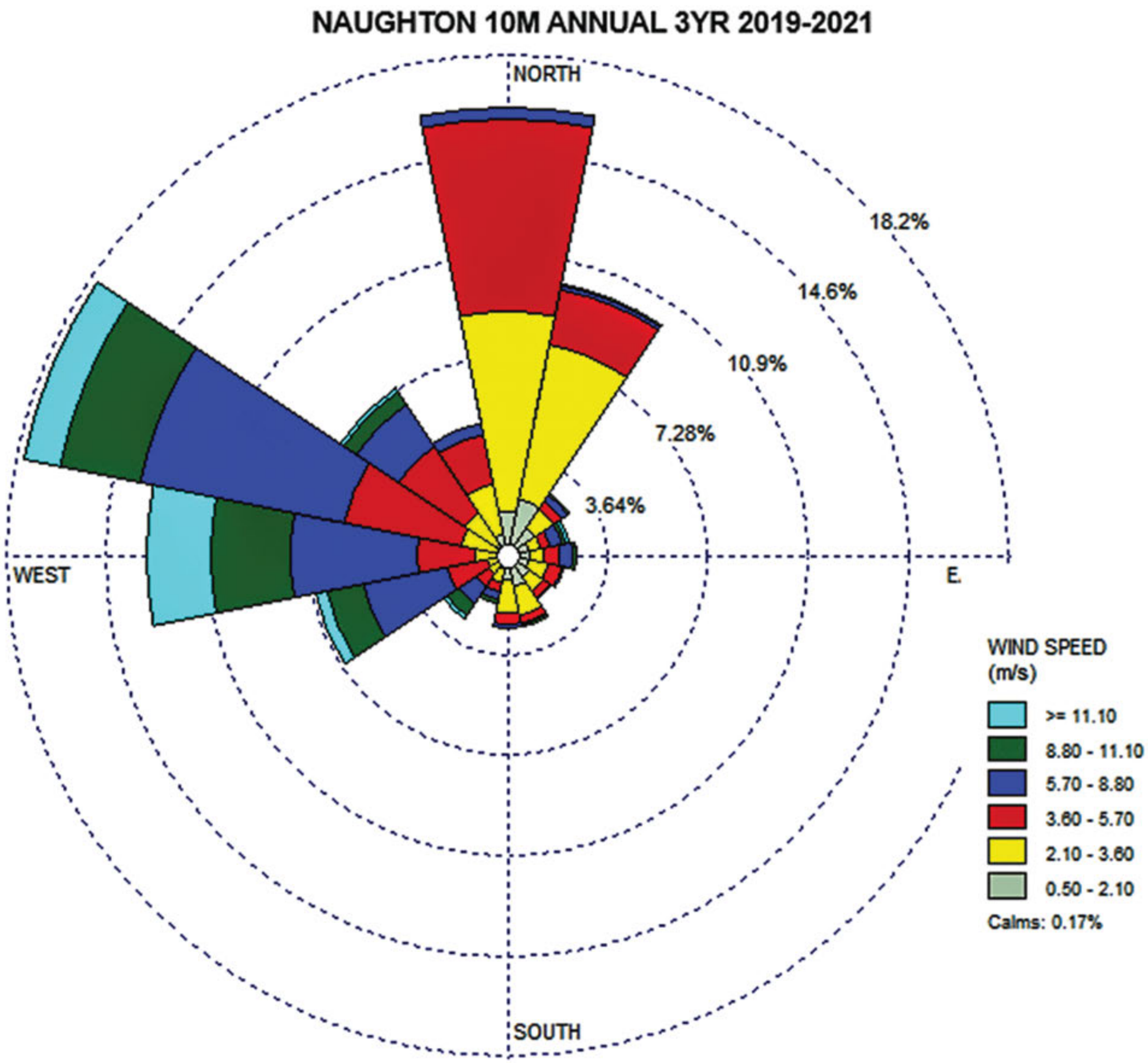


Figure 2.7-10 Naughton Power Plant Annual 3 Year Composite Wind Rose 2019-2021, 50 m

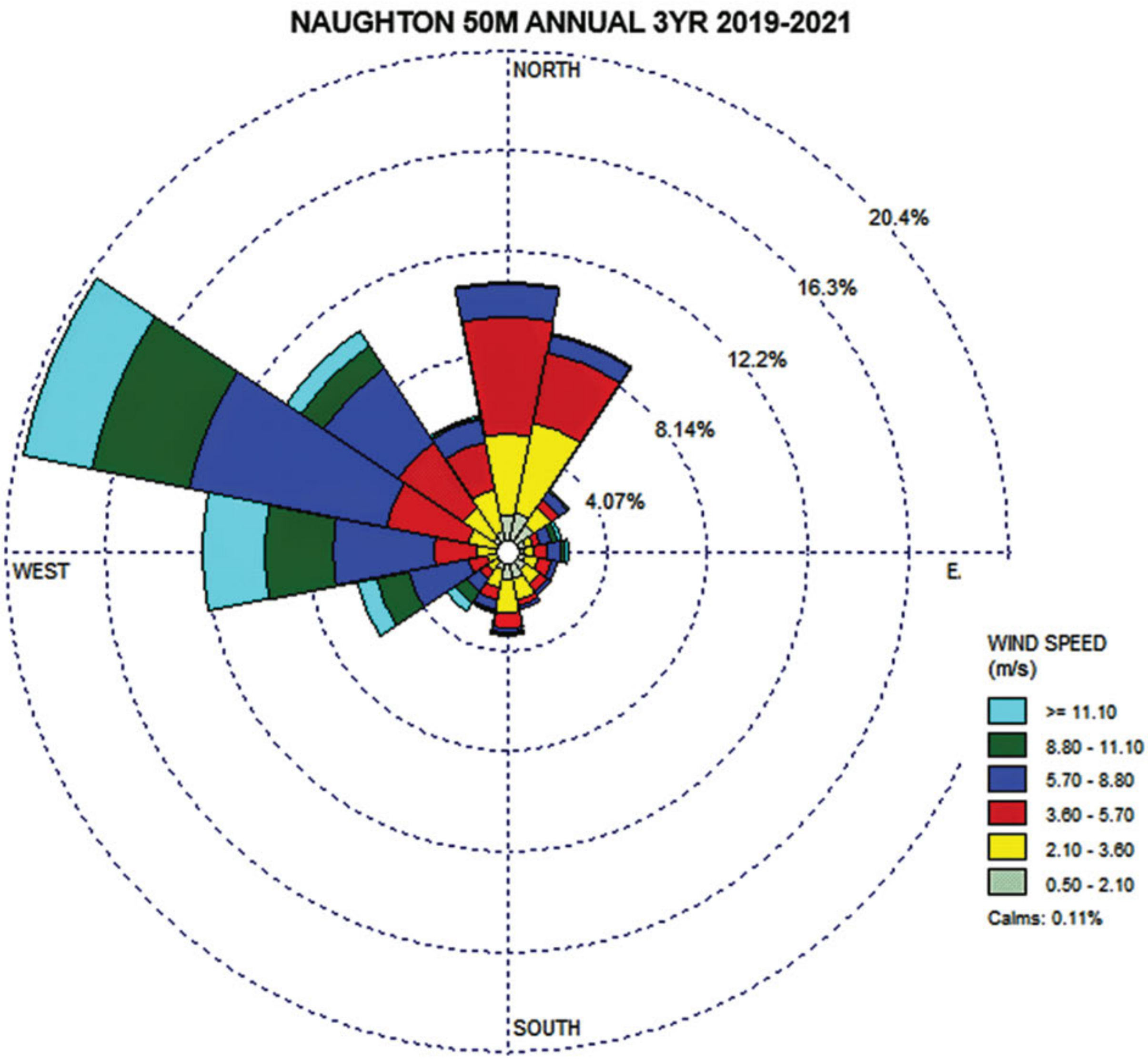


Figure 2.7-11 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

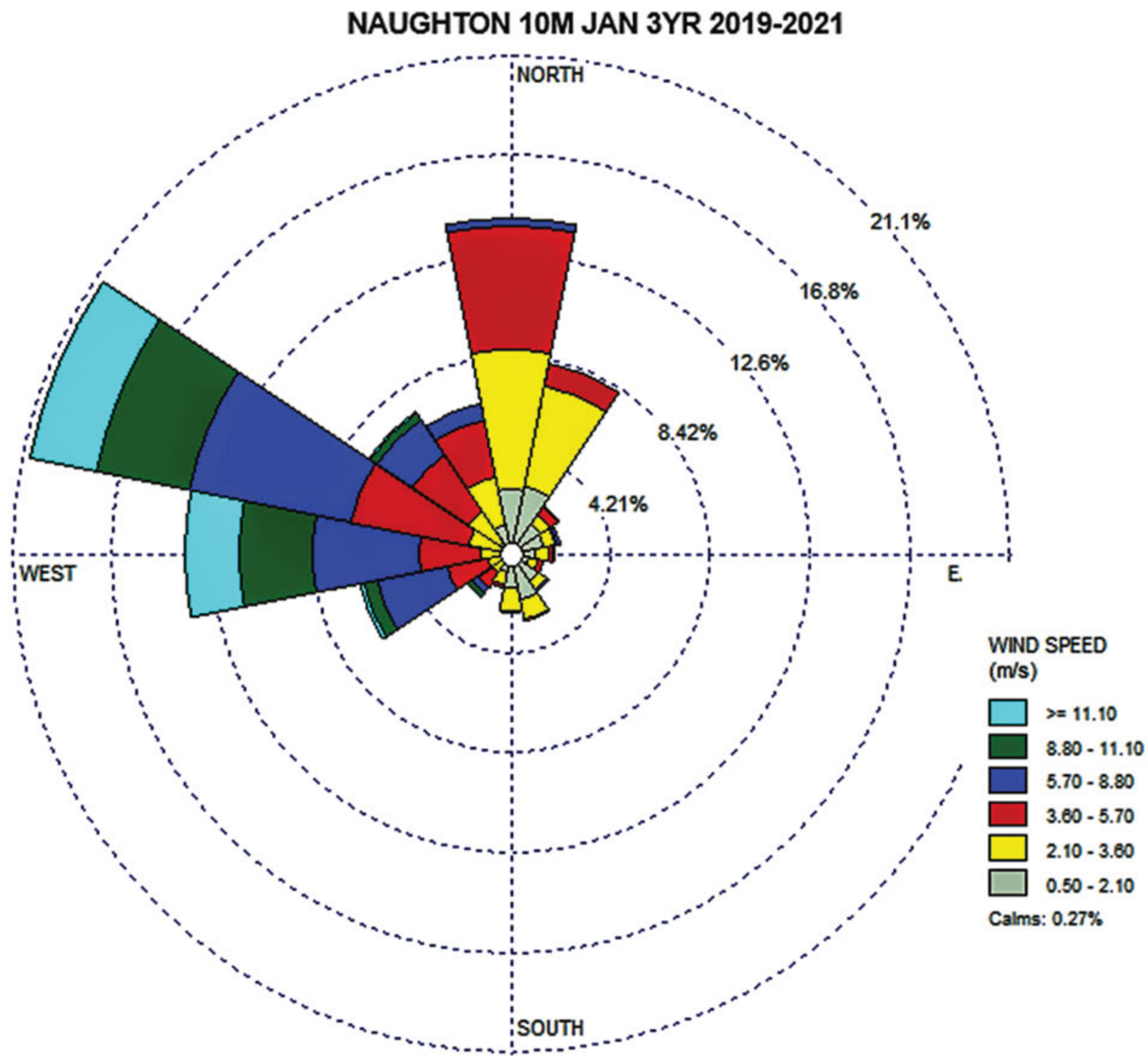


Figure 2.7-12 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

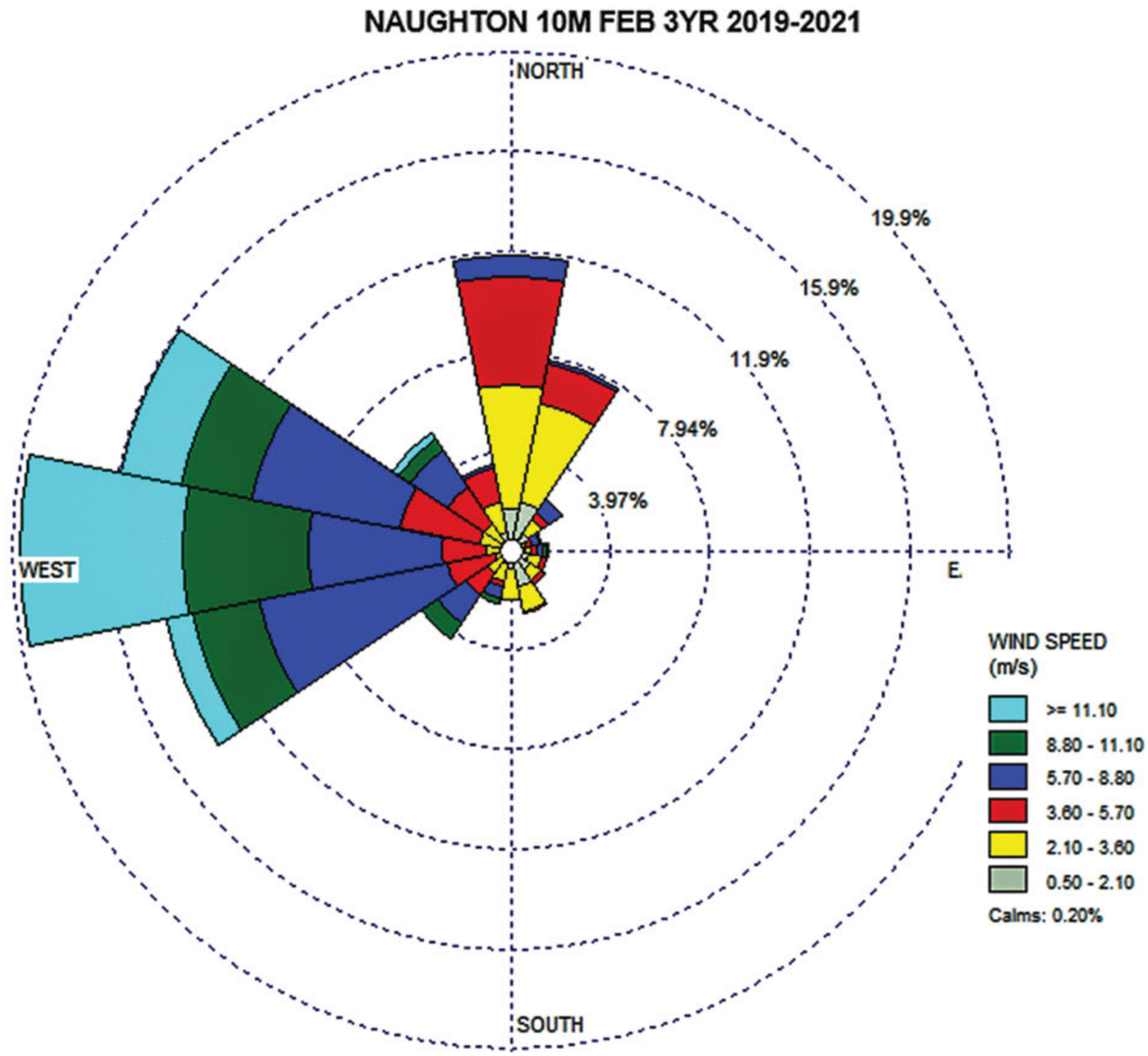


Figure 2.7-13 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

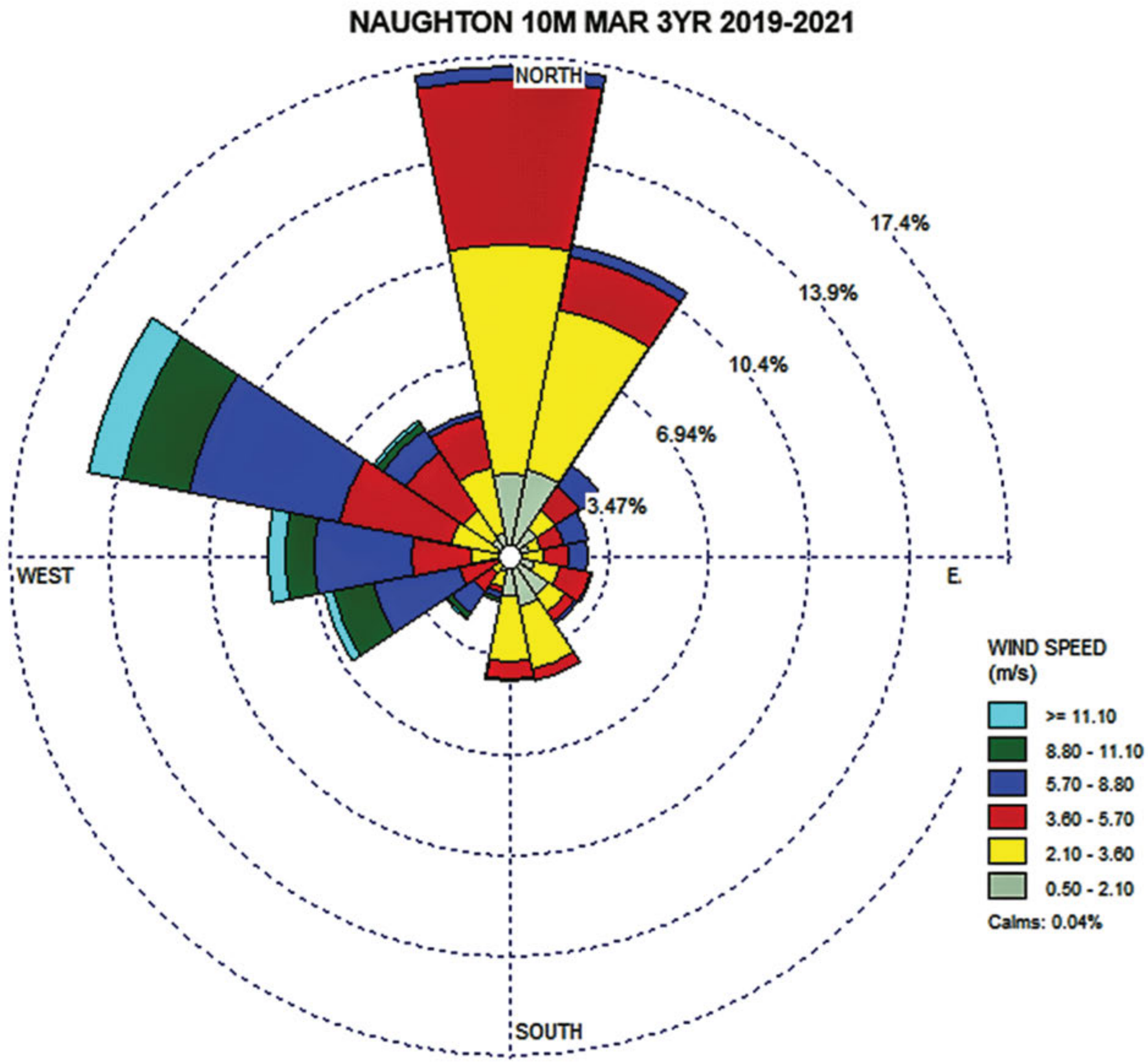


Figure 2.7-14 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

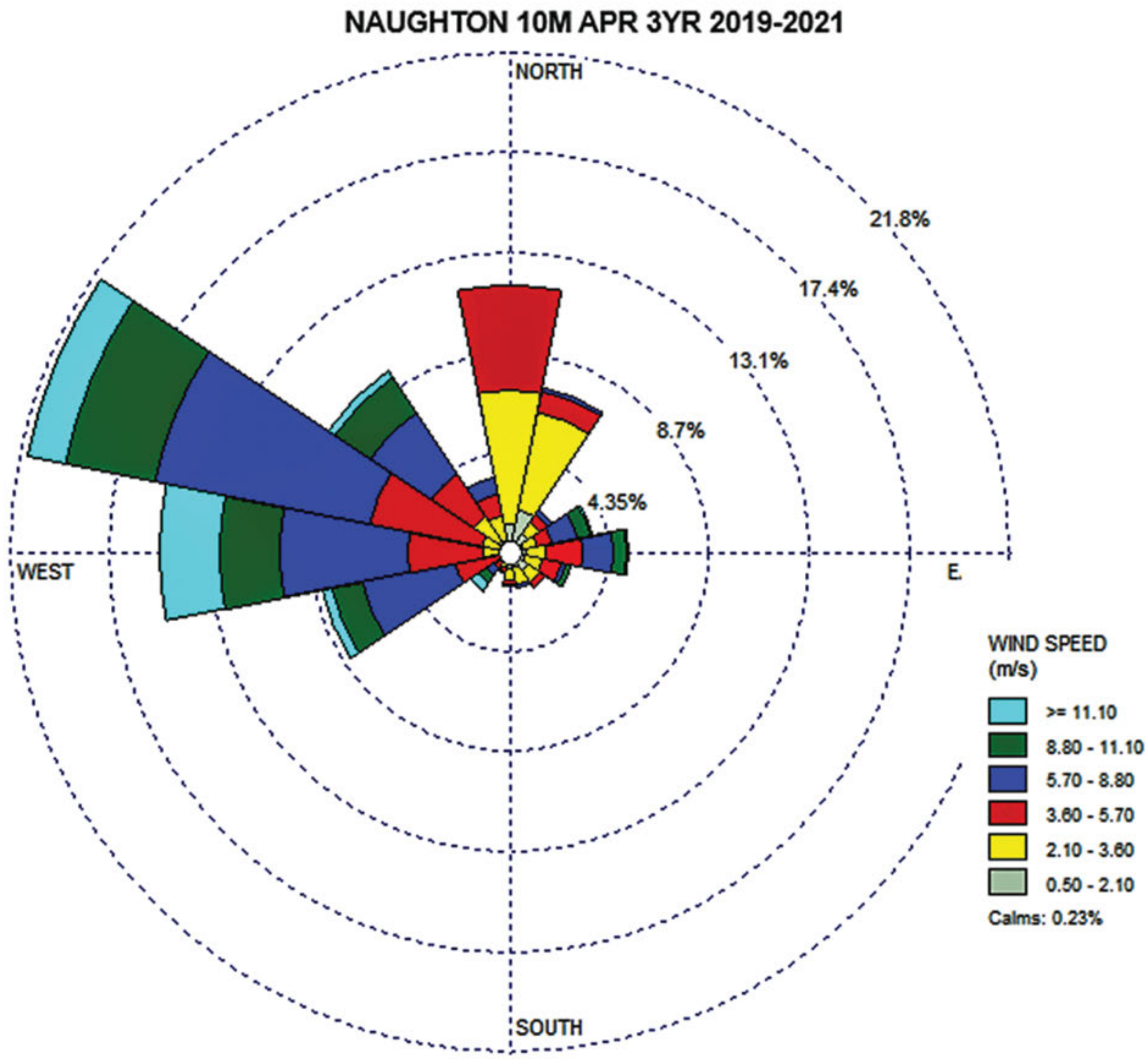


Figure 2.7-15 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

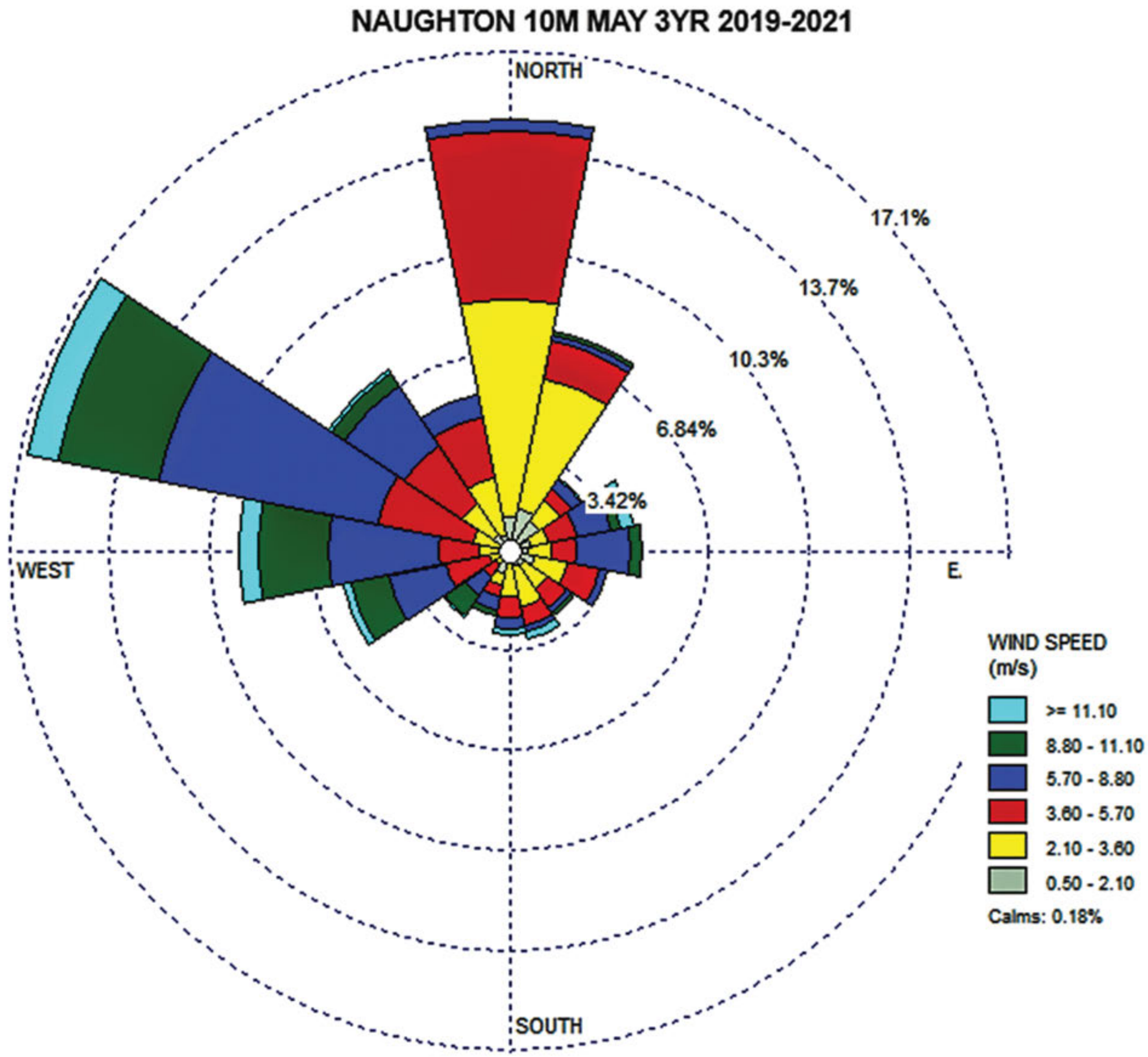


Figure 2.7-16 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

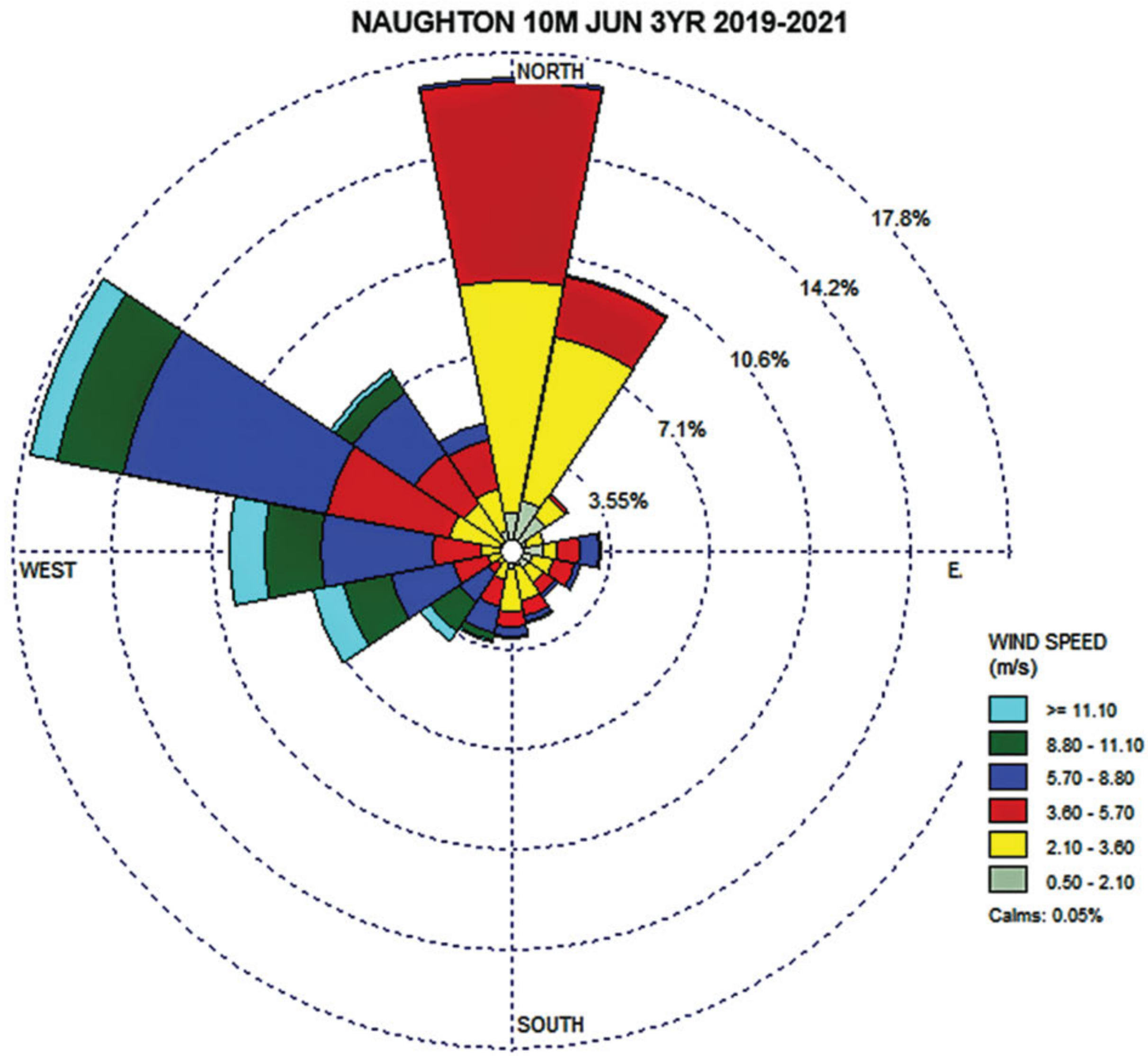


Figure 2.7-17 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

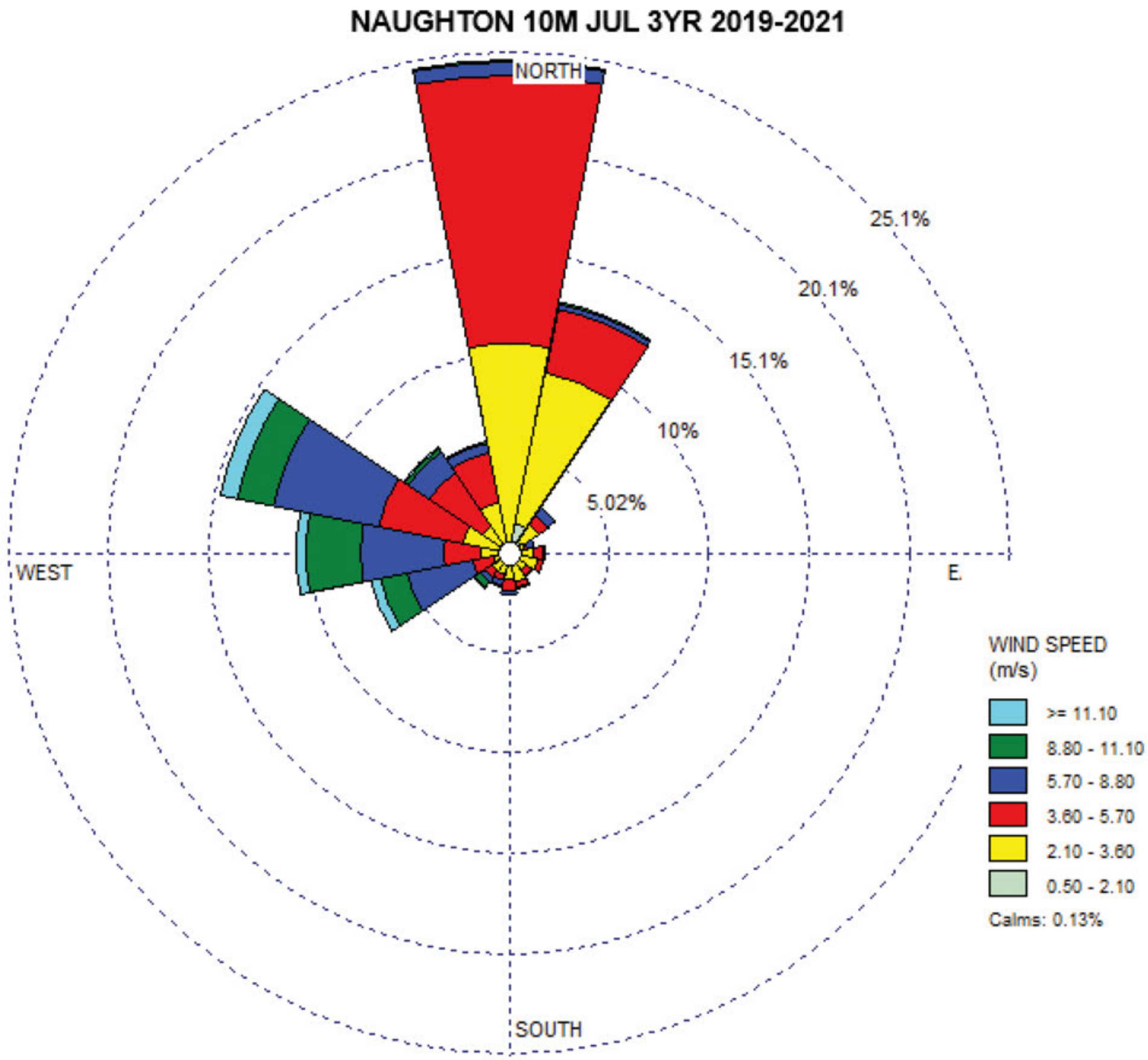


Figure 2.7-18 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

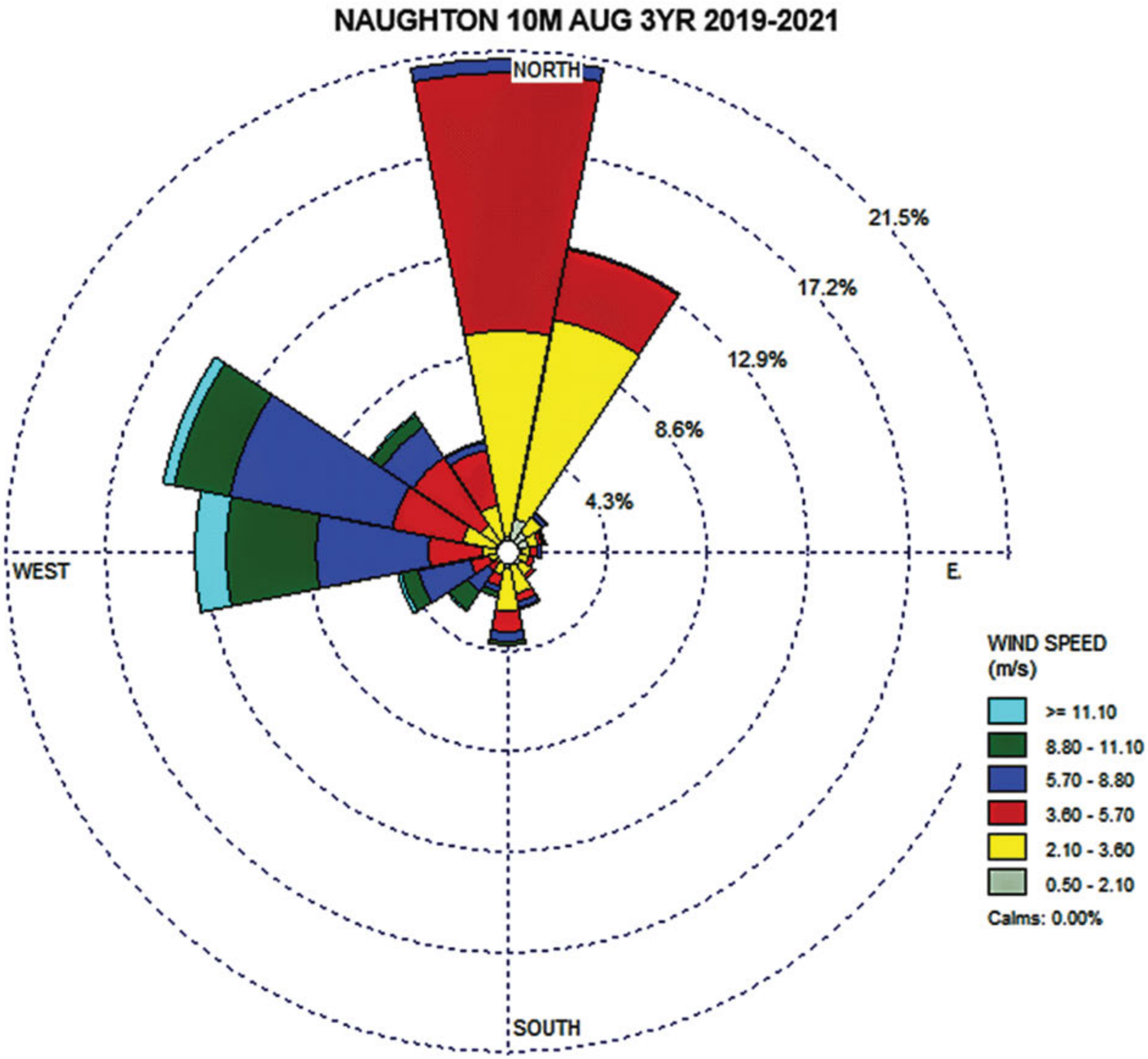


Figure 2.7-19 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

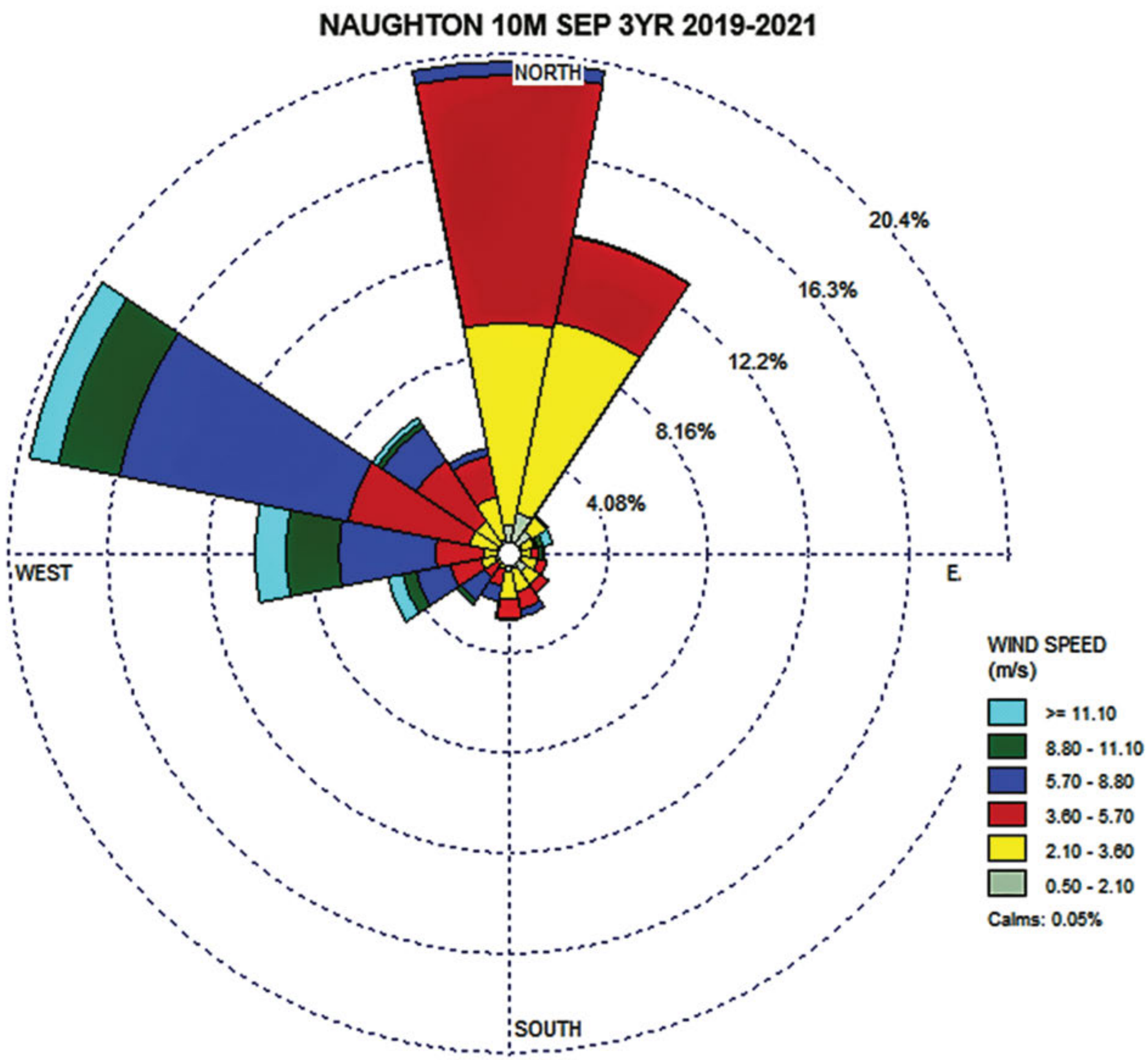


Figure 2.7-20 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

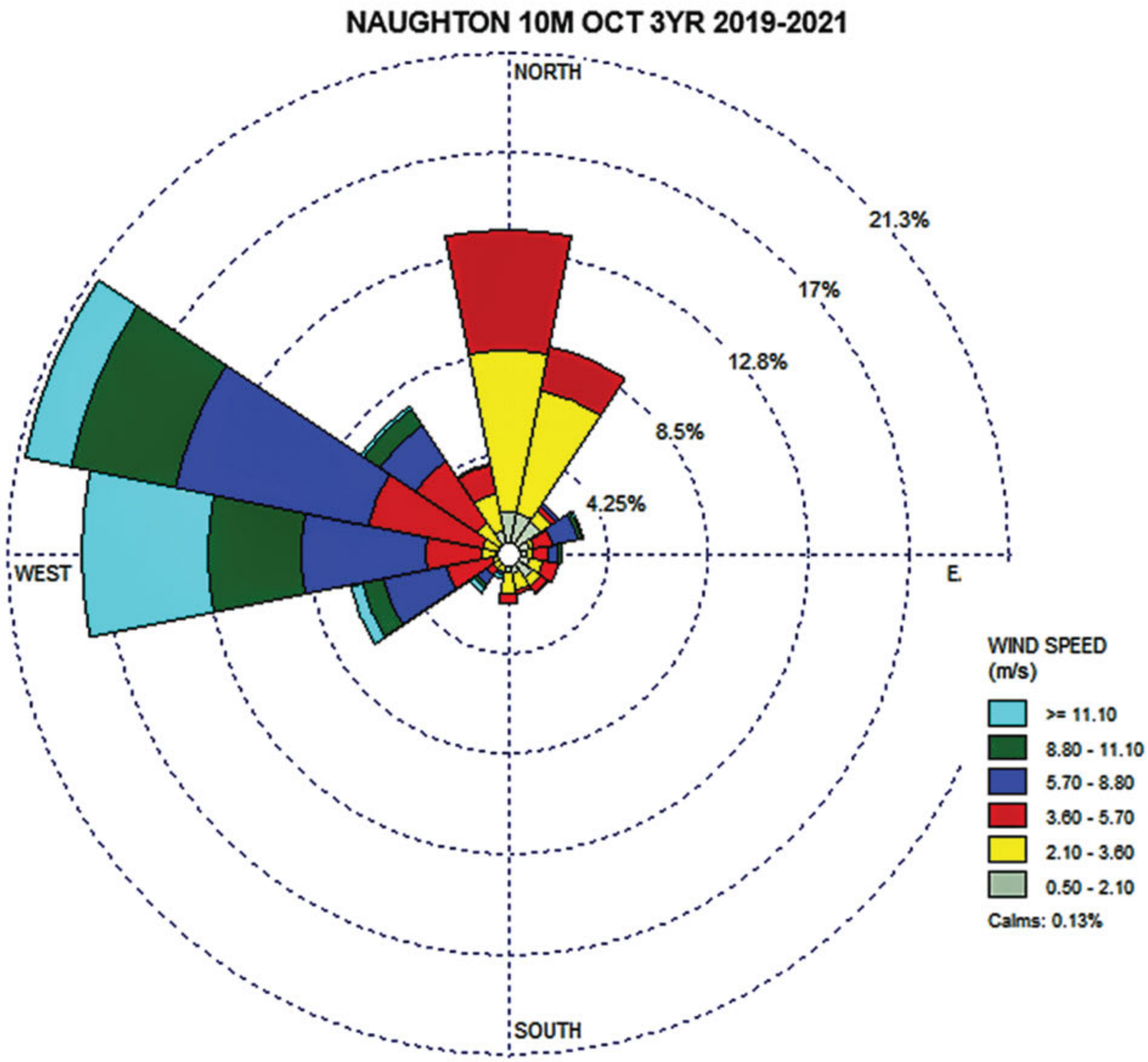


Figure 2.7-21 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

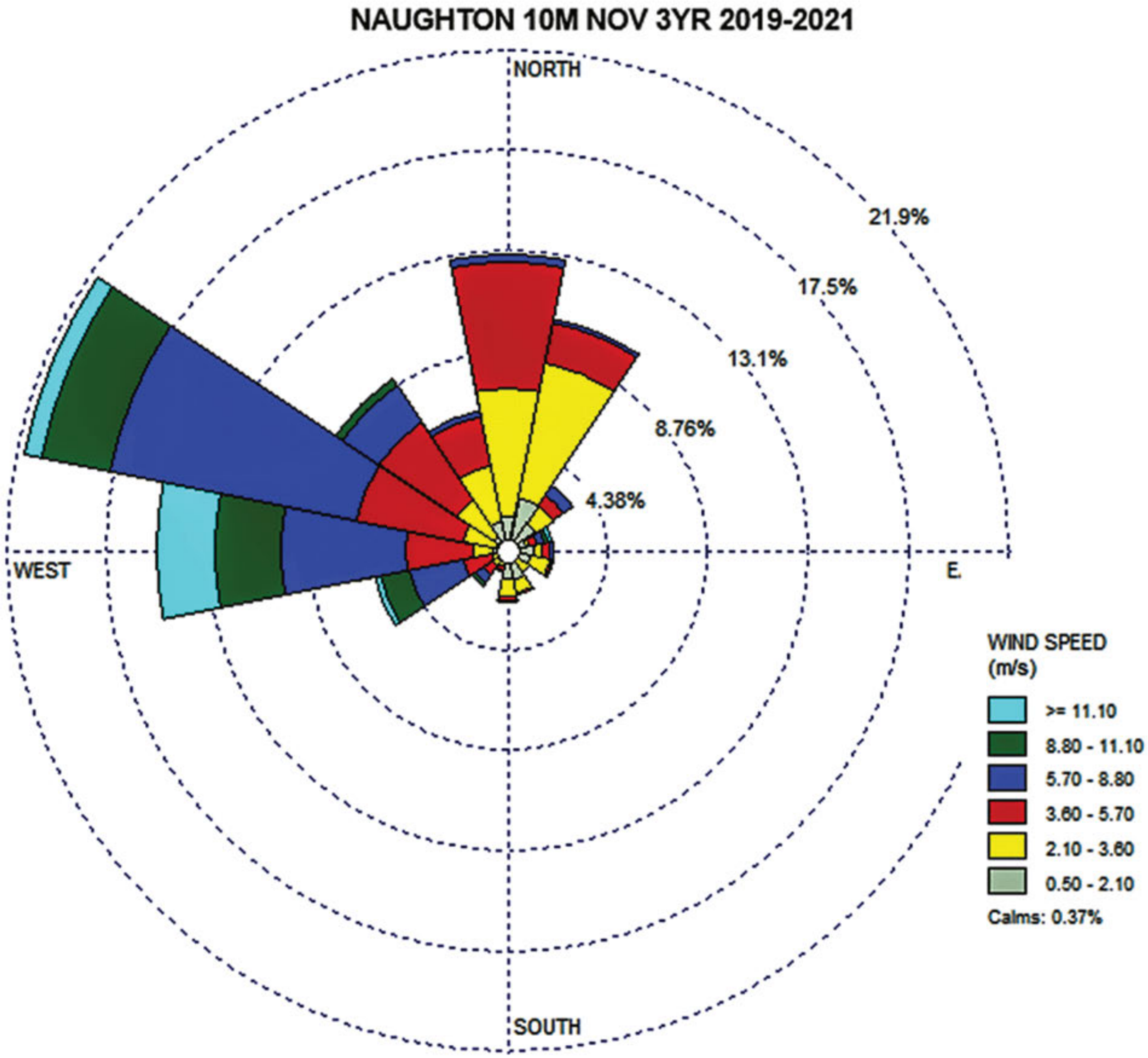


Figure 2.7-22 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 10 m

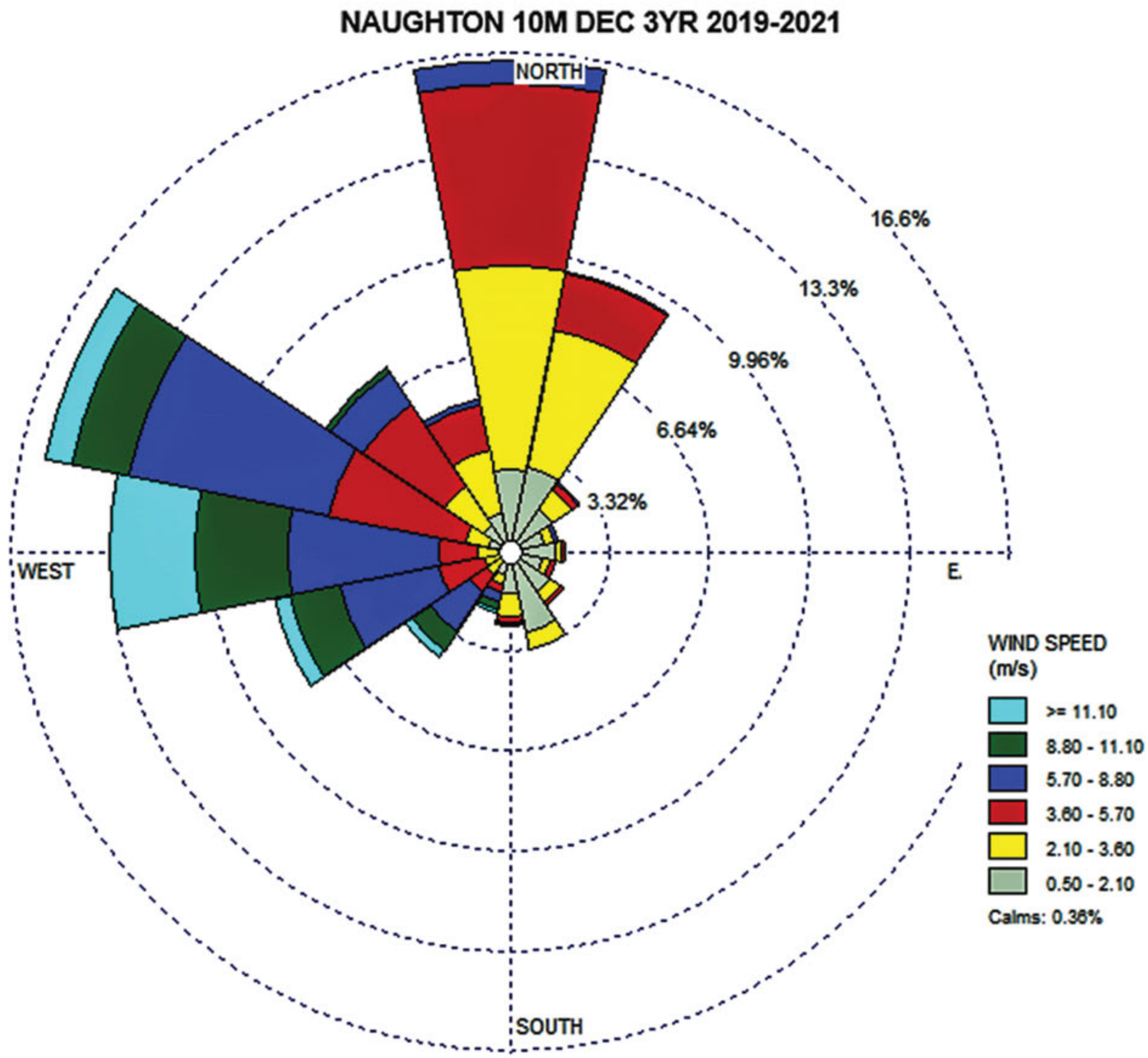


Figure 2.7-23 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

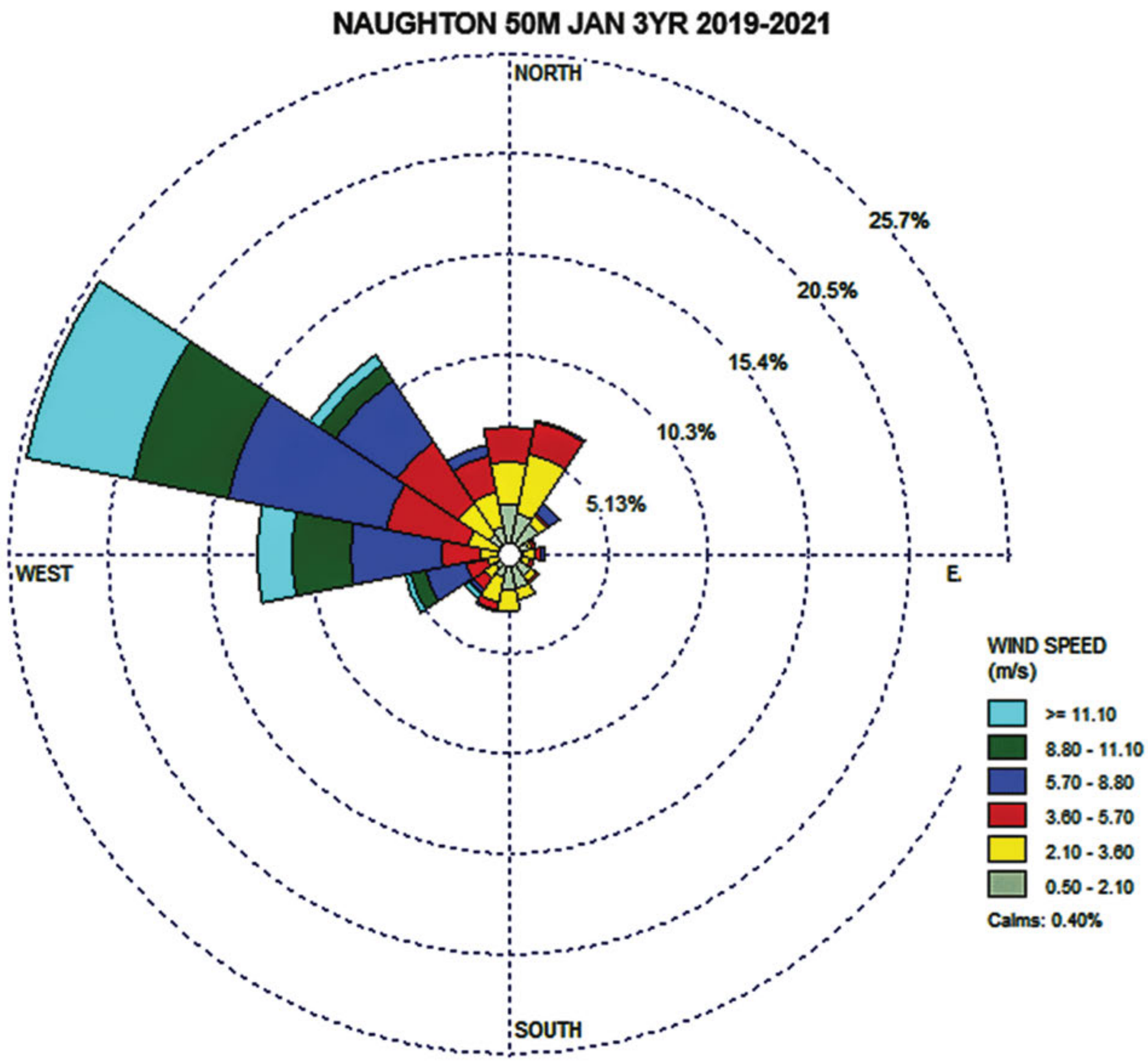


Figure 2.7-24 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

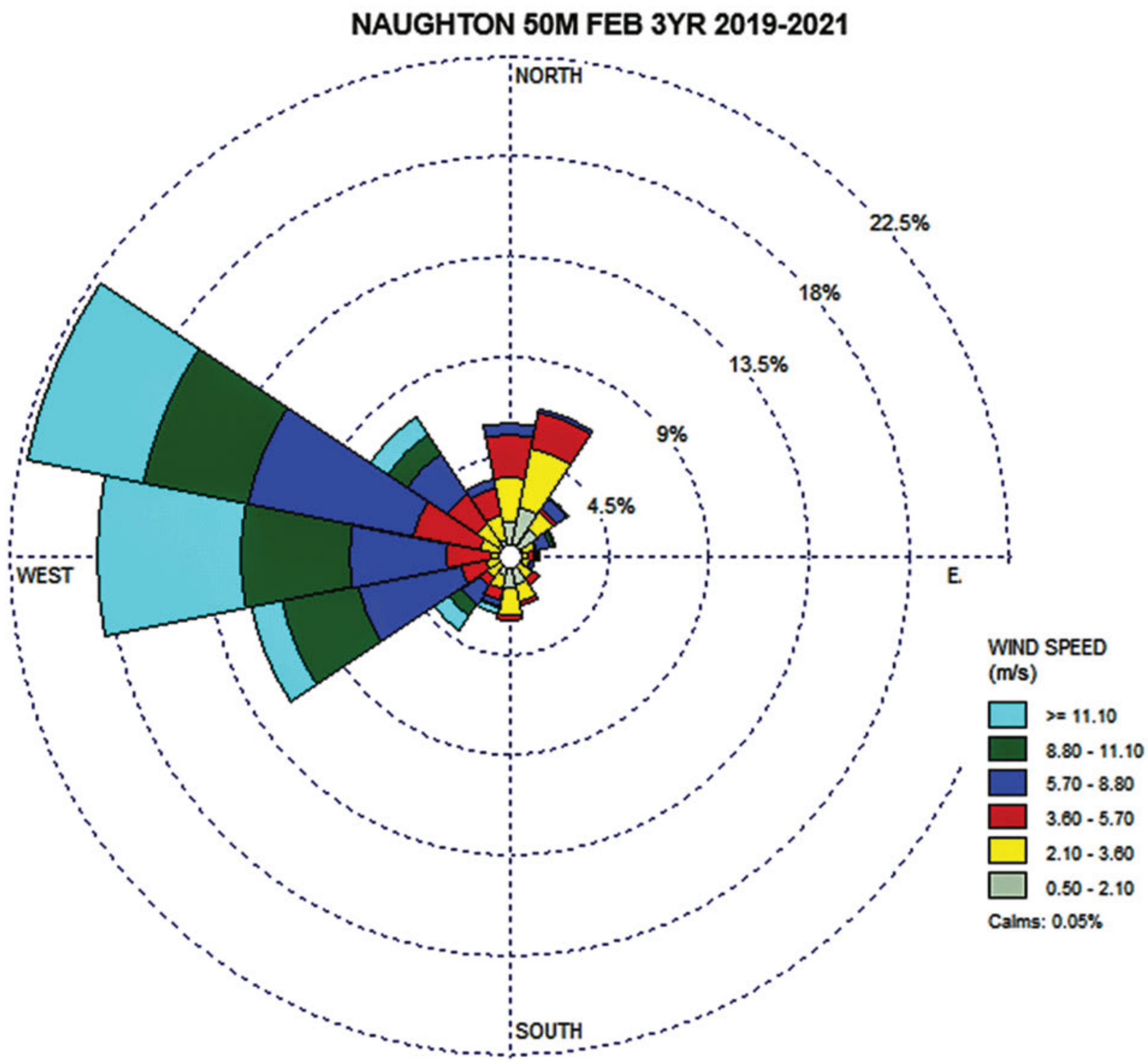
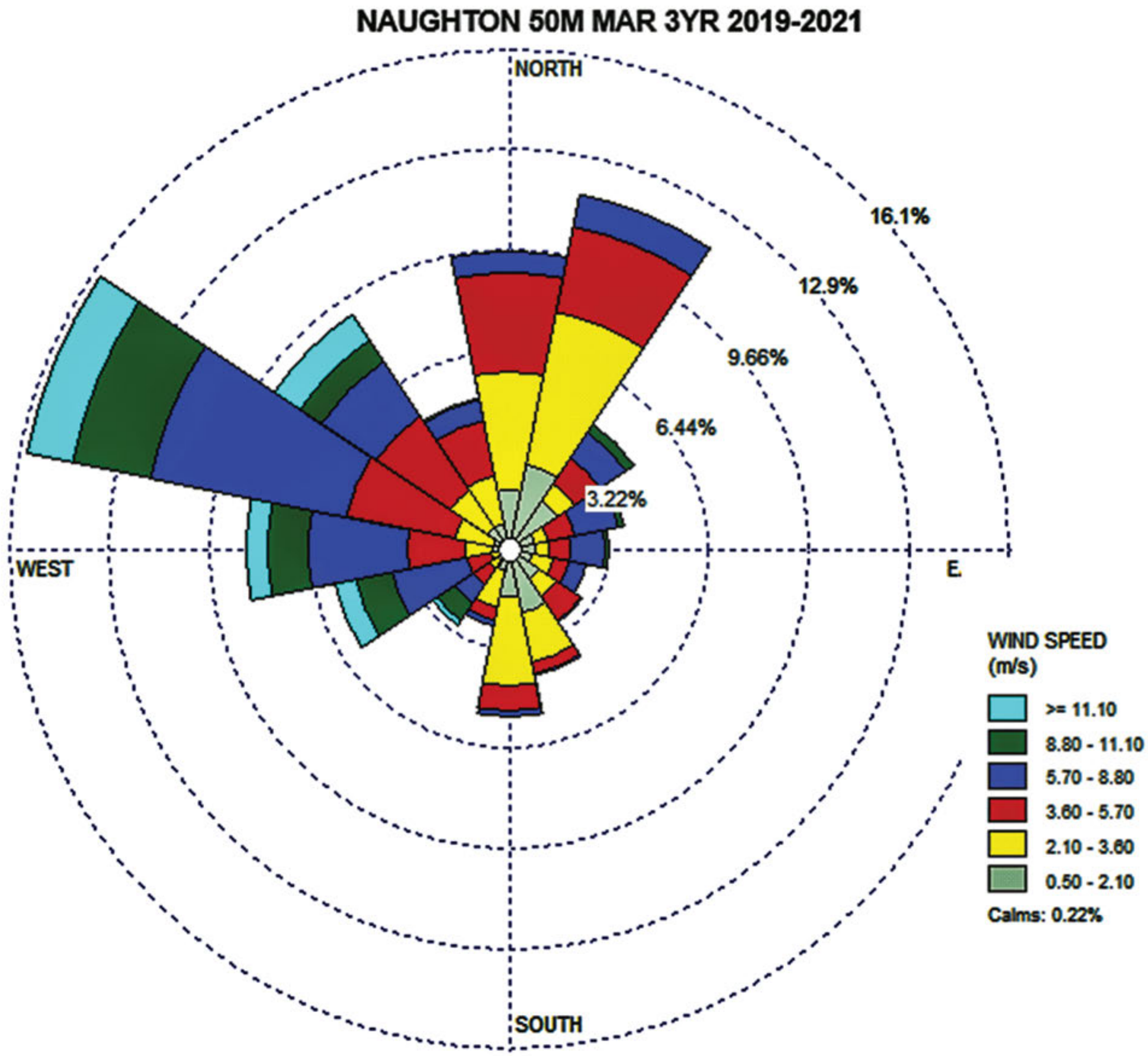


Figure 2.7-25 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m



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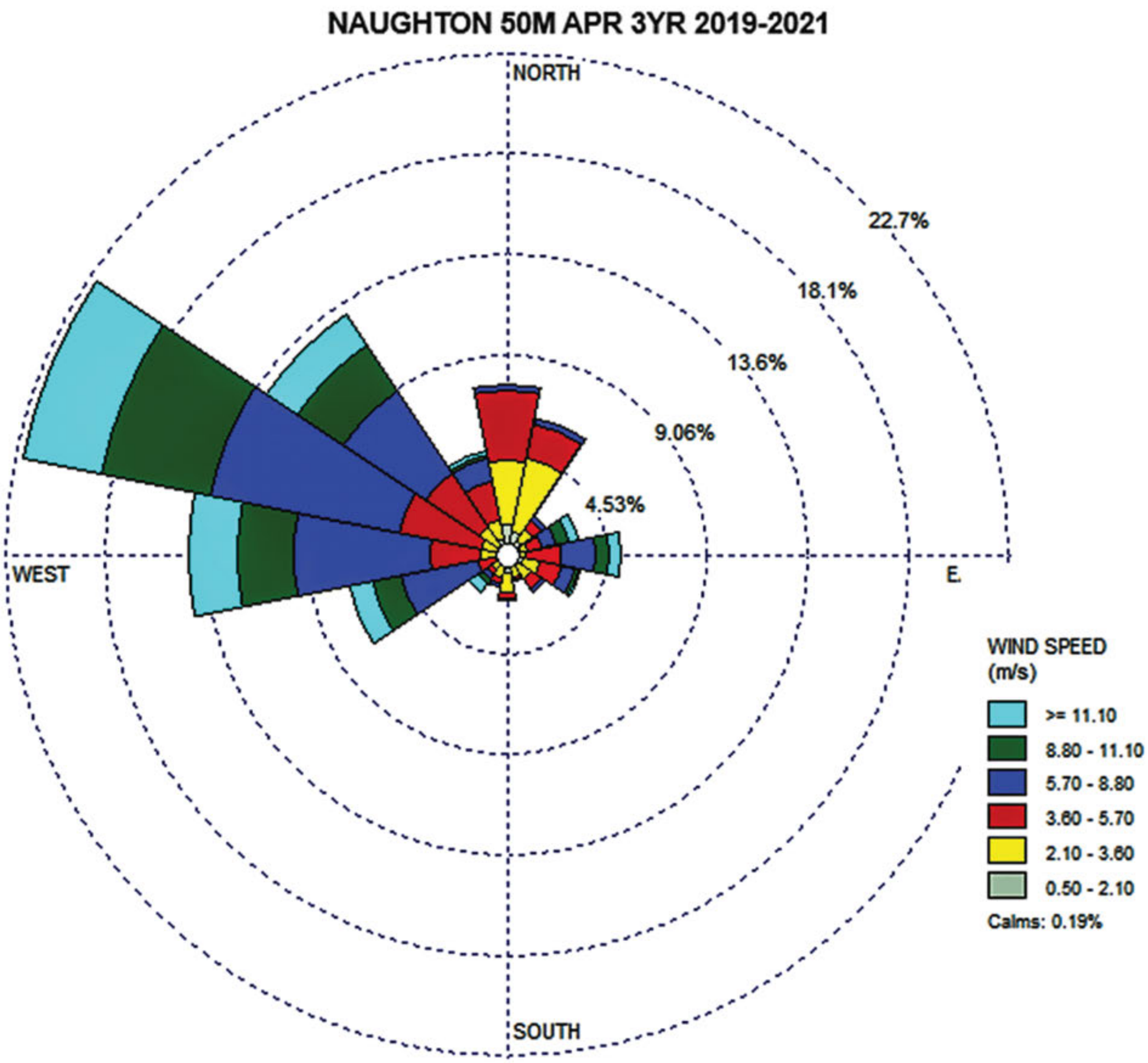

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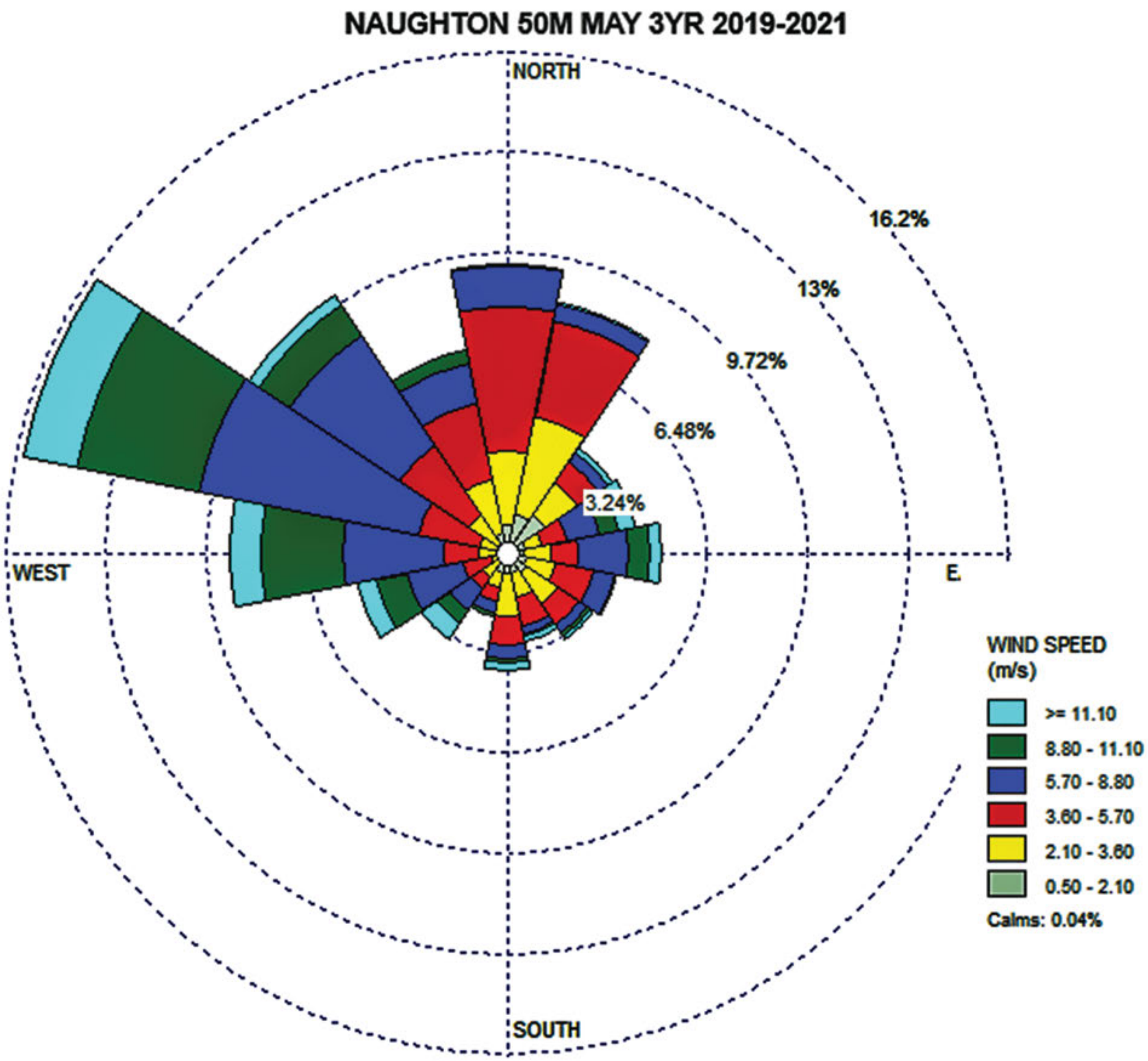


Figure 2.7-28 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

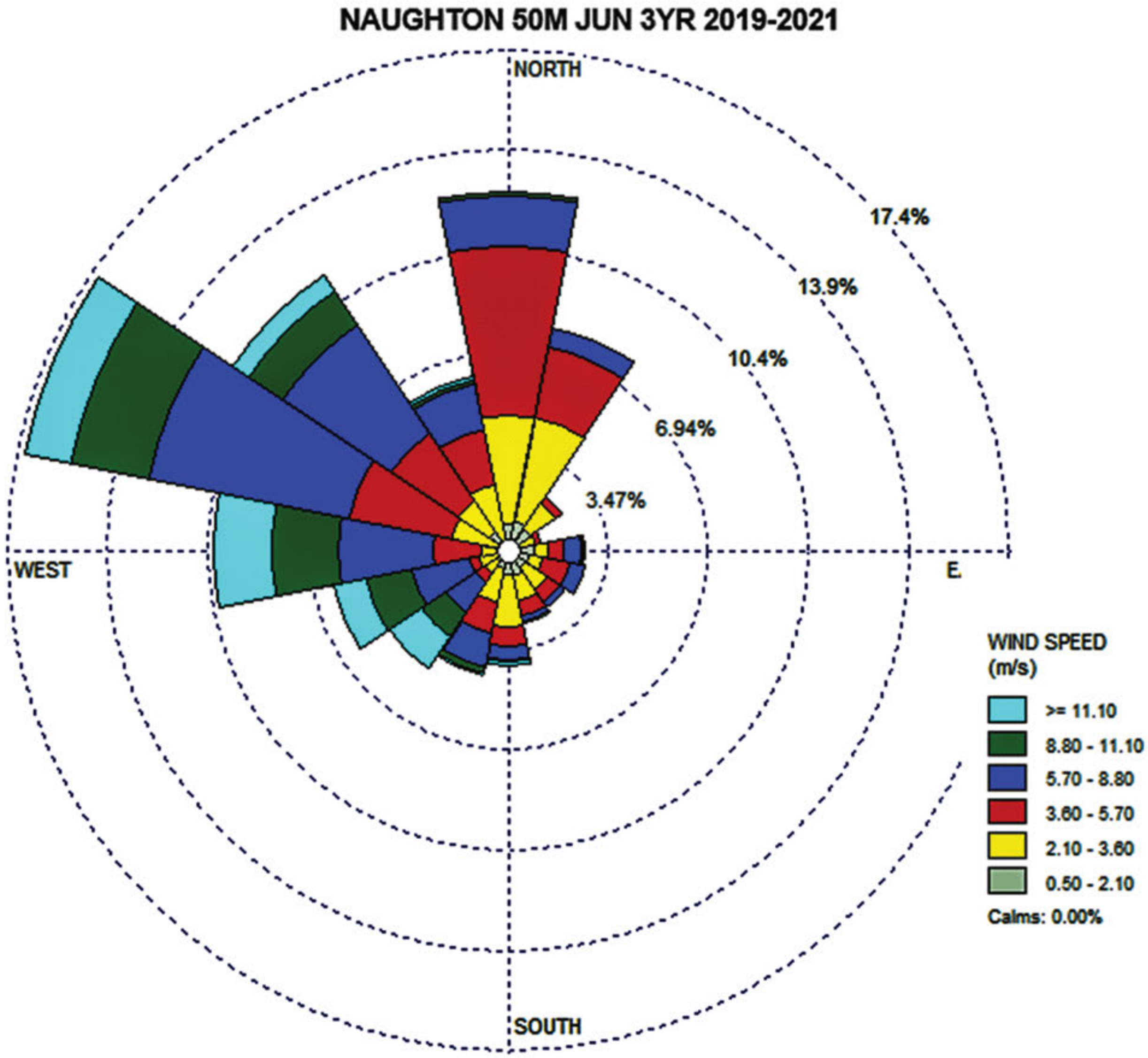


Figure 2.7-29 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

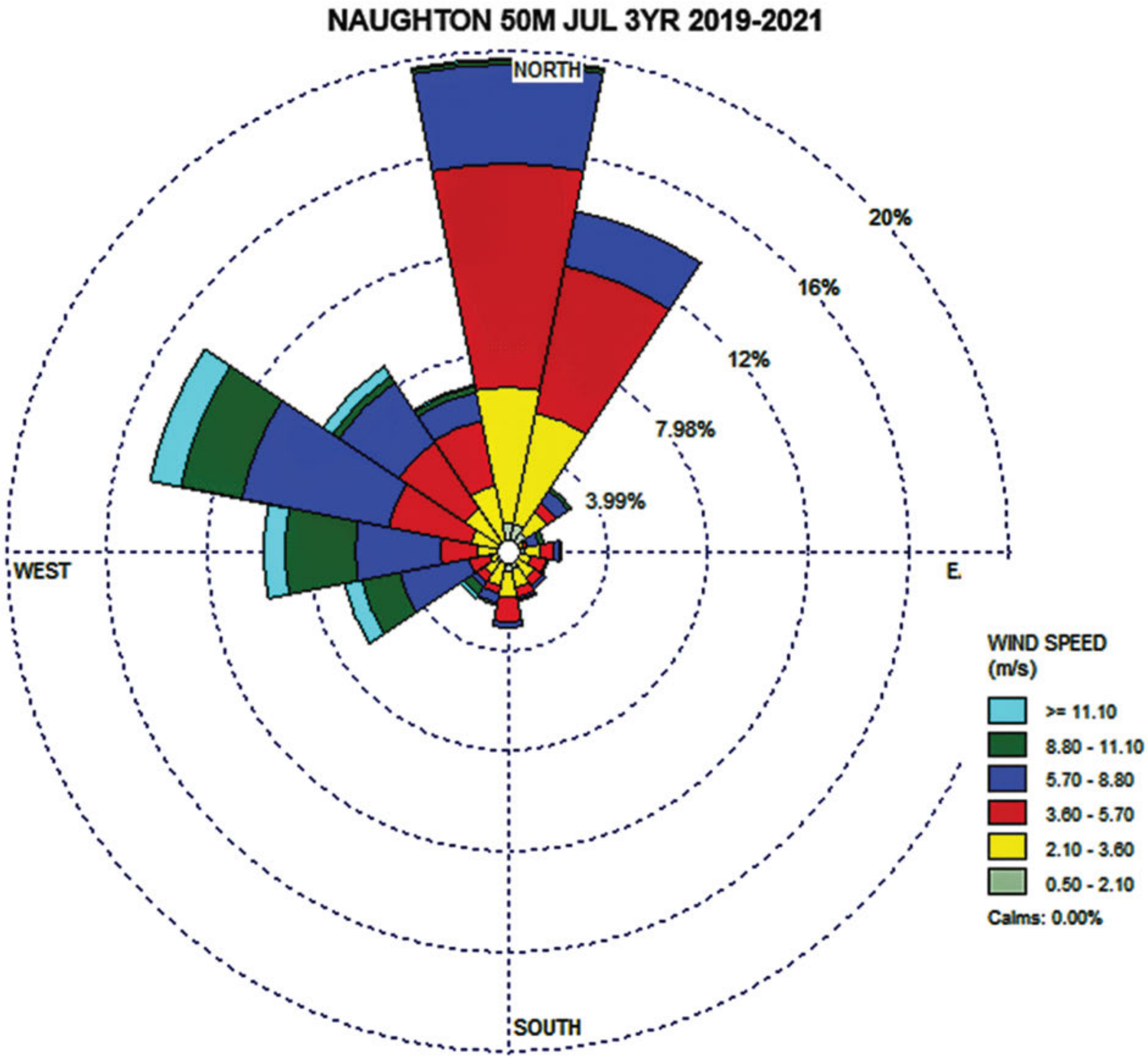


Figure 2.7-30 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

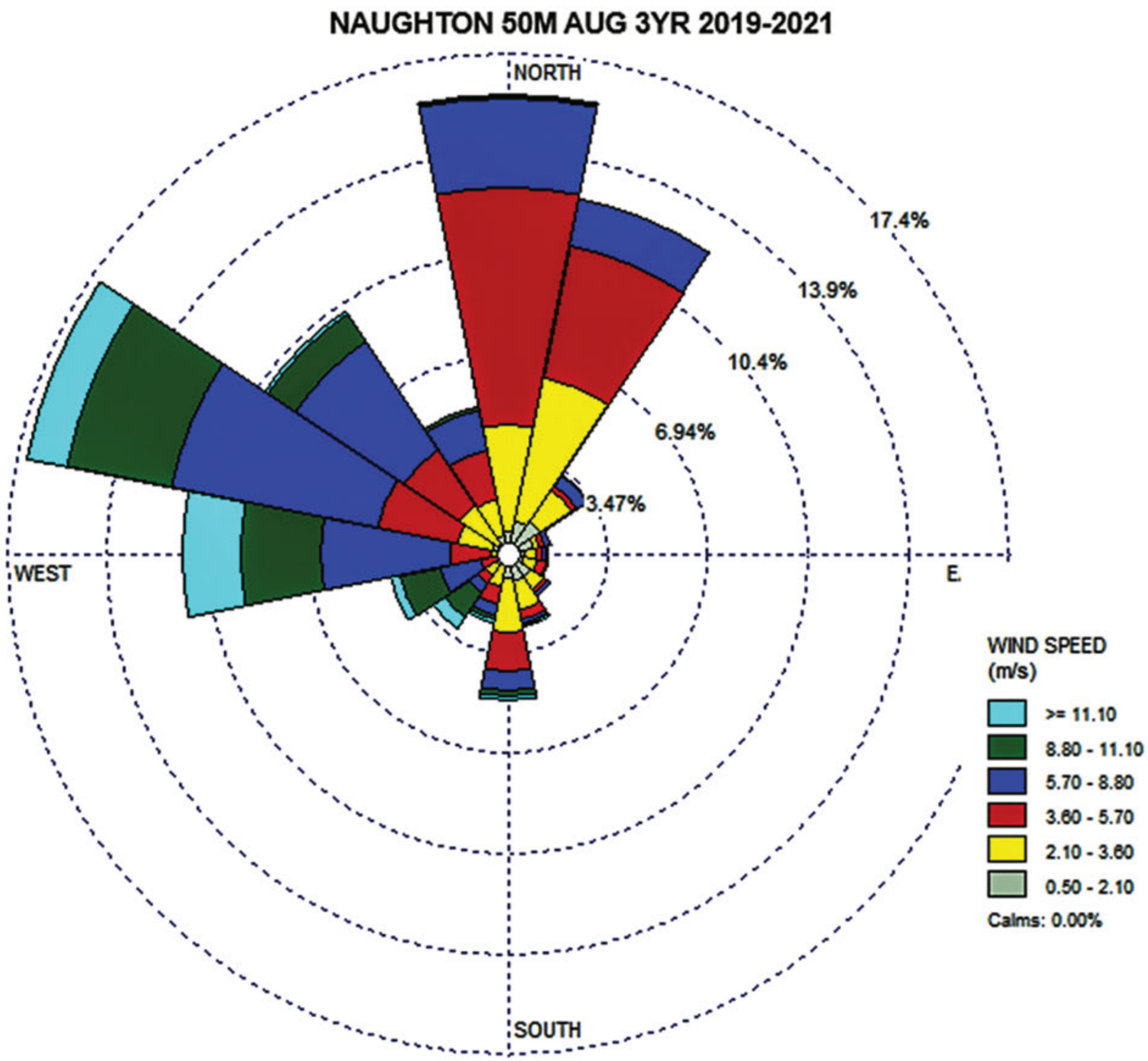


Figure 2.7-31 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

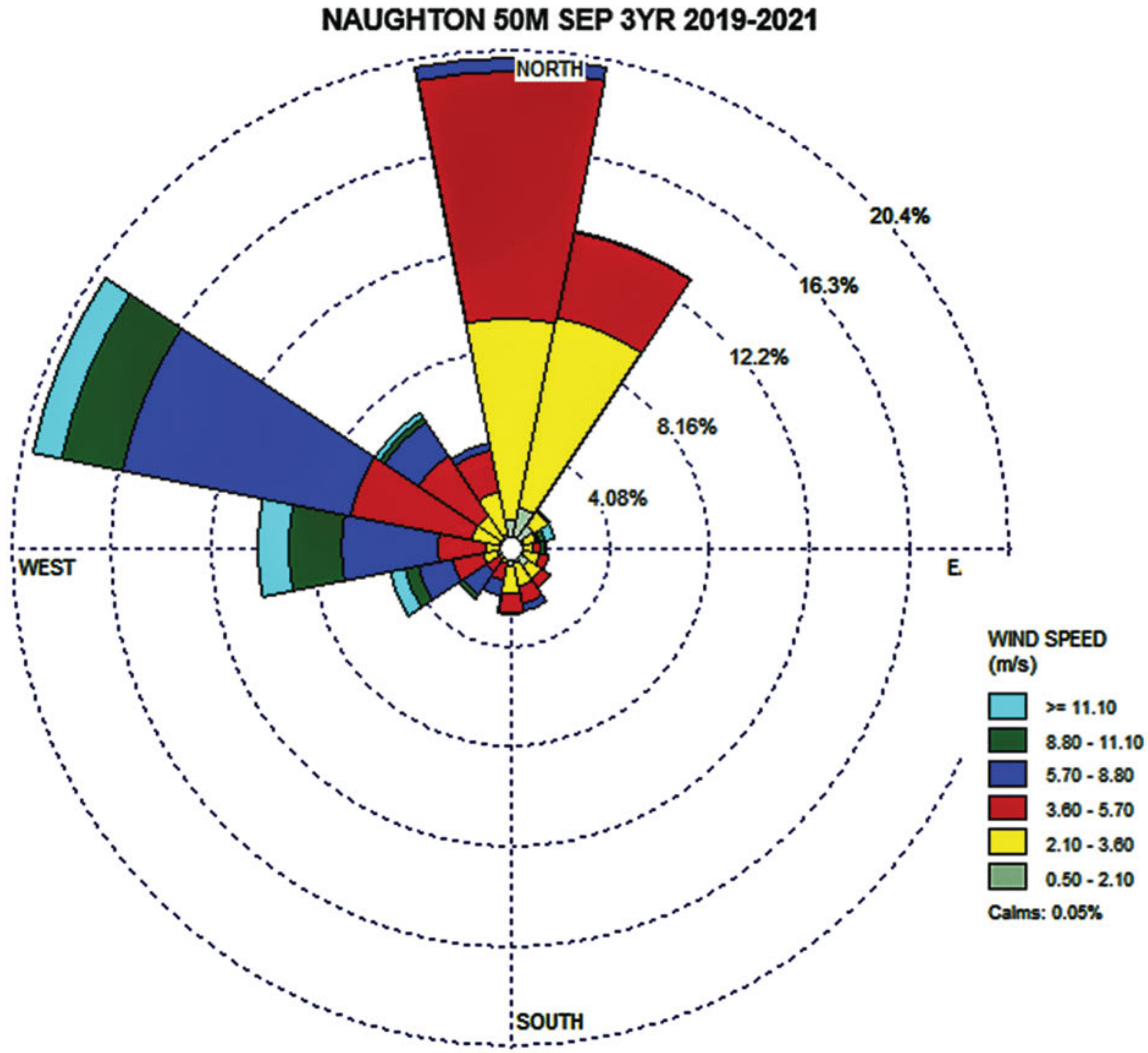


Figure 2.7-32 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

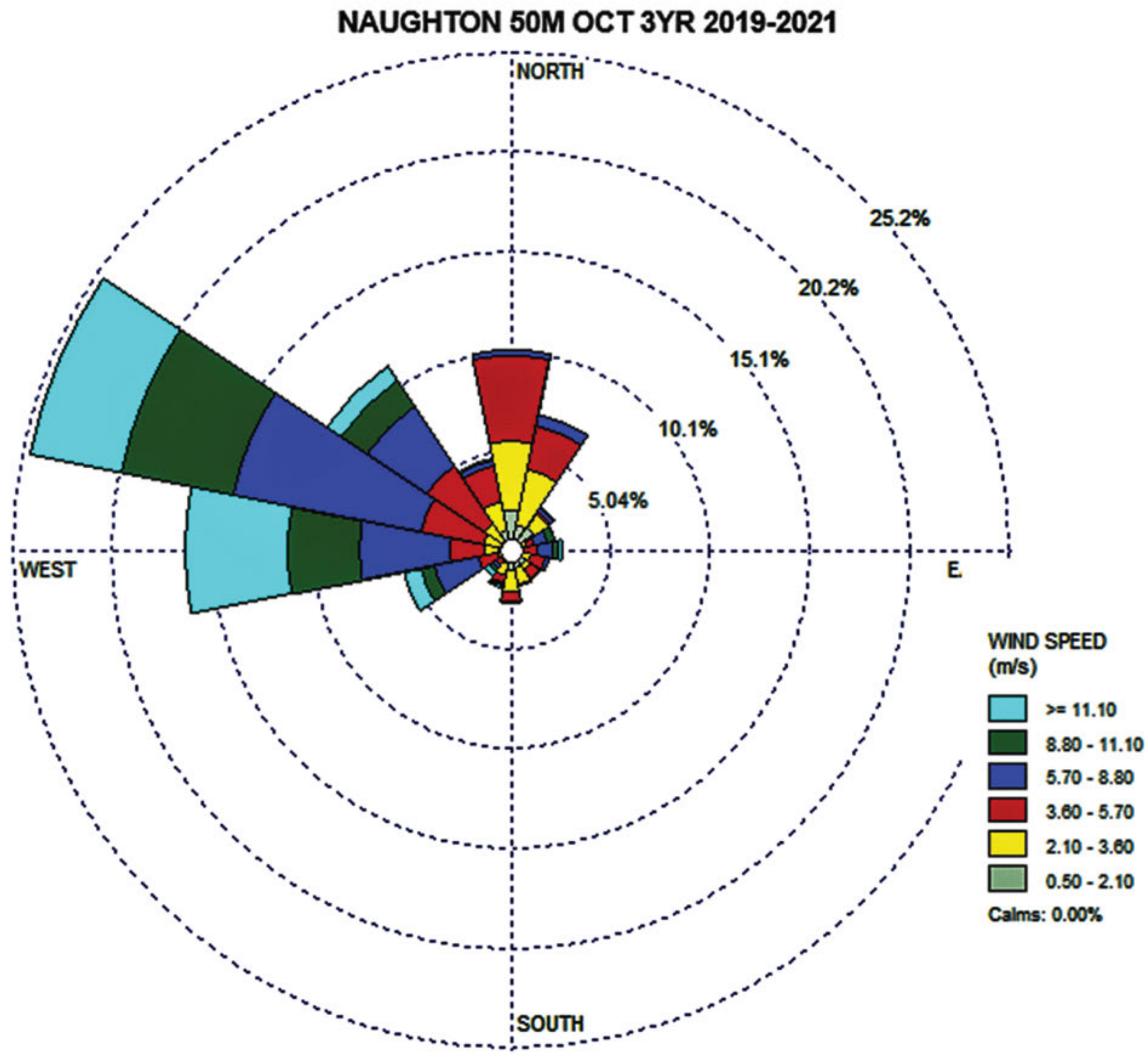


Figure 2.7-33 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

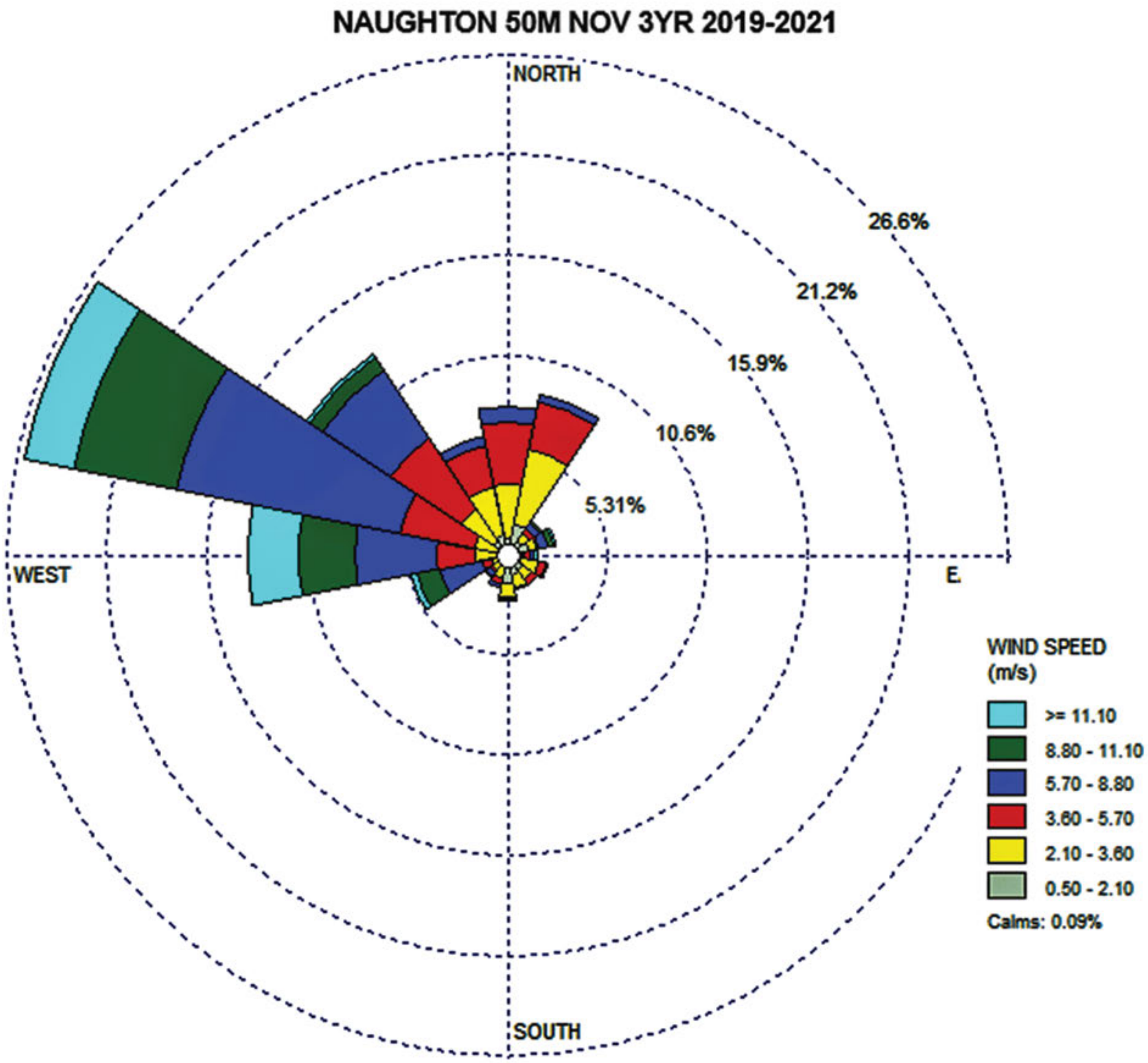


Figure 2.7-34 Naughton Power Plant Monthly Composite Wind Rose 2019-2021, 50 m

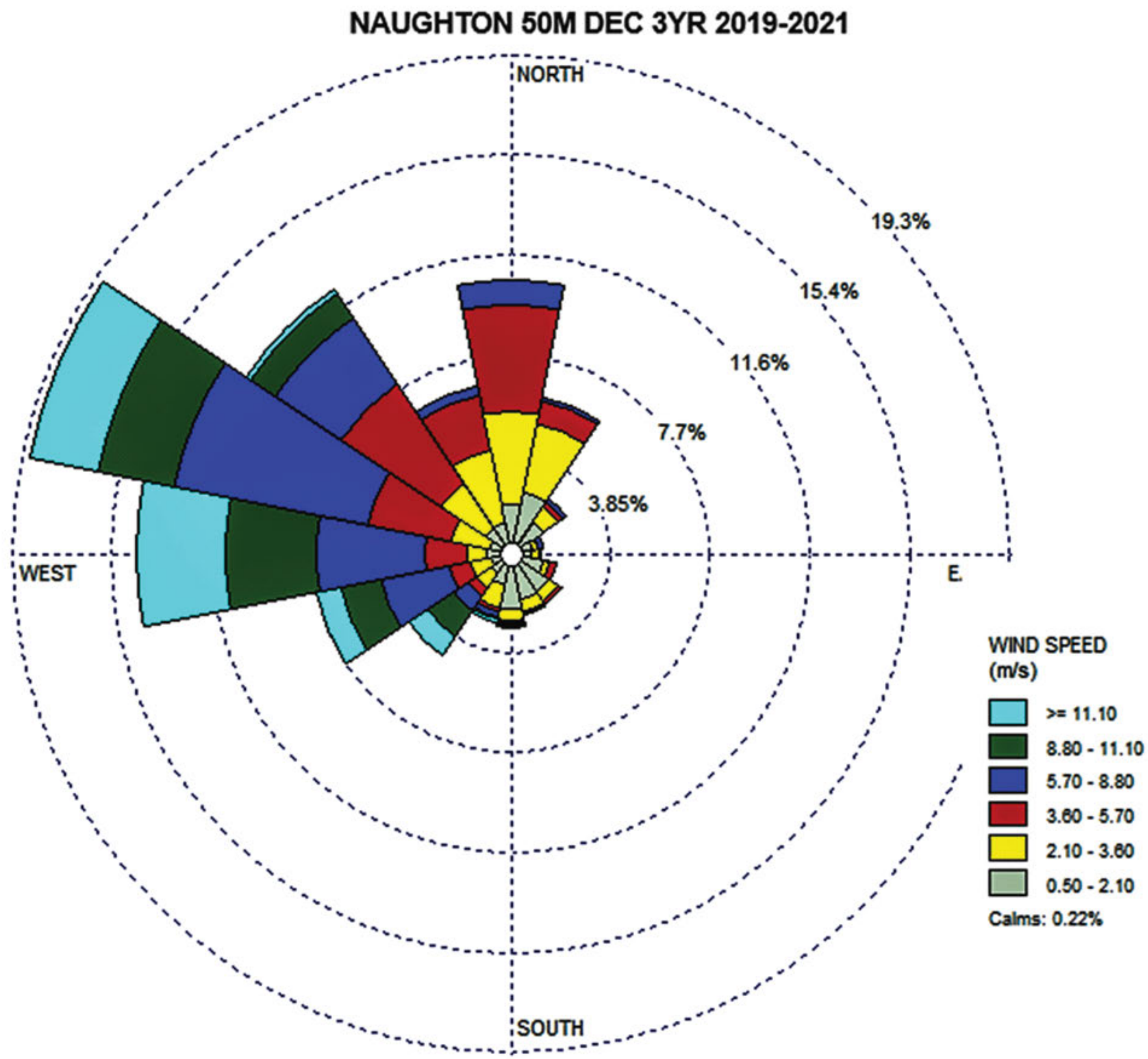


Figure 2.7-35 Naughton Power Plant Annual Average Wind Rose 2022-2023, 10 m

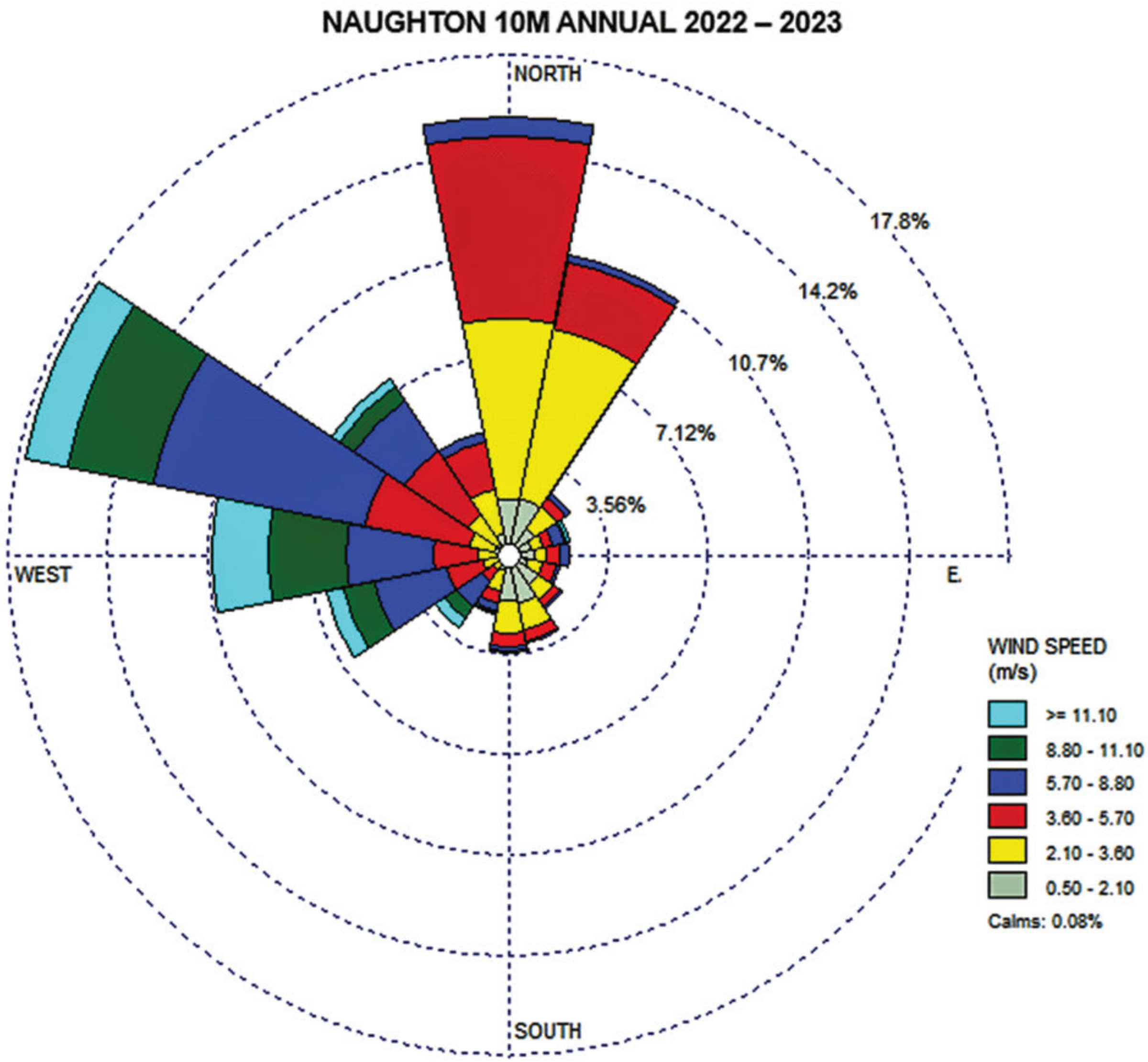


Figure 2.7-36 Naughton Power Plant Annual Average Wind Rose 2022-2023, 50 m

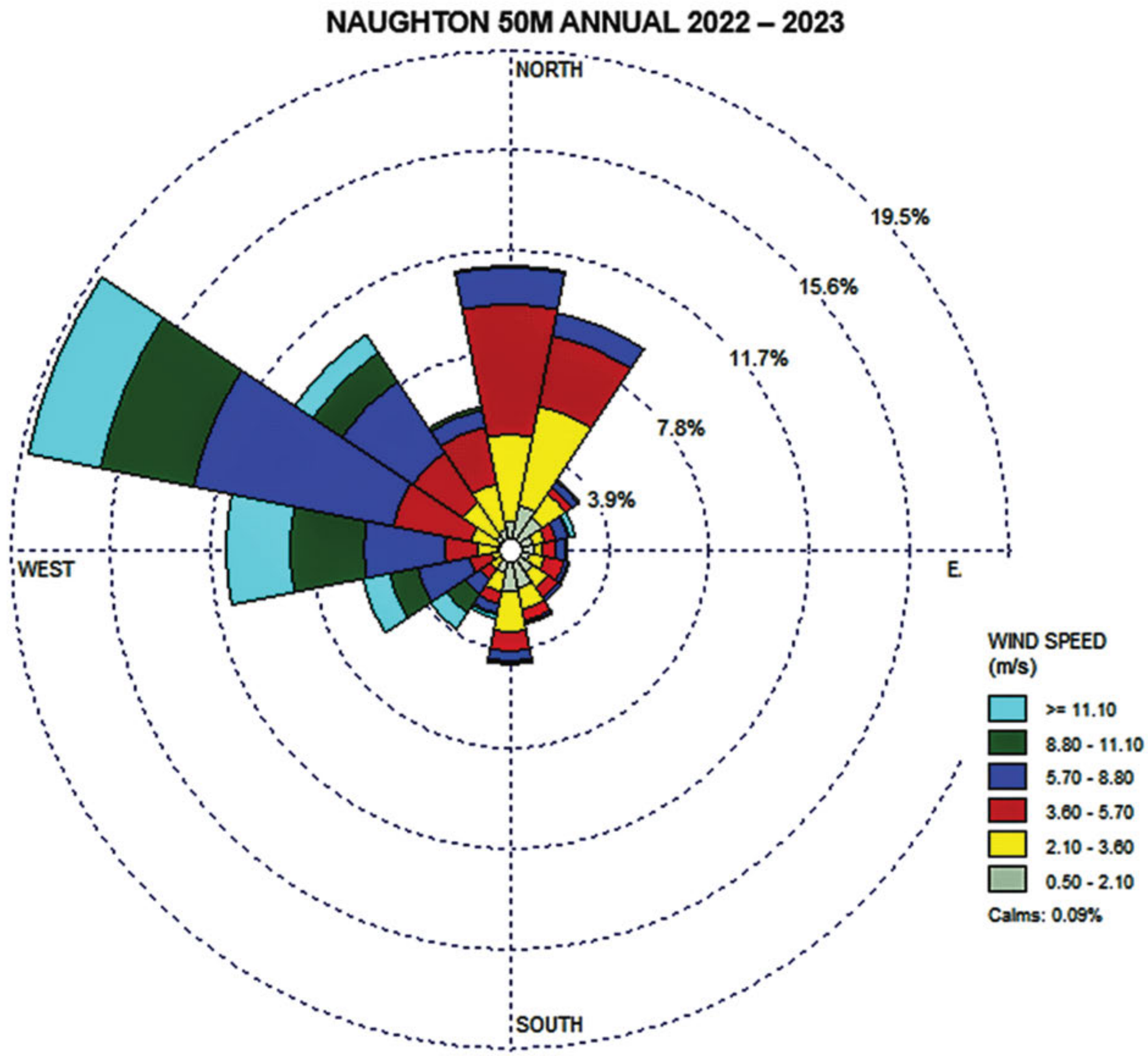


Figure 2.7-37 Naughton Power Plant Seasonal Composite Wind Rose 2019-2021, 10 m

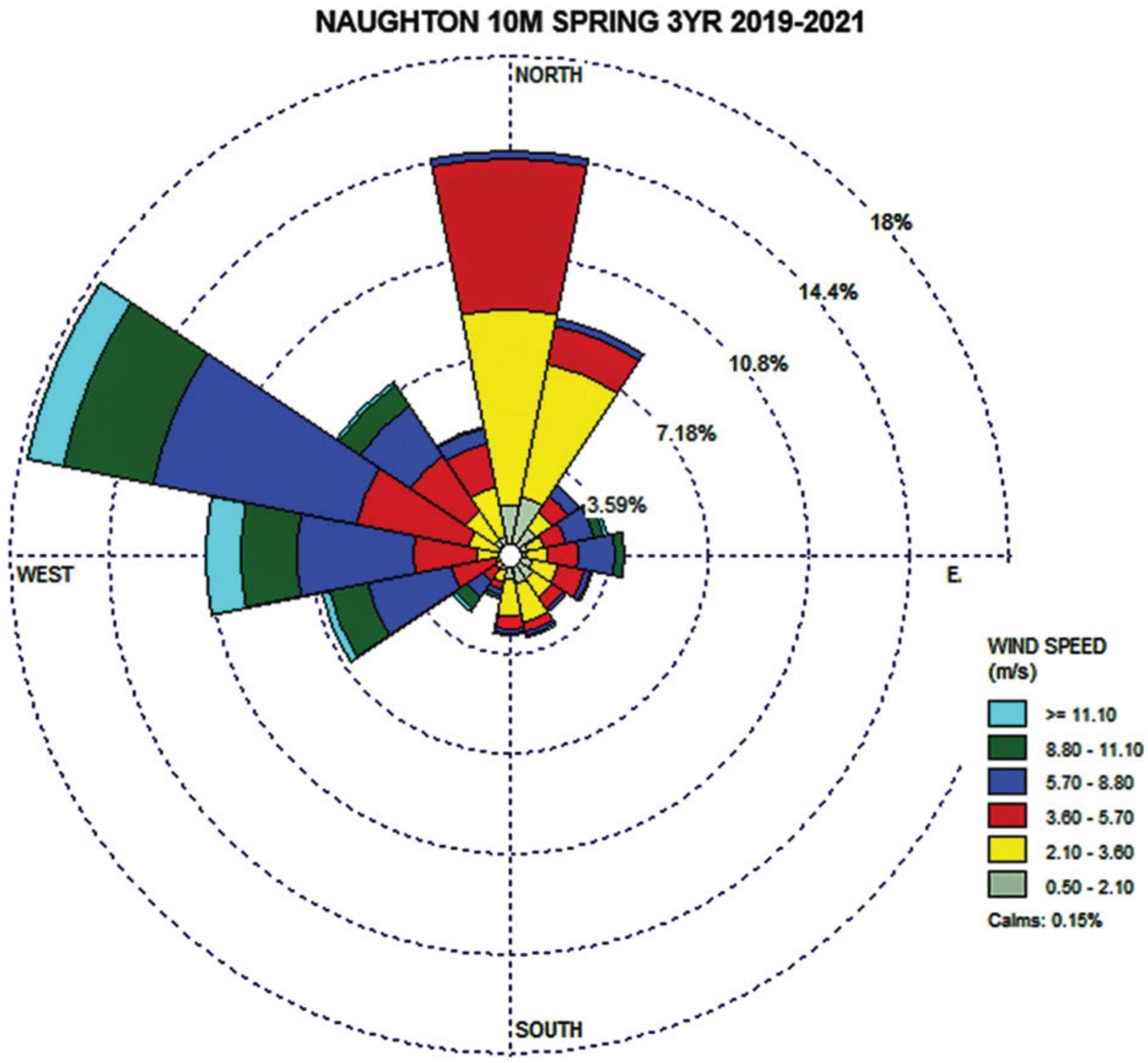


Figure 2.7-38 Naughton Power Plant Seasonal Composite Wind Rose 2019-2021, 10 m

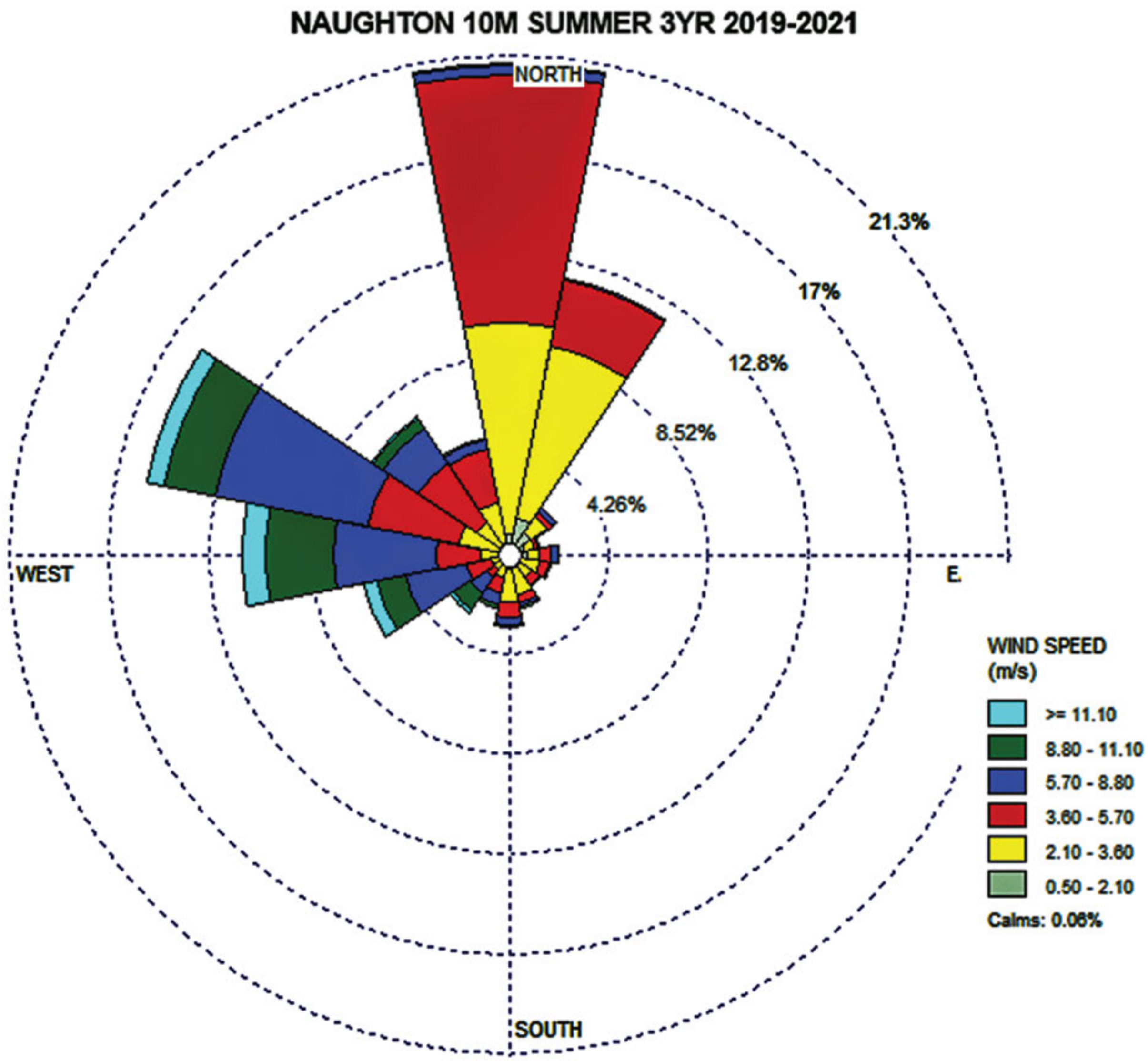


Figure 2.7-39 Naughton Power Plant Seasonal Composite Wind Rose 2019-2021, 10 m

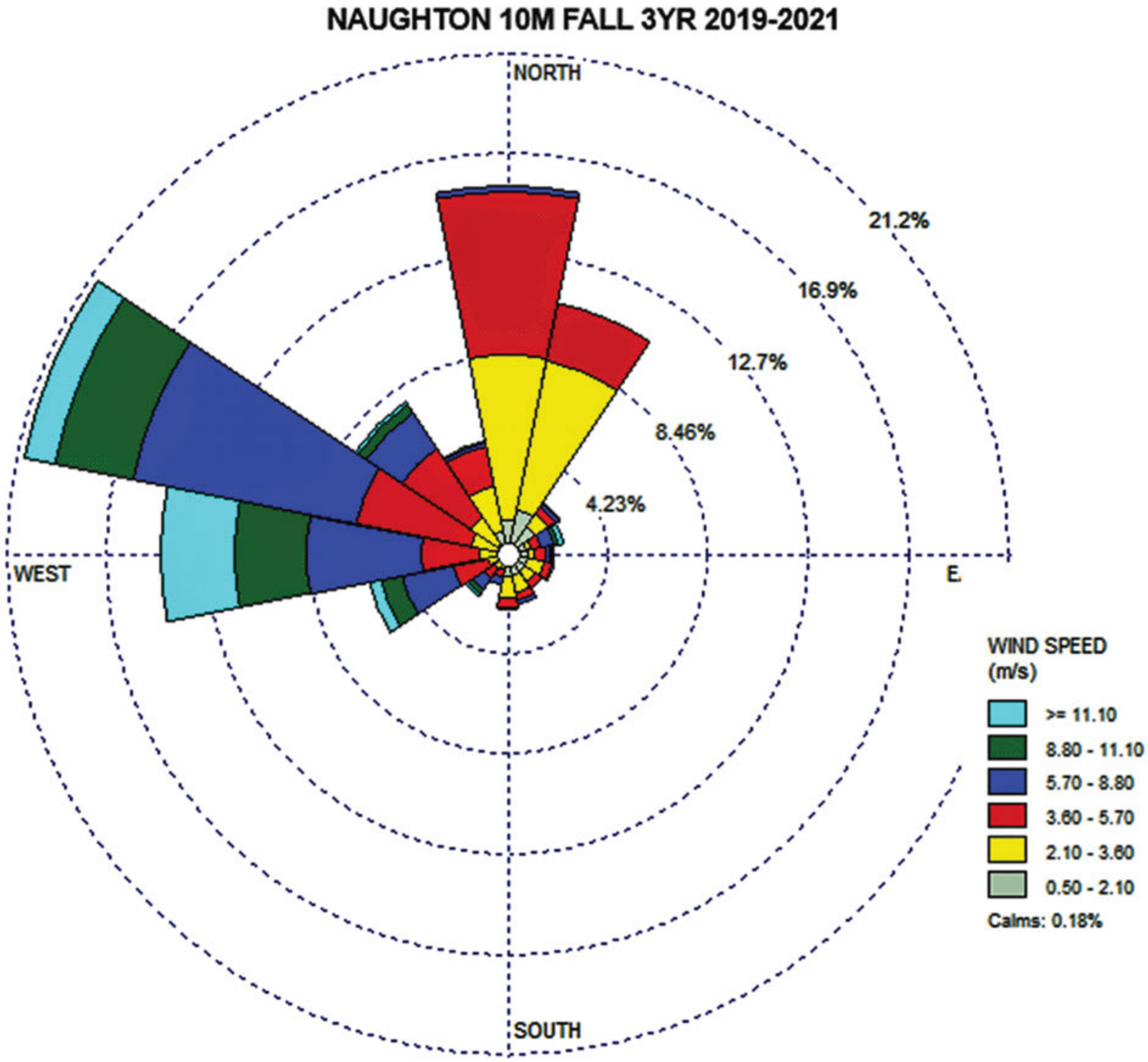


Figure 2.7-40 Naughton Power Plant Seasonal Composite Wind Rose 2019-2021, 10 m

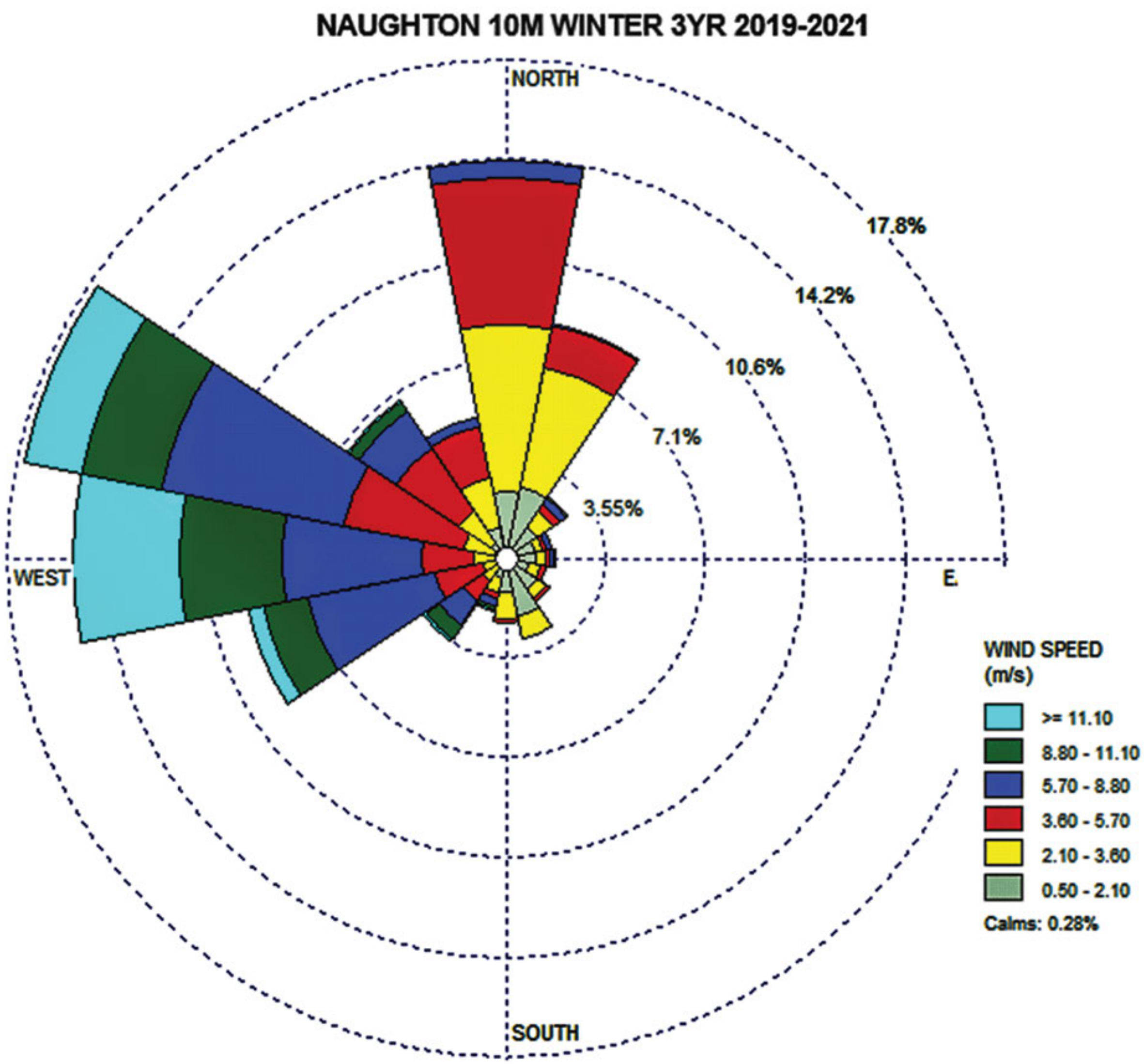


Figure 2.7-41 Naughton Power Plant Seasonal Composite Wind Rose 2019-2021, 50 m

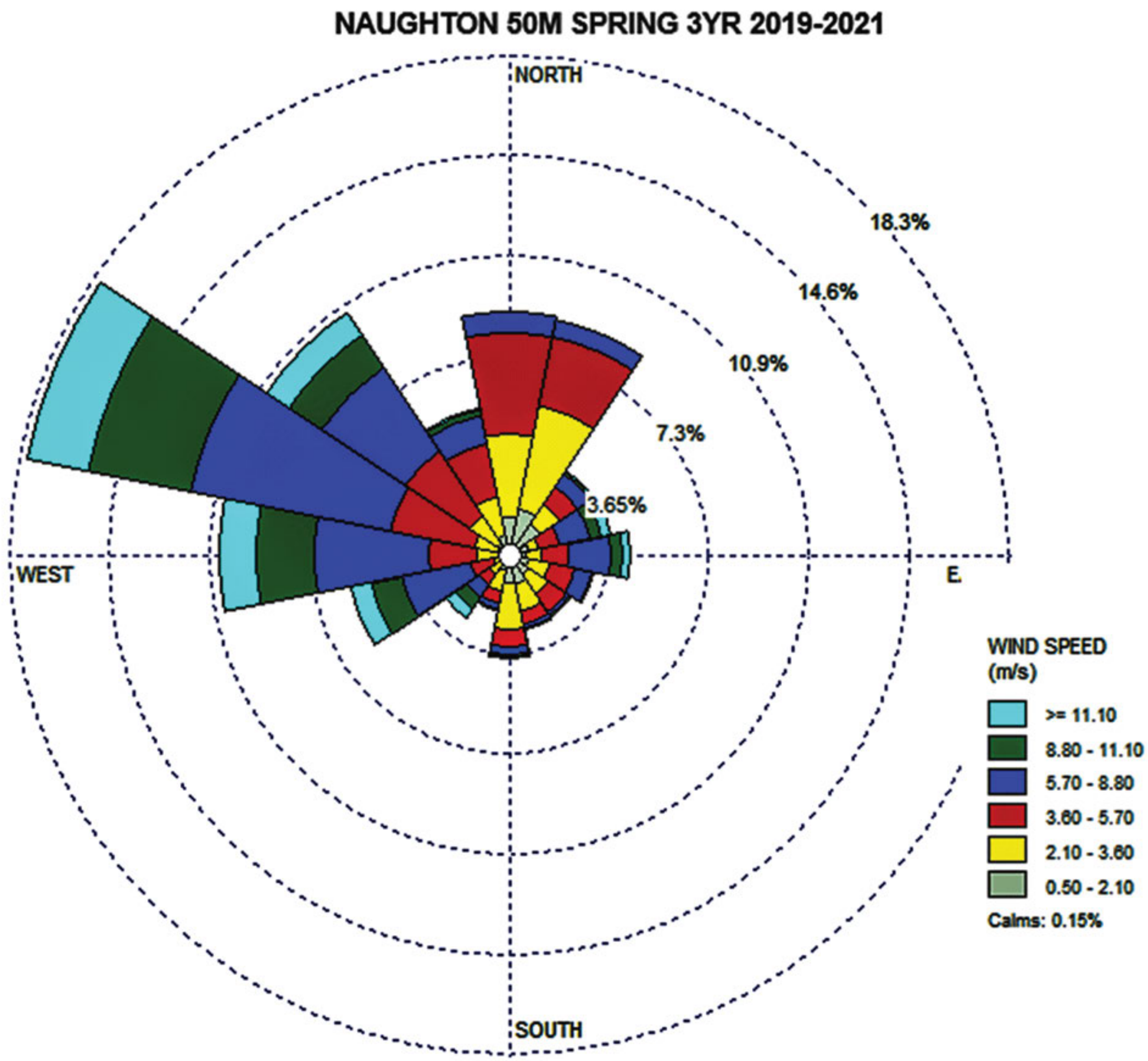


Figure 2.7-42 Naughton Power Plant Seasonal Composite Wind Rose 2019-2021, 50 m

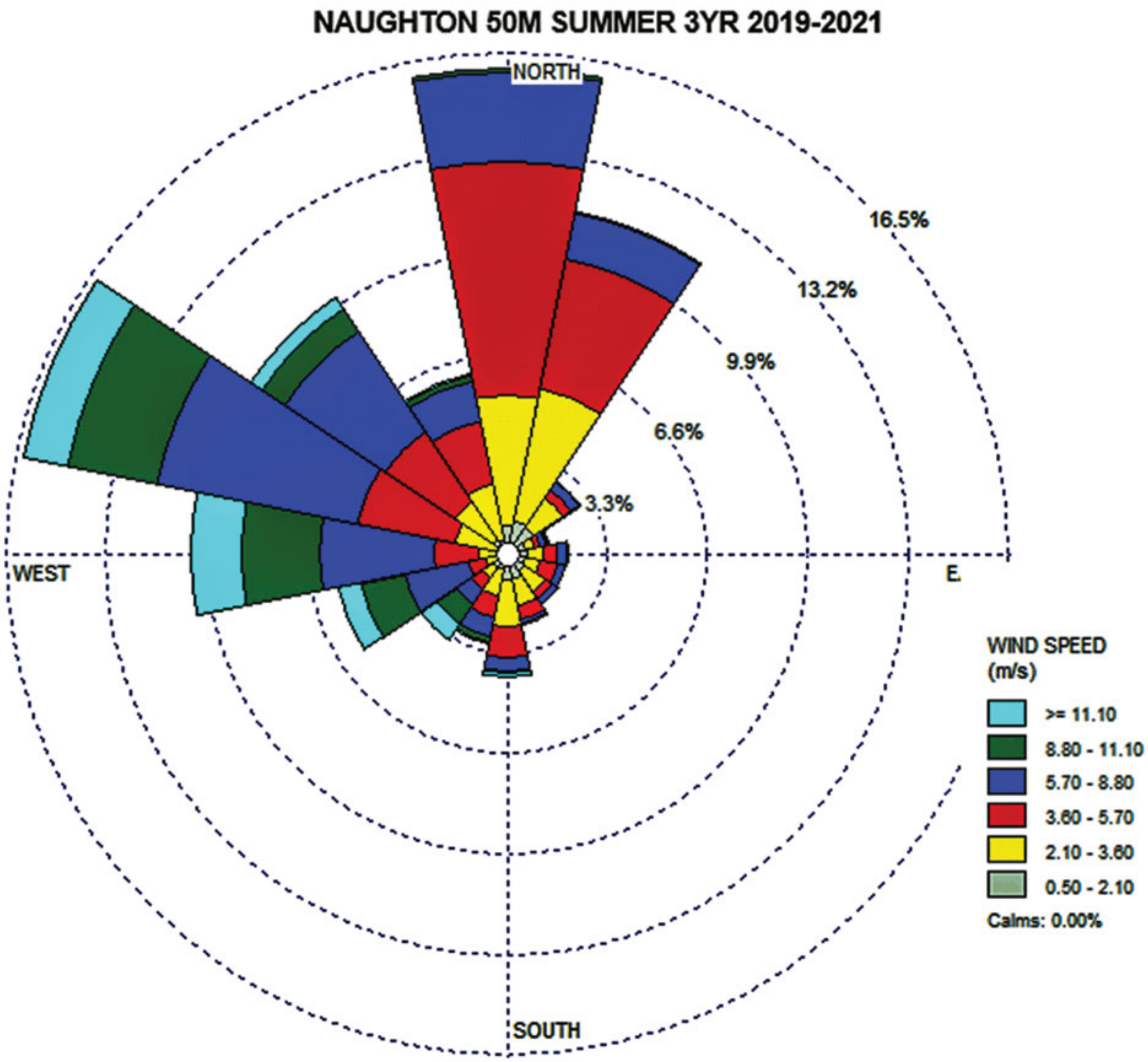


Figure 2.7-43 Naughton Power Plant Seasonal Composite Wind Rose 2019-2021, 50 m

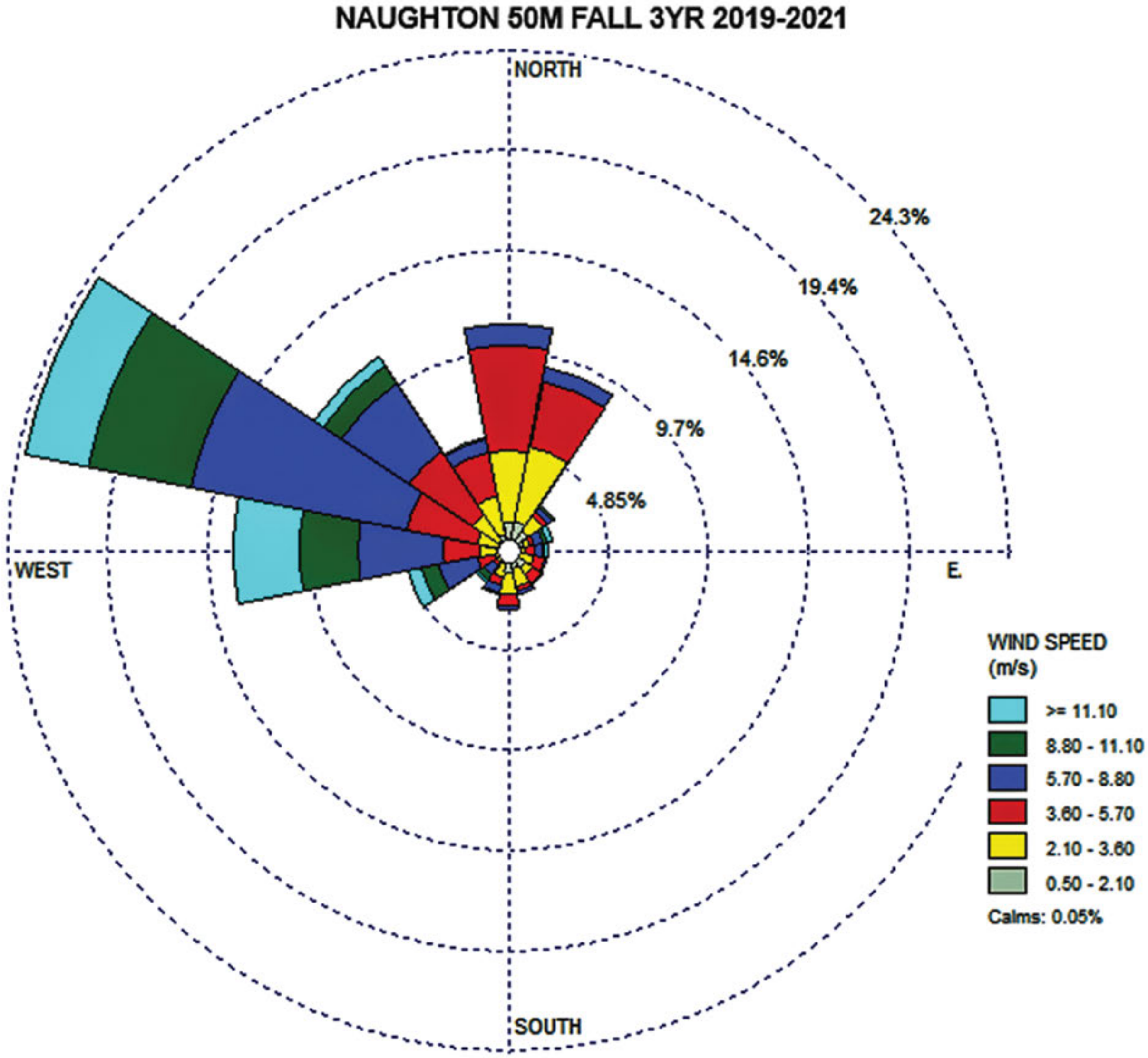


Figure 2.7-44 Naughton Power Plant Seasonal Composite Wind Rose 2019-2021, 50 m

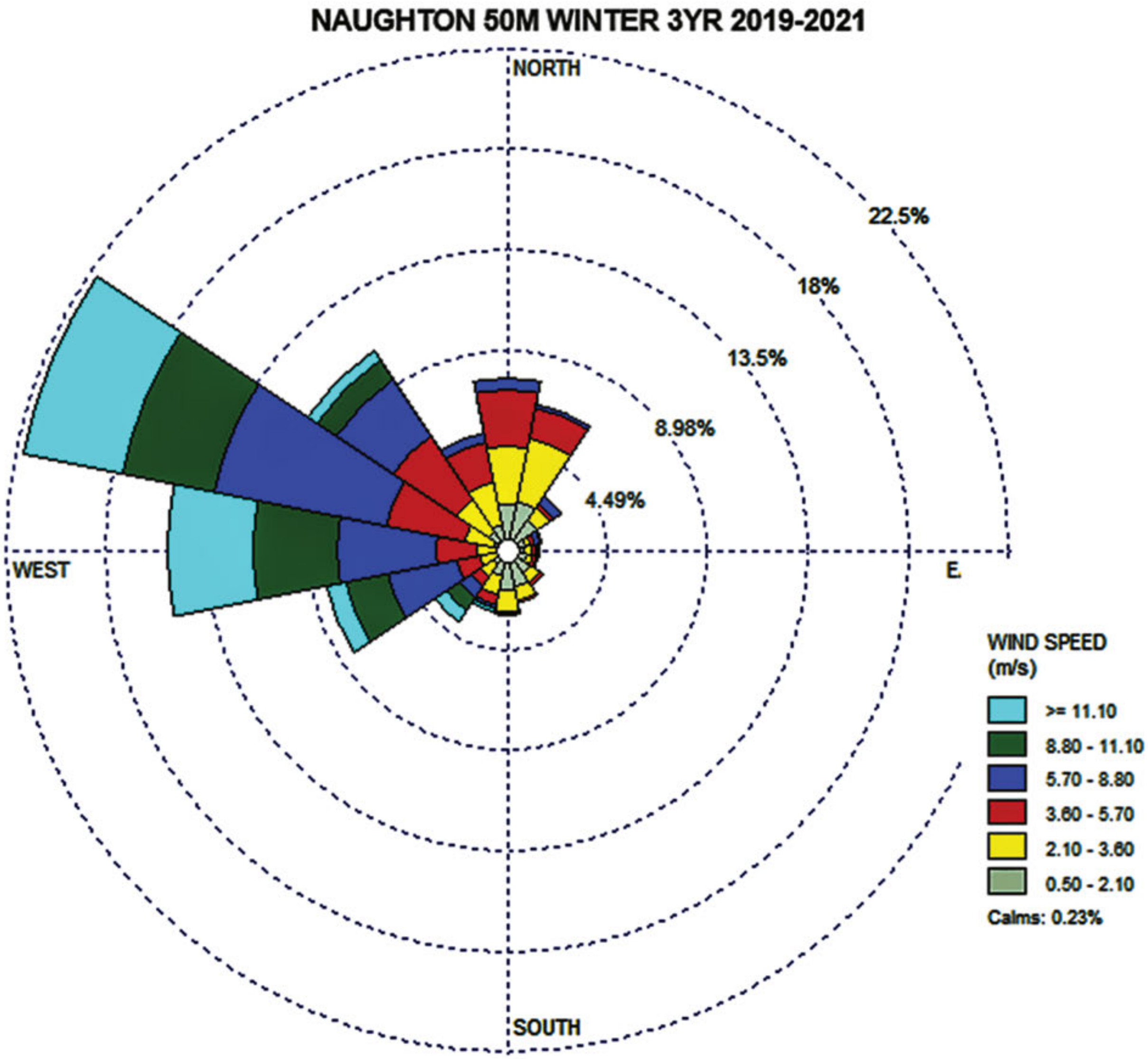


Figure 2.7-45 Naughton Power Plant Seasonal Composite Wind Rose 2022-2023, 10 m

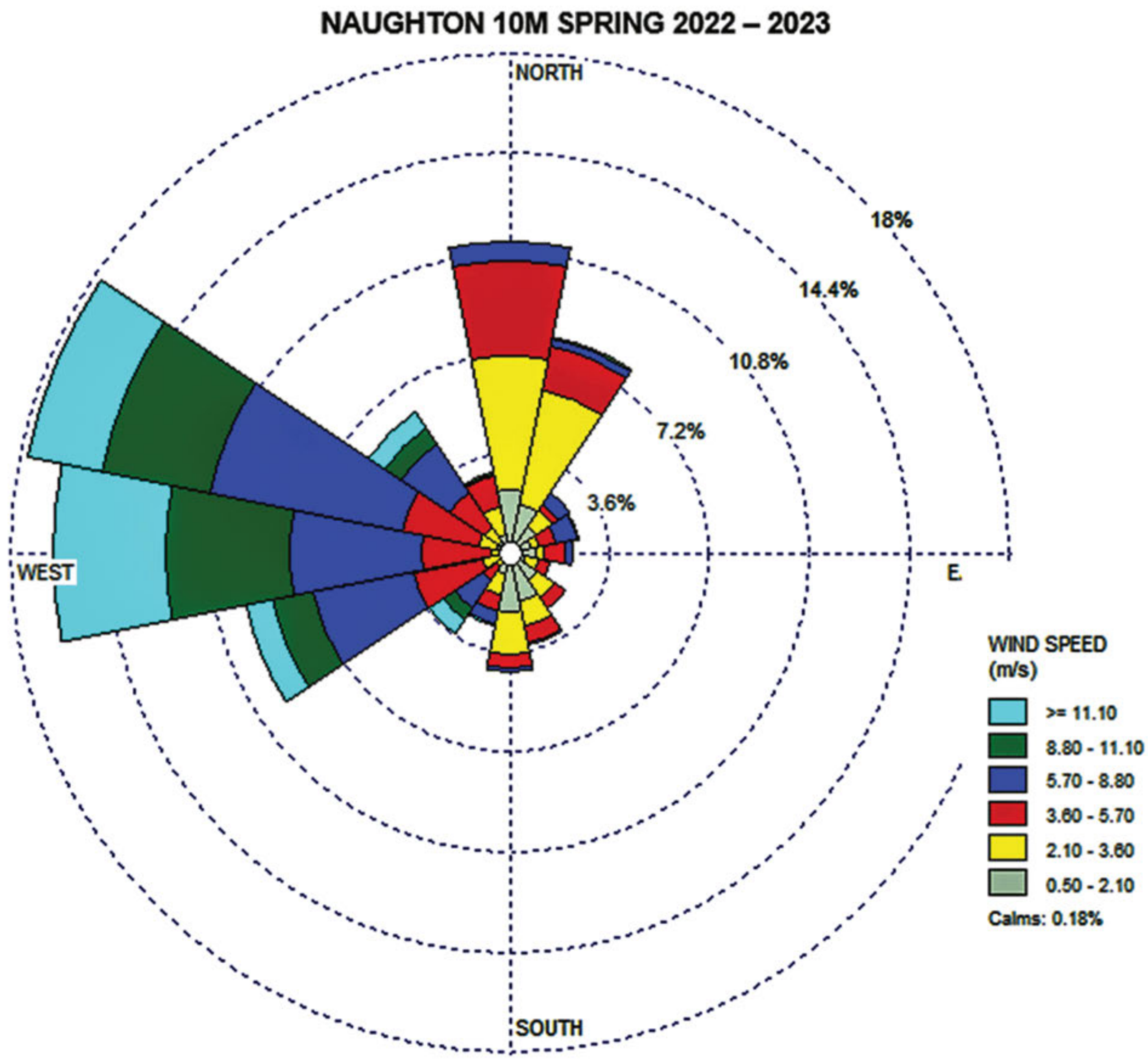


Figure 2.7-46 Naughton Power Plant Seasonal Composite Wind Rose 2022-2023, 10 m

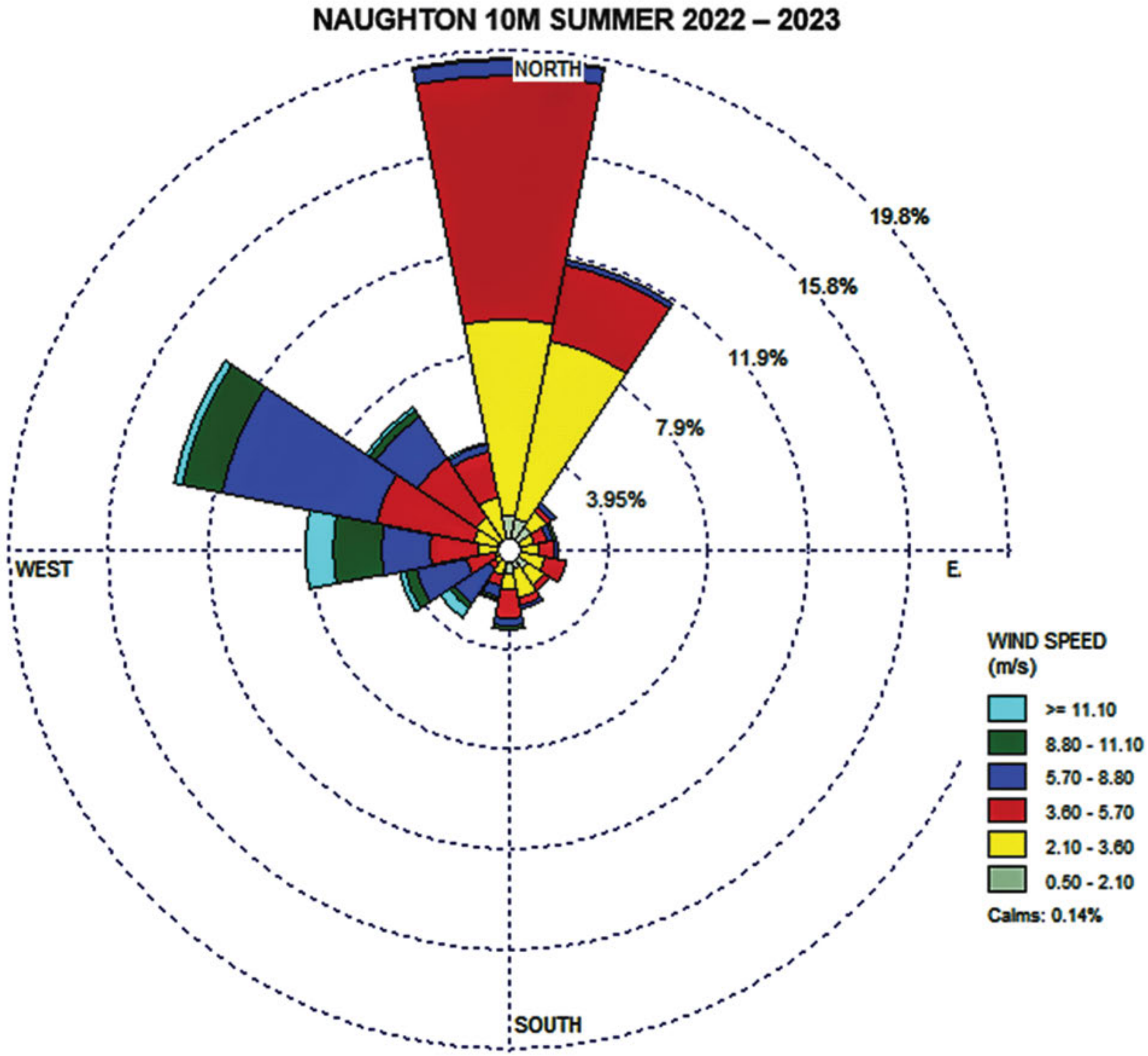


Figure 2.7-47 Naughton Power Plant Seasonal Composite Wind Rose 2022-2023, 10 m

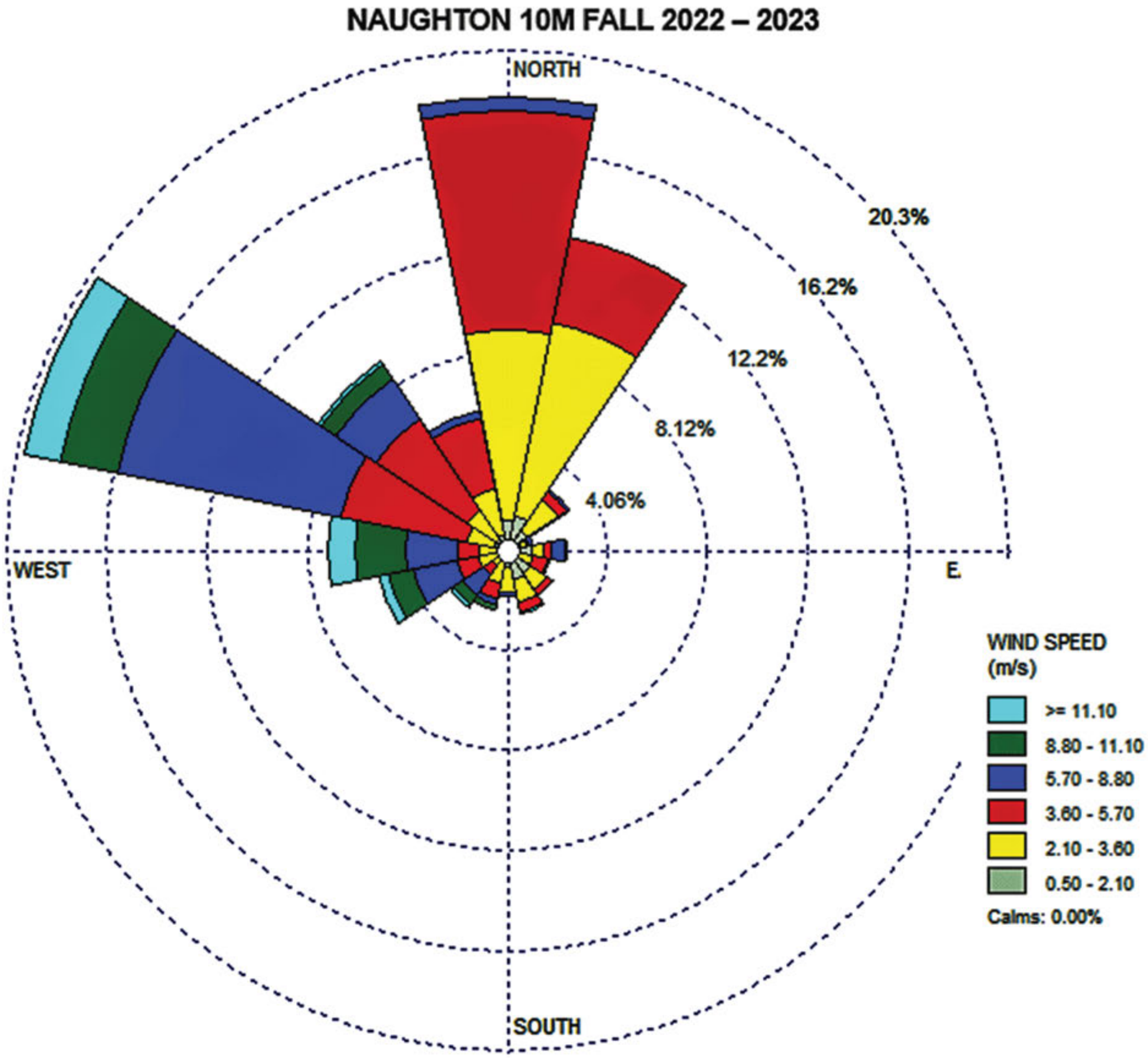


Figure 2.7-48 Naughton Power Plant Seasonal Composite Wind Rose 2022-2023, 10 m

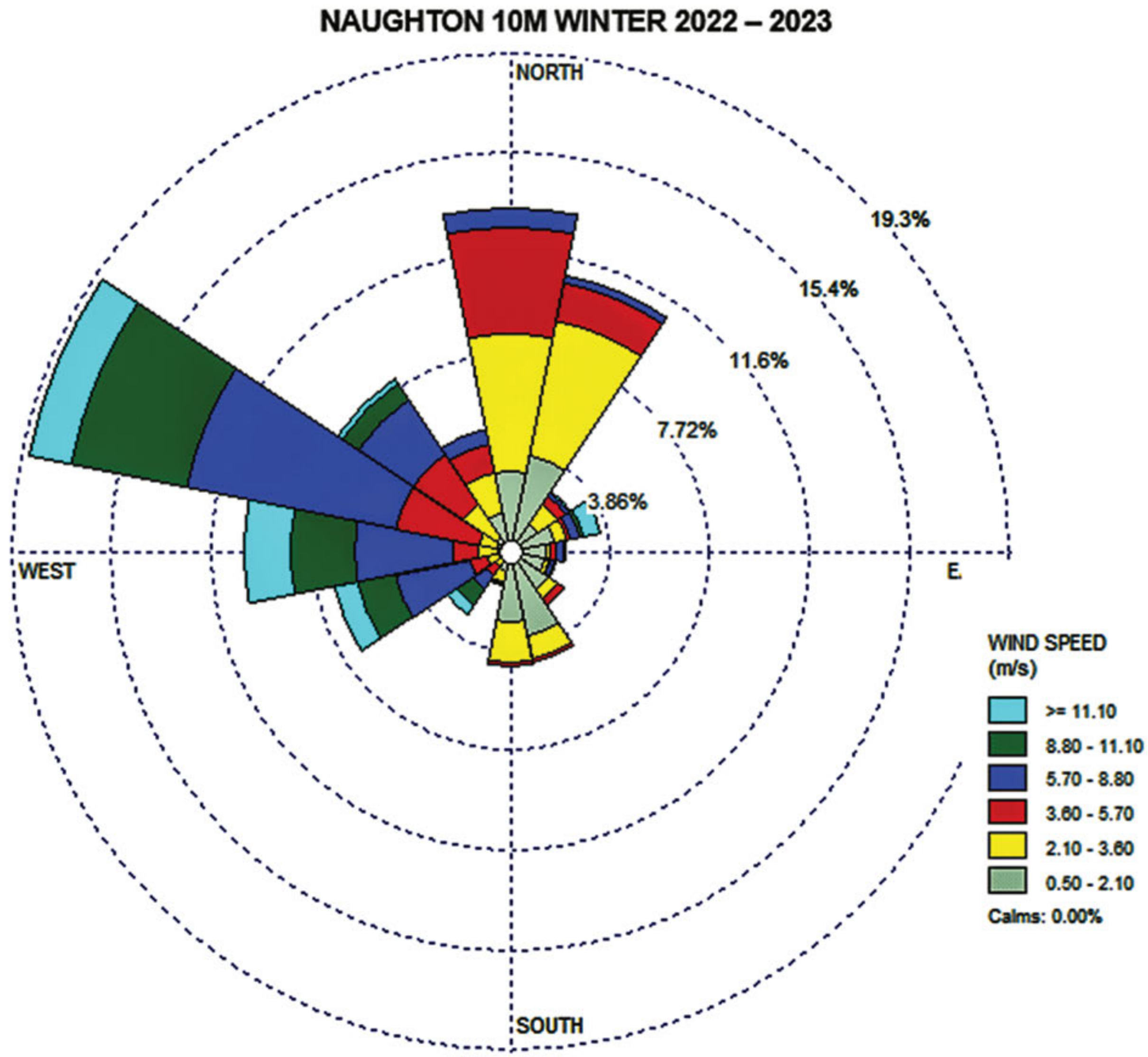


Figure 2.7-49 Naughton Power Plant Seasonal Composite Wind Rose 2022-2023, 50 m

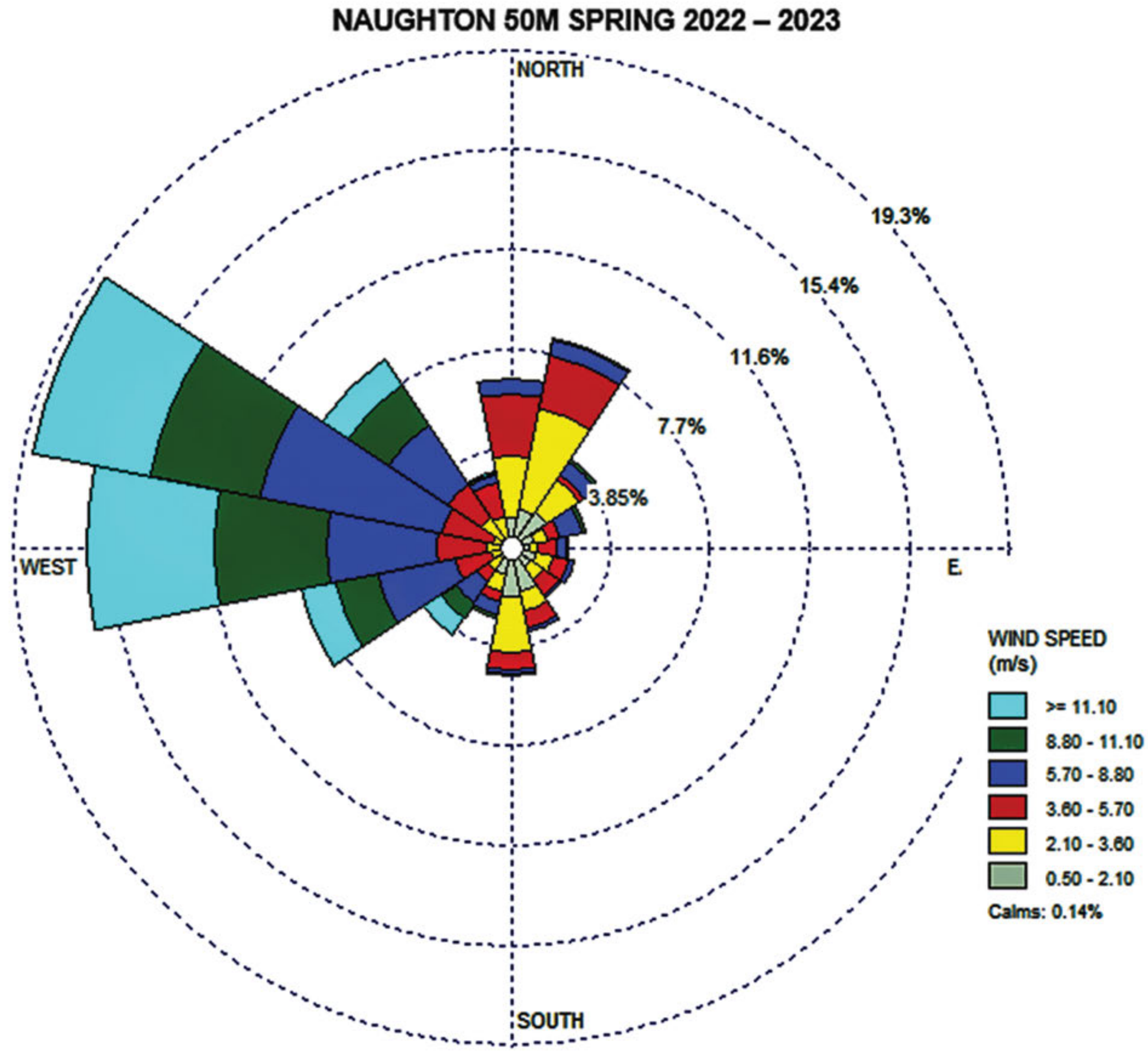


Figure 2.7-50 Naughton Power Plant Seasonal Composite Wind Rose 2022-2023, 50 m

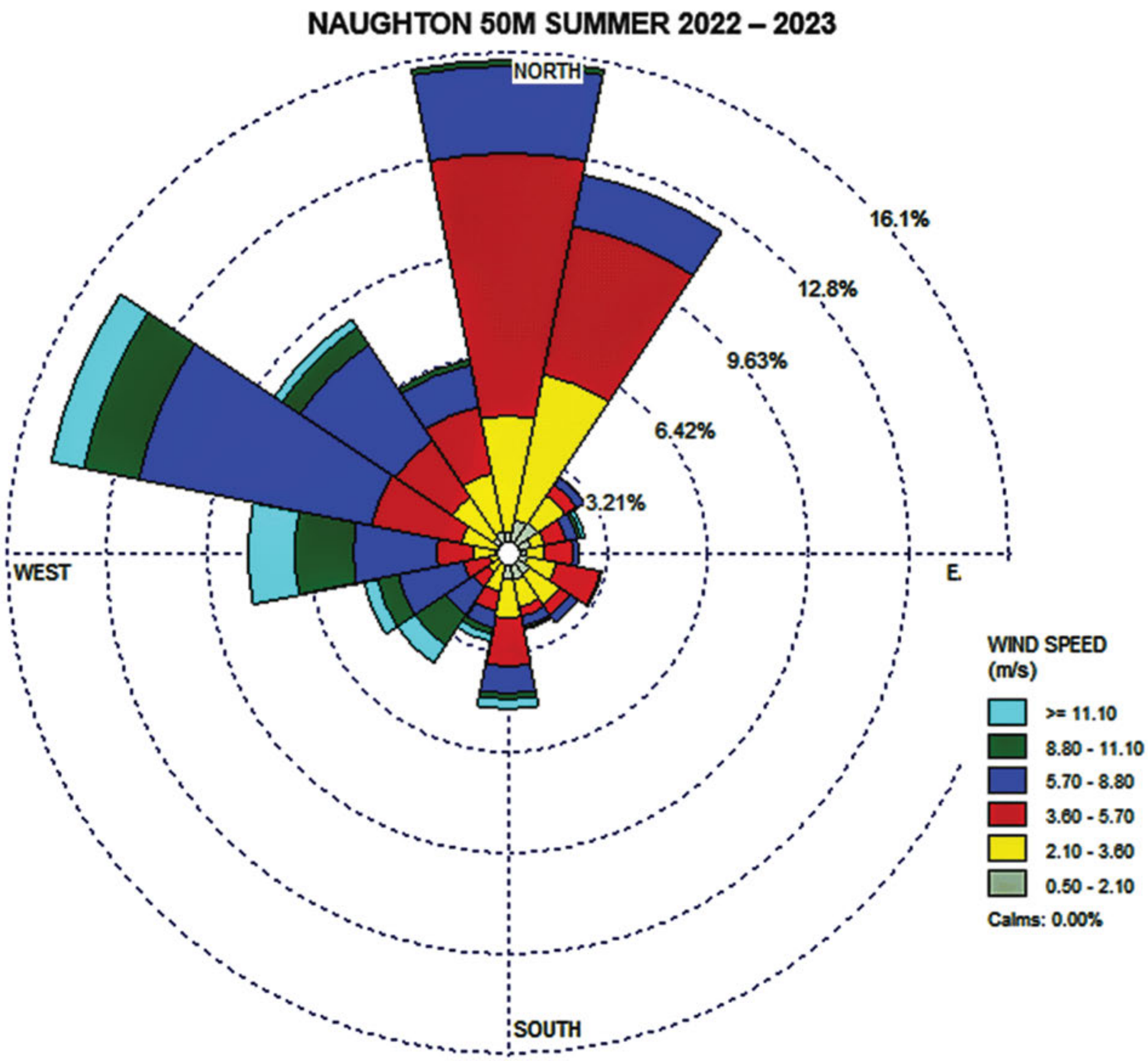


Figure 2.7-51 Naughton Power Plant Seasonal Composite Wind Rose 2022-2023, 50 m

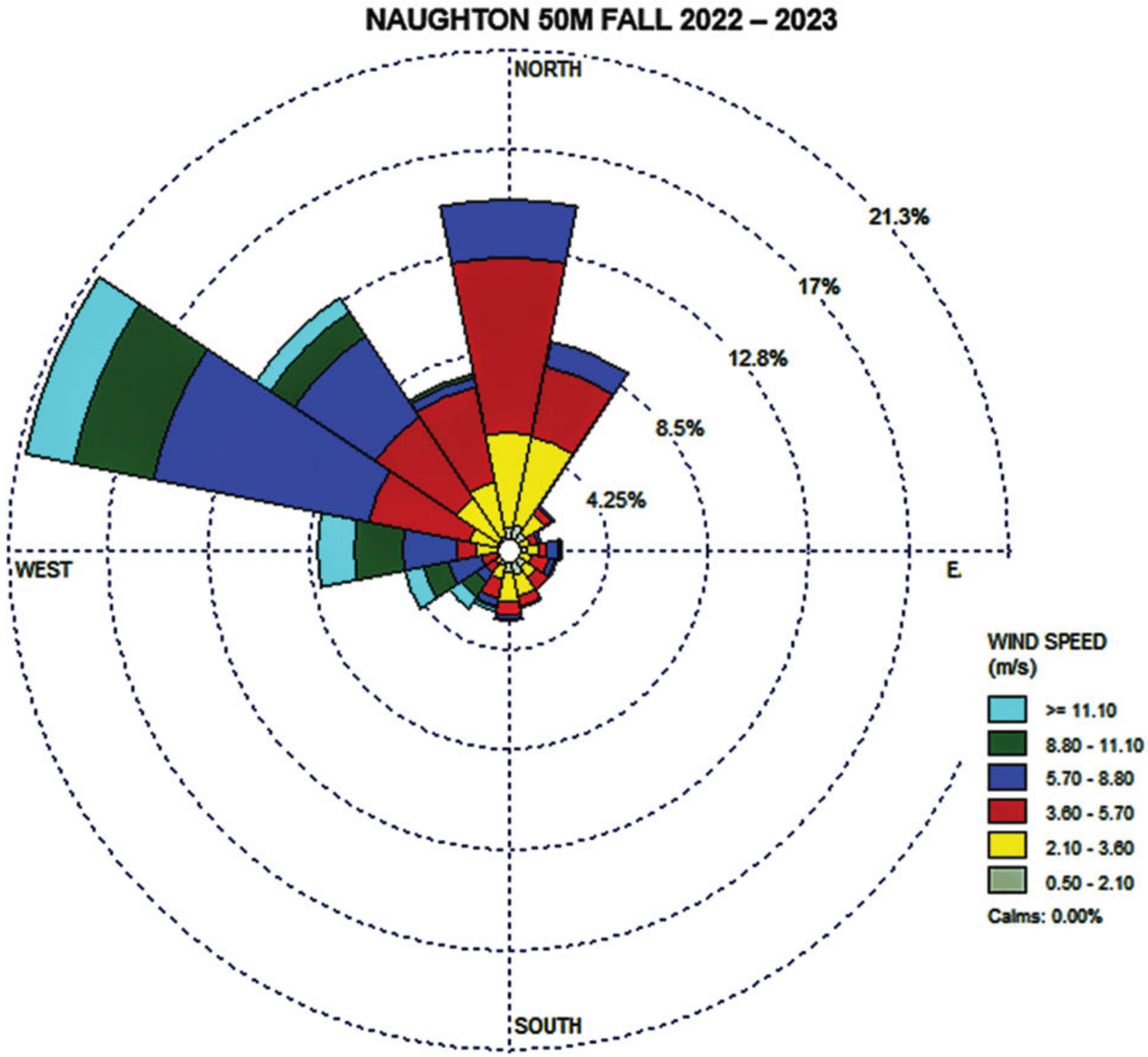


Figure 2.7-52 Naughton Power Plant Seasonal Composite Wind Rose 2022-2023, 50 m

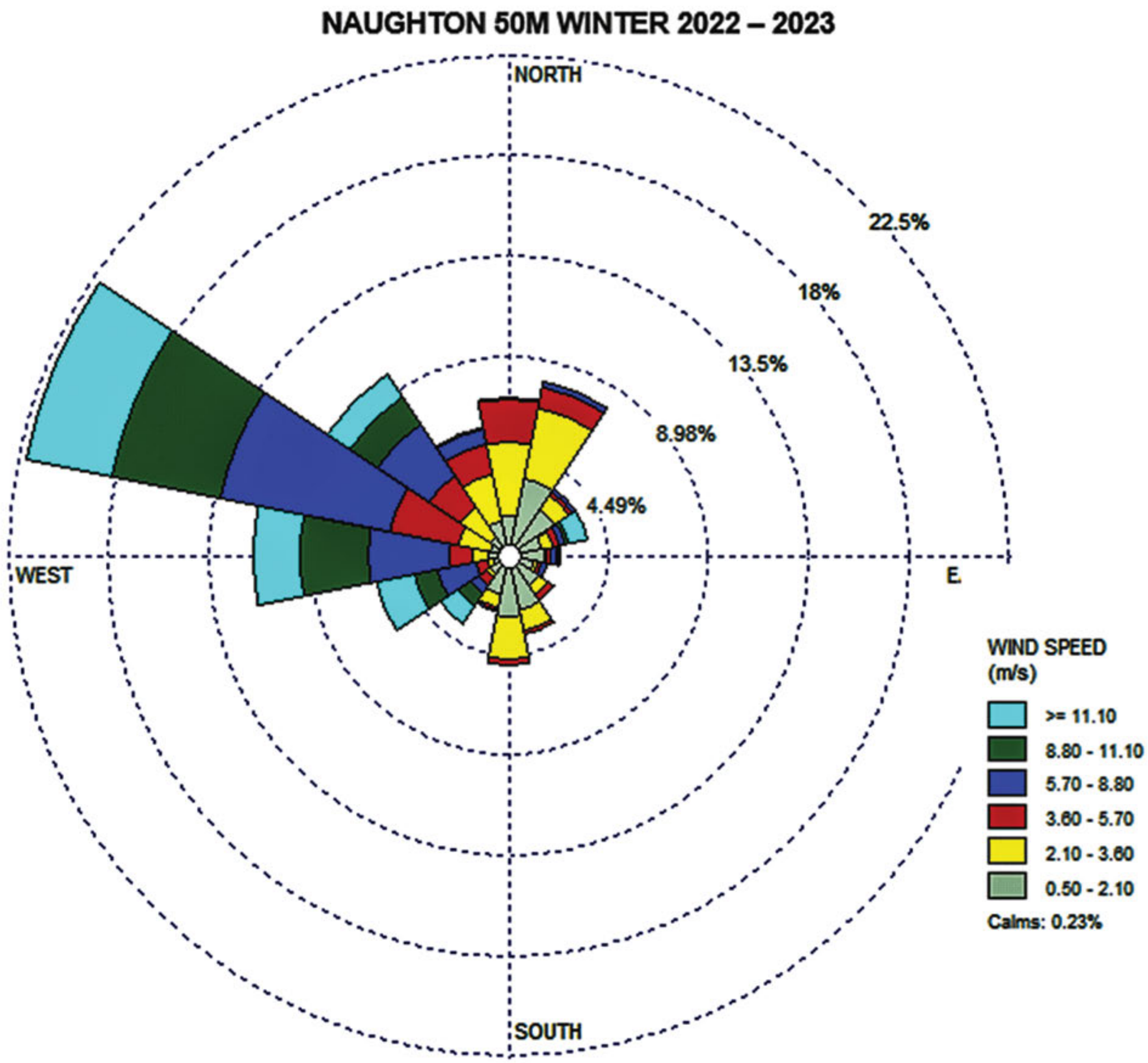


Figure 2.7-53 Kemmerer Unit 1 Annual Wind Rose 2022-2023, 10 m

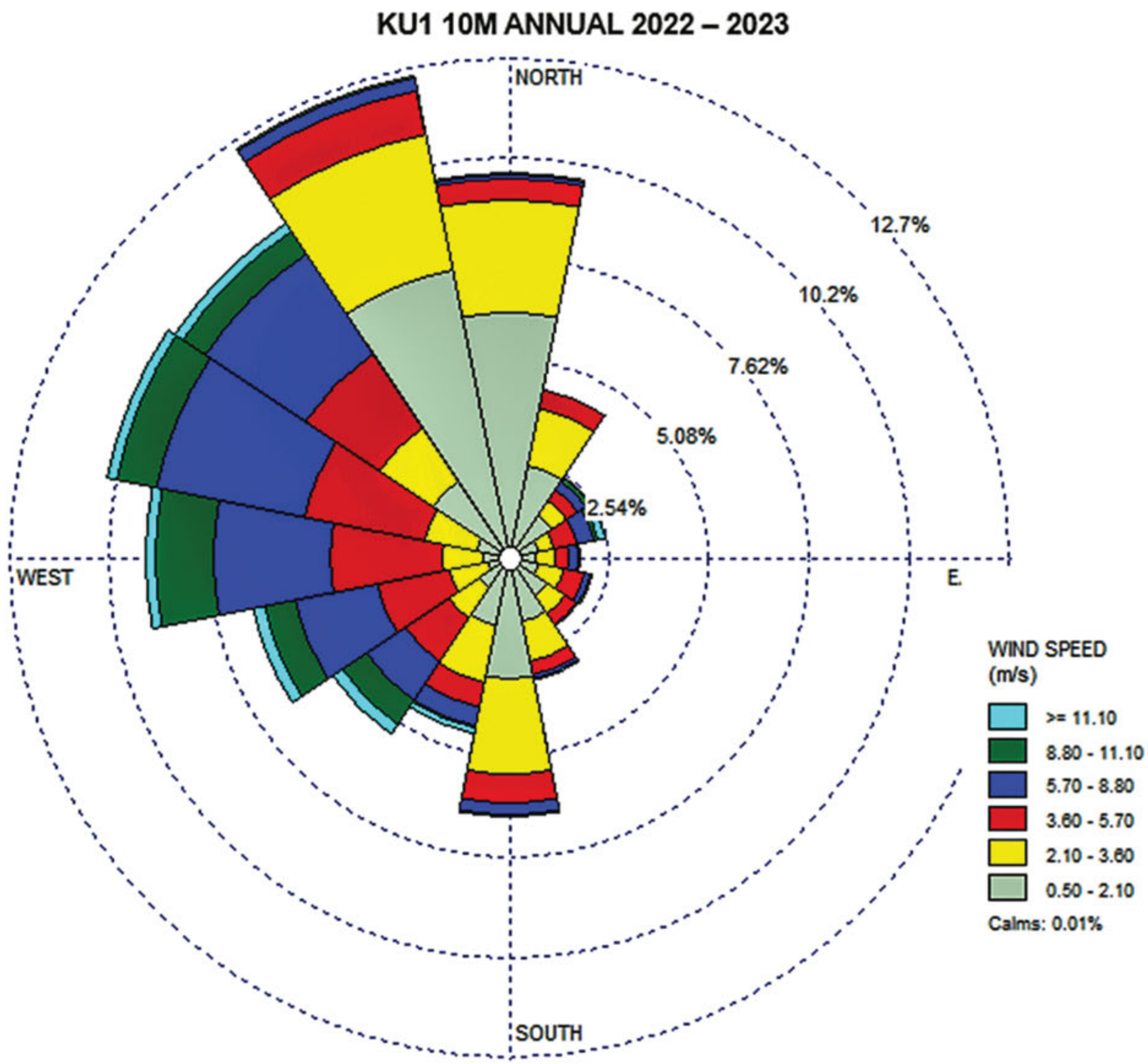


Figure 2.7-54 Kemmerer Unit 1 Annual Wind Rose 2022-2023, 60 m

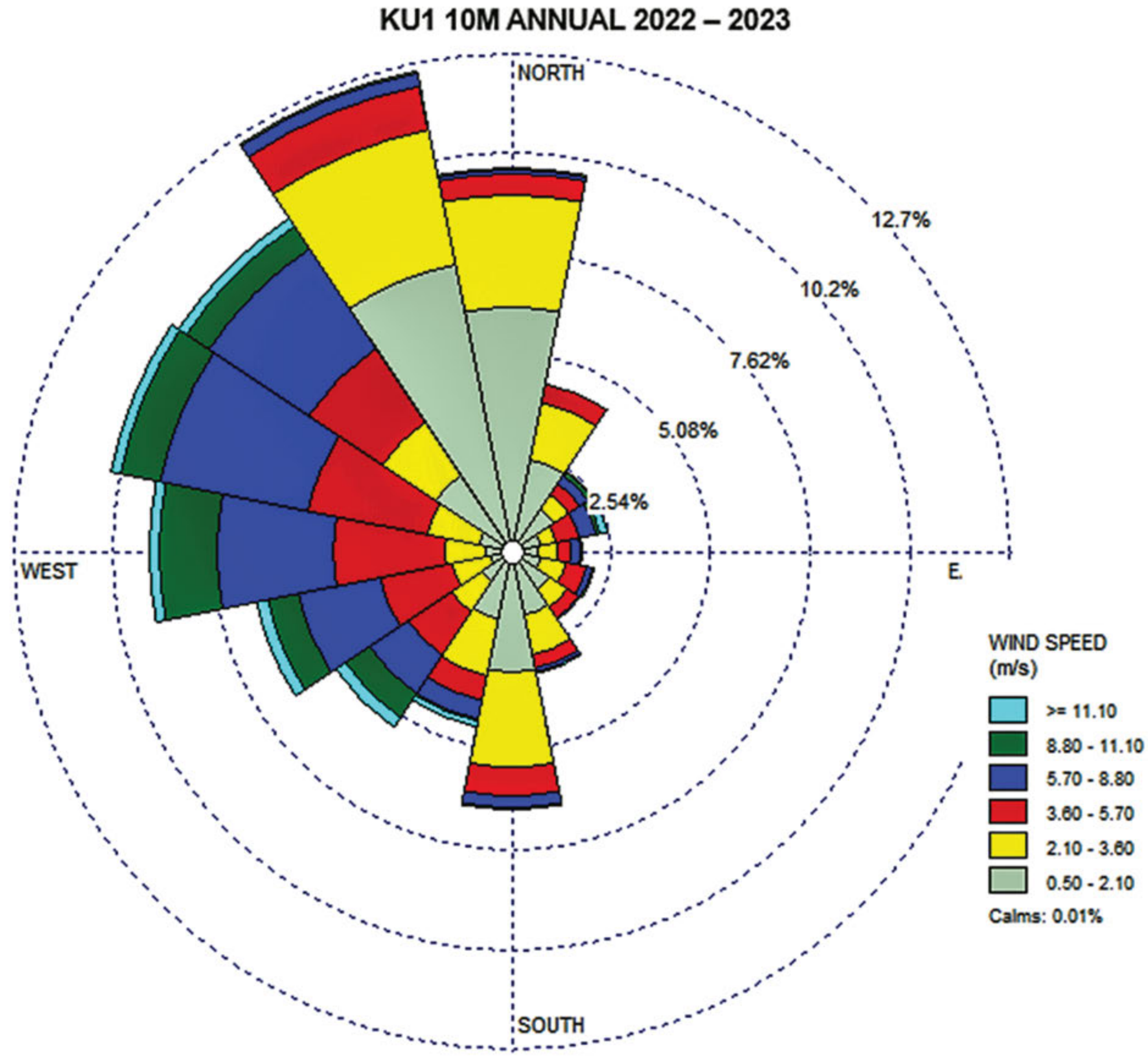


Figure 2.7-55 Kemmerer Unit 1 Seasonal Composite Wind Rose 2022-2023, 10 m

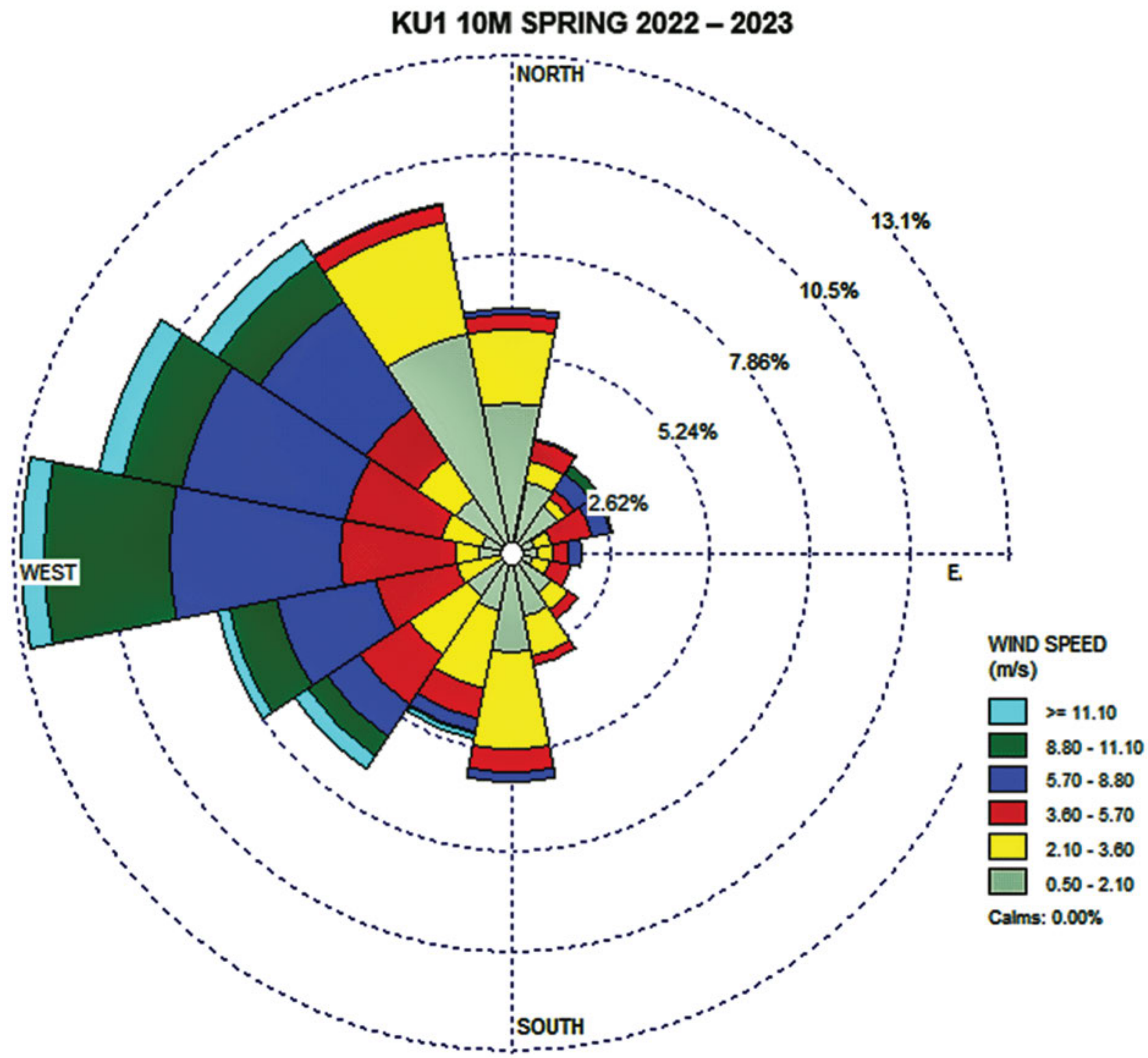


Figure 2.7-56 Kemmerer Unit 1 Seasonal Composite Wind Rose 2022-2023, 10 m

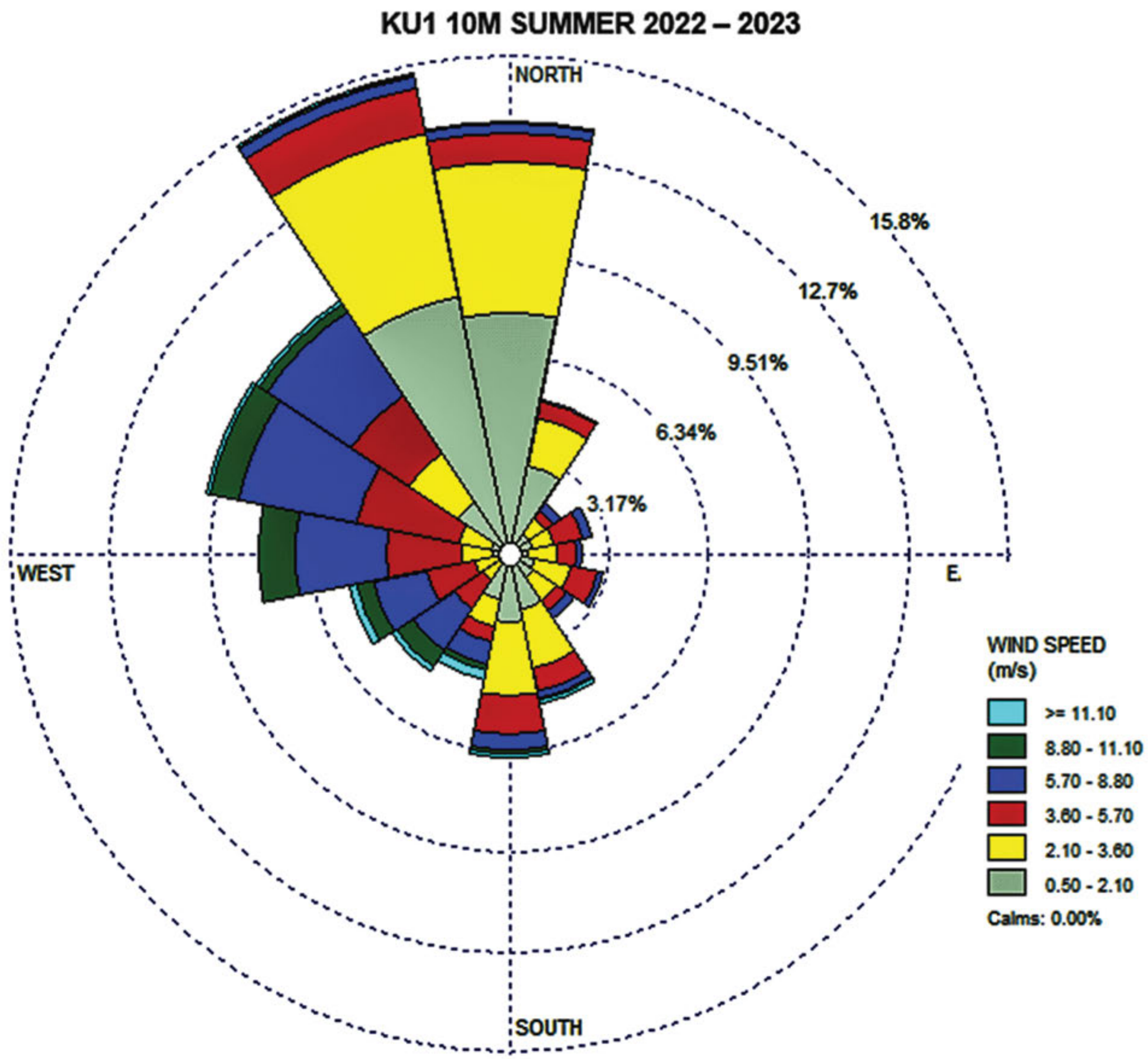


Figure 2.7-57 Kemmerer Unit 1 Seasonal Composite Wind Rose 2022-2023, 10 m

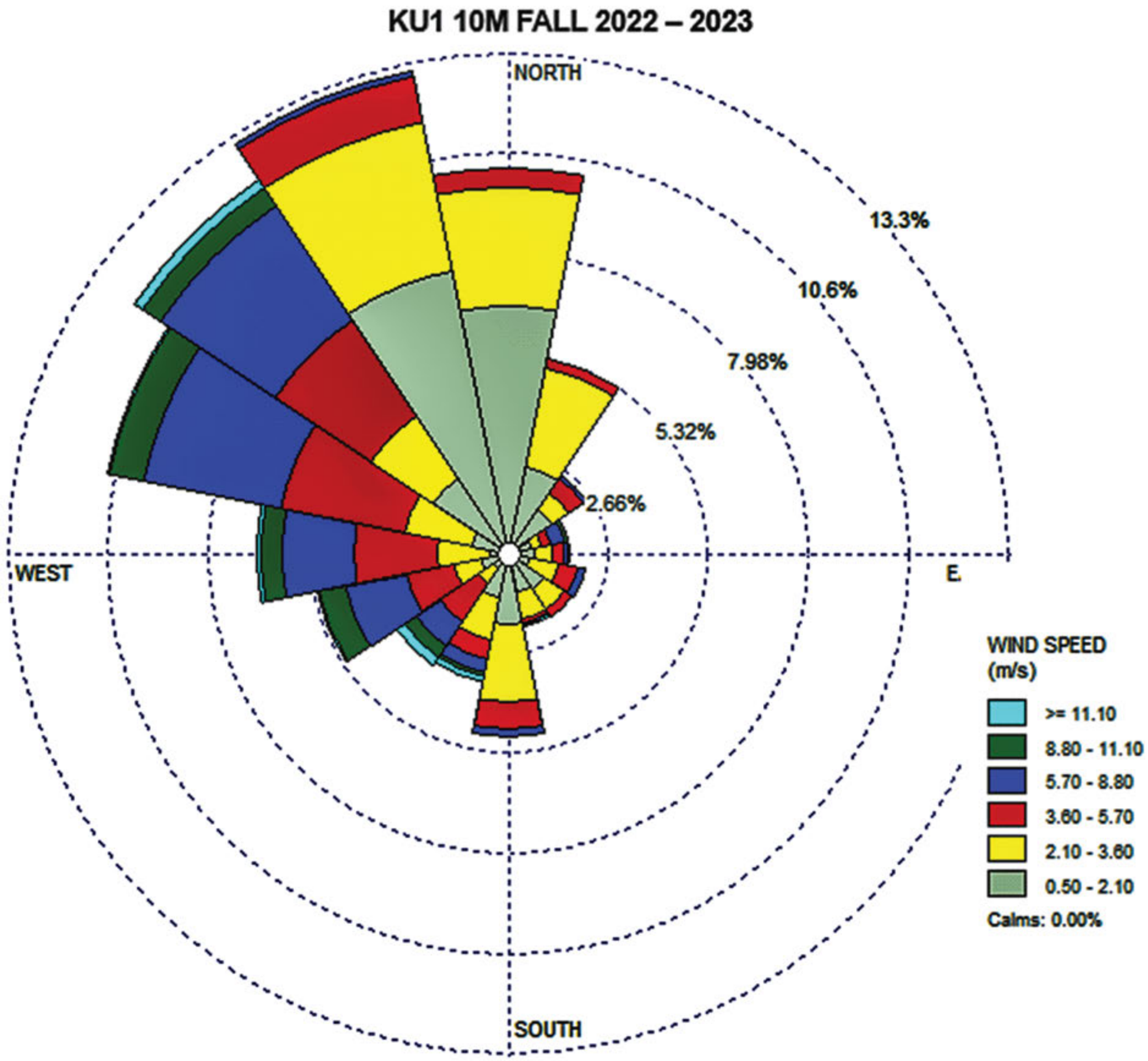


Figure 2.7-58 Kemmerer Unit 1 Seasonal Composite Wind Rose 2022-2023, 10 m

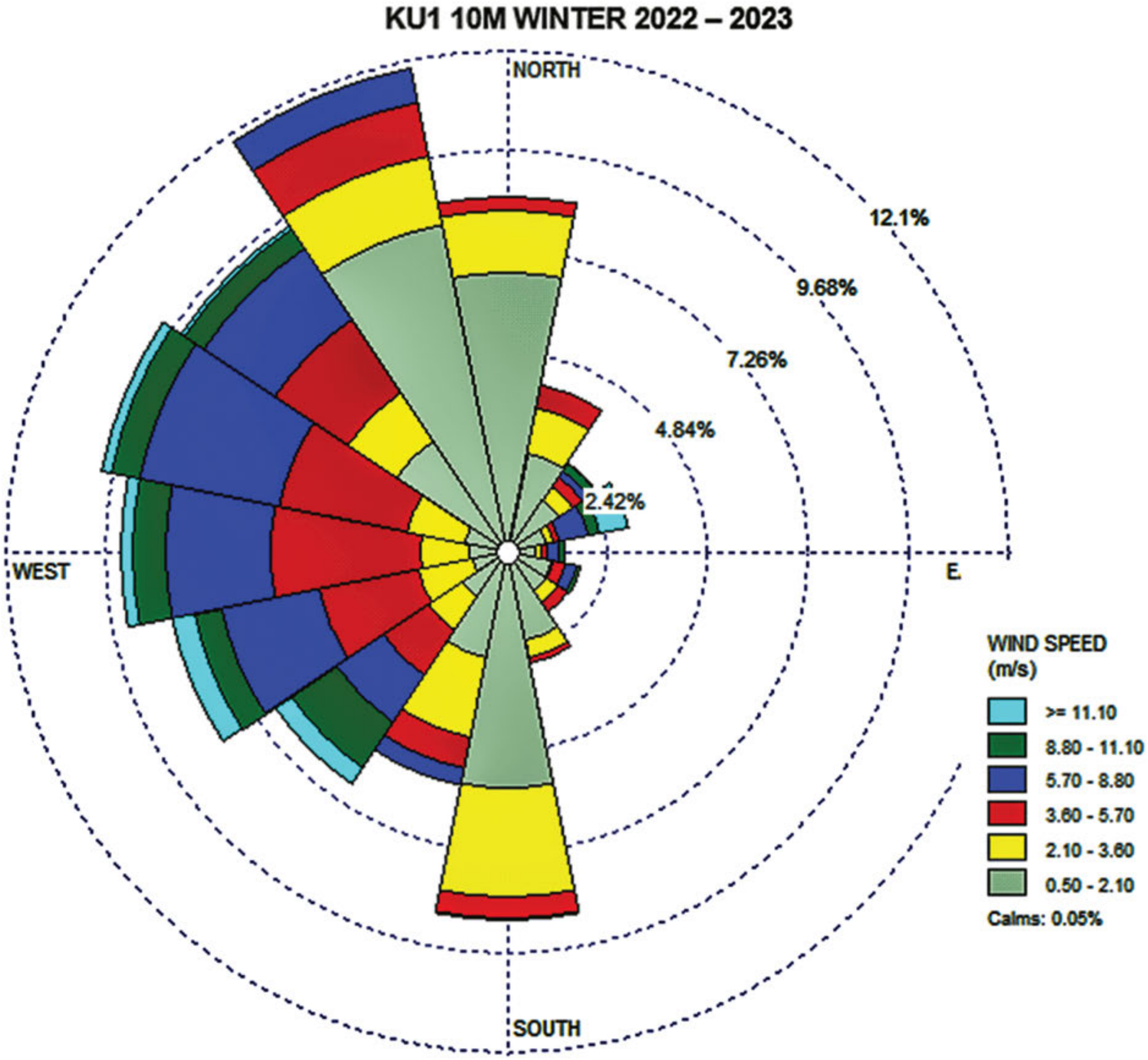


Figure 2.7-59 Kemmerer Unit 1 Seasonal Composite Wind Rose 2022-2023, 60 m

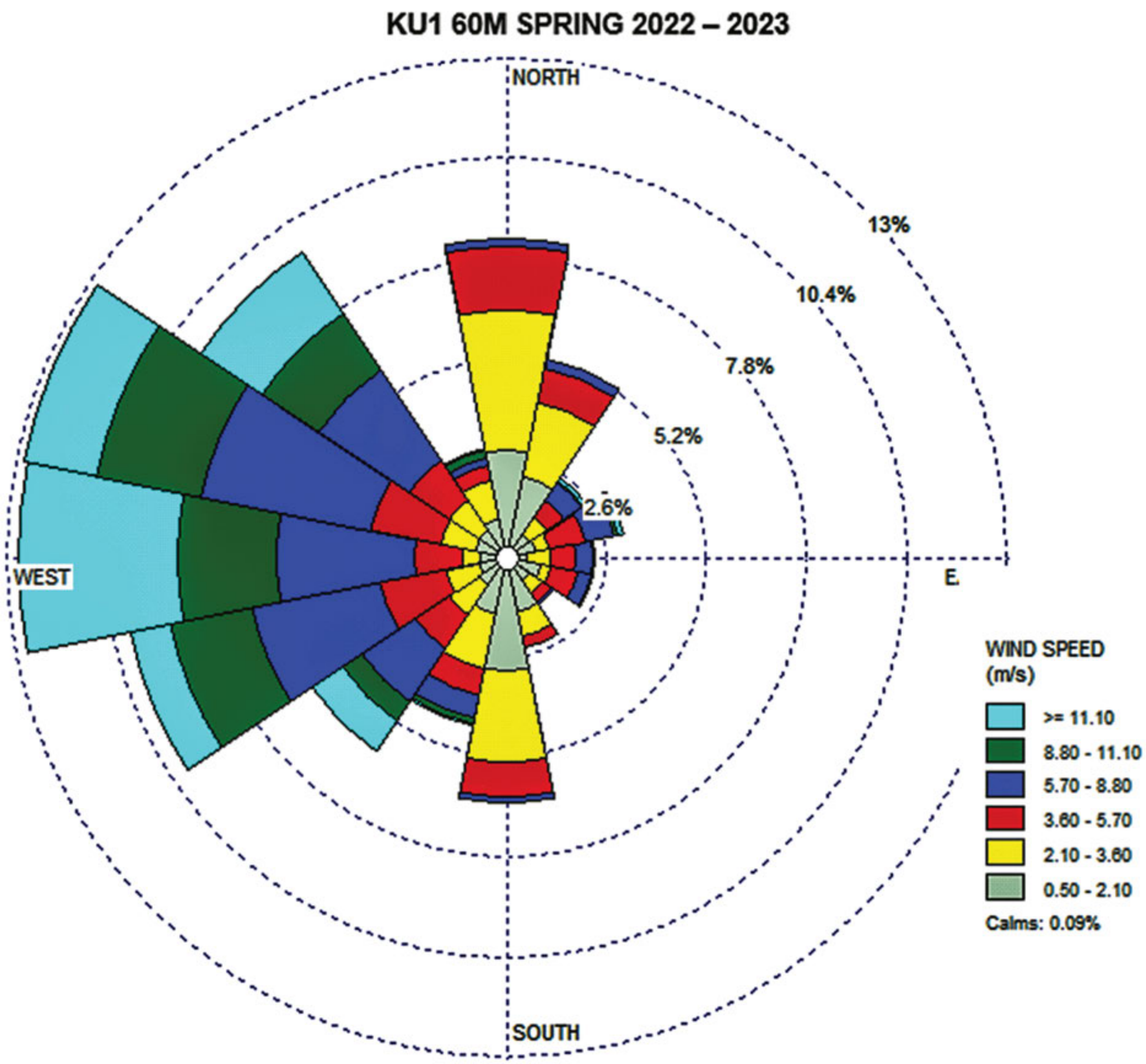


Figure 2.7-60 Kemmerer Unit 1 Seasonal Composite Wind Rose 2022-2023, 60 m

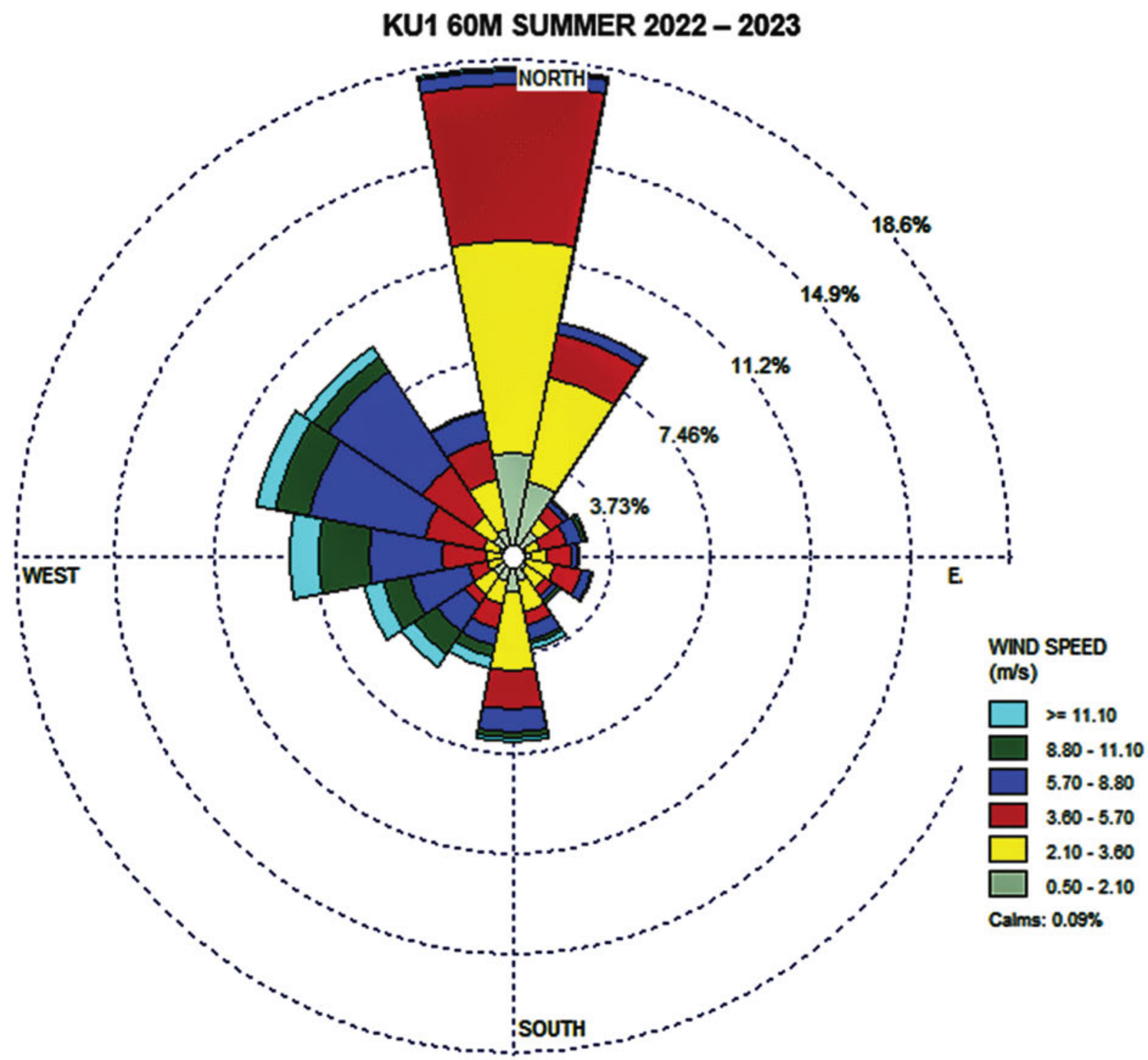


Figure 2.7-61 Kemmerer Unit 1 Seasonal Composite Wind Rose 2022-2023, 60 m

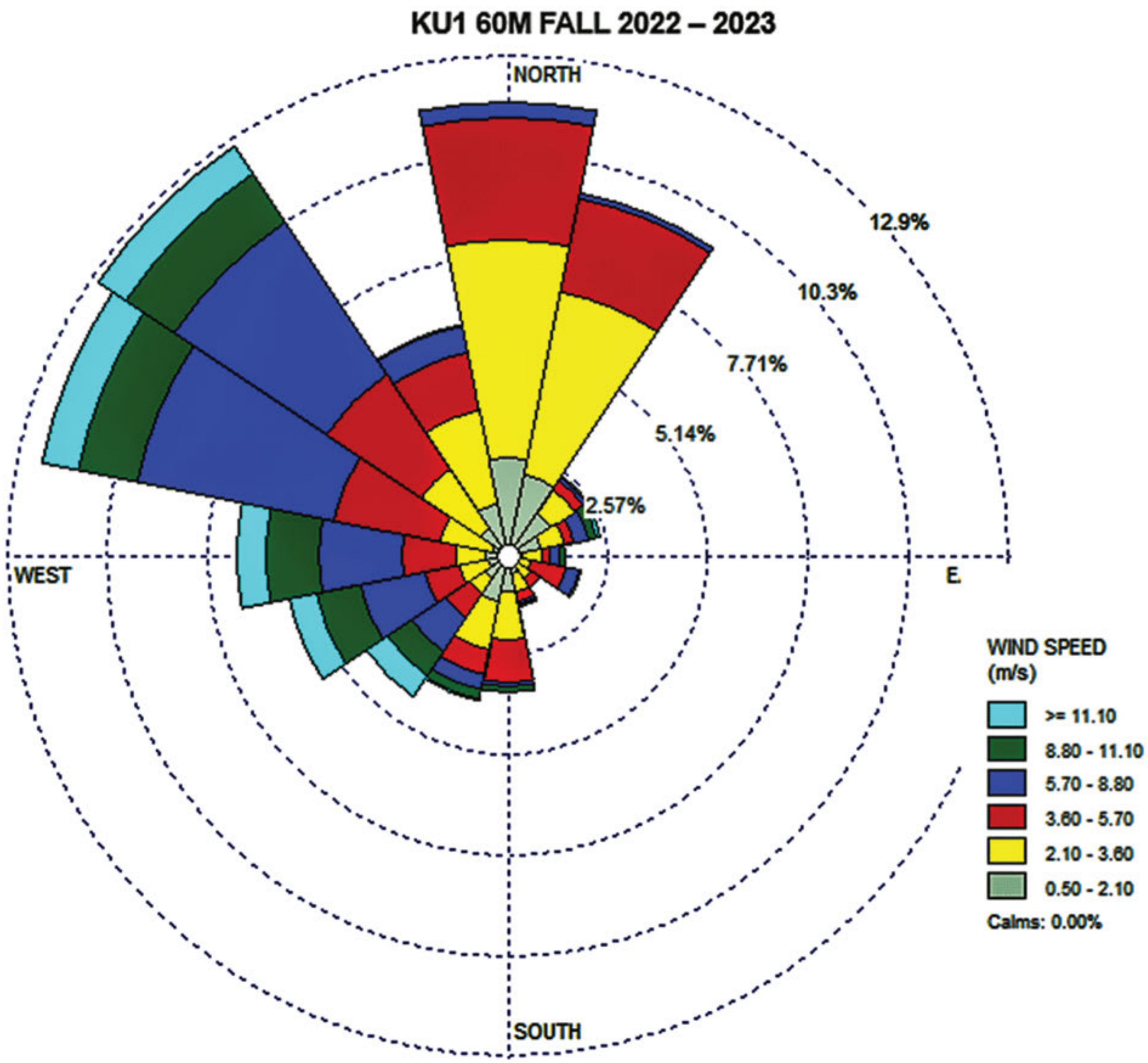


Figure 2.7-62 Kemmerer Unit 1 Seasonal Composite Wind Rose 2022-2023, 60 m

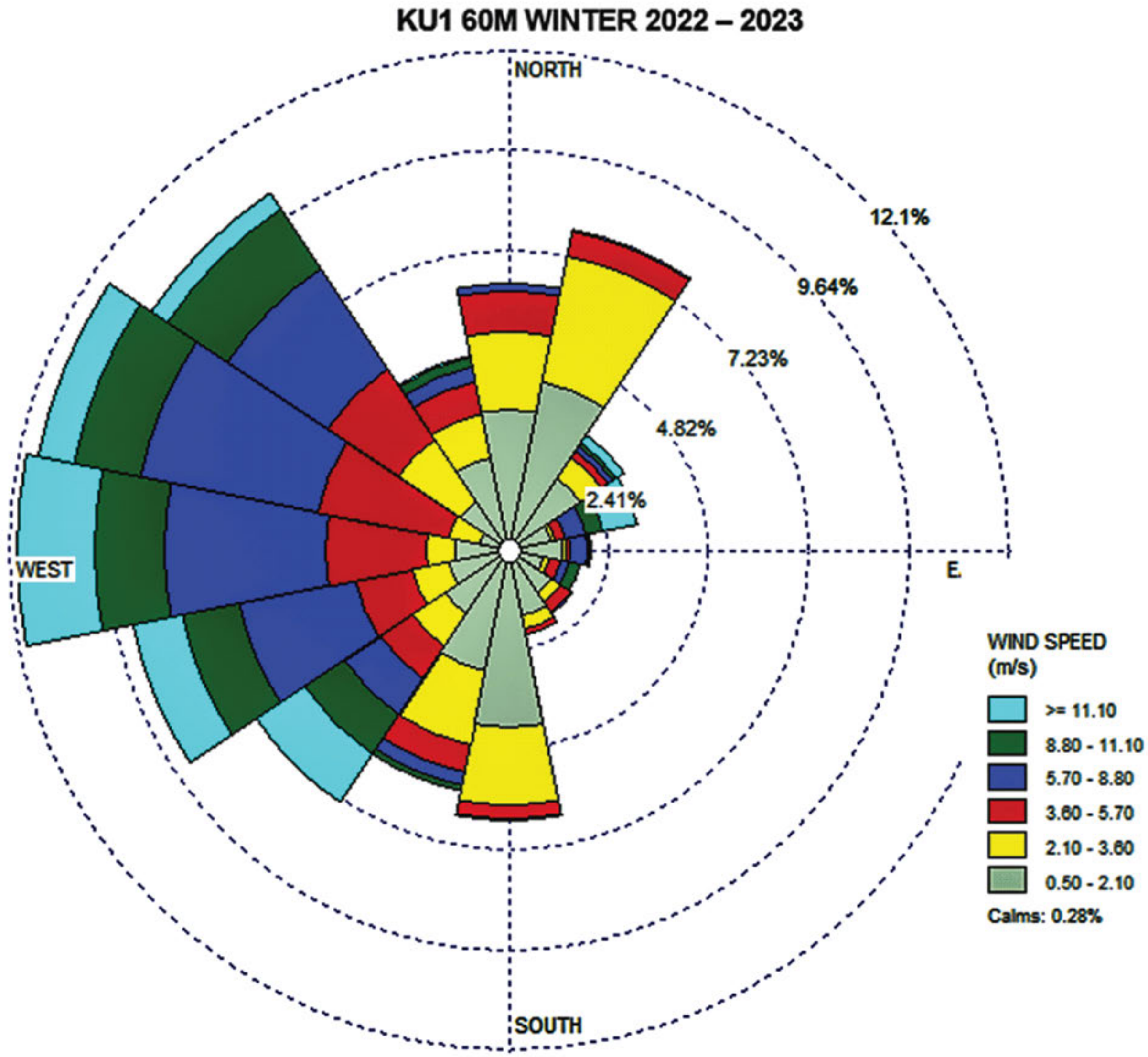


Figure 2.7-63 UGRB Ozone Non-Attainment Area and Nearest Class 1 Federal Area

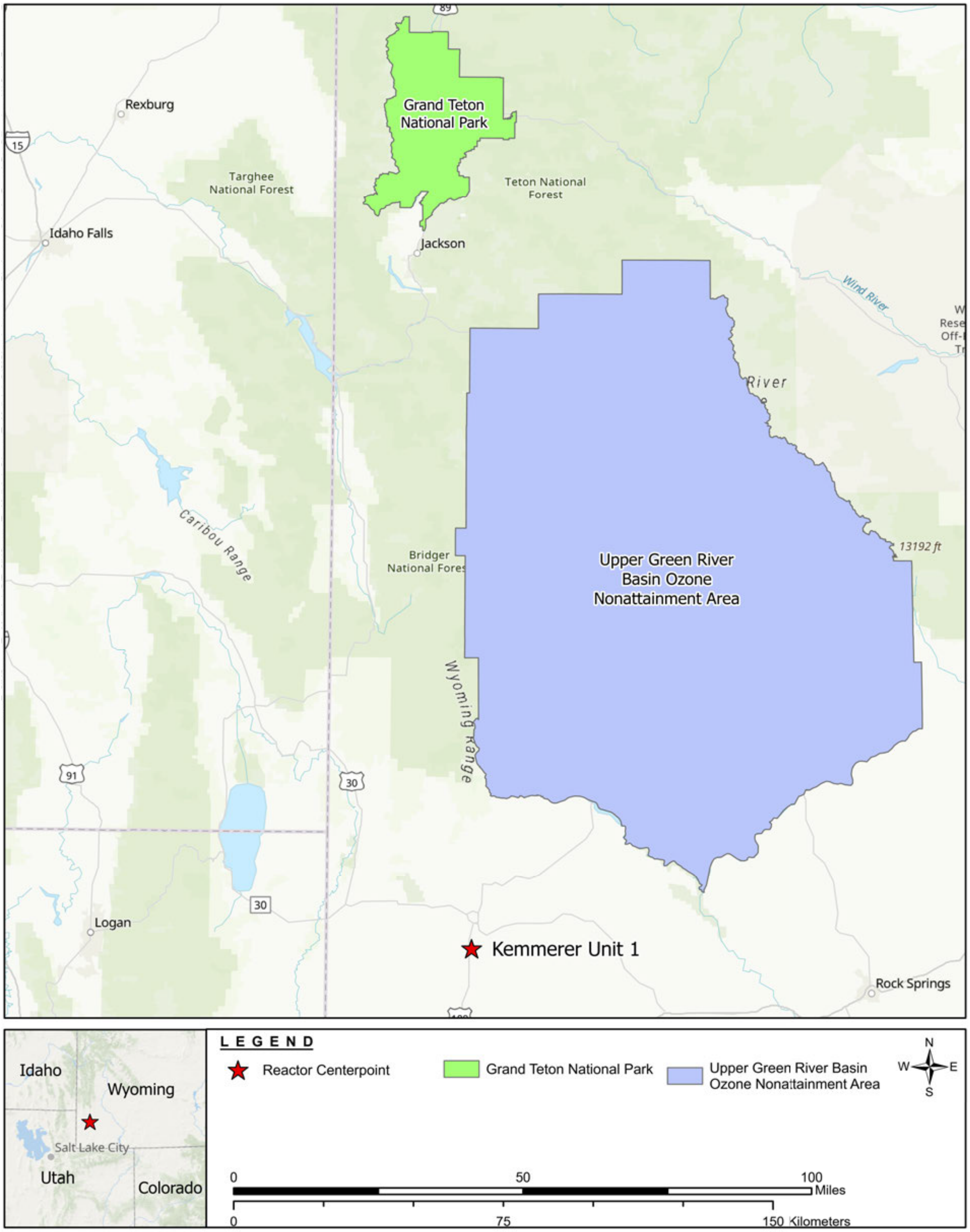
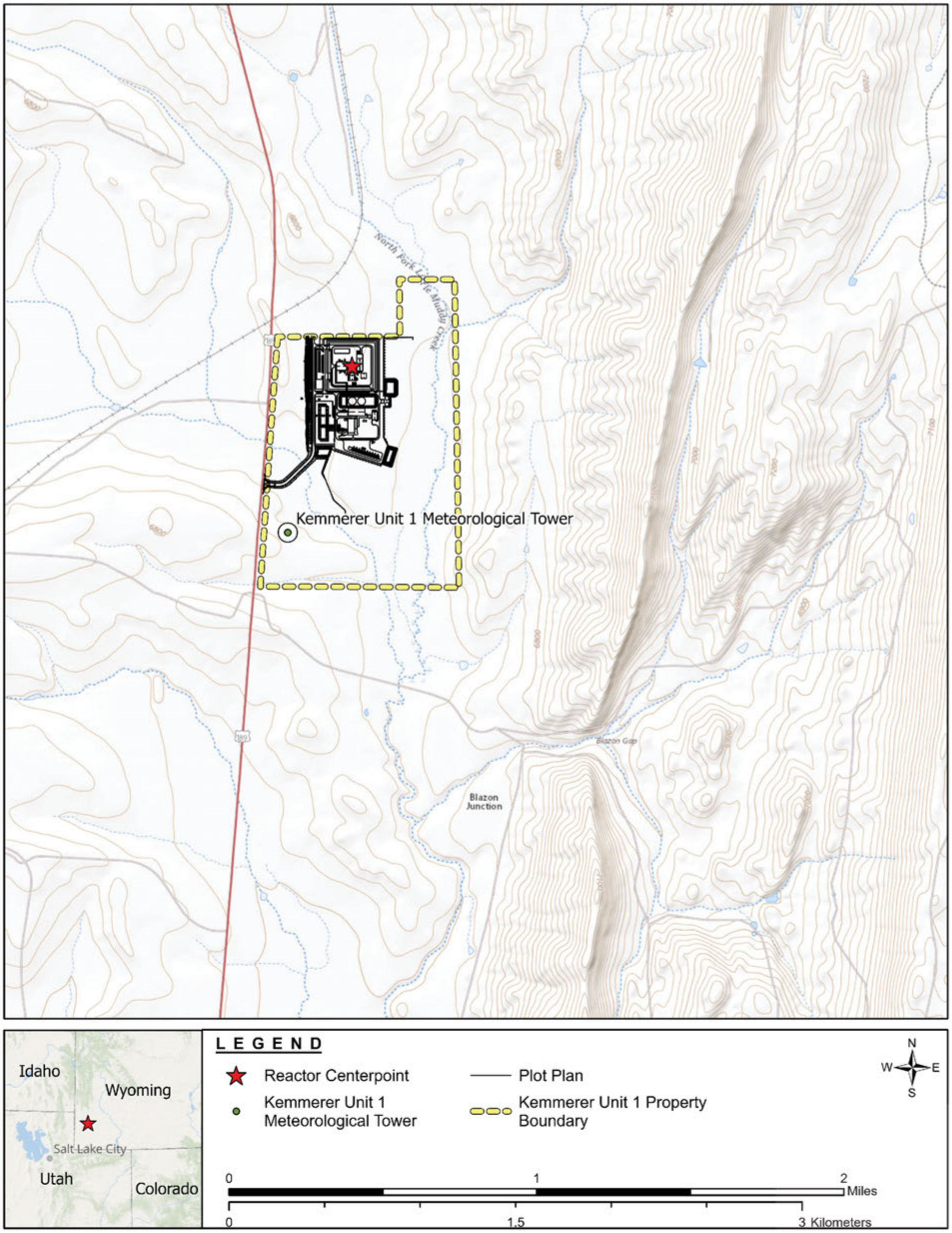


Figure 2.7-64 Topographic map of Kemmerer Unit 1 with Location of Meteorological Tower



2.8 Nonradiological Health

The basis for evaluating impacts on nonradiological human health from construction and operation of Kemmerer Unit 1 are provided in this section.

2.8.1 Public and Occupational Health

In 2020, approximately 3,128 people lived within 10 miles (16 kilometers) of the Kemmerer Unit 1 Site. Population distribution details are given in Section 2.4.1. The resident population is concentrated in Kemmerer and Diamondville. The nearest residence is approximately 2.8 miles (4.5 kilometers) from the site and 1.5 miles (2.4 kilometers) from the closest point along the macro-corridors. As described in Section 2.4.2.5.2, much of the land in the vicinity of the site is Federally owned and managed for public use such as hunting. There are livestock trails in the area used by local ranchers to “run” their livestock (mostly sheep) from winter to summer ranges and back. Those ranchers employ migrant workers as sheepherders to run the livestock. Approximately 15 sheepherders could be near the site at one time.

There are several small recreation areas and tourist attractions in the 10-mile (16-kilometer) vicinity, and the area is commonly visited by tourists traveling to Yellowstone National Park and other parks and attractions to the north. Road systems in the vicinity of the site are discussed in Section 2.4.2.3.1. The vicinity is predominantly rural and dominated by shrub/scrub land cover (see Section 2.1.1.2).

There are two large industrial sites in the vicinity, Naughton Power Plant and the Kemmerer Operations, LLC coal mine. The macro-corridors cross areas in and near the power plant and mine. The former Kemmerer Coke Plant, owned by FMC Corporation, is located immediately south of the common macro-corridor. It includes closed hazardous waste and industrial waste landfills (Reference 2.8-9). The common macro-corridor crosses an undeveloped portion of the FMC-owned property to the north of the former Kemmerer Coke Plant facilities.

People who could be vulnerable to noise, fugitive dust, and gaseous emissions resulting from building activities are listed below in order of most vulnerable to least vulnerable:

- Construction workers and onsite personnel working at the proposed Kemmerer Unit 1 site and offsite construction locations
- People working immediately adjacent to the proposed site and offsite construction locations
- Transient populations (i.e., temporary employees, recreational visitors, tourists)

People who could be vulnerable to noise, wastewater discharges, and gaseous emissions resulting from operations are listed below in order of most vulnerable to least vulnerable:

- Operations workers at Kemmerer Unit 1
- People working or living immediately adjacent to or downstream from the site
- Transient populations (i.e., temporary employees, recreational visitors, tourists)

As discussed in Section 2.1, the site and adjacent properties are undeveloped other than US 189, County Road 325, and the Union Pacific railroad spur. The vicinity includes industrial facilities and a natural gas pipeline. These surrounding features store and convey hazardous materials. The industry and hazardous material carriers and conveyance are subject to Federal regulations addressing hazardous materials safety.

A 2021 investigation of reported past and present use of hazardous substances and materials and petroleum products, as well as other activities that may have resulted in potential environmental concerns related to the site and surrounding property, was conducted as part of a Phase 1 Environmental Site Assessment. The assessment involved reviewing reasonably ascertainable public records, interviewing knowledgeable persons, and conducting a visual inspection of the site and contiguous properties. The assessment included a site reconnaissance for conditions such as stained ground and pavement, stressed vegetation, unauthorized dumping, and evidence of the use, storage, or release of hazardous materials, including petroleum products. No recognized environmental conditions were identified.

Occupational hazards are managed and minimized by compliance with Occupational Safety and Health Administration (OSHA) regulations. Construction activities and operations at the site would be subject to Federal and State occupational safety and health regulations. The Federal regulations administrated by the United States OSHA were adopted by the Wyoming Department of Workforce Services (Reference 2.8-10). The regulations applicable to the construction industry are found in 29 Code of Federal Regulations 1926, and those applicable to general industry are found in 29 Code of Federal Regulations 1910. Construction activities and operations for the transmission lines and water supply pipeline that fall within the Kemmerer mine permit boundary (Figure 2.1-6) are subject to the Mine Safety and Health Administration's mandatory safety standards for surface coals mine and surface work areas of underground coal mines (30 Code of Federal Regulations 77). The Wyoming Department of Workforce Services's analogous regulations are found at Washington Administrative Code Chapter 5, Section 77.

The United States Bureau of Labor Statistics (BLS) collects information from United States companies on occupational injuries, illnesses, and fatalities. The national incidence rate for nonfatal occupational injuries and illnesses for the heavy and civil engineering construction industry was 2.1 per 100 full-time workers, and the rate for the nuclear electric power generation industry was 0.2 per 100 full-time workers (Reference 2.8-1). The Wyoming incidence rates for the heavy and civil engineering construction industry and electric power generation, transmission, and distribution were 3.5 and 2.0 per 100 full-time workers for 2021 (Reference 2.8-2). BLS also publishes occupational fatality rates. The national rate of fatal work injuries for the construction industry for 2021 was 9.4 per 100,000 full-time equivalent workers, and the manufacturing industry rate for 2021 was 2.6 per 100,000 full-time equivalent workers (Reference 2.8-3). The Wyoming fatal injury rate for the transportation and utilities industry was 36 per 100,000 full-time equivalent workers for 2021 and no fatality rate was calculated for the construction industry. BLS notes that state industry rates are not directly comparable to national industry rates due to differences in grouping workers between national and state data. (Reference 2.8-4). Sections 4.8.1 and 5.8.5 describe measures which will be taken to minimize the incidence of injuries and illnesses to workers and the public during construction and operations.

Etiological agents associated with nuclear power plant operation can have negative impacts on human health. There are no public health regulations tied to microorganism exposure associated with cooling ponds or towers or thermal discharges. These etiological agents include enteric pathogens (e.g., *Salmonella* spp. and *Pseudomonas aeruginosa*), thermophilic fungi, bacteria (e.g., *Legionella* spp. and *Vibrio* spp.), dinoflagellates (e.g., *Karenia brevis*), bluegreen algae, and free-living ameba (e.g., *Naegleria fowleri* and *Acanthamoeba* spp) (Reference 2.8-8, Section 3.9.3). The CDC compiles statistical data regarding waterborne disease and outbreaks in the United States. A review of the most recent report (2015) indicates that there have been no reported cases associated with untreated recreational waters in Wyoming in 2015 (Reference 2.8-6). Statistics for 2013 to 2015 indicate there were no reported cases of waterborne disease associated with environmental and undetermined exposures to water in Wyoming (Reference 2.8-5 and Reference 2.8-6). There have been no reported cases of *N. fowleri* infection in Wyoming from 1962 to 2022 (Reference 2.8-7).

2.8.2 Noise

The Kemmerer Unit 1 Site is a greenfield site with no preexisting noise sources. No known ambient noise studies have taken place on or near the site, and no noise study is planned. The site and surrounding land cover is rangeland that is occasionally grazed by livestock. The parcels comprising the site and those immediately north, west, and south are zoned industrial, and the parcels east of the site are zoned rural by Lincoln County (Reference 2.8-13). All but one land section along the macro-corridors are zoned industrial. There are no Federal, State, or county noise restrictions or limits associated within the industrial or rural zoning districts in Lincoln County (Reference 2.8-11, Reference 2.8-12, Reference 2.8-15, and Reference 2.8-14). Lincoln County has established a guideline nuisance noise limit of 60 dBA beyond the property line for certain special use categories (Reference 2.8-14).

The closest residence is located south of US 30 approximately 2.8 miles (4.5 kilometers) northeast of the site. The closest large industrial sites are Kemmerer Mine, which is approximately 2.2 miles (3.5 kilometers) to the west and Naughton Power Plant, which is approximately 3.8 miles (6.1 kilometers) northwest of the Kemmerer Unit 1 Site. Smaller industrial sites, including HilCorp Energy Company and Ovintiv Service Inc., are located near County Road 325 approximately 1.8 miles (2.9 kilometers) from the site. The site and surrounding area is also traversed by persons accompanying livestock, hunters, and other visitors. Other noise-sensitive human receptors are more distant in the outskirts of Diamondville. The closest public building and recreational areas are in Diamondville, which lies approximately 4.2 miles (6.8 kilometers) north of the proposed site. Noise-sensitive human receptors and noise levels specific to building activities and operations are discussed in Sections 4.8 and 5.8.

2.8.3 Transportation

The transportation network of the region is presented in Section 2.4.2.3. The roadways providing access to the Kemmerer Unit 1 Site for commuters, deliveries, and shipments are State Road 412, US 30, US 189, and I-80. Road performance is measured using level of service (LOS) ratings. The LOS ratings are qualitative measures used to relate the quality of motor vehicle traffic services. The designated LOS rating compares the existing or proposed roadway to the ideal conditions for that type of roadway. The LOS ratings range from “A” to “F,” with “A” being the best travel conditions and “F” being the worst (Reference 2.8-20). The characteristics, classifications, and carrying capacity of these roadways at LOS C are presented in Table 2.8-1. LOS C is defined as the condition of stable traffic flow but with most drivers being restricted in their freedom to select their own speed. The Wyoming Department of Transportation uses LOS C as the appropriate LOS rating to warrant capacity improvements for interstate highways and intersecting roads. LOS D, which is defined as the highway condition of approaching unstable flow with drivers having minimal freedom to maneuver, is used as the appropriate LOS rating to warrant capacity improvements in other highway sections (Reference 2.8-20).

The Annual Average Daily Traffic counts for 2021 and 2022 recorded near the site are presented in Table 2.8-2.

Because the site would be accessed via US 189, it would carry all the commuting and delivery traffic and would be the most impacted. Figure 2.8-1 shows the historic and projected trends for traffic along US 189 near the site. Any planned modifications of US 189 could affect existing traffic patterns. The Wyoming Department of Transportation’s plans for fiscal years 2024 to 2029 indicate there is to be no new construction or alignment for US 189 (Reference 2.8-25). The Wyoming Department of Transportation does plan to add wildlife fencing, eight underpasses, and an overpass between the Kemmerer Unit 1 Site and Evanston. The project is anticipated to commence in 2024 and last two to three construction seasons (Reference 2.8-26).

Section 3.3.1.2 presents information on the proposed action building activities with regard to roads. Building activities do not include the creation of heavy-haul roads. Certain reactor components and equipment exceed highway weight and size limits and will need to be transported to the site as heavy-haul, oversize cargo, or both. Heavy-haul and oversize loads will be scheduled in advance with specific routes. Route surveys will be performed to plan routes and logistics for heavy-haul and oversize cargo.

Wyoming Department of Transportation collects data annually on the number of vehicle crashes and the resulting injuries and fatalities. The vehicle crash statistics for 2018 to 2022 is presented in Table 2.8-3.

The impacts from increased traffic during construction and operation of Kemmerer Unit 1 are discussed in Sections 4.8.3 and 5.8.6.

2.8.4 Electromagnetic Fields

Electric fields are created by differences in voltage. As the voltage increases, the resultant field becomes stronger. Magnetic fields are created when electric current flows, and greater current results in a stronger magnetic field. Electric and magnetic fields, collectively referred to as the electromagnetic fields (EMFs), are produced by operating transmission lines. Electromagnetic fields are present everywhere in the environment but are invisible to the human eye (WHO 2016). Members of the public near transmission lines may be exposed to the EMFs produced by the transmission lines. The EMF varies in time as the current and voltage change, so that the frequency of the EMF is the same (e.g., 60 hertz [Hz] for standard alternating current [AC]). Electrical fields can be shielded by objects such as trees, buildings, and vehicles. Magnetic fields, however, penetrate most materials, but their strength decreases with increasing distance from the source (Reference 2.8-32).

Power lines associated with nuclear plants usually have voltages of 230 kV, 345 kV, 500 kV, or 765 kV. EMF strength at ground level varies greatly under these lines, generally being stronger for higher-voltage lines, a flat configuration of conductors, relatively flat terrain, terrain with no shielding obstructions (e.g., trees or shrubs), and a closer approach of the lines to the ground. At locations where the field strength is at a maximum, the measured values under 500 kV lines often average about 4 kV per meter but sometimes exceed 6 kV per meter. Maximum electric field strengths at ground level are 9 kV per meter for 500 kV lines and 12 kV per meter for 765 kV lines. Measured magnetic field strengths at the location of maximum values beneath 500 kV lines often average about 70 milligauss. During peak electricity use, when line current is high, the field strength may peak at 140 milligauss (about 1 percent or less of the time) (Reference 2.8-32).

The EMFs resulting from 60-Hz power transmission lines fall under the category of nonionizing radiation. Much of the general population has been exposed to power line fields since near the turn of the 20th century. There was little concern about health effects from such exposures until the 1960s. A series of events during the 1960s and 1970s heightened public interest in the possibility of health effects from non-ionizing radiation exposures and resulted in increased scientific investigation in this area (Reference 2.8-32). Then, in 1979, results of an epidemiological study suggested a correlation between proximity to high-current wiring configurations and incidence of childhood leukemia (Reference 2.8-33). This report resulted in additional interest and scientific research; however, no consistent evidence linking harmful effects with 60-Hz exposures has been presented. Many studies have been conducted on the safety of electric fields, but no health effects have been associated with the magnitude of the electric fields that are associated with electrical power usage. Most research on health effects has focused on magnetic fields (Reference 2.8-32). Studies continue to be conducted and additional information is published regarding the effects of exposure to electric and magnetic fields (Reference 2.8-34, Reference 2.8-30, Reference 2.8-31, Reference 2.8-29), and there continues to be no conclusive evidence of a link between electric and magnetic fields and possible health impacts, including the development of cancer, reproductive disorders, or other abnormalities in humans.

Two new 230 kV lines will be installed from the Kemmerer Unit 1 Site to the existing Naughton Power Plant switchyard (Figure 3.1-4). A new switchyard will be installed at Kemmerer Unit 1, as explained in Section 3.2.2.14. Figure 2.1-10 shows the macro-corridor concept which includes the new 230 kV transmission lines. The macro corridor will be approximately 1.5 miles (2.4 kilometers) from the closest resident.

There is no conclusive evidence which shows there are chronic health effects of EMFs. The effects are considered uncertain and no generic impact level is assigned (Reference 2.8-32). According to the World Health Organization to date, no adverse health effects from low-level, long-term exposure to radiofrequency fields or power frequency fields have been confirmed, but scientists are actively continuing to research this area (Reference 2.8-34).

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Table 2.8-1 Road Characteristics and Classifications

Road	Functional Class	Description	Capacity at LOS C as Annual Average Daily Traffic[c]
State Road 412	Rural Minor Arterial[a]	2-lane undivided	-
US 30	Rural Principal Arterial - Other[b]	2-lane undivided	29,300
US 189	Rural Minor Arterial - Other[b]	2-lane undivided	29,300
I-80	Rural Principal Arterial - Interstate[b]	4-lane divided	53,900

a. Reference 2.8-17

b. Reference 2.8-22

c. Reference 2.8-16

Table 2.8-2 Average Annual Daily Traffic Counts Near the Site

Road Segment	2021 Annual Average Daily Traffic[a]	2022 Annual Average Daily Traffic[b]
US 30 west of US 189 at Kemmerer	1,575	1,510
US 30 east of US 189 junction to Wyoming 240 at Opal	2,135	2,047
US 189north of US 30 at Diamondville-Kemmerer	4,218	4,059
US 189 at US 30 junction south to County Road 304 West to Elkol	1,041	1,001
US 189 south of County Road 304 to junction with WY 412	1,636	1,574
US 189 at Lincoln-Uinta County Line	1,135	1,102
US 189 interchange with I-80	1,135	1,102
US 189/I-80 at Evanston East interchange	8,052	7,805
US 189/I-80 at WY 412 interchange (Carter-Mountain View)	6,837	6,670

a. Reference 2.8-23

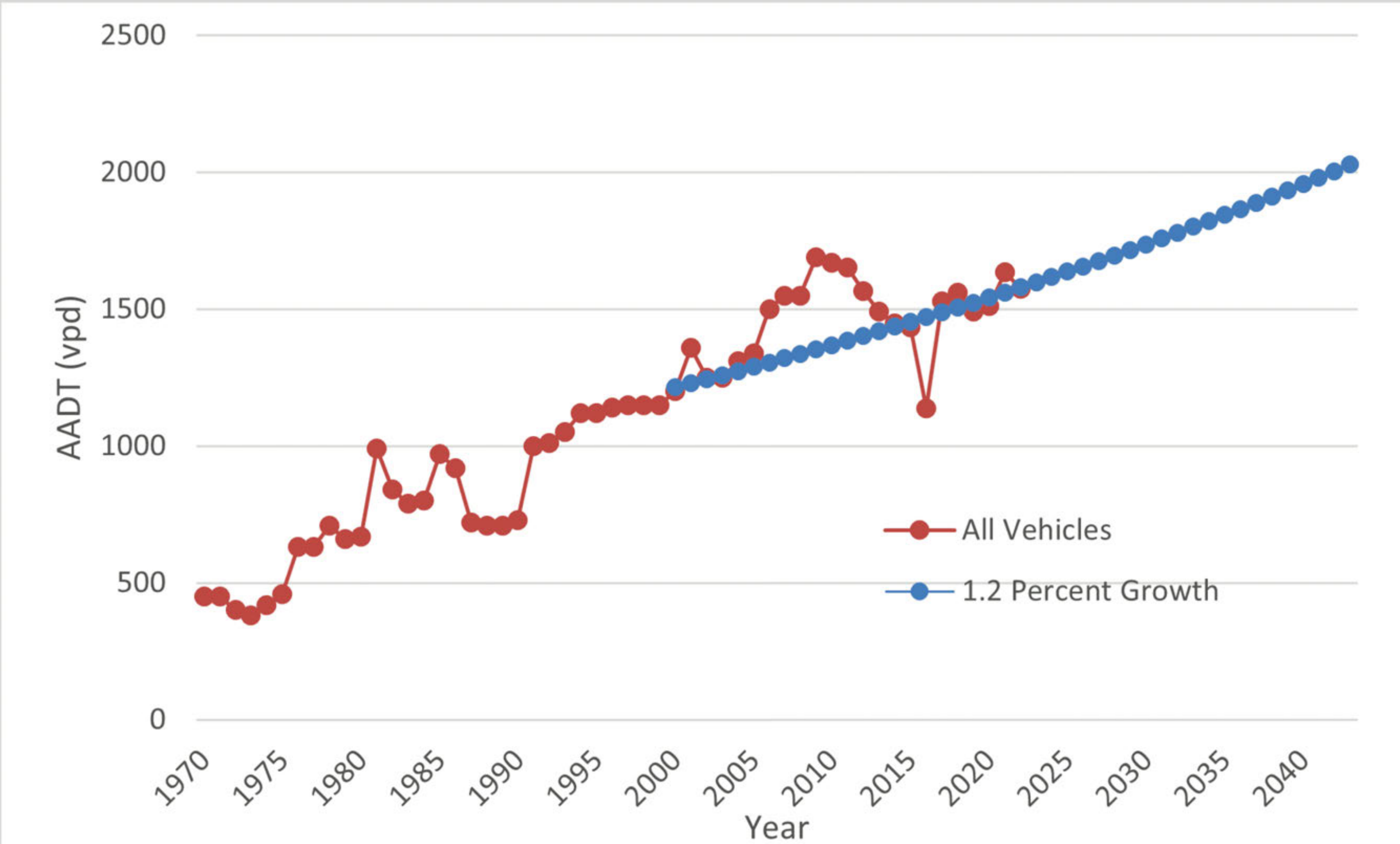
b. Reference 2.8-27

Table 2.8-3 Wyoming Vehicle Crash Statistics for 2018 - 2022

	2018	2019	2020	2021	2022	Average
Total Crashes	13,792	14,882	13,161	13,885	13,569	13,858
Injury Crashes	2,432	2,577	2,256	2,425	2,388	2,416
Number Injured	3,262	3,488	3,121	3,374	3,271	3,303
Fatalities	111	147	127	111	134	126

Reference 2.8-18, Reference 2.8-19, Reference 2.8-21, Reference 2.8-24, Reference 2.8-28

Figure 2.8-1 Historical and Projected Traffic on US 189 Near Kemmerer Unit 1



2.9 Radiological Environment and Radiological Monitoring

The Kemmerer Unit 1 Radiological Environmental Monitoring Program (REMP) will be a component of the Kemmerer Unit 1 Process and Effluent Monitoring and Sampling Program. The REMP will be designed to adequately characterize the radiological environment in the vicinity of Kemmerer Unit 1. The REMP will provide data on measurable levels of radiation and radioactive materials in the site environs and will provide baseline data on surveillance of exposure. The information provided in this section describes the background radiological characteristics of the site and the contents of the Kemmerer Unit 1 REMP that will be developed. The REMP will be consistent with NEI 07-09A, "Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description" (Reference 2.9-7), and the guidance provided in Regulatory Guide 4.1, Revision 2, "Radiological Environmental Monitoring for Nuclear Power Plants," and will comply with the requirements of 10 CFR 20.1302. Plant design features, administrative programs, and procedures will also assist in maintaining radiation exposure as low as reasonably achievable in accordance with 10 Code of Federal Regulations 20.1101. The ODCM and REMP will be developed at the operating license stage.

The preoperational monitoring program will be implemented at least two years before initial facility operation to establish a baseline. Because there are no radiological effluents during the preapplication, site preparation, preconstruction, or construction phases, radiological monitoring to assess the impact of radiological effluent releases is not necessary during those phases.

2.9.1 Background Radiological Characteristics

Kemmerer Unit 1 will be constructed and operated on an undeveloped site with no existing operating or permanently shut down reactors; therefore, available information from literature as to the background radiological characteristics of the site is presented in the following sections. In the United States, the public's exposure to ionizing radiation results in an average annual radiation dose per person of 620 millirem (mrem), with approximately half of this total attributed to naturally occurring radioactive sources and the remaining half attributed to man-made sources (Reference 2.9-9, Reference 2.9-3). Based on the information in the following sections, the location of Kemmerer Unit 1 at a relatively high elevation within the state of Wyoming leads to an estimated average annual radiation dose per person from natural background sources of 662 mrem. The estimated average annual radiation dose per person from man-made sources at Kemmerer Unit 1 is consistent with the national average.

2.9.1.1 Natural Sources

Natural sources of radiation are divided into three categories; cosmic, internal, and terrestrial. Cosmic radiation results from energetic particles from extraterrestrial sources, primarily the sun and other stars, penetrating the earth's atmosphere, with differences in elevation, atmospheric conditions, and Earth's magnetic field affecting the amount of cosmic radiation received. Internal radiation results from the naturally occurring radioactive elements, primarily potassium-40 and carbon-14, present within all humans from birth and contained within the food and water humans consume. Terrestrial radiation results from naturally occurring radioactive elements found within the environment, including radon in the air, the largest source of normal background radiation dose for the average member of the public, along with uranium, thorium, and radium in soil and rock. (Reference 2.9-10, Reference 2.9-3)

2.9.1.1.1 Cosmic Radiation

The Kemmerer Unit 1 site elevation of 6,758 feet (2,060 meters) (NAVD 88) results in an estimated annual dose from cosmic radiation of 66 mrem (Reference 2.9-1).

2.9.1.1.2 Internal Radiation

The national average annual dose from internal radiation of 40 mrem is applicable to Kemmerer Unit 1 (Reference 2.9-1).

2.9.1.1.3 Terrestrial Radiation

Since Wyoming is not located along the Gulf Coast, the Atlantic Coast, or the Colorado Plateau, the average annual dose of 46 mrem from ground-based sources of terrestrial radiation is applicable. The average annual dose from radon in Wyoming is 510 mrem, approximately 2.2 times higher than the national average. Therefore, the estimated annual dose from all terrestrial radiation sources is 556 mrem for Kemmerer Unit 1. (Reference 2.9-1, Reference 2.9-3)

2.9.1.2 Man-Made Sources

Man-made sources of radiation primarily consist of medical sources, consumer products, and nuclear facilities. Medical procedures, such as X-rays, computed tomography scans, and other nuclear medicine procedures, are the most significant man-made source of radiation exposure to the public. Consumer products, such as building and road construction materials, smoke detectors, televisions, x-ray security systems, tobacco, and combustible fuels, including gas and coal, also contribute to man-made radiation exposure. To a lesser degree, the public is exposed to radiation from the nuclear fuel cycle, including from uranium mining and milling, operating nuclear power plants, and the storage and disposal of used nuclear fuel. Additionally, the public receives minimal radiation exposure from the transportation of radioactive materials and fallout from nuclear weapons testing and reactor accidents. (Reference 2.9-11)

2.9.1.2.1 Medical Sources

There are two medical facilities within 50 miles (80 kilometers) of Kemmerer Unit 1 that offer radiology services: South Lincoln Medical Center in Kemmerer, Wyoming, and Evanston Regional Hospital in Evanston, Wyoming. South Lincoln Medical Center offers imaging services, while Evanston Regional Center offers both imaging and nuclear medicine services (Reference 2.9-5, Reference 2.9-4).

The average annual dose to the public from medical sources, including computed tomography, nuclear medicine, interventional fluoroscopy, and conventional radiography and fluoroscopy, is an estimated 300 mrem (Reference 2.9-3). This annual dose is applicable for Kemmerer Unit 1.

Medical personnel may receive a higher radiation dose than the public; however, as occupationally exposed individuals, medical personnel would not receive a dose in excess of the 10 CFR 20 annual occupational limit of 5,000 mrem (Reference 2.9-11).

2.9.1.2.2 Consumer Products

While ionizing radiation dose from consumer products is highly dependent on the individual, the average annual dose due to consumer products of approximately 13 mrem is assumed for Kemmerer Unit 1 (Reference 2.9-3). Trace amounts of naturally occurring radioactive elements are released in the combustion process at coal-fired power plants (Reference 2.9-2). The nearby Naughton Power Plant consists of two coal-fired units and one natural gas unit (Reference 2.9-15). Therefore, an estimated annual dose of 0.03 mrem associated with the coal-fired power plant is applicable to Kemmerer Unit 1 (Reference 2.9-1).

2.9.1.2.3 Nuclear Fuel Cycle

There are no operating or permanently shut down nuclear power reactors, fuel cycle facilities, uranium recovery facilities, or research and test reactors of any type within 50 miles (80 kilometers) of Kemmerer Unit 1 (Reference 2.9-12, Reference 2.9-13, Reference 2.9-14). Therefore, nuclear facilities do not contribute to man-made radiation dose estimates for Kemmerer Unit 1.

2.9.1.2.4 Other Man-Made Exposure Sources

Roads near Kemmerer Unit 1 which could be used in the transportation of radioactive materials include US 30 and US 189. Additionally, there is a railroad north of Kemmerer Unit 1 which could be used for radioactive material transport. Transportation of radioactive materials along these routes may result in additional doses. Section 6.2 discusses transportation of Kemmerer Unit 1 nuclear fuel and wastes.

Average annual doses of 0.5 mrem from miscellaneous occupational exposures, 0.3 mrem from miscellaneous industrial exposures, and 1 mrem from exposure to nuclear weapons testing fallout are assumed for Kemmerer Unit 1 (Reference 2.9-1, Reference 2.9-3).

2.9.2 Radiological Environmental Monitoring Program Contents

The REMP will include: (1) the number and location of sample collection points and measuring devices, and the pathway sampled or measured; (2) sample size, sample collection frequency, and sampling duration; (3) type and frequency of analysis; and (4) general types of sample collection and measuring equipment. The choice of sample sites, analyses, sampling frequencies, sampling and measuring durations, and sample sizes is justified by adherence to the guidance presented in NUREG-1301, “Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors” (Reference 2.9-8). The lower limits of detection for specific analyses will be provided and justified in the Offsite Dose Calculation Manual.

The Kemmerer Unit 1 REMP will include indicator and control sampling locations within a 20-mile (32-kilometer) radius of Kemmerer Unit 1. Indicator locations near the site are designed to indicate increases or buildup of radioactivity that might occur during operation. Control locations farther away from the site are designed to indicate the level of naturally occurring radioactivity.

2.9.3 Environmental Exposure Pathways Monitored

The three routinely monitored pathways of exposure which will be included in the REMP are inhalation, ingestion, and direct radiation. Each pathway can have one or more routes of exposure. Each route of exposure has an associated media which will be sampled as part of the REMP to identify when radioactive material has been transferred from the environment to an individual, thus causing an exposure. The routes of exposure and the associated sample media are identified during the site-specific land use census, described in Section 2.9.4.

Inhalation, ingestion, and direct radiation pathways will be monitored in accordance with NUREG-1301. A description of potential preoperational and operational monitoring and sampling locations which will be used to monitor the exposure pathways, and the associated sampling or collection frequencies and analysis types and frequencies, are provided in Table 2.9-1. The potential local and remote monitoring and sampling locations are depicted in Figure 2.9-1 and Figure 2.9-2.

Monitoring locations consist of an inner ring of onsite thermoluminescent dosimeters, one in each meteorological sector (T-1 through T-16); an outer ring of thermoluminescent dosimeters located approximately 5 miles (8 kilometers) from the reactor center point (T-17 through T-32); a selection of six special interest locations (T-33 through T-38); and two control locations (T-39 and T-40). In addition, particulates and airborne iodine will be monitored close to the site boundary in the direction that has the highest calculated annual average ground level deposition (A-1 through A-3), as well as in the vicinity of a community with the highest calculated annual average ground level deposition (A-4). A control location (A-5) in the least prevalent wind direction will also be monitored.

Sampling locations will include a series of surface water samples to be collected at points both upstream and downstream of Kemmerer Unit 1 (W-1 through W-5), as well as collections of samples corresponding to the ingestion pathways that could be impacted by the site (milk, fish and invertebrates, and other food products).

Sampling results and locations will be evaluated to determine effects from seasonal yields and variations. Sampling media and sample size are defined in environmental monitoring and laboratory standard operating procedures. Trending and comparison reviews provide information regarding changes in background levels and determine the adequacy of analytical techniques in light of program results and changes in technology, when compared to baseline measurements. Changes in program implementation including sampling techniques, frequencies, and locations, may occur as a result of monitoring results. Inter-laboratory programs verify the accuracy and precision of radioactive analyses of environmental samples.

2.9.4 Land Use Census

A land use census, conducted annually, or as required by the Offsite Dose Calculation Manual, identifies changes in land use that may require modifications to the Kemmerer Unit 1 REMP or the Offsite Dose Calculation Manual.

A land use census is performed by:

- Conducting field surveys in each meteorological sector out to five miles (eight kilometers) to determine or confirm the:
  - Nearest residence
  - Nearest garden greater than 500 square feet (46.5 square meters) that produces broad leaf vegetation
  - Nearest milking animal
- Identifying locations and determining and recording distances to the reactor centerpoint for each parameter and sector
- Comparing current census results to previous results
- Contacting the County Agent for verification of nearest dairy animals

2.9.5 Quality Assurance Program

The Kemmerer Unit 1 REMP quality assurance program will be conducted in accordance with Regulatory Guide 4.15, Revision 2, "Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations To License Termination) – Effluent Streams and the Environment." Quality assurance will be provided in the REMP through quality training, the use of qualified personnel, program implementation by periodic tests, performing quality control checking for sampling and analysis, the inter-laboratory comparison program, auditing, taking corrective actions, and administrative and technical procedures.

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Table 2.9-1 Potential Radiological Environmental Monitoring Program Sample Station Locations[1]
(Sheet 1 of 4)

Sample Type	No. of Samples[3]	Location	Distance to Reference Point (miles)[2]	Direction (Sector)	Sampling and Collection Frequency[4]	Analysis Type or Equipment	Minimum Analysis Frequency[4]
DIRECT RADIATION[5]							
Direct radiation (thermoluminescent dosimeters)	An inner ring of 16 stations (1 in each emergency meteorological sector) within the site boundary	T-1	0.1 (north of Nuclear Island warehouse)	N	Continuous monitoring with sample collection quarterly[6]	Gamma exposure rate	Quarterly
		T-2	0.1 (north of Nuclear Island warehouse)	NNW			
		T-3	0.1 (north of Nuclear Island guard house)	NW			
		T-4	0.1 (north end of parking lot)	WNW			
		T-5	0.1 (west end of parking lot)	W			
		T-6	0.1 (near Security, Training, and Admin Building)	WSW			
		T-7	0.2 (NW corner of switchyard)	SW			
		T-8	0.3 (SW corner of switchyard)	SSW			
		T-9	0.3 (near cooling tower)	S			
		T-10	0.2 (near Water Treatment Building)	SSE			
		T-11	0.1 (near Fire Tanks and Pump Building)	SE			
		T-12	0.1 (near retention pond)	ESE			
		T-13	0.1 (at plant fence east of Fuel Handling Building)	E			
		T-14	0.1 (at plant fence east of Fuel Handling Building)	ENE			
		T-15	0.1 (at plant fence NE of Fuel Handling Building)	NE			
		T-16	0.1 (north of Fuel Handling Building)	NNE			
	An outer ring of 16 stations (1 in each emergency meteorological sector) within 6 to 8 kilometers range from the site	T-17	5.0 (5-mi ring around reactor center point)	N			
		T-18		NNW			
		T-19		NW			
		T-20		WNW			
		T-21		W			
		T-22		WSW			
		T-23		SW			
		T-24		SSW			
		T-25		S			
		T-26		SSE			
		T-27		SE			
		T-28		ESE			
		T-29		E			
		T-30		ENE			
		T-31		NE			
		T-32		NNE			

Table 2.9-1 Potential Radiological Environmental Monitoring Program Sample Station Locations[1] (Sheet 2 of 4)

Sample Type	No. of Samples[3]	Location	Distance to Reference Point (miles)[2]	Direction (Sector)	Sampling and Collection Frequency[4]	Analysis Type or Equipment	Minimum Analysis Frequency[4]
Direct radiation (thermoluminescent dosimeters) (cont)	6 stations in nearby special interest areas	T-33	2.7 (closest residence)	NE	Continuous monitoring with sample collection quarterly[6]	Gamma exposure rate	Quarterly
		T-34	4.9 (nearby residence)	S			
		T-35	3.7 (nearest garden)	ENE			
		T-36	4.7 (Diamondville Town Hall)	NNE			
		T-37	5.6 (Kemmerer High School)	N			
		T-38	4.1 (Naughton Power Plant)	NNW			
	2 control stations	T-39	8.0 (Kemmerer Municipal Airport)	N			
		T-40[11]	18.5 (Viva Naughton Reservoir)	NNW			
AIRBORNE							
Particulates/ iodine	3 samples from close to the 3 site boundary locations (in different sectors) of the highest calculated historical annual average ground level D/Q	A-1	0.4 (average D/Q 2.012×10^{-7})	ESE	Continuous sampler operation with sample collection at least weekly or more frequently if required by dust loading	Radioiodine canister - Analysis for I-131 Particulate sampler - Gross beta radioactivity analysis Gamma isotopic analysis[8] of composite[7] (by location)	Weekly Following filter change[7] Quarterly
		A-2	0.7 (average D/Q 7.636×10^{-8})	S			
		A-3	0.3 (average D/Q 2.305×10^{-7})	E			
	1 sample from the vicinity of a community having the highest calculated annual average ground level D/Q	A-4	3.4 (Hwy. 31 at Oakley St. - average D/Q 1.866×10^{-10})	NNE			
	1 sample from a control location 15-40 kilometers distant and in the least prevalent wind direction	A-5[11]	18.5 (Viva Naughton Reservoir)	NNW			
WATERBORNE							
Surface Water	Samples from 3 locations, with at least one upstream and one downstream[9]	W-1[11]	18.5 (Viva Naughton Reservoir)	NNW	Grab monthly composite	Gamma isotopic analysis Composite for tritium analysis	Monthly Quarterly
		W-2[11]	11 (Naughton Intake Structure along Ham's Fork)	N			
		W-3	4.6 (Naughton Raw Water Storage Pond)	NNW			
		W-4	1.7 (Downstream of Naughton release point, upstream of Kemmerer Unit 1 release point)	NNW			
		W-5	1.0 (Downstream of Kemmerer Unit 1 release point along North Fork Little Muddy Creek)	S			
Groundwater	Sample from 1 or 2 sources only if likely to be affected	N/A	**No sampling planned; Kemmerer Unit 1 does not discharge liquid radioactive waste to the environment. Additionally, the groundwater at the site is unlikely to be affected by accidental liquid release.**	N/A	Grab quarterly composite	Gamma isotopic and tritium analysis	Quarterly
Sediment from Shoreline	1 sample from downstream area with existing or potential recreational value	N/A	**No sampling planned; there are no water sources in the site vicinity with existing or potential recreational value. (NOTE 12)**	N/A	Semi-annually	Gamma isotopic analysis	Semi-annually

Table 2.9-1 Potential Radiological Environmental Monitoring Program Sample Station Locations[1] (Sheet 3 of 4)

Sample Type	No. of Samples[3]	Location	Distance to Reference Point (miles)[2]	Direction (Sector)	Sampling and Collection Frequency[4]	Analysis Type or Equipment	Minimum Analysis Frequency[4]
Drinking Water	1 sample from the nearest water supply that could be affected by discharge	N/A	**No sampling planned; Kemmerer Unit 1 does not discharge liquid radioactive waste to the environment. No drinking water supplies would be affected by plant discharge.**	N/A	Monthly composite, bi-weekly when I-131 is present	Gamma isotopic analysis I-131 analysis Composite for tritium analysis	Monthly When present Quarterly
	1 sample from control location	N/A		N/A			
INGESTION							
Milk	1 sample from milking animals in each of 3 locations within 5 kilometers that have the highest potential. If there are none, then 1 sample from milking animals in each of 3 locations between 5 and 8 kilometers where doses are calculated to be greater than 1 mrem per year	M-1	NOTE 10	NOTE 10	Semi-monthly when animals are on pasture; monthly at other times	Gamma isotopic and I-131 analysis	Monthly
		M-2	NOTE 10	NOTE 10			
		M-3	NOTE 10	NOTE 10			
	1 sample from milking animals at a control location (15-30 kilometers in the least prevalent wind direction)	M-4	NOTE 10	NOTE 10			
Fish & Invertebrates	1 sample of commercially and recreationally important species in vicinity of plant discharge area	F-1-x	NOTE 10	NOTE 10	Semi-annually or when in season	Gamma isotopic analysis on edible portions	Semi-annually
	1 sample of same species in areas not influenced by plant discharge	F-2-x	NOTE 10	NOTE 10			
Food Products	**If milk sampling is not performed:** Samples of three different kinds of broad leaf vegetation grown nearest each of two different offsite locations of highest predicted historical annual ground level D/Q	FP-1	NOTE 10	NOTE 10	Monthly, if available, or at harvest	Gamma isotopic and I-131 analysis	Monthly or at harvest
		FP-2	NOTE 10	NOTE 10			

Table 2.9-1 Potential Radiological Environmental Monitoring Program Sample Station Locations[1]
(Sheet 4 of 4)

Sample Type	No. of Samples[3]	Location	Distance to Reference Point (miles)[2]	Direction (Sector)	Sampling and Collection Frequency[4]	Analysis Type or Equipment	Minimum Analysis Frequency[4]
Food Products (cont)	**If milk sampling is not performed:** 1 sample of broad leaf vegetation grown 15-30 kilometers in the least prevalent wind direction	FP-3	NOTE 10	NOTE 10	Monthly, if available, or at harvest	Gamma isotopic and I-131 analysis	Monthly or at harvest
	1 sample of food products from any area that is irrigated by water in which plant liquid effluents have impacted	FP-4	NOTE 10	NOTE 10			

NOTES:

1. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to circumstances such as hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment, or other legitimate reasons. If specimens are unobtainable as a result of sampling equipment malfunction, corrective action shall be taken before the end of the next sampling period.
2. All distances in this table are approximate and are measured from the reactor center point unless otherwise noted. Specific parameters of distance and direction sector from the centerline of the plant vent stack and additional description, where pertinent, will be provided for the sample locations in tables and figure(s) in the Offsite Dose Calculation Manual.
3. The number of samples indicated represents a minimum for the site at which each entry is applicable. At times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the Radiological Environmental Monitoring Program given in the Offsite Dose Calculation Manual.
4. The following definition of frequencies shall apply to Table 2.9-1 only:
   a. Weekly: Not less than once per calendar week. A maximum interval of 11 days is allowed between the collection of any two consecutive samples.
   b. Semi-monthly: Not less than two times per calendar month with an interval of not less than seven days between sample collections. A maximum interval of 24 days is allowed between collection of any two consecutive samples.
   c. Monthly: Not less than once per calendar month with an interval of not less than 10 days between collection of any two consecutive samples (maximum interval of 31 days).
   d. Quarterly: Not less than once per calendar quarter (maximum interval of 92 days).
   e. Semi-annually: One sample each between calendar dates (January 1 to June 30) and (July 1 to December 31). An interval of not less than 30 days will be provided between sample collections. The frequency of analyses is to be consistent with the sample collection frequency.
5. One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters.
6. Refers to normal collection frequency. More frequent sample collection is permitted when conditions warrant it.
7. Airborne particulate sample filters are analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thorium daughter decay. In addition to the requirement for a gamma isotopic on a composite sample, a gamma isotopic is also required for each sample having a gross beta radioactivity which is >1.0 pCi/m^3 and which is also >10 times that of the most recent control sample.
8. Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.
9. Offshore grab samples.
10. The need to sample a particular ingestion pathway (milk, fish & invertebrates, food products, etc.), along with the specific location(s) for sampling, will be established at the initiation of the preoperational REMP.
11. Monitoring or sampling location is not shown on Figure 2.9-1 or Figure 2.9-2.
12. Based on the Environmental and Recreational Water Use Analysis for the Green River Basin, Wyoming (Martinson 2018, 48)

Figure 2.9-1 Kemmerer Unit 1 Local Radiological Monitoring/Sampling Locations (1 Mile Radius)

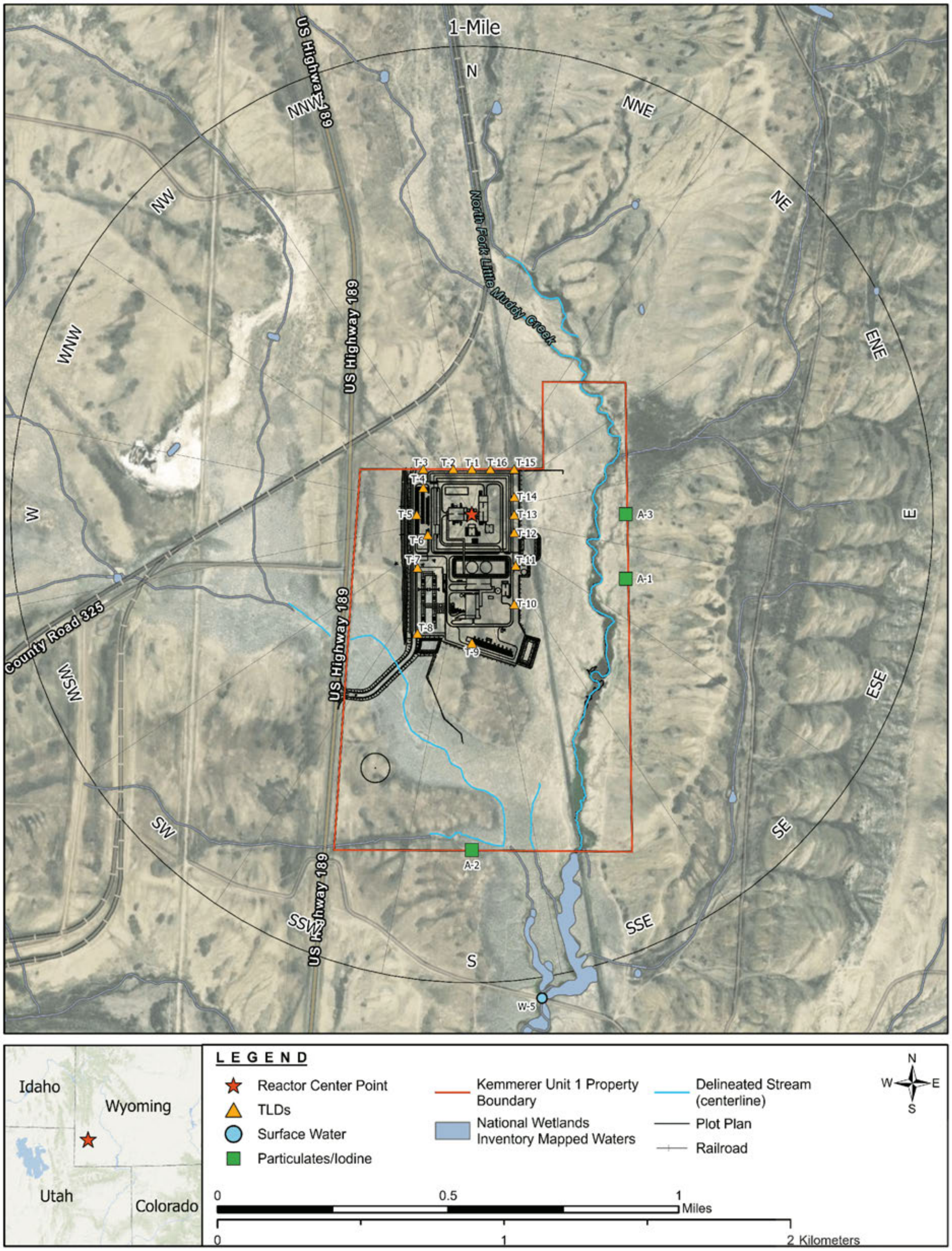
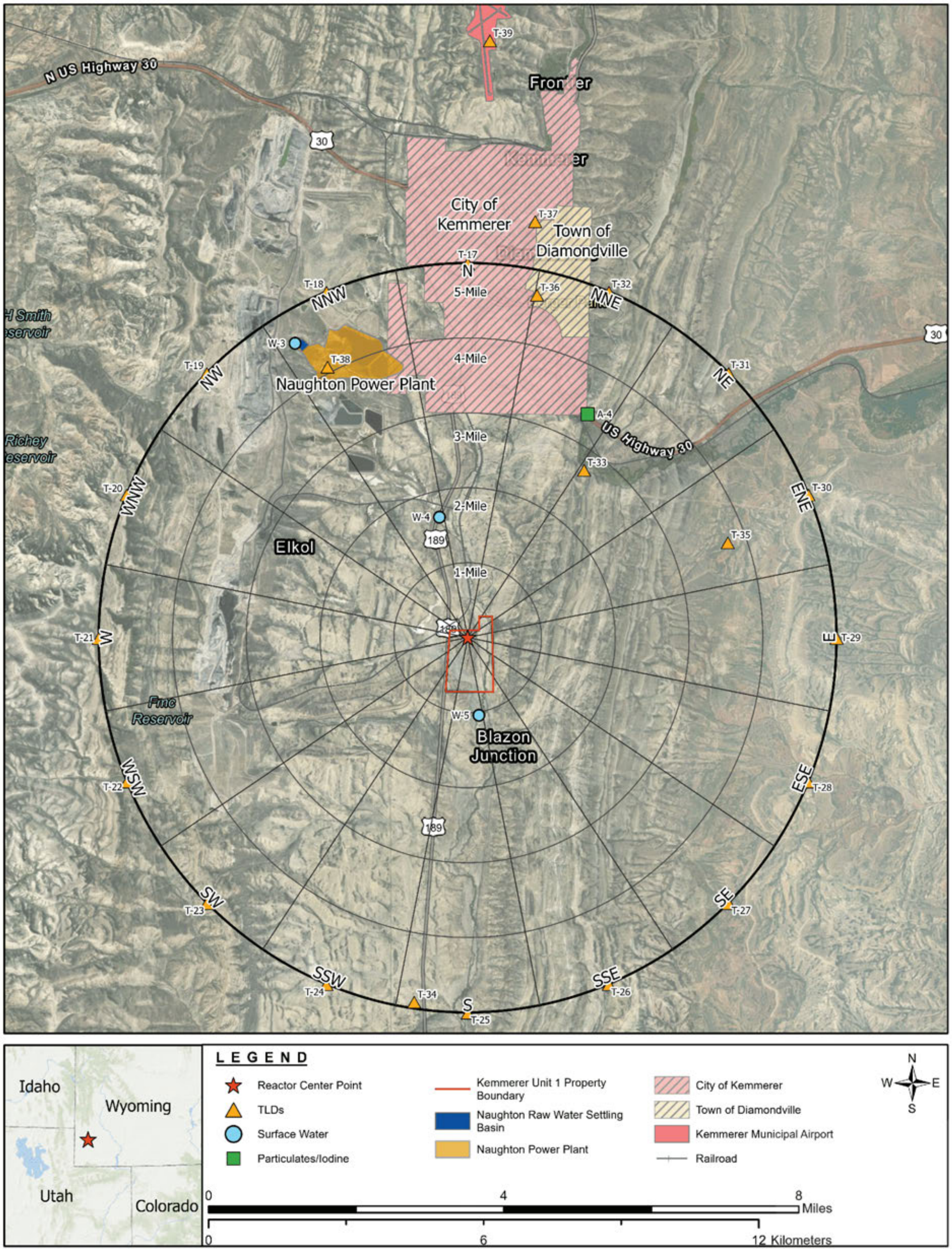
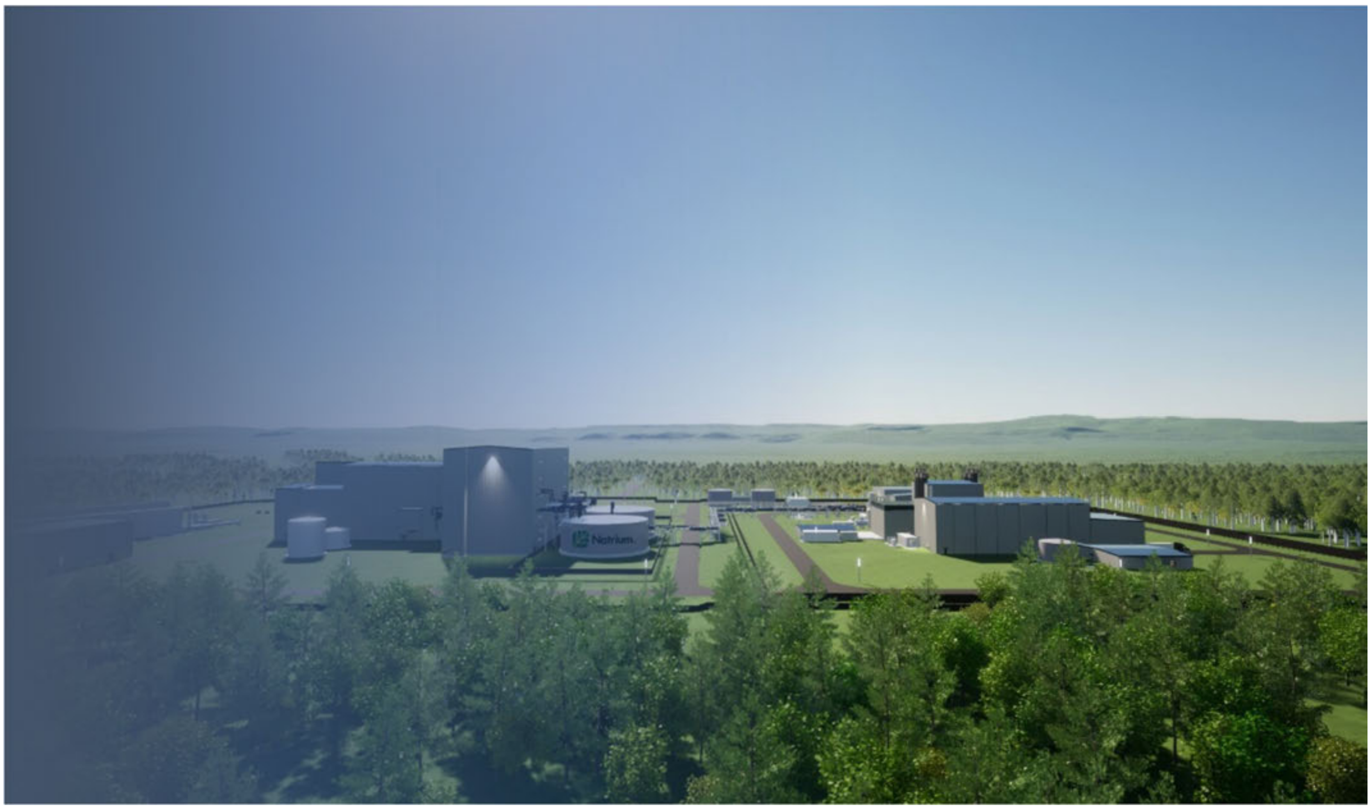


Figure 2.9-2 Kemmerer Unit 1 Remote Radiological Monitoring/Sampling Locations (5 Mile Radius)





Kemmerer Power Station Unit 1
ER, Chapter 3

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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Chapter 3 Site Layout and Project Description

The Kemmerer Unit 1 Site layout, design, and the activities required to build and operate the plant are described in this chapter. A description of the associated structures and facilities as well as the physical activities involved in building and operating the plant are provided. The chapter is divided into four sections.

- External Appearance and Plant Layout- Section 3.1
- Proposed Plant Structures, Systems, and Components- Section 3.2
- Building Activities- Section 3.3
- Operational Activities- Section 3.4

3.1 External Appearance and Plant Layout

The Kemmerer Unit 1 Site will be located in Lincoln County, Wyoming, approximately 3.0 miles (4.8 kilometers) south of the municipal limits of the City of Kemmerer, along U.S. Highway 189. Measured from the reactor centerpoint, PacifiCorp's Naughton Power Plant is approximately 3.8 miles (6.1 kilometers) to the northwest.

The infrastructure associated with Naughton Power Plant, such as the Raw Water Settling Basin, intake structure on Hams Fork River, and tie-in to electric transmission lines, will be shared as practicable.

Figure 3.1-1 depicts the location of Kemmerer Unit 1 in relation to Naughton Power Plant and the City of Kemmerer, along with the planned shared infrastructure.

3.1.1 Proposed Site

The Kemmerer Unit 1 Site is approximately 290 acres (117 hectares). The Natrium reactor plant is an 840 megawatts thermal (MWt) pool-type sodium fast reactor(SFR) that contains a molten salt energy storage system which enables the plant to vary its supply of energy to the grid, up to 500 megawatts electric (MWe) net, while maintaining constant reactor power. The plant is oriented in a north-south direction on the site. Figure 3.1-2 provides an architectural rendering of Kemmerer Unit 1 and identifies four principal areas of the site: Nuclear Island (NI), Energy Island (EI), site infrastructure, and linear facilities. Figure 3.1-3 identifies the major plant structures. Provided below is a more detailed description of the areas depicted on Figure 3.1-2:

1. NI: The NI is comprised of the following buildings and structures associated with the operation of the reactor and storage of spent fuel: Reactor Building (RXB), Reactor Auxiliary Building (RAB), Fuel Handling Building (FHB), Fuel Auxiliary Building (FAB), NI Control Building (NCB), Reactor Fabrication Building (RFB), and NI Warehouse.

2. EI: The EI contains the following equipment associated with thermal energy storage and power production, as well as support equipment for both the EI and NI: Energy Storage Structure Salt Tanks (Hot and Cold), Steam Generator Building, Turbine Facility Building, Water Intake Structures and Water Treatment Buildings, Fire Tanks and Pump Building,

Cooling Tower, Wastewater Treatment Building, Switchyard, Switchyard Control Building, Power Transformers, Standby Diesel Generators, and NI Argon and Nitrogen Bulk Storage and Hydrogen Gas Trailer.

3. Site Infrastructure: The site infrastructure includes plant roads, walkways, and storm drainage infrastructure.

4. Linear Facilities: The linear facilities Include macro-corridors consisting of two 230-kV transmission lines and a water pipeline.

The principal areas; NI, EI, site infrastructure, and linear facilities, are described in more detail below.

3.1.1.1 Nuclear Island

The Kemmerer Unit 1 plant arrangement includes five major buildings in the NI (RXB, RAB, FHB, FAB, and NCB), along with other supporting facilities, such as the RFB and NI Warehouse.

A brief description of the NI structures is provided below.

<u>Reactor Building</u>

The RXB is the center point of the NI and houses the reactor, Sodium Cover Gas System, and Sodium Processing System and supports the ducts and stacks for the passive Reactor Air Cooling system. The RXB is composed of two main structural sections: a steel framed superstructure above grade and a reinforced concrete and steel substructure below grade.

The above-grade RXB superstructure is a rectangular-shaped, steel-framed structure with metal siding that is approximately 108 feet (32.9 meters) wide and 70 feet (21 meters) long with an approximate height of 111 feet (33.8 meters) above grade. The above-grade RXB superstructure is centered on the reactor to provide a high bay space over the refueling access area floor primarily used for various refueling and maintenance activities. The RXB superstructure supports a single-failure proof overhead bridge crane used for various maintenance activities and refueling.

The RXB substructure provides housing to support and protect systems and components, including the reactor, Reactor Enclosure System, and the air or duct stacks for the Reactor Air Cooling System that provides passive air cooling of the Reactor Vessel. The Reactor Air Cooling system is integrated into the RXB design and has above ground intake and discharge stacks outboard of the above-grade RXB superstructure which exhausts above the RXB roof.

There are two main levels contained within the RXB which are further described below:

- Refueling access area floor (located at-grade in the above-grade RXB superstructure): The Ex-Vessel Handling Machine, which carries an argon-inerted, heated or cooled cask that moves a single core assembly to and from the Reactor Vessel using a sodium filled core assembly pot, is located at grade and goes between the RXB and the FHB for refueling.

- Operating Deck or Head Access Area: The Head Access Area is located below grade in a reinforced concrete and steel RXB substructure and provides maintenance access to the reactor head and its associated piping and equipment.

The Reactor Enclosure System, located below the Head Access Area, is housed in a reinforced concrete basement. The reactor and associated systems are located underground to protect them from natural hazards.

3.1.1.1.1 Reactor Auxiliary Building

The RAB is located in the NI, next to and west of the RXB. The RAB is a rectangular structure that is approximately 144 feet (43.9 meters) wide by 214 feet (65.2 meters) long and 70 feet (21 meters) above grade at its highest point and is orientated in the east and west axis. It is comprised of two reinforced-concrete substructure levels and a steel-framed superstructure with metal siding and a metal roof. The RAB houses the components that receive the hot non-radioactive and radioactive intermediate sodium from the RXB and transfers the heat to the salt systems. The RAB and RXB are connected via a pipe chase and an above-ground personnel passageway.

Both the below-grade and above-grade portions of the RAB support the Intermediate Heat Transport System (IHT) and NI Salt System (NSS) piping loops and components. The two below-grade levels house the NSS and IHT drain tanks, sodium processing system equipment, and the supplemental tank for the IHT low point drain in a reinforced concrete basement provided with below-grade waterproofing. The RAB is part of the radiologically controlled area (RCA), is not normally occupied, and is access controlled for security.

Reactor Auxiliary Building Substructure

The below-grade RAB substructure is primarily a reinforced concrete structure which includes two below grade levels:

- The first underground level houses the IHT drain tanks, NSS drain vessel, and Sodium Processing System equipment and is approximately 30 feet (9.1 meters) deep, 119 feet (36.3 meters) wide and 126 feet (38.4 meters) long.
- The second underground level consists of the supplemental tank for the low point drain.

An underground pipe chase runs from the RAB to the RXB.

Reactor Auxiliary Building Superstructure

At grade level, there is an array of sodium-salt heat exchangers. The RAB superstructure houses equipment that receives the hot nonradioactive intermediate sodium from the RXB and transfers the heat to the salt systems. The main floor at ground level supports the sodium-salt heat exchangers, and equipment platform levels support both instrument and service air receivers, pressure and overpressure equipment, IHT expansion tanks, and Intermediate Sodium Pump access platforms. Emerging from the west side of the RAB are pipes transferring the heated molten salt above grade from the RAB to the EI. Salt pipe racks west of the RAB support EI salt heat transport system hot and cold piping carrying molten salt between the RAB NSS and the EI thermal salt storage tanks and pumps.

3.1.1.1.2 Fuel Handling Building

The FHB is located east of the RXB and north of the FAB. The FHB is within the protected area and is a part of the RCA. Personnel will enter and exit via the FAB connector located in the southeast corner of the FHB. The size of the building accommodates the spent fuel pool and the area that is required for refueling operations, which includes using an overhead crane to lift and move components. The FHB is a rectangular building and is orientated on a north-south axis. The overall FHB size (which includes the North Wing and South Wing) is approximately 103 feet (31.4 meters) wide, 293 feet (89.3 meters) long, and 76 feet (23 meters) tall. The North Wing is approximately 77 feet (23 meters) long by 103 feet (31.4 meters) wide and 50 feet (15.2 meters) tall. The South Wing (Main Building) is approximately 216 feet (65.8 meters) long by 103 feet (31.4 meters) wide and 76 feet (23 meters) tall. An overhead bridge crane, supported by the FHB superstructure, is used to move dry fuel casks, spent fuel casks, new fuel assemblies, and other equipment located in the FHB.

The FHB houses operations and equipment related to fuel receipt, refueling operations, storage, and the spent fuel pool, along with equipment associated with the RWL, RWG, and RWS systems. The FHB consists of a primary floor at grade level, an equipment platform, and substructure (below grade) areas. The main level (at grade) contains fuel loading and unloading (using dry fuel and spent fuel casks), radiological waste storage systems for the plant, Operator Room, access by ladder or stairs to substructures, and a separate set of stairs for the equipment platform.

The north wing provides a truck bay area and stairs for the equipment platform. Next to the truck bay in the North Wing are rooms enclosed by concrete to shield the liquid radwaste system and solid radwaste system rooms. The North Wing contains liquid radwaste system and solid radwaste system equipment.

The FHB main building includes the spent fuel pool, tracks for the ex-vessel handling machine and bottom loading transfer cask, Fuel Handling Control Room, overhead bridge crane, and material storage and laydown space. An on-grade rail system connects to the RXB to transport fuel using an Ex-Vessel Handling Machine via a connector. The overhead bridge crane supports moving casks, Gaseous Radwaste Processing System maintenance, and equipment within the center part of the facility.

3.1.1.1.3 Fuel Auxiliary Building

The FAB, located southeast of the RXB and south of the FHB, is located within the protected area and acts as the primary entrance into the RCA. The FAB is a one-story building with the roof at approximately 18 feet (5.5 meters) tall. The approximate building dimensions are 90 feet (27 meters) wide by 90 feet (27 meters) long; with a tall corridor extension to the FHB that is 12 feet (3.6 meters) wide; 40 feet (12.1 meters) long; and 10 feet (3.0 meters) tall. The FAB is expected to facilitate consumable storage, provide FHB access control, hand tool and small equipment inventory, dosimetry management, Radiation Protection offices, and the Chemistry Lab.

The FAB provides a centralized location for employee and visitor ingress to, and egress from, the major NI facilities (RXB, FHB, RAB) by way of the RCA Clearance Monitoring Area. Daily plant personnel, outage workers, and visitors will check in and out of the RCA at the FAB, don protective clothing in the locker room, and collect dosimetry, portable tools, personal protective equipment, respirators, hand tools, and other portable equipment needed for assignments.

In addition to serving as the entry point to the RCA, the FAB provides areas dedicated to the storage of calibration sources and temporary storage of contaminated tools. Although roughly half of the FAB is categorized as a non-radiologically controlled area, these areas are segregated from the remainder of the FAB with limited access. Personnel decontamination capability and a decontamination shower are provided in this area. The drain system for potentially contaminated water is segregated and routed to the Liquid Radwaste Processing System. Contaminated equipment and radioactive waste are transported through the FHB to solid waste storage for disposal.

3.1.1.1.4 Nuclear Island Control Building

The NCB is located south of the RXB and west of the FAB. The NCB serves as the primary control center for the NI and houses the main control room and associated equipment to ensure safe plant operations. The NCB is designed as a steel frame, one-story superstructure above grade with a reinforced concrete and steel substructure below grade. The following is a description of the two main structural sections of the NCB:

- The rectangular-shaped NCB superstructure is an approximately 82 feet (25 meters) wide, 88 feet (26.8 meters) long, steel-framed metal building that is approximately 21 feet (6.4 meters) tall. Housed within the NCB superstructure is the Main Control Room and related equipment rooms, offices, and lavatories and is located within a control room envelope surrounded by a reinforced enclosure that provides radiation shielding and fire protection as well as the required protection from external hazards. Stairwell extensions are located on both sides of the superstructure to provide access to the NCB substructure.
- The NCB substructure is an approximately 82 feet (25 meters) wide, 131 feet (40.2 meters) long reinforced concrete and steel substructure and is 33 feet (10 meters) below grade. The NCB substructure houses safety-significant systems and equipment, including the reactor protection system vaults and battery racks. The remote shutdown complex is also contained in the NCB substructure.

3.1.1.1.5 Reactor Fabrication Building

The RFB is located northwest of the RAB and is used for the reactor assembly process. The RFB structure will remain in place during operations.

3.1.1.1.6 Nuclear Island Warehouse

The NI Warehouse is located west of the RXB and south of the RFB. This building is used to store plant maintenance material.

3.1.1.2 Energy Island

The EI facilities support thermal energy storage, steam generation equipment, and equipment to convert the energy in the steam to electricity. The independence of plant operations between the EI and the NI is a key aspect of the plant design philosophy. The NI boundary is designed so the interrelationship with the EI does not impact the NI safety analysis. The EI provides systems and components used to supply energy to the grid while maintaining isolation from any events impacting NI safety functions associated with reactivity control, core cooling, or containing the release of radioactivity.

The EI contains the following principal facilities:

- Energy Storage Structure Salt Tanks (Hot and Cold)
- Steam Generator Building
- Turbine Facility Building
- Condensate Storage Tank
- Water Treatment Building and Demineralized Water Tank
- Fire Tanks and Pump Building
- Circulating Water Pump Area Intake Facility and Cooling Tower
- Wastewater Treatment
- Switchyard and Switchyard Control Building
- Power Transformers (Main and Auxiliary and Reserve Auxiliary)
- Standby Diesel Generators
- NI Argon and Nitrogen Bulk Storage
- Hydrogen Gas Trailer

Brief descriptions of some of the principal structures of the EI are provided below.

3.1.1.2.1 Energy Storage Structure Salt Tanks (Hot and Cold)

The Energy Storage Structure Salt Tanks (Hot and Cold) are located north of the Steam Generator Building. Hot salt is stored in the Hot Energy Storage Structure Salt Tanks and is pumped to the steam generator system to produce high pressure steam. The cooled salt from the Steam Generator System is returned to the cold salt storage tank for storage. Salt from the cold storage tank is pumped to the NSS to cool the intermediate sodium loop. Heated salt from the NSS is then returned to the hot salt storage tank. A berm surrounds the tanks to contain any accidental releases.

3.1.1.2.2 Steam Generator Building

The Steam Generator Building houses evaporator circulation pumps, startup electric feedwater heaters, startup feedwater recirculation pumps, economizers, steam drums, superheaters and reheaters, and evaporators. The Steam Generator Building is located south of the RXB and Energy Storage Structure Salt Tanks (Hot and Cold).

3.1.1.2.3 Turbine Facility Building

The turbine facility building houses the EI subsystem equipment and piping, including the condensers, feedwater heaters, condensate, feedwater pumps, the steam turbine, and the turbine generator. It is located adjacent and south of the Steam Generator Building.

3.1.1.2.4 Water Treatment Building and Demineralized Water Tank

The water intake structures and water treatment buildings house chemical tanks and associated pumps and piping, sumps, an operations room, and laboratory. The water intake structures and water treatment buildings, along with the adjacent EI demineralized water tank, is located east of the Steam Generator Building.

3.1.1.2.5 Fire Tanks and Pump Building

The Fire Protection System includes a pump house, two 300,000-gallon (1,000 m^3) (minimum) water storage tanks, and one primary electric and one backup diesel engine pump. The fire tanks and Pump Building are located east of the Steam Generator Building.

3.1.1.2.6 Circulating Water Pump Area Intake Facility and Cooling Tower

The Heat Rejection System provides cooling water to the main condenser and the NI and EI closed cooling water subsystems under all conditions of plant power loading and design weather conditions and quench water to the Steam Generator System and Steam Turbine System auxiliary boiler blowdown subsystems. The heated circulating water flow is returned to the cooling tower where the waste heat from the thermal cycle is rejected to the atmosphere. Makeup to the cooling tower basin is provided by the raw water supply from the Naughton Power Plant Raw Water Settling Basin.

The cooling tower basin also receives blowdown from the Steam Generator System and Steam Turbine System auxiliary boiler blowdown sumps. The Heat Rejection System blowdown is taken from the circulating water pumps’ discharge header and routed to the waste water system for treatment and eventual discharge in accordance with the Wyoming Pollutant Discharge Elimination System permit. The water chemistry control for the system is provided by the Heat Rejection System chemical injection system.

3.1.1.2.7 Wastewater Treatment

The Wastewater Treatment Building is located northeast of the cooling tower and will treat plant wastewater, including cooling tower blowdown, and will discharge to North Fork Little Muddy Creek in accordance with the Wyoming Pollutant Discharge Elimination System permit, as shown in Figure 3.1-4.

3.1.1.2.8 Switchyard, Switchyard Control Building, and Power Transformers (Main and Auxiliary and Reserve Auxiliary)

The 230-kV switchyard will transfer power generated by the steam-turbine generator to the transmission system and supply plant auxiliary loads through the unit auxiliary transformer during plant normal operation. It is located southwest of the turbine facility building. Plant auxiliary loads receive alternate power from the reserve auxiliary transformer fed from the 230-kV switchyard when the normal main power supply subsystem is out of service.

3.1.1.2.9 Standby Diesel Generators

The Standby Diesel Generator enclosure, located west of the Steam Generator Building, houses both Standby Diesel Generators and provides backup power in the event of a disruption in the normal power source. The Standby Diesel Generators charge batteries in the event of loss of off-site power and support plant-specific loads for investment protection, as discussed in PSAR Section 1.1.4.3.6.

3.1.1.2.10 NI Argon and Nitrogen Bulk Storage and Hydrogen Gas Trailer

The NI Argon and Nitrogen Bulk Storage is located west of the Steam Generator Building. The Hydrogen Gas Trailer is located northwest of the turbine facility building.

3.1.1.3 Site Infrastructure

The Security, Training, and Administration Building is located outside of the NI on the west side of the site. Plant roads, walkways, and storm drainage infrastructure will also be constructed in support of Kemmerer Unit 1.

3.1.1.4 Linear Facilities

The linear facilities, two 230-kV transmission lines and a water pipeline, are located in a macro-corridor that includes a co-located leg, a water corridor leg, and a transmission corridor leg. Figure 3.1-5 illustrates the macro-corridor concept. The estimated macro-corridor widths for each leg of the corridor along with the estimated actual disturbance width are as follows:

- The co-located leg consists of two 230-kV transmission lines and a water pipeline:
    - The maximum width is approximately 1120 feet (341 meters), and the minimum width is approximately 360 feet (110 meters).
    - Actual disturbance is estimated to be less than 300 feet (91 meters) (400 feet [122 meters] on ends of legs to allow for laydown and pulling of the wires).
- The water corridor leg will be composed of the water pipeline.

  - The maximum width is approximately 550 feet (168 meters), and minimum width is approximately 370 feet (113 meters).
  - Actual disturbance is estimated to be less than 50 feet (15 meters) in width with larger amounts on ends of legs to allow for laydown.
- The transmission corridor leg will be composed of two 230-kV lines:
  - Maximum width is approximately 540 feet (164.6 meters), and minimum width is approximately 360 feet (110 meters).
  - Actual disturbance is estimated to be less than 250 feet (76 meters) in width (400 feet [122 meters] on ends of legs).

Site operations water will be supplied from the Naughton Power Plant Raw Water Settling Basin. The source of the Naughton Power Plant Raw Water Settling Basin, the Viva Naughton reservoir, is described in Section 3.4.1.1. Power generated by Kemmerer Unit 1 will connect to an existing switchyard at the Naughton Power Plant and is described in Section 3.2.

3.1.1.5 Other Facilities

3.1.1.5.1 Emergency Response Facility Building

A single onsite, primary Emergency Response Facility (ERFP) is proposed for Kemmerer Unit 1. The ERFP may be co-located with or within a facility that serves another function at the plant, provided the other site functions do not prevent or hinder the emergency response organization functions. The location of the ERFP will most likely be within the Site Support Building and collocated within the outage control center, approximately 2,500 feet (762 meters) from the reactor.

3.1.1.5.2 Training Center

The Training Center will be used for initial training of future Kemmerer Unit 1 personnel. The Training Center will be located southwest of the EI, and will include a 102-spot parking lot. The Training Center will be built in advance of, and separate from, the NI and EI. The building is proposed as an approximately 30,000 square foot (2787 square meters), two-story structure measuring 150 feet (45.7 meters) by 100 feet (30.5 meters).

References

3.1-1 (PacifiCorp 2023). PacifiCorp. “2023 Integrated Resource Plan (Amended Final).” May 31, 2023. https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2023-irp/2023_IRP_Volume_I_Final_5-31-23.pdf. Accessed November 12, 2023.

Figure 3.1-1 Kemmerer Unit 1 Shared Infrastructure

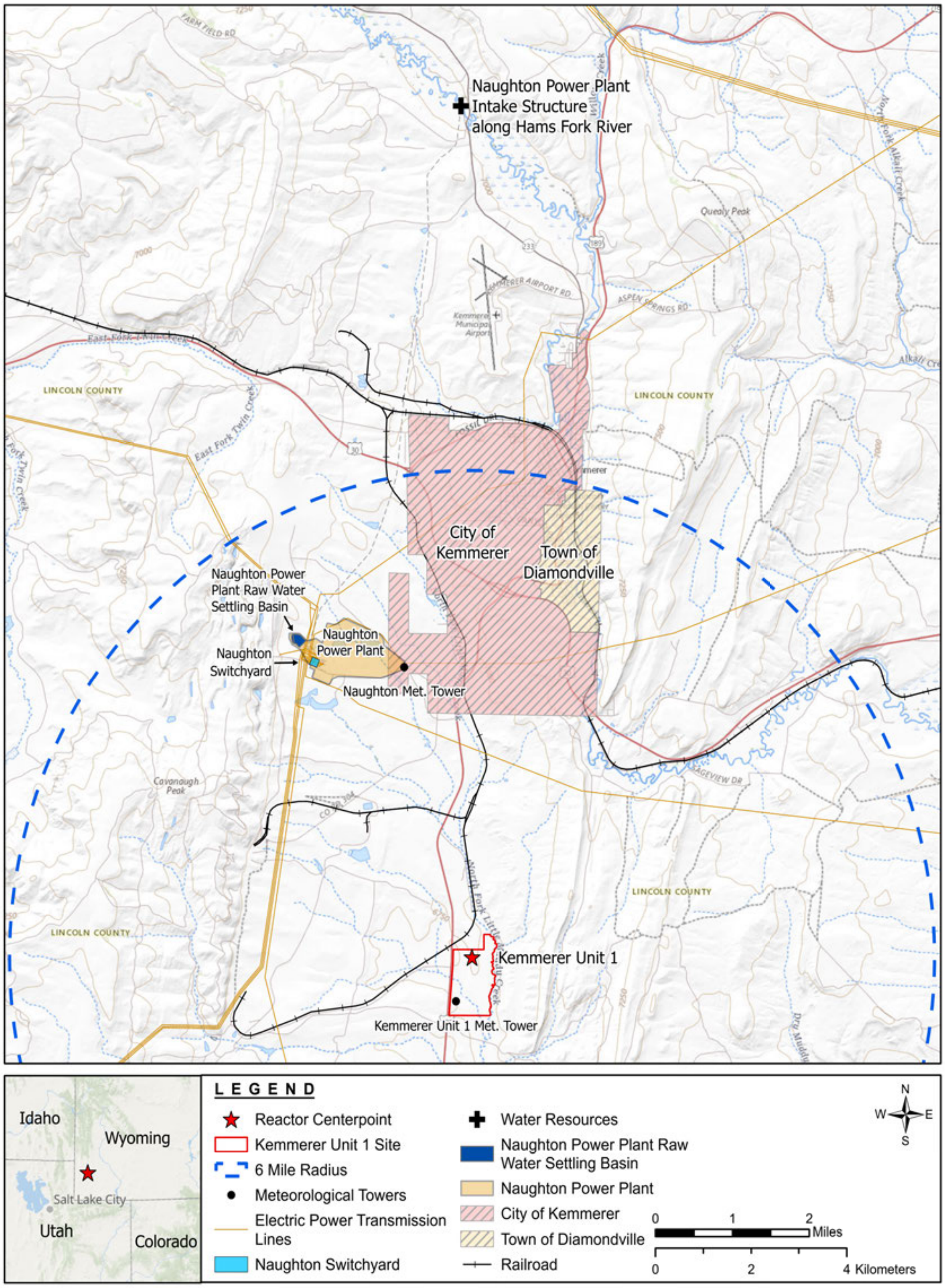


Figure 3.1-2 Architectural Rendering of Kemmerer Unit 1

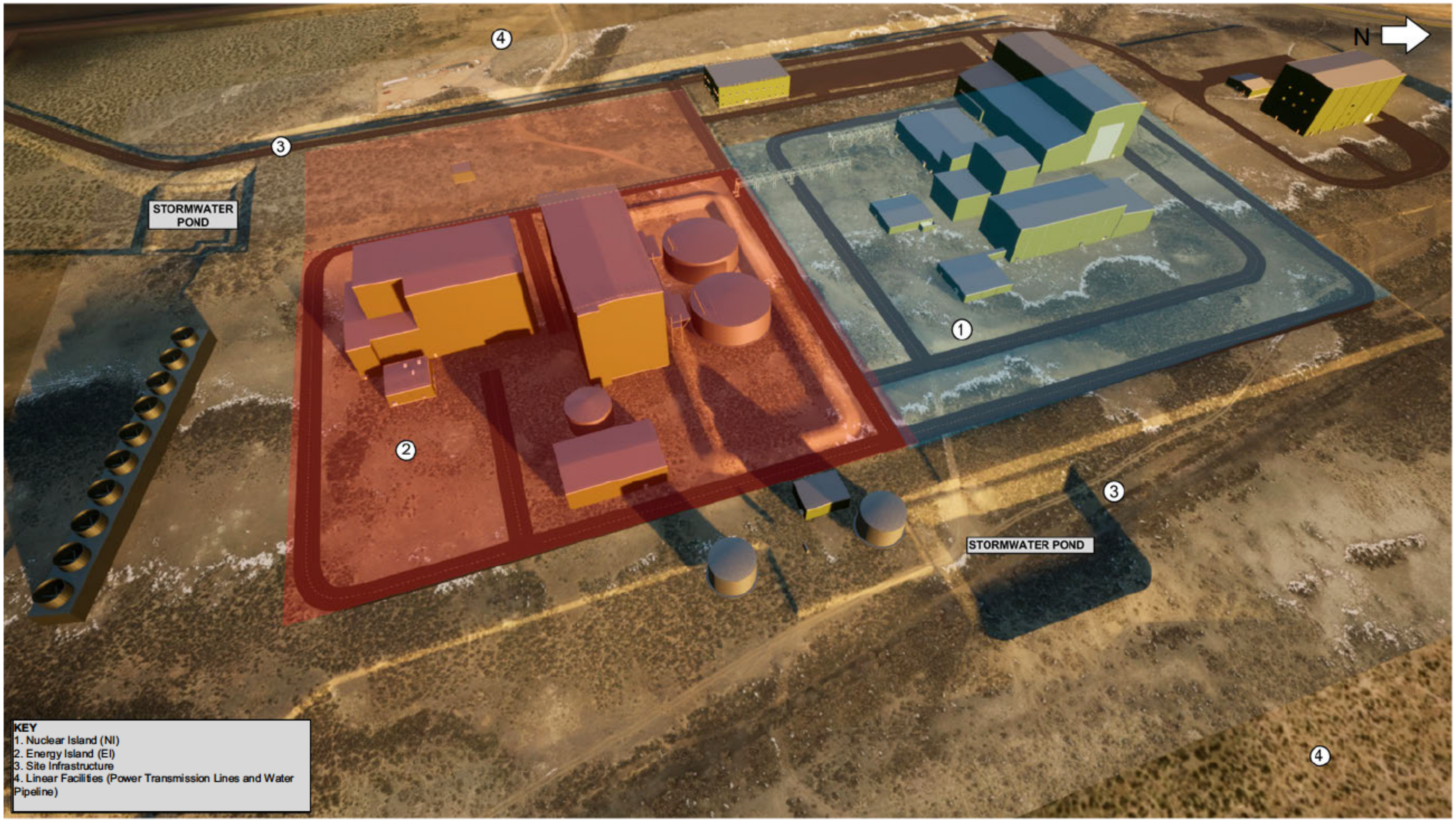


Figure 3.1-3 Kemmerer Unit 1 Major Plant Structures

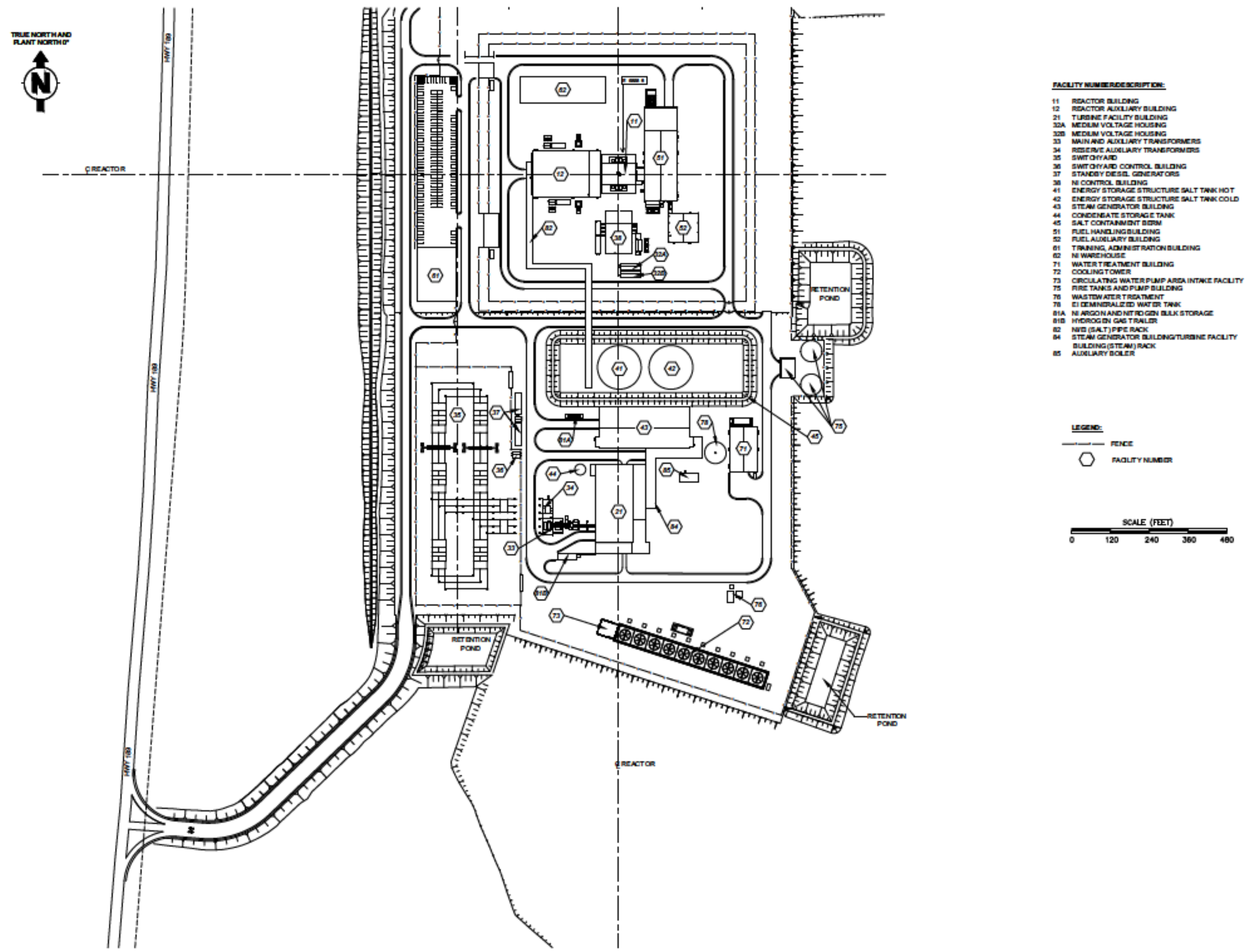


Figure 3.1-4 Kemmerer Unit 1 Site Plan

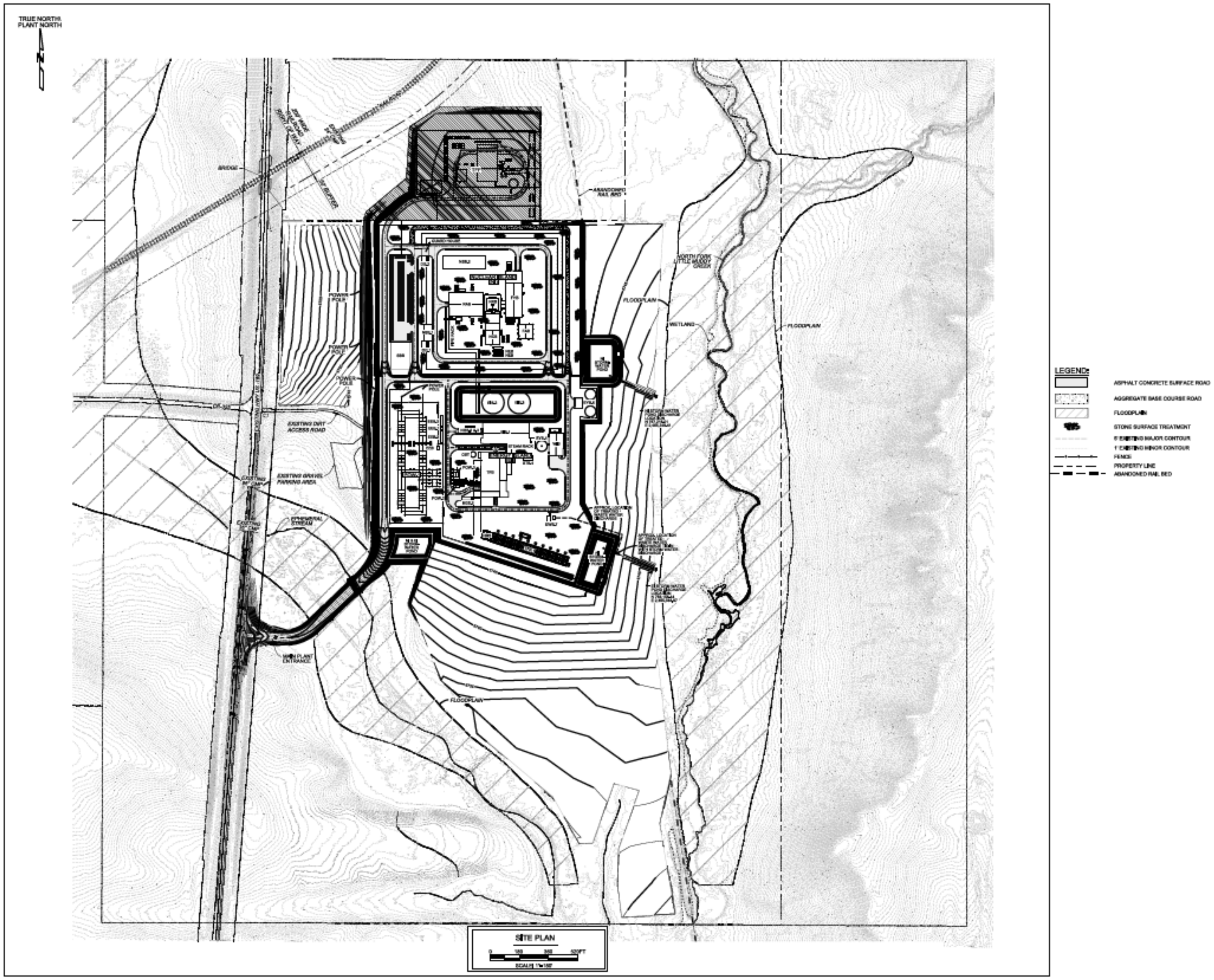
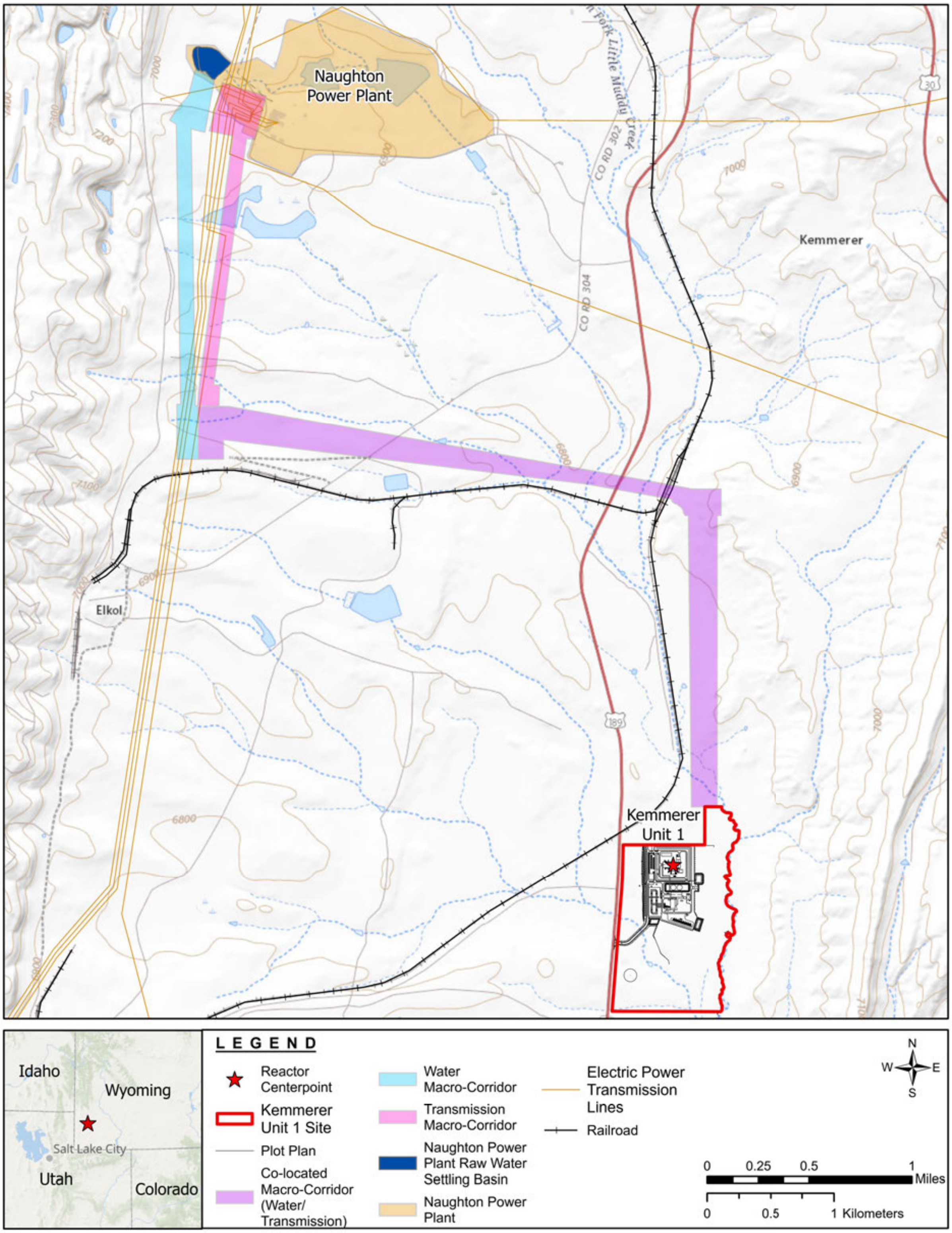


Figure 3.1-5 Kemmerer 1 Unit Macro-Corridors



3.2 Proposed Plant Structures, Systems, and Components

The overall proposed nuclear energy generating system, including the reactor power conversion system, and structures, systems, and components that will interface with the environment during construction and plant operations are described in this section. The reactor power system is shown in Figure 3.2-1. Water use streams and flow rates are provided in Table 3.2-1, and the plant water use and balance are shown in Figure 3.2-2.

3.2.1 Proposed Plant Structures

Proposed plant structures and site layout with location and dimensions are discussed in Section 3.1 and shown in Figure 3.1-3 and Figure 3.1-4. The proposed transmission line and corridor for transmission and water pipeline is discussed in Section 3.1 and shown in Figure 3.1-5.

Plant grade and major structure elevations are provided in Figure 3.1-3. The proposed plant grade is 6,757 feet (2,060 meters) with a high point elevation in the Nuclear Island at approximately 6,868 feet (2,093 meters) for the height of the Reactor Building. Crane heights will be 200 feet (61 meters) or less. The high point elevation in the Energy Island is not yet determined; however, building and crane heights will be 200 feet (61 meters) or less, as described in Section 3.1.

3.2.2 Proposed Plant Systems and Components

3.2.2.1 Reactor Power Conversion System

3.2.2.1.1 Reactor Core and Fuel

The reactor provides the heat required to produce steam, which is transferred ultimately to the steam turbine to generate electricity. The Natrium reactor has a core reactor thermal power of 840 megawatts thermal. The net electrical output is estimated at 319 megawatts electric and, when needed, the net electrical output can be increased to 500 megawatts electric by use of a GWh-scale molten salt energy storage system. The core contains 162 fuel assemblies containing enriched Uranium-235 fuel. The fuel employs a metal fuel system instead of oxides, and the enrichment level of the fuel is up to [redacted] weight percent. The burn-up is in the range exhibited by Gen III+ LWR design and PRISM (greater than 33,000 megawatt-days per metric ton of uranium).

3.2.2.1.2 Heat Transport

The reactor heat transport systems transfer energy from the reactor to a steam turbine to generate electricity. In the primary system, the heat produced by the reactor is transferred from the primary sodium coolant to the intermediate sodium loop. The intermediate sodium loop transfers heat to the Nuclear Island (NI) Salt System (NSS) via the Sodium-Salt Heat Exchangers. The molten salt flows from the NI to the Energy Island (EI) where the hot salt is stored for eventual supply to the Steam Generator System (SGS). The SGS then generates high-pressure, superheated steam for conversion to electrical power by the turbine generator.

3.2.2.2 Salt Systems (NSS, ESS, TSS)

Energy storage allows for operational flexibility between the EI and the NI. Heat is removed from the intermediate sodium in the Sodium-Salt Heat Exchanger Systems, that are located in the Reactor Auxiliary Building, by the NSS-EI Salt Heat Transport System (ESS)-Thermal Salt Storage System (TSS) molten salt loop during reactor operation. Salt is stored in the Energy Storage Structure Salt Tanks (Hot and Cold) to be circulated to the ESS, NSS, and SGS. The TSS stores cold molten salt to be supplied to the ESS and NSS as the primary heat sink for the NI Intermediate Heat Transport System. The ESS transfers hot salt to the TSS hot salt storage tanks in order to store and deliver hot salt to the SGS for steam generation, as required to support power generation. The thermal storage in the TSS is used to increase the range of power output from the steam turbine generator. Cold salt is returned from the SGS to the TSS cold salt storage tanks.

The NSS isolation valves outside of the Reactor Auxiliary Building (RAB) form the boundary between the NSS and ESS. The NSS monitors the molten salt flow rate as well as the hot and cold salt temperatures and pressures. This provides feedback to the main control room that the NSS-ESS-TSS-SGS loop is transferring heat to the EI from the NI during normal operations. The NSS-ESS-TSS-SGS systems form the salt loop that transfers heat from the NI to the EI steam turbine.

3.2.2.3 Power Cycle Systems (SGS, Condensate and Feedwater System, Steam Turbine System, Heat Rejection System, Generator System)

Heat is removed from the TSS salt loop via the SGS. Salt flows through the SGS heat exchangers to produce superheated and reheated steam. The SGS receives high-pressure feedwater from the condensate and feedwater system for steam generation. The steam turbine system converts steam into rotational energy. The generator system converts the rotational energy into electricity. The condensate and feedwater system condenses waste steam from the steam turbine system in the condenser. Condensate is pumped through several low-pressure feedwater heaters to the deaerator. The feedwater pumps take suction from the deaerator and supplies high pressure feedwater to the SGS. The Heat Rejection System (HRS) removes heat from the condenser through the cooling tower.

The HRS provides cooling water to the main condenser, NI, and EI Closed Cooling Water System under all conditions of plant power loading and design weather conditions. The heated circulating water flow is returned to the cooling tower where the waste heat from the thermal cycle is rejected to the atmosphere. Makeup to the cooling tower basin is provided by the Raw Water System. The cooling tower basin also receives blowdown flow from the Service Water System and discharges from the demineralized water systems and from SGS. The HRS blowdown is taken from the cooling tower basin and is routed to the waste water system for eventual discharge in accordance with the Wyoming pollutant discharge elimination system permit. The water chemistry control for the system is provided by the HRS chemical injection system.

Anticipated water demands for Kemmerer Unit 1 and Naughton Power Plant are provided in Table 3.4-1. The location of the cooling tower is provided on Figure 3.1-3.

3.2.2.4 Water Intake (Raw Water System)

The existing Naughton Power Plant Raw Water Settling Basin is the Kemmerer Unit 1 raw water source. The Naughton Power Plant Raw Water Settling Basin receives makeup flow from the existing Naughton Power Plant cooling water intake structure on the Hams Fork River. Raw water is conveyed from the Naughton Power Plant Raw Water Settling Basin to Kemmerer Unit 1 via raw water transfer pumps located within a pump house near the Raw Water Settling Basin (Figure 3.2-3) and filtered through an ultrafiltration unit.

3.2.2.5 Service Water System

Filtered raw water is the source for the service water system. Service water is supplied to EI building washdown hose stations and the demineralized water system.

3.2.2.6 Demineralized Water System

The EI Demineralized Water System creates, stores, and transfers demineralized water to the Condensate and Feedwater System power cycle fill and makeup, EI Closed Cooling Water System fill and makeup, and the NI water system fill. Water from the Service Water System is used as the water supply for the water treatment skids. The water treatment skids, located within the water intake structures and treatment buildings, include water treatment systems such as reverse osmosis filters, cartridge filters, reverse osmosis permeate tanks, electro-deionization skids, chemical feed skids, and clean-in-place skids to adequately treat the service water. Demineralized water is stored in the demineralized water storage tank, and the demineralized water transfer pumps then convey water to the required users.

3.2.2.7 Potable Water System

The potable water system provides a water supply for domestic use and human consumption. Water of potable quality is produced by passing the demineralized water through a mineralizer; the treated water is then stored in a potable water storage tank. Potable water is distributed to restrooms, kitchens, showers, service sinks, and emergency showers and eye wash stations throughout the EI and NI. The water is treated to ensure Federal, State, and local water quality standards are met.

3.2.2.8 Closed Cooling Water System

The EI and NI closed cooling water systems remove heat from auxiliary equipment within the EI and NI. Demineralized water from the EI and NI demineralized water systems are used for the initial fill and makeup to the cooling loops. The EI and NI closed cooling water circulation pumps circulate fluid through the closed cooling loop, removing heat from components and heat exchangers which are necessary for EI and NI operation.

The EI and NI closed cooling water loop is equipped with a chemical addition tank to maintain the chemistry of the closed cooling water and an expansion tank to absorb expansion of the cooling fluid with temperature fluctuations. Heat accumulated in the EI and NI closed water loop is removed through the use of heat exchangers, with water from the HRS acting as the heat sink.

3.2.2.9 Chilled Water System

The NI chilled water system removes heat from the NI heating, ventilation, and air cooling system air-handling units. Demineralized water from the NI demineralized water system is used for the initial fill and makeup to the cooling loop through the expansion tank. The NI chilled water circulation pumps circulate fluid through the closed cooling loop, removing heat from air handling unit cooling coils.

The NI chilled water loop is equipped with a chemical addition tank to maintain the chemistry of the circulating fluid and an expansion tank to absorb expansion of the circulating fluid with temperature fluctuations. Heat accumulated in the NI chilled water loop is cooled by air-cooled chillers.

3.2.2.10 Sanitary Waste System

Sanitary waste from restrooms, kitchens, showers, and service sinks is collected and treated. In each applicable building, sanitary waste flows by gravity to the respective building lift station. Each lift station is at a low point in the sanitary waste system and has pumps to transfer waste streams for processing.

Each lift station pump conveys sanitary waste to the extended aeration skid to treat the Kemmerer Unit 1 sanitary waste stream, which is received by the waste water system for discharge.

3.2.2.11 Floor and Equipment Drains System

Process fluid from equipment and floor drains is collected in building sumps. Each sump is equipped with sump pumps to convey the collected fluid to an oil and water separator, if required, and ultimately to the waste water sump. The reject and backwash sump in the water intake structures and water treatment buildings is routed directly to the waste water sump.

Floor drains and drain piping that could contain potentially radioactive fluid are kept physically separate from nonradioactive drains and are not contained in this system. Water from such drains is routed to the Liquid Radwaste Processing System for processing with other liquid radioactive wastes. (See Section 3.4.2)

3.2.2.12 Water Discharge (Waste Water System)

Extended aeration skid effluent, HRS cooling tower basin blowdown, floor and equipment drains, and water treatment reject are collected in the waste water sump and then mixed with a neutralizing acid or caustic substance. When the combined discharge has met Wyoming pollutant discharge elimination system permit limitations, the combined process waste streams discharge to the outfall at North Fork Little Muddy Creek.

3.2.2.13 Stormwater Management System

The Kemmerer Unit 1 stormwater management system is comprised of catch basins, manholes, storm drainpipe, and three stormwater detention basins (two on the east side of the site and one on the west side of the site). Water is drained away from buildings and roads via sheet flow to catch basins. From there, stormwater pipes convey the water into the stormwater detention ponds. In the stormwater basins, release is controlled via a basin outlet structure with properly sized orifices. In case of a riser failure or rainfall events exceeding the design storm, emergency spillways are provided to prevent overtopping. Approximately half of the runoff from the NI discharges to a stormwater basin to the east (see PSAR Section 2.5.2).

The permanent stormwater management basins for Kemmerer Unit 1 make use of the sediment basins used during the construction phase. After building activities are complete, the basins will be inspected, and any remaining built-up sediment will be removed prior to their conversion to permanent stormwater detention basins. Runoff from the site during operation will be directed to the permanent stormwater management basins where the sediment in the runoff will settle out prior to runoff being discharged to nearby water courses. Maintenance activities will include inspecting and clearing culverts, cleaning catch basins and stormwater basins, and keeping paved areas clear of debris (see PSAR Section 2.5.2).

3.2.2.14 Transmission System

Kemmerer Unit 1 has one 230 kV switchyard to transmit generated power to the transmission lines for power export during normal operation and import power during plant startup. The 230 kV switchyard will be connected to the nearby Naughton Power Plant substation by two transmission lines. Kemmerer Unit 1 will comply with PacifiCorp’s “Facility Connection Requirements for Transmission Systems (46 kV and Higher Voltages)” policy for technical requirements for facilities that are interconnected with PacifiCorp\'s transmission system at Naughton Power Plant. (PacifiCorp 2021)

The main power for Kemmerer Unit 1 consists of three systems:

- The 230 kV switchyard that transfers power between Kemmerer Unit 1 and the 230 kV transmission lines
- A normal main power supply system that transforms and transfers the power generated by the steam-turbine generator unit to the 230 kV switchyard and supplies power to plant auxiliary loads through the unit auxiliary transformer during plant normal operation
- An alternate main power supply system that transforms and transfers power from the 230 kV switchyard to the plant auxiliary loads through the reserve auxiliary transformer when the normal main power supply system is out of service

During normal plant operation, the normal main power supply system transmits power from the main generator to the 230 kV switchyard via the generator circuit breaker and the main step-up transformer. Plant auxiliary power is provided from the isolated phase bus tapped connection through the unit auxiliary transformer, which, in turn, supplies the medium voltage 6.9 kV distribution system.

During plant startup and shutdown, with the generator circuit breaker open, plant auxiliary loads are back feed power via the main step-up transformer from the 230 kV switchyard to the unit auxiliary transformer. When the normal main power supply system is not available, plant auxiliary loads are supplied from the reserve auxiliary transformer, an alternate main power supply system fed from the 230 kV switchyard.

During a loss of offsite power event, two standby diesel generators will automatically start and provide backup power to NI Alternating Current Electrical Power–Medium Voltage System for plant-specific loads, including power to NI battery chargers, and heat tracing to avoid freezing. The standby diesel generators are part of the EI Standby Alternating Current Power System.

References

3.2-1 (PacifiCorp 2021). PacifiCorp. “Facility Connection Requirements for Transmission Systems (46 kV and Higher Voltages) T&D Planning Policy No. 139.” Revision 9, 2021.

Table 3.2-1 Water Balance Stream Flow Rate

Stream No.	Stream Description	Maximum (100%) (gallons per minute)	Average (70%) (gallons per minute)	Minimum (20%) (gallons per minute)
1	Naughton Raw Water Settling Pond to EI	5,270	3,689	1,054
2	Raw Water Upstream of Ultrafiltration	258	180	52
3	Fire Water Storage Tanks Makeup	0	0	0
4	Reject Water From Ultrafiltration	33	23	8
5	Ultrafiltration Skid Effluent	225	161	55
6	Water Treatment Reject from First Pass RO	45	32	11
7	Demineralized Water to Power Cycle	170	119	34
8	Steam Generation System Blow Tank Influent	90	63	18
9	Sampling and Misc. Losses	80	56	16
10	Quench Water to Blowdown Tank	63	44	13
11	Blowdown Tank Flash Losses	37	26	7
12	Quenched Blowdown to Cooling Tower	116	81	23
13	Cooling Tower Blowdown	1,029	720	206
14	Service Water Users	5	5	5
15	Potable Water to Potable Water Users	6	6	6
16	Packaged Sewage Treatment Extended Aeration Skid Influent	6	6	6
17	Packaged Sewage Treatment Extended Aeration Skid Sludge to Off-Site Disposal	0	0	0
18	Extended Aeration Skid Effluent to Waste Water Basin	6	6	6
19	Plant Discharge from Waste Water Basin	1,118	787	236
20	Makeup to Cooling Tower	5,012	3,508	1,002
21	Cooling Tower Evaporation and Drift	4,116	2,881	823
22	Floor and Equipment Drains to Oil and Water Separator	5	5	5
23	Oil and Water Separator Sludge to Off-Site Disposal	0	0	0
24	Oil and Water Separator Effluent to Cooling Tower	5	5	5

Figure 3.2-1 Reactor Power Conversion System Diagram

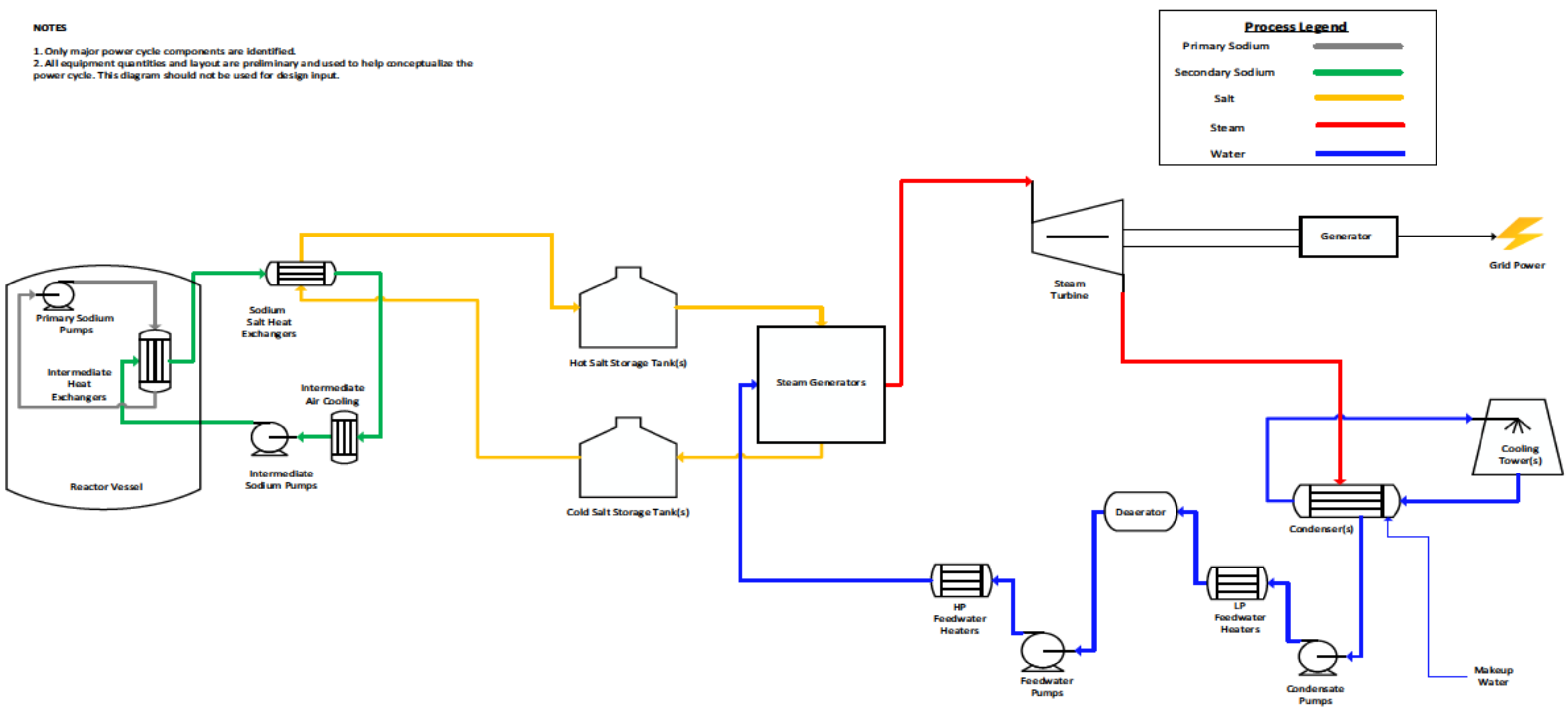


Figure 3.2-2 Plant Water Use/Balance

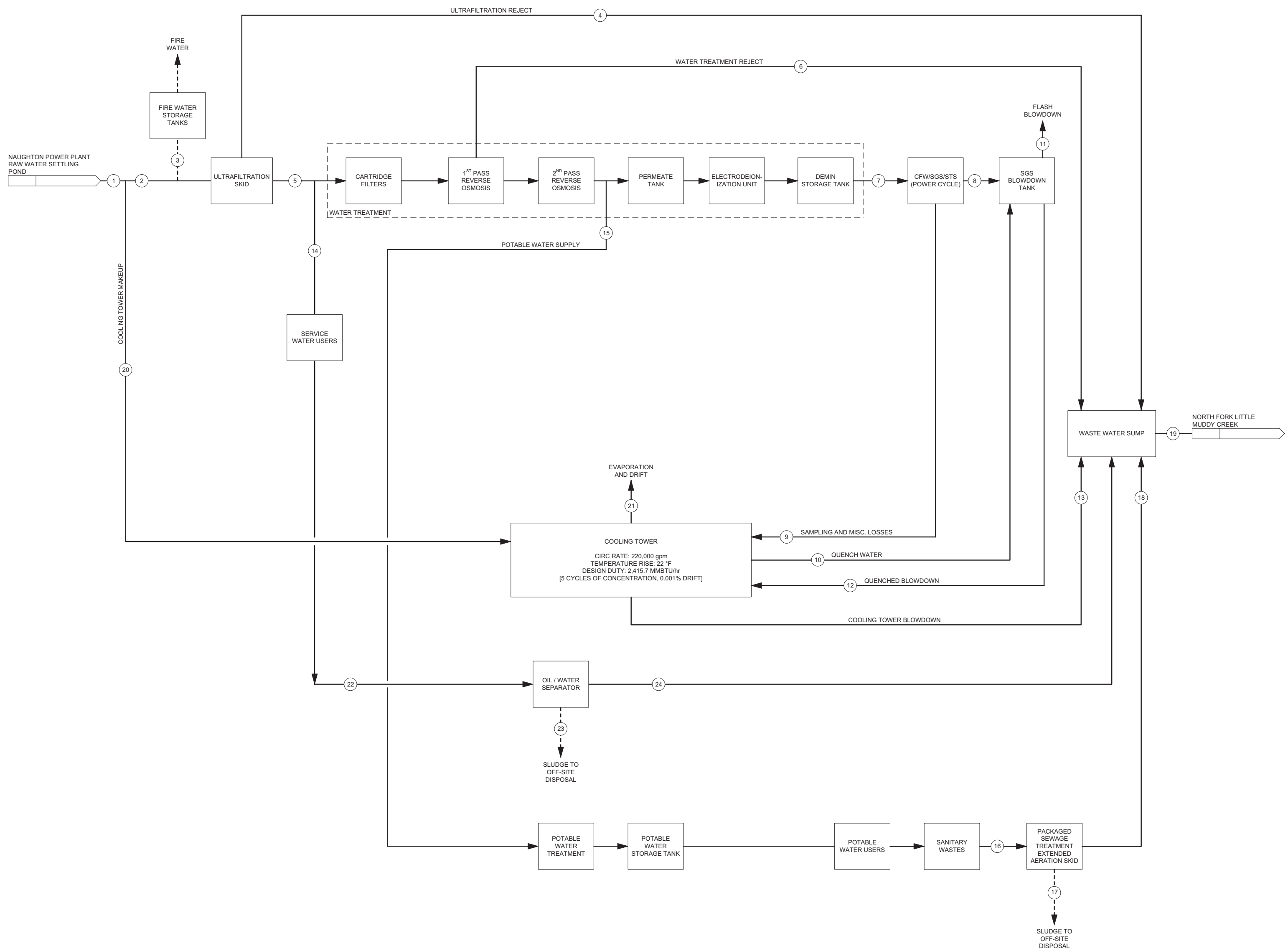
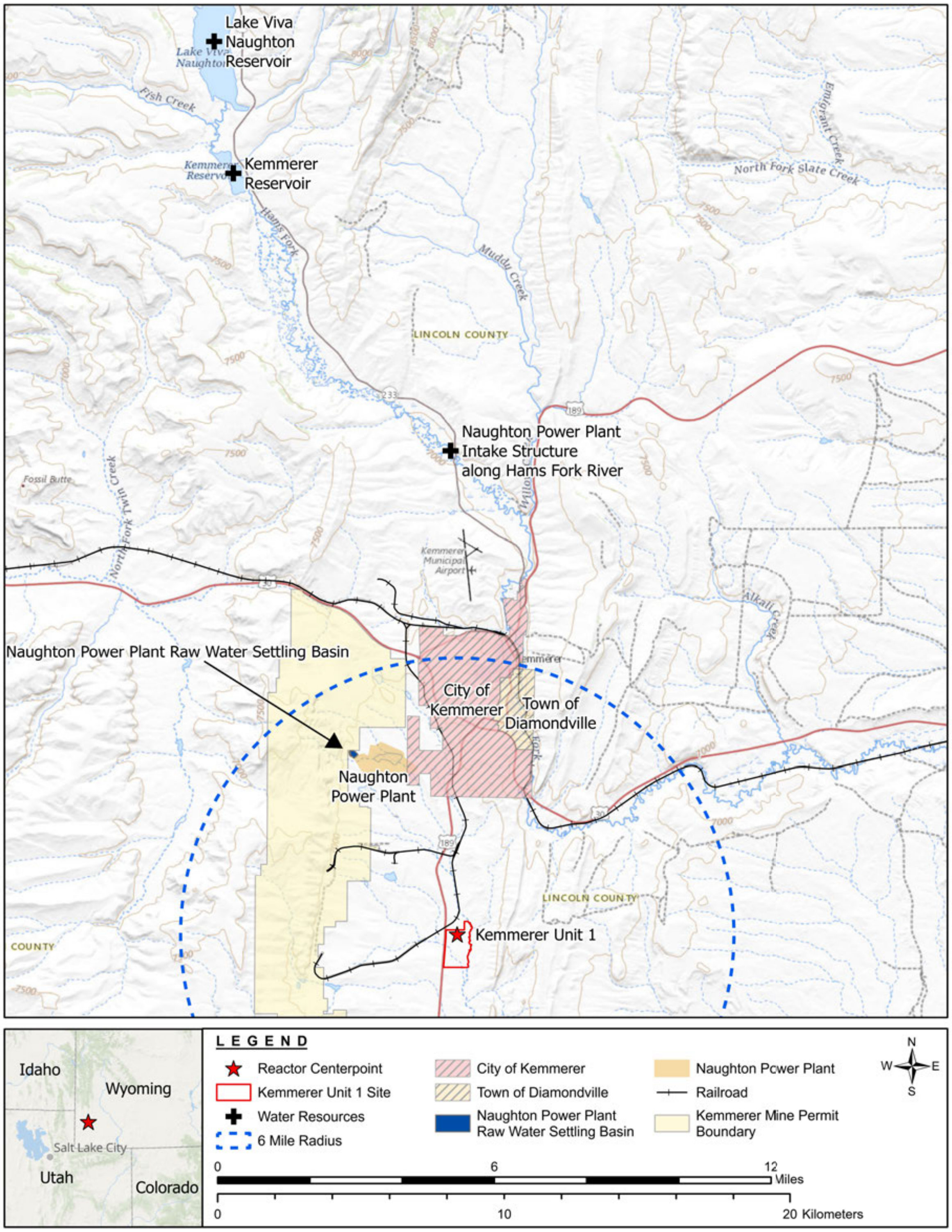


Figure 3.2-3 Water Intake



3.3 Building Activities

A conceptual description of building activities, preconstruction and construction, for Kemmerer Unit 1 are described in this section. Building activities, methods, and durations influence the environmental impacts resulting from the building of Kemmerer Unit 1. The environmental impacts resulting from the building of Kemmerer Unit 1 and mitigative measures are presented in Chapter 4.

Preconstruction Activities and Activities Prior to NRC Environmental Impact Statement Issuance

Consistent with the NRC definition of construction activities in 10 CFR 51.4, those activities not considered construction will commence prior to issuance of the construction permit (CP). The preconstruction activities, however, will not begin prior to receipt of necessary approvals, inclusive of a Department of Energy (DOE) National Environmental Policy Act of 1969 (NEPA) review and issuance of a Wyoming Department of Environmental Quality industrial siting permit along with other State and local permitting requirements (see Section 1.4 for a list of permits).

Construction Permit Activities

Upon receipt of the CP, the construction activities described in 10 CFR 51.4 will begin. Specifically, constructing the structures, systems, and components for Kemmerer Unit 1, such as the reactor building, reactor auxiliary building, and fuel handling building.

Schedule

Preconstruction activities will begin as soon as April 2025, after receipt of necessary approvals and prior to issuance of an Environmental Impact Statement (EIS) from the NRC.The construction schedule assumes approximately 53 months upon receipt of the CP, with the start of fuel load as soon as July 2030. The peak construction workforce for Kemmerer Unit 1 of 1,653 occurs at month 18. It is anticipated Kemmerer Unit 1 will initiate commercial operations by the end of 2031. Because the Kemmerer Unit 1 Site is in a remote area, it is anticipated the project will require a significant in-migration workforce from outside of Lincoln County and the State to meet the peak needs of the project. Table 3.3-1 summarizes the major milestone activities for the preconstruction activities, CP construction, and startup and operations.

Summary of Land Disturbance

The building activities for Kemmerer Unit 1 will comply with State and local requirements. Environmental best management practices will be implemented to minimize impacts during preconstruction and construction activities.

The Construction Facilities Plan, as depicted in Figure 3.3-1, illustrates the disturbed land areas and other construction features. A summary of the major land disturbances on the site and in the vicinity is provided in Table 3.3-2.

3.3.1 Preconstruction Activities

Preconstruction activities for Kemmerer Unit 1 are anticipated to commence as soon as March 2025 and continue through the issuance of the NRC CP, estimated to occur as soon as September 2026. Note, there are defined preconstruction activities that will be ongoing throughout the building of Kemmerer Unit 1.

It is anticipated that preconstruction activities will occur throughout winter months. Table 3.3-3 provides the preconstruction activities that are anticipated to be performed in advance of CP issuance for Kemmerer Unit 1. A description of those preconstruction activities occurring prior to issuance of the Kemmerer Unit 1 CP are presented in Table 3.3-3 and described below.

3.3.1.1 Earthwork, Spoils and Laydown Areas, and Stormwater Management Pond Establishment

Early earthworks will occur in four phases. Phases A and B will occur throughout the site. Phases C and D will be limited to the Energy Island (EI) and site infrastructure with the exception of the installation of temporary power distribution and construction trailer set up on the Nuclear Island (NI). A description of each of these phases is provided below.

Phase A – Layout, Benchmarks, Erosion Control: Survey of the site will occur, benchmarks will be set based on State coordinates and translated to job site coordinates. Silt fence and erosion controls will be installed to protect from silt and runoff to surrounding wetlands and waterways.

Phase B – Clear and Grub, Drains: This phase will include stripping of the top layer of the site, including the laydown areas. Topsoil and organic material will be removed. Stripping will include up to 12 inches (30 centimeters) of soil according to site topography. Where grade is suitable, storm water pipe and catch basins will be installed for removal and collection of surface water.

Phase C – Mass Excavation and Backfill: This phase will include importation and placement of common and structural backfill for site roads and the placement of a retaining wall and structural fill pad at the Reactor Fabrication Building (RFB) for start of its construction. In parallel and follow on, there will be general excavation for the site. Areas will be taken to a common sub-grade elevation for further excavations for specific commodities such as foundations, duct banks, and underground pipe. Areas will be left open, with temporary drainage, to accommodate installation of these commodities. Backfill will occur as installation completes. Individual areas such as foundations and pipe will be backfilled directly after completion.

Phase D – Construction of the RFB, Temporary Construction Power Distribution and set up Trailers: This phase will entail the construction and powering of the RFB and installation of the above ground portions of the temporary construction power system. Underground portions will be installed primarily in the phases above. Minimal excavation will occur to deliver temporary power cables to their final location. Trailer setup will require minimal excavation, typically only auger type anchors or shallow foundations will be required.

The estimated soil quantity to be removed or filled and earthwork activities are identified in Table 3.3-4. Construction work will be contracted and the source of the qualified fill will be identified at that time. Typical construction equipment and associated noise levels are provided in Table 3.3-5.

3.3.1.1.1 Spoils Areas

Spoils areas will be established to manage soils and debris cleared, grubbed, or excavated during preparation of the Kemmerer Unit 1 Site. The total area for spoils will be approximately 1.5 acres (0.6 hectares). Drainage from the spoils piles will be controlled through measures such as berms, riprap, sedimentation filters, and detention ponds in compliance with the Storm Water Pollution Prevention Plan. The project will use qualified spoils for common fill on site. Storage for imported fill will be located near the spoils piles on the southern part of the site. The estimated area for storage of this fill is estimated at 1 to 2 acres (0.4 to 0.8 hectares).

3.3.1.1.2 Laydown Areas

Laydown areas will be set up to support fabrication and installation activities. There are three laydown areas proposed for the building of Kemmerer Unit 1:

- East Laydown area: 17 acre (6.9 hectare) area located east of the EI
- South Laydown area: 42 acre (17 hectare) area located south of the EI
- Remote Laydown area (Access Road): 1 acre (0.4 hectare) area located south of the EI
- Remote Laydown: 5 acre (2 hectare) area located south of the EI

The major construction land disturbances are presented in Table 3.3-2.

3.3.1.1.3 Stormwater Management Ponds

The excavation of pond areas will also occur during this timeframe. This will include the building of the sediment pond embankments. Inlet and outfall structures and culverts will also be installed.

3.3.1.2 Access Road and Parking Areas

3.3.1.2.1 Access Road and Temporary Roads

In order to facilitate the building and operation of a nuclear facility on the Kemmerer Unit 1 Site, road improvements will be required. It will be necessary to grade and clear the ground along the paths in order to build the main access and onsite roads. A new entrance will be built for the site as part of the building of the Sodium Test and Fill Facility. Modifications to U.S. 189 will be necessary for both the Sodium Test and Fill Facility and Kemmerer Unit 1 sites. Access locations are identified on Figure 3.3-1. The access and temporary road is slated to occur prior to initiation of Kemmerer Unit 1 building activities (see Sections 1.0 and 1.3). This evaluation will be included as part of the Cumulative Impacts for the Sodium Test and Fill Facility project.

3.3.1.2.2 Parking Areas

The parking area will be located to the west of the NI, as shown on Figure 3.3-1. The parking area will not be built until the Section 106 consultation process is complete. Temporary parking will be set up prior to building of the permanent lot. The area will be cleared and grubbed, levelized, and sloped for drainage. Geofabric and road base for the surface will be installed, and a road will be installed from the access road to the parking lot. The parking area will be approximately 13 acres (6.5 hectares) to support the construction workforce.

3.3.1.3 Temporary Utilities

Temporary power distribution will be delivered from the existing 25-kV line running along US 189. The lines will be overhead on new poles. The temporary utilities support the building site and associated activities, including trailers, warehouses, storage and laydown areas, fabrication and maintenance shops, and the concrete batch plant. Water for the batch plant, dust suppression, flushing water tanks, and miscellaneous water for washing trucks and equipment will be provided by the Kemmerer-Diamondville Water and Wastewater Joint Powers Board and trucked to the jobsite and stored in onsite water tanks. Supplemental water from the Naughton Power Plant Raw Water Settling Basin may be used for dust suppression. Drinking water will be a combination of bottled water and through the use of on-site water purification trailers. Potable water will be taken from the local municipal site and held in storage tanks to be treated by the on-site trailers. Waste water from bathroom trailers, and portable toilets will be emptied and disposed of off-site by a subcontractor or can be treated on site using treatment trailers for dust suppression or non-potable use. Estimated water usage for construction of Kemmerer Unit 1 is provided in Table 3.3-6.

3.3.1.4 Nuclear Island Structural Preparation and Building Activities

3.3.1.4.1 Reactor Fabrication Building

Following placement of the RFB structural fill pad, the following activities will occur: placement of the reinforced concrete floor slab; erection of structural steel for the building; installation of the RFB bridge crane, conductor rails and aerial raceway and lighting; finishing building siding and roofing; installation of oversize doors and powering up and utilizing the temporary construction power system.

3.3.1.4.2 Reactor Building

Excavation to the top of the shaft will occur during preconstruction. This will include removal of earth and rock to the design elevation to the top of reactor shaft and establishment of a temporary dewatering system. Spoils will be removed from the area to the designated stockpile areas. The reactor shaft will be installed after permit approval and are 120 feet (36.6 meters) below plant finish grade.

3.3.1.4.3 Reactor Auxiliary Building and Spent Fuel Handling Building

Removal of earth and rock to the bottom of the design elevation and establishment of the temporary dewatering system will also occur during this timeframe. Spoils will be removed from the area and sent to the spoils area.

3.3.1.5 Energy Island Structural Preparation and Building

3.3.1.5.1 Energy Island Preparation

Excavation or backfilling will occur to establish sub-grade for respective buildings and tanks and the bottom of the electrical trench. Installation of the electrical culverts, along with the installation of formwork, rebar, embeds, and the placement of concrete, will occur during preconstruction. Additional underground commodities will be installed in this phase, including various pipe classes, grounding wire, and a stormwater drainage system.

3.3.1.5.2 Turbine Facility

During this phase, removal of earth and rock to the bottom of the design elevation will occur. Installation of sand bedding for areas with circulating water pipe and installation of pipe will also occur.

3.3.1.5.3 Fire Water Tanks

The excavation of tank foundations and the installation of underground commodities in the area will also occur prior to issuance of CP. Installation of formwork, rebar, embeds and the placement of concrete will also occur during this timeframe.

3.3.1.5.4 Demineralized Water and Condensate Makeup Tanks

The installation of formwork, rebar, and embeds and placement of concrete will occur.

3.3.1.6 Site Infrastructure

3.3.1.6.1 Concrete Batch Plant

Located southeast of the EI will be a concrete batching facility and concrete testing trailer. The area will be prepared, cleared, and grubbed of vegetation; dirt levelized; and foundations and washout basins excavated. The installation of base slabs for the batch plant, storage silos, wash stations, and aggregate bins will also occur prior to issuance of the CP and EIS along with the setup of batch plant components and support trailers. Temporary power will also be installed, and the foundation will be made of graded fill. The average amount of water used by a 150 to 200 yards (115 to 152 m^3) per hour central mix concrete plant is estimated to be approximately 30,000 gallons (114 m^3) per day at the peak and will come from the Kemmerer-Diamondville Water and Wastewater Joint Powers Board.

3.3.1.7 Linear Facilities and Support Facilities

Prior to initiating the permanent construction, the site will provide temporary facilities such as offices, wellbeing tents for the professional craft, warehouses, and trailers for each crew in a distinct area. These temporary support structures will be supported by a shallow concrete foundation.

Two 230-kV overhead transmission lines will be built with steel towers providing electrical clearances and design factors consistent with the applicable design codes. Tower foundations will be concrete and use foundation configurations and depths appropriate for local soil conditions and loads. Spans will be adjusted to avoid placing structures in wetlands, streams, and culturally sensitive areas. The transmission lines will occupy a nominal 250-foot-wide (76-meter-wide) right-of-way. Two areas, each approximately 400 feet by 400 feet (122 meters by 122 meters), will be needed at the ends of the legs for laydown and pulling of the wires during construction.

The water supply pipeline will require a nominal 50-foot-wide (15-meter-wide) construction easement. The construction easement will allow for temporary trench spoil storage and equipment parking during pipeline installation. The pipeline will be buried for most of its length using open cut trench excavation techniques. Horizontal directional drilling will be employed for the rail and highway crossings. Horizontal directional drilling will also be used where the pipeline route crosses wetlands, streams, and culturally sensitive areas. Because the detailed designs and routes of the linear facilities are not available, a macro-corridor analysis to characterize the impacts to land, ecological, and cultural resources has been used.

3.3.2 Building Activities After NRC EIS Issuance

The building activities that will be performed after receipt of the CP and EIS, including the structural construction and completion of structures, systems, and components, are presented in the following subsections.

3.3.2.1 Earthwork

Phases C and D earthwork will continue on the NI as described in Section 3.3.1.1.

3.3.2.2 Nuclear Island Construction

3.3.2.2.1 Fuel Handling Building

The Fuel Handling Building mass excavation will be performed in conjunction with the NI mass excavation to a common elevation. Deep excavation for subgrade foundations will occur after the Reactor Building (RXB) deep shaft is installed. Subgrade foundation walls will be installed to support equipment installation. After subgrade equipment is installed, grade foundation will begin. The Fuel Handling Building contains a high percentage of in-slab commodities including pipe, embeds, and electrical. In foundation commodities will be installed to support concrete placements. Above grade steel will be erected after foundation completion to support above ground equipment set. Roof panels will be left out to support equipment installation. Crane access for this setting will be on the east side due to the RXB and NI Control Building (NCB) placement.

3.3.2.2.2 Reactor Auxiliary Building

The foundation for the Reactor Auxiliary Building will be excavated in conjunction with the mass excavation for the RXB and NI Warehouse. The deepest excavations for the foundations of the sodium and nitrate salt drain tanks will be performed next in order to install the deep shaft walls. Floor foundations and walls in the subgrade section will be installed next. Concurrent with the mass excavations, all associated underground and in foundation quantities will be installed. Equipment setting in the subgrade elevations will occur prior to at grade foundation installations. Above-ground steel will be installed by direct hire craft professionals after equipment and foundations are complete. Mechanical and electrical bulks will follow steel installation. Crane access will be on the north and south side of the building. Crane support for heavy equipment will be from the north and will be a Liebherr LR1400, or equivalent. Crane height is not anticipated to be greater than 200 feet (61 meters).

3.3.2.2.3 Fuel Auxiliary Building

The Fuel Auxiliary Building will be excavated separate from the mass excavation due to its location and the relatively shallow depth of the foundation. This building has no deep areas. The foundation will be excavated in a neat line manner to support installation. Embedded commodities will be installed. Steel structure panels and roofing will be installed after completion of foundations. Equipment installation will be through the roof. Roof and wall panels will be shipped in the largest sections available in order to minimize installation time in the field. Crane access to this building will be from the north or west depending on load weight and location.

3.3.2.2.4 Nuclear Island Control Building

The NCB area will be part of the mass excavation of the NI to establish a common elevation. The NCB has significant underground foundations below the control room to house electrical equipment and RPS cabinets. Underground ductbanks between the NCB and the RXB will be installed at this time while the area is uncovered for foundation work. After subgrade foundation work is complete, electrical equipment in this area will be installed and protected prior to the installation of the NCB at grade floor. In the event equipment delivery does not support the planned construction sequence, provisions for equipment installation into the subgrade will be provided to facilitate equipment installation. After subgrade equipment is set, the NCB grade foundation will be installed, followed by the building shell and roof. Equipment in the NCB above grade will be installed after the roof is installed through access doors.

3.3.2.2.5 Reactor Fabrication Building

The RFB is required for the assembly of the guard vessel and the reactor vessel. The building will be completed early in the project to support first delivery of the individual pieces.

During the construction phase, the RFB will be used for erection, assembly, testing and storage of the completed reactor subassemblies. After transport of the completed reactor assembly to the RXB, the RFB will be used for storage.

The building will remain after construction is completed.

3.3.2.2.6 Nuclear Island Warehouse

The NI Warehouse will be a separate structure for housing of spare parts for plant operations. The building will not be used for construction purposes.

3.3.2.3 Energy Island Structural Construction

3.3.2.3.1 Turbine Facility Building

The Turbine Facility Building fill and excavation will occur during the mass excavation. Large amounts of backfill will be required on the east side due to native elevation of the site. Backfill will be brought in to bring elevation up to the bottom of the EI foundations, or slightly above the bottom of the mat in order to minimize form work. The construction method will be determined based on the final design. Underground commodities in the area will be installed as the earthwork progresses. The turbine foundation will be installed to release above ground installation. Steel erection will begin after foundation work is complete. Steel and platforms will be built in tiers. As each tier completes, piping and electrical commodities will be released.

Additional above ground concrete in the turbine building will be required for the turbine pedestal and support columns. These columns will be erected with engineered formwork and placed sequentially. After pedestal legs are complete, installation of the turbine pedestal top will occur. Numerous embedded commodities will be installed in this foundation. Condenser erection will occur concurrently outside the turbine building. The two condensers will be shipped modularized from the manufacturer by the largest size and weight permissible for transit. This will reduce erection time and allow the condensers to be slid into location prior to the pedestal placement. Turbine and generator erection will be by a subcontractor with technical support from the manufacturer. A combination of the permanent overhead crane and a strand jack system will be used to support the erection. Strand jacks will be used for the heavier pieces, usually the low-pressure rotors and the generator.

Crane support for steel, piping, and electrical is provided on both the east and west sides of the turbine. Clear access for cranes exists on three sides of the building. Mechanical and electrical equipment will be installed as building erection progresses to minimize complicated rigging operations and allow installation of building siding.

3.3.2.3.2 Energy Storage Structure Salt Tanks (Hot and Cold)

The Energy Storage Structure Salt Tanks (Hot and Cold) has the deepest foundations in the EI due to weight and temperature. Excavation and fill in this area will occur during the mass excavation and then neat line excavated to bottom of concrete. Following completion of the foundation, the installation of the tanks proper will be performed by a subcontractor. Above ground commodities for electrical, pipe, and steel platforms will be installed by direct hire craft.

Piping and electrical will be sequenced after platform steel is installed. Pipe rack connections to the tank pipe systems will occur after the tanks are erected. This will allow for better access to the tanks to complete welding and coatings. Crane access for the west tank will be from the north and west sides. Crane access for the east tank will be from the north and east sides. Each tank erection will require a 90- or 100-ton (80- to 90-metric-ton) RT crane. Crane support will be intermittent to support discipline work.

3.3.2.3.3 Security,Training, Administration Building

The Security, Training, and Administration Building will be located on the far west side of the plant. The Security, Training, and Administration Building is a basic administrative and services building. The Security, Training, and Administration Building is in a large backfill area. Backfill operations will stop at an elevation above the bottom of the mud mat and be excavated down to allow for ease of form installation. The remainder of the construction of this building will be similar to a commercial type or warehouse building. Commodities to be installed include air conditioning and heating, electrical, and piping.

3.3.2.3.4 Steam Generator Building

The foundation for the Steam Generator Building (EIB) will be worked after the Energy Storage Structure Salt Tanks (Hot and Cold) foundations are completed. This foundation will be placed in two or three placements depending on final slab dimensions. Underground and embedded commodities will be installed in and around the foundation prior to placement. Structure installation will begin after concrete operations are completed. Steel erection will occur from west to east. Modularization of steel bays will be evaluated to facilitate schedule improvements. Bottom elevations of the structure are similar and are modularized. Installation of the structure will occur in a tiered approach allowing the far east bay to be built up two bays and then proceeding with the bottom section in the next bay. This method will proceed until building steel is erected. Electrical and piping commodities will be installed as bays and safe access permit.

There are multiple sets of steam generating equipment located in the EIB. This equipment is modularized to the maximum extent possible by design and equipment configuration. The equipment may be set per bay and per elevation. Interconnections may be performed as the area becomes available.

Interconnecting piping between the EIB and the Turbine Facility Building will be installed after equipment set in the EIB is complete. Pipe rack supports for this pipe run will be installed concurrently with the EIB foundation.

Three cranes will required to support the erection of the EIB. One crane will be on the west side to support steel and commodity installation. This crane will be a 200-ton (180-metric-ton) Manitowoc 14000 track crane or equivalent. On the east side of the EIB there will also be a 200 ton (180-metric-ton) Manitowoc 14000 track crane, or equivalent, to support steel and commodity installation. Additionally, on the southeast side of the EIB there will be a Liebherr LR14000, or equivalent, to support equipment installation for reach and capacity during building construction. This crane supports both the EIB and the Turbine Facility Building.

3.3.2.3.5 Water Treatment Building

The WIB foundation will be placed in two mass pours. All required in-slab drains, sumps, piping, and electrical will be installed prior to placement. Structural steel will be installed using a Grove RT100 or similar capacity crane. Building siding and roofing along with girt steel will be installed. Electrical and mechanical skids and equipment will be set in place. Any large equipment will be set prior to roofing being installed. Piping and electrical bulk installation will occur in conjunction with equipment setting.

3.3.2.3.6 Cooling Tower

At the completion of HRS piping, installation work will begin on the circulating water pipe structure and forebay bottom mat. This will be the deepest foundation associated with the cooling tower. The walls of the forebay structure will be broken into vertical sections with the break line at the sloping section of the Circulating Water Pump Area Intake Facility. The slope walls and base will be poured concurrently. Once the walls of the Circulating Water Pump Area Intake Facility are completed, the top mat and pump supports will be installed along with embeds and any commodities. Pump installation will occur later after completion of the cooling tower structure and associated components. The cooling tower basin foundation will be installed after completion of the forebay structure. The basemat will be poured in seven segments. As the basemat progresses, work will begin on the walls with a slip form system. After completion of the basin, the substructure will be installed, followed by the top deck. Installation will be by column line with prefabricated bents after completion of the structure equipment including fans and fan shrouds. Pipe and electrical bulks will occur after completion of the structure and roof deck.

3.3.2.4 Other Facilities and Site Completion

Other facilities to be constructed or installed include the following:

- Switchyard
- Transmission
- Plant support buildings
- Salt Containment Berm
- Miscellaneous tanks
- Training and Administration Building
- Circulating water piping
- Main and Auxiliary Transformers
- Reserve Auxiliary Transformers

3.3.2.4.1 Construction Sequencing

The NI is separated from the EI by physical barrier with controlled access for personnel and material. The NI and EI, depicted in Figure 3.3-1, will proceed in parallel with the sequence described in Table 3.3-7.

3.3.3 Workforce Characterization

The workforce for the construction and operation of Kemmerer Unit 1 is provided to assess the environmental and socioeconomic impacts of Kemmerer Unit 1, as described in Sections 4.4 and 5.4. This workforce characterization involves estimating the number of workers for building and operating Kemmerer Unit 1, workforce relocation, and commuting.

The estimated workforce, characterization, and relocation and commuting are described in the following paragraphs.

3.3.3.1 Construction Workforce Characterization

The construction workforce for building Kemmerer Unit 1 will generally consist of two components: field craft labor and field craft nonmanual labor. Field craft labor will be the largest component of the construction workforce, consisting of approximately 75 percent of the field workforce, based on conventional pressurized water reactor nuclear power plant construction. This labor force will consist of various disciplines, including civil, electrical, mechanical, piping, subcontractors, and instrumentation personnel. This labor force will be used during the building and startup of Kemmerer Unit 1. Field nonmanual labor will make up the balance of the construction workforce, or approximately 25 percent, with the assumption that design engineering will be performed offsite. The field nonmanual labor workforce will be comprised of field management, field supervision, field engineers, quality assurance and quality control, environmental safety and health, and administrative and clerical staff.

3.3.3.1.1 Preconstruction Activities Workforce Before Construction Permit Issuance

As described in Section 3.3, preconstruction activities will begin as soon as April 2025 with an estimated peak workforce of 772 over a 16-month schedule before the issuance of the CP and the start of construction for Kemmerer Unit 1. The work schedule is five days a week, ten hours per day until issuance of the CP. Table 3.3-8 and Figure 3.3-3 summarize the workforce personnel requirements by month for building activities.

3.3.3.1.2 Construction Activities Workforce

As described in Section 3.3, it is estimated that the Kemmerer Unit 1 construction workforce will peak at approximately 1,653 employees. The workforce curve is based on projected labor from various sources including the construction schedules, subcontractor estimates, and the indirect craft buildup. Table 3.3-8, Figure 3.3-2 and Figure 3.3-4 summarize the workforce personnel requirements by month for construction activities.

3.3.3.1.3 Construction Worker Relocation and Commuting

Information regarding the expected residency patterns for in-migrating construction workers is presented in Section 4.4.2.

3.3.3.1.4 Operations Workforce

It is estimated the onsite operations workforce will be 250 personnel. It is assumed the onsite operations workforce is hired and trained over a three year period. Table 3.3-9 presents the estimated onsite operations workforce by month. Figure 3.3-2, Figure 3.3-3, and Figure 3.3-4 illustrate the workforces of construction, operations, and combined workforce by month, through initiation of Kemmerer Unit 1 commercial operations.

References

3.3-1 (FHA 2006). Federal Highway Administration. “Construction Noise Handbook Chapter 9.” 2006. https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook. Accessed July 23, 2023.

Table 3.3-1 Kemmerer Unit 1 Building Activities Milestones

Activity or Milestone	Date
DOE ARDP Award	October 2020
Interconnection Request Application Submitted to PacifiCorp Transmission	April 2022
Cluster Study Agreement Executed	June 2022
Construction Permit Application Submitted to NRC[a]	March 2024
Industrial Siting Permit Application Submittal to WYDEQ	Projected Q3 2024
DOE NEPA Review for Kemmerer Unit 1 Complete	Projected Q2 2025
Kemmerer Unit 1 Site Preparation Start	Projected Q2 2025
Nuclear Island First Concrete	Projected Q4 2026
Operating License Application Submittal	Projected Q3 2027
Kemmerer Unit 1 Construction Complete	Projected Q4 2029
Fuel Load Start	Projected Q3 2030
Full Power Operations	Projected Q3 2031

[a] See Table 1.4-1

Table 3.3-2 Major Construction Land Disturbances

Location	Area (Sq Ft)	Area (Acres)
NI Volume	1,150,889	26
EI Volume	1,010,010	23
Switchyard Volume	321,704	7
East Laydown Area Volume	749,154	17
West Construction Parking Volume	555,169	13
South Laydown Area Volume	1,810,131	42
Remote Laydown Access Road Volume	44,131	1
Remote Laydown Area Volume	234,476	5
NI Pond Volume	72,929	2
EI Pond Volume	74,101	2
NI EI Pond	46,061	1
Misc Areas	507,255	12
Total	**6,576,011**	**151**

Table 3.3-3 Preconstruction Activities Prior to CP Issuance

Early Earthworks
Phase A **-** Layout, Benchmarks, Erosion Control
Phase B **-** Clear & Grub, Drain
Nuclear Island
Earthworks
Phase D **-** Install Temp Power Distribution, Set Up Trailers
Other Works
Reactor Fab Building **-** FREP Basemat, Excavation Install UG Services, Erect Steel Structure, Install Tray and Rails
Reactor Building**-** Excavate to Top of Shaft
Reactor Aux Building **-** Excavation
Fuel Handling Building **-** Spent Fuel Excavation
Energy Island
Earthworks
Phase C **-** Mass Excavation
Phase D **-** Install Temp Power Distribution, Set Up Trailers
Other Works
Turbine Facility Excavation, Install UG Services (Circ Water Pipe)
Turbine Facility **-** FREP Basemat
Install UG Service
Fire Water Tanks **-** Excavation, Install UG Services, FREP Foundations
Demin Water Tank **-** Excavation
Condensate MU Tank **-** Excavate, Prep Area
EI Support Building **-** Excavation
Site Infrastructure and Construction Support
Earthworks
Phase C **-** Mass Excavation
Phase C **-** Mass Backfill
Phase D **-** Install Temp Power Distribution, Set Up Trailers
Other Works
Install Concrete Batch Plant
Install Construction Sediment Ponds
Establish Parking Lot **-** (cultural area start)
South Entrance Modification, Access Road Expansion and Heavy Load Haul Route to RFB
Convert Construction Sediment Ponds to Permanent Stormwater Management Basins

Table 3.3-4 Approximate Earthwork Quantities

Location	Cut (Cu Yds)	Fill (Cu Yds)	Net (Cu Yds) (- is Fill)
NI Volume	8,035	436,681	-428,646
EI Volume	7,840	206,219	-198,379
Switchyard Volume	0	242,583	-242,583
East Laydown Area Volume	0	106,505	-106,505
West Construction Parking Volume	7,077	25,894	-18,817
South Laydown Area Volume	118,446	75,278	43,169
Remote Laydown Access Road Volume	8	5,535	-5,527
Remote Laydown Area Volume	886	2,102	-1,216
NI Stormwater Pond Volume	1,635	9,305	-7,670
EI Stormwater Pond Volume	0	19,920	-19,920
NI and EI Stormwater Pond	0	15,880	-15,880
Misc Areas	17,365	112,159	-94,794
Total	**161,292**	**1,258,060**	**-1,096,768**

Table 3.3-5 Expected Construction Equipment with Peak Noise Levels

Equipment	Sound Level (dBA) at 50 ft Away
Auger Drill Rig	84
Backhoe	78
Blasting	94
Boring Jack Power Unit	83
Chain Saw	84
Compactor (Ground)	83
Compressor (Air)	78
Concrete Batch Plant	83
Crane	81
Dozer	82
Dump Truck	76
Excavator	81
Front End Loader	79
Generator	81
Grader	85
Impact Pile Driver	95
Mounted Impact Hammer (Hoe Ram)	90
Pneumatic Tools	85
Roller	80
Welder/Torch	74

Source: Reference 3.3-1

Table 3.3-6 Estimated Water Usage for Construction Operations

Dust Suppression							
Truck Capacity (gal)	**Number of Trucks**	**Times Run per Day**	**Days Running per Week, March - November**	**Number of Weeks**	**Number of Years**	**Total Volume (gal)**	**Water Quality**
2,000	2	3	6	40	4	11,520,000	Non-potable
500	1	1	6	52	5	780,000	Non-potable
Concrete Batch Plant							
Volume of Tanks (gal)		**Gallons per Cubic Yard (including washout)**	**Total Cubic Yards**	**-**	**-**	**Total Volume (gal)**	**Water Quality**
2x2 tanks x 25,000 gal per =	100,000	40	76,000	-	-	3,040,000	Potable or Better
Other Uses							
Use	**Gal per Day per Person, or Capacity - Fill Once**	**Average Staffing**	**Days Running per Week, Mark - November**	**Number of Weeks**	**Number of Years**	**Total Volume (gal)**	**Water Quality**
Drinking Water	2	1,200	6	52	5	3,744,000	Drinking Water
Flushing Water Tanks	6 tanks x 2	250	6	52	5	4,680,000	Non-potable
Misc. (e.g., for Tracks, Form Wash)	-	1,000	6	52	5	1,560,000	Non-potable
					Total Gallons Needed	**25,324,000**	

Table 3.3-7 Construction Sequencing for Kemmerer Unit 1

Building	Representative Sequence
Nuclear Island	
Reactor Fabrication Building	1
Reactor Building	2
Reactor Auxiliary Building Nuclear Island Control Building	3
Fuel Handling Building	4
Fuel Auxiliary Building	5
NI Warehouse-Sallyport	6
Energy Island	
Turbine Facility	1
Energy Storage Structure Salt Tanks (Hot and Cold)	2
Steam Generator Building	3
Switchyard	4
Water Treatment Building	5
Cooling Tower	6

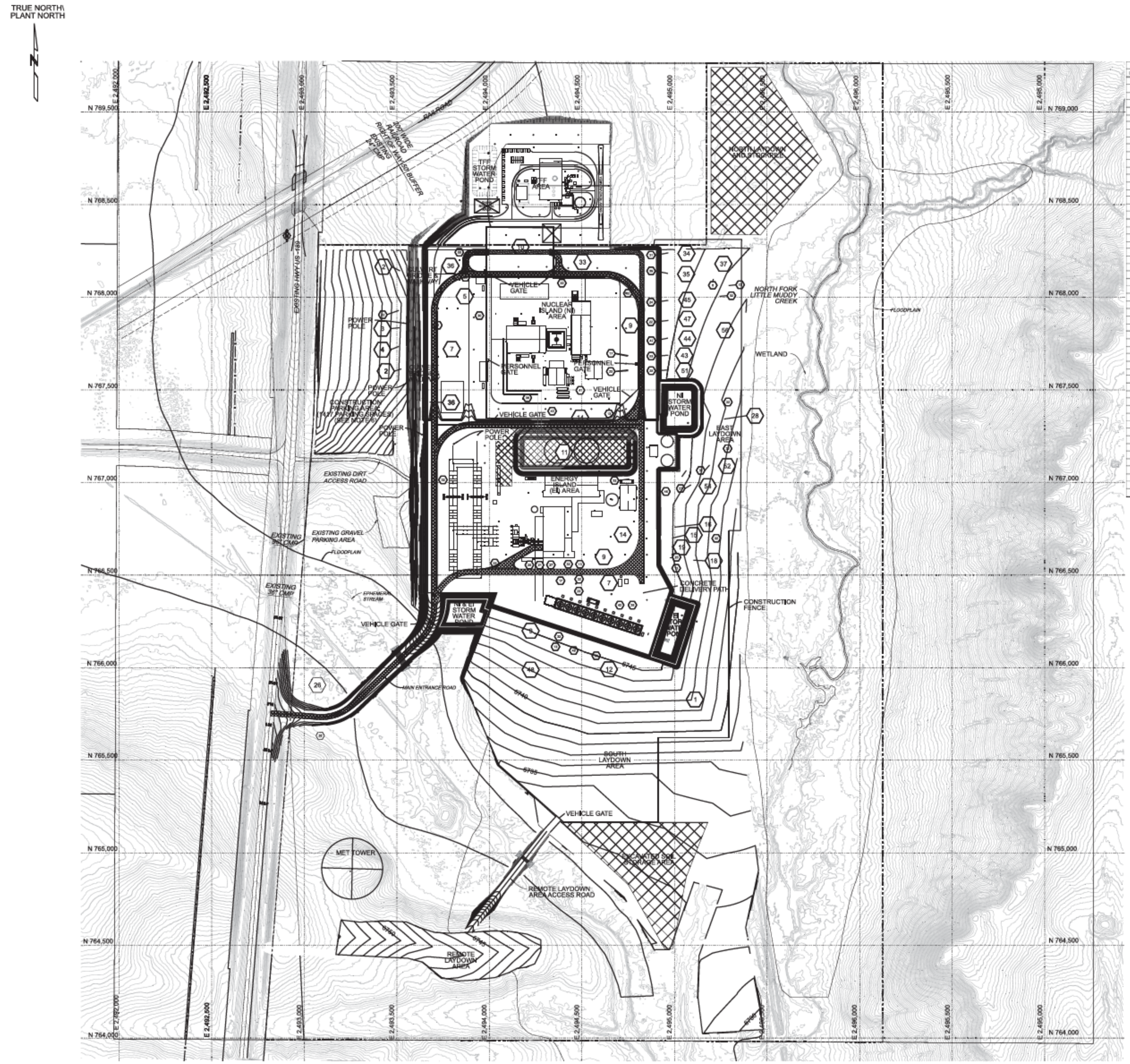
Table 3.3-8 Estimated Construction Workforce by Month for Kemmerer Unit 1

Month	Number of Personnel	Month	Number of Personnel	Month	Number of Personnel
Preconstruction Activities Prior to CP Begin Month -16		8	1,585	33	1,073
-16	1	9	1,607	34	968
-15	38	10	1,618	35	908
-14	45	11	1,639	36	789
-13	65	12	1,633	37	722
-12	85	13	1,641	38	570
-11	123	14	1,649	39	464
-10	151	15	1,645	40	375
-9	208	16	1,647	41	343
-8	265	17	1,617	42	265
-7	315	18	1,653	43	221
-6	402	19	1,634	44	139
-5	507	20	1,628	45	120
-4	553	21	1,652	46	116
-3	621	22	1,631	47	75
-2	678	23	1,631	48	33
-1	772	24	1,635	49	21
Building Activities Post CP Issuance Begin Month 1		25	1,635	50	14
1	933	26	1,632	51	14
2	978	27	1,599	52	14
3	1,117	28	1,542	53	14
4	1,258	29	1,474	54	5
5	1,365	30	1,368	55	5
6	1,445	31	1,226	56	0
7	1,555	32	1,169	57	0

Table 3.3-9 Estimated Operational Workforce by Month for Kemmerer Unit 1

Month	Number of Personnel	Month	Number of Personnel	Month	Number of Personnel
Preconstruction Activities Prior to CP Begin Month -16		9	10	35	140
-16	0	10	10	36	140
-15	0	11	20	37	140
-14	0	12	20	38	180
-13	0	13	20	39	180
-12	0	14	20	40	180
-11	0	15	20	41	200
-10	0	16	20	42	200
-9	0	17	20	43	225
-8	0	18	40	44	225
-7	0	19	40	45	250
-6	0	20	40	46	250
-5	0	21	40	47	250
-4	0	22	60	48	250
-3	0	23	60	49	250
-2	0	24	60	50	250
-1	0	25	60	51	250
Building Activities Post CP Issuance Begin Month 1		26	80	52	250
1	0	27	80	53	250
2	0	28	80	54	250
3	0	29	100	55	250
4	0	30	100	56	250
5	0	31	100	57	250
6	0	32	120	58	250
7	0	33	120	59	250
8	10	34	120	60	250

Figure 3.3-1 Construction Facilities Plan for Kemmerer Unit 1



CONSTRUCTION FACILITIES IDENTIFICATION	
ITEM NO.	DESCRIPTION
1	STEEL MODULE ASSEMBLY
2	BADGING TURNSTILE)
3	TRAINING AND BADGING
4	FIRST AID & FIT FOR DUTY (FFD) TESTING
5	BECHTEL CONSTRUCTON PROFESSIONAL
6	TERRAPOWER
7	CRAFT ASSEMBLY BUILDING AND WELL BEING
8	CHEMICAL STORAGE
9	PROCUREMENT AND WAREHOUSE
10	REACTOR FABRICATION BUILDING
11	TANK ERECTION AREA (SHOP)
12	BATCH PLANT
13	WASTE DUMPSTERS
14	WELD RODROOM
15	HEAVY EQUIPMENT MAINTENANACE SHOP
16	FUEL TANKSTATION
17	TOOL ROOM
18	HAZMAT STORAGE
19	GAS BOTTE STORAGE
20	WATER FIL STATION
21	PIPEFITTER
22	IRON WORKERS
23	CIVIL CONCRETE
24	ELECTRICAL
25	CARPENTERS
26	ENTRANCEWHEEL WASHER
27	RIGGING
28	SCAFFOLDS
29	ELECTRICIANS
30	NRC OFFICE
31	BOILERMAKER
32	BATHROOM
33	MIRRS/GVSTORAGE AND COATING
34	PIPE FAB AREA
35	REBAR FAEAREA
36	SECURITY GUARD CHECK
37	COATING BUILDING
38	DOCUMENT CONTROL NUCLEAR ISLAND
39	RODBUSTER
40	M&TE
41	WELD TEST
42	INSTRUMENTATION
43	INSULATION LAYDOWN AREA
44	INSTRUMENT FAB AREA
45	ELECTRICIAN FAB AREA
46	SAFETY & CONSTRUCTION SUPERVISION
47	IRONWORKERS FAB AREA
48	CRUSHINGAND SIFTING EQUIPMENT
49	BATCH PLANT TRAILER
50	BATCH PLANT PARKING
51	CARPENTER LAYDOWN AREA
52	BOIL MAKER LAYDOWN AREA
53	INSULATION SHOP
54	RIGGING LAYDOWN AREA
55	TEMP POWER
56	SUB CONTRACTOR AREA

Figure 3.3-2 Projected Onsite Construction Workforce by Month for Kemmerer Unit 1

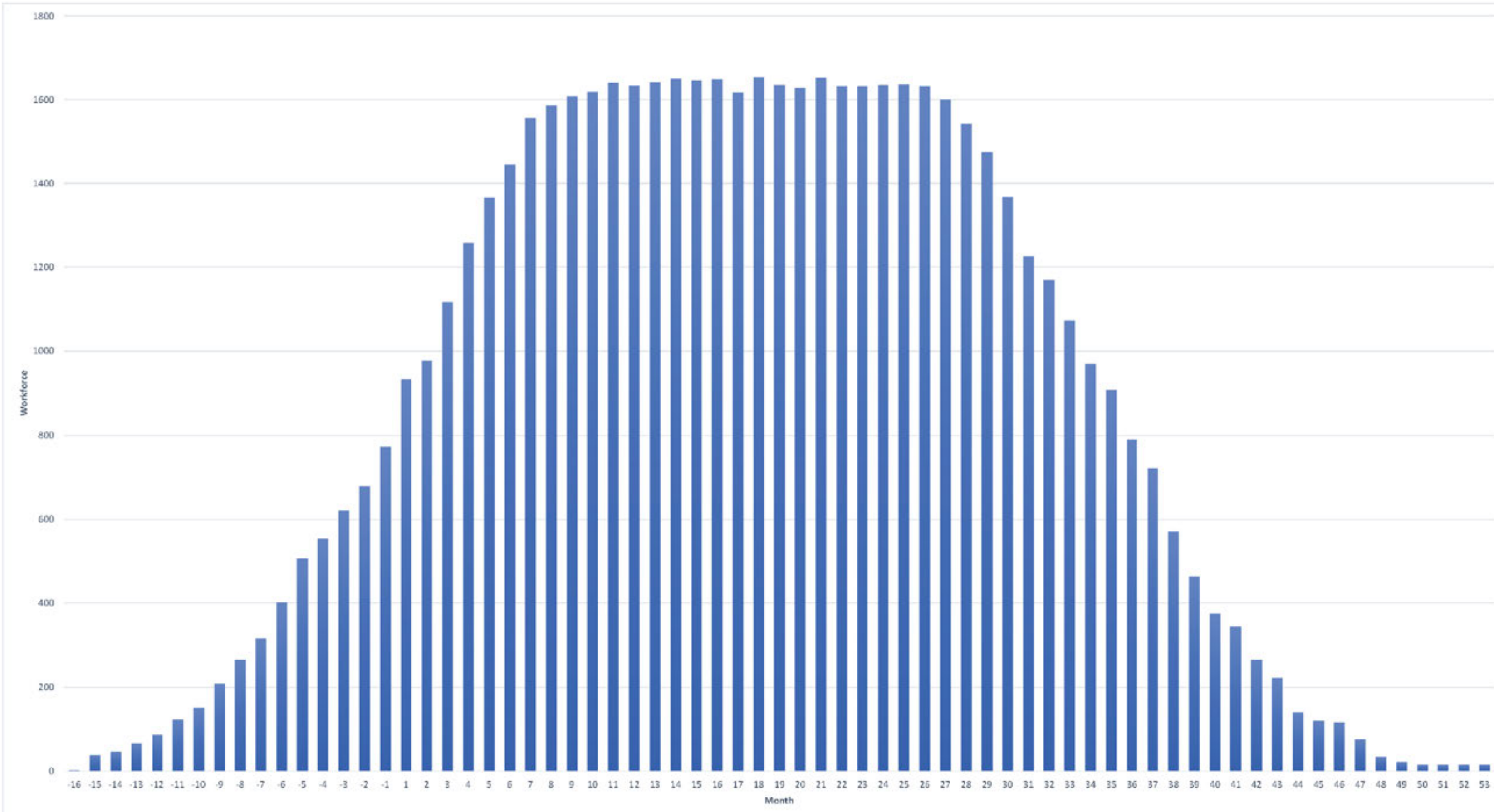


Figure 3.3-3 Projected Onsite Operations Workforce by Month for Kemmerer Unit 1

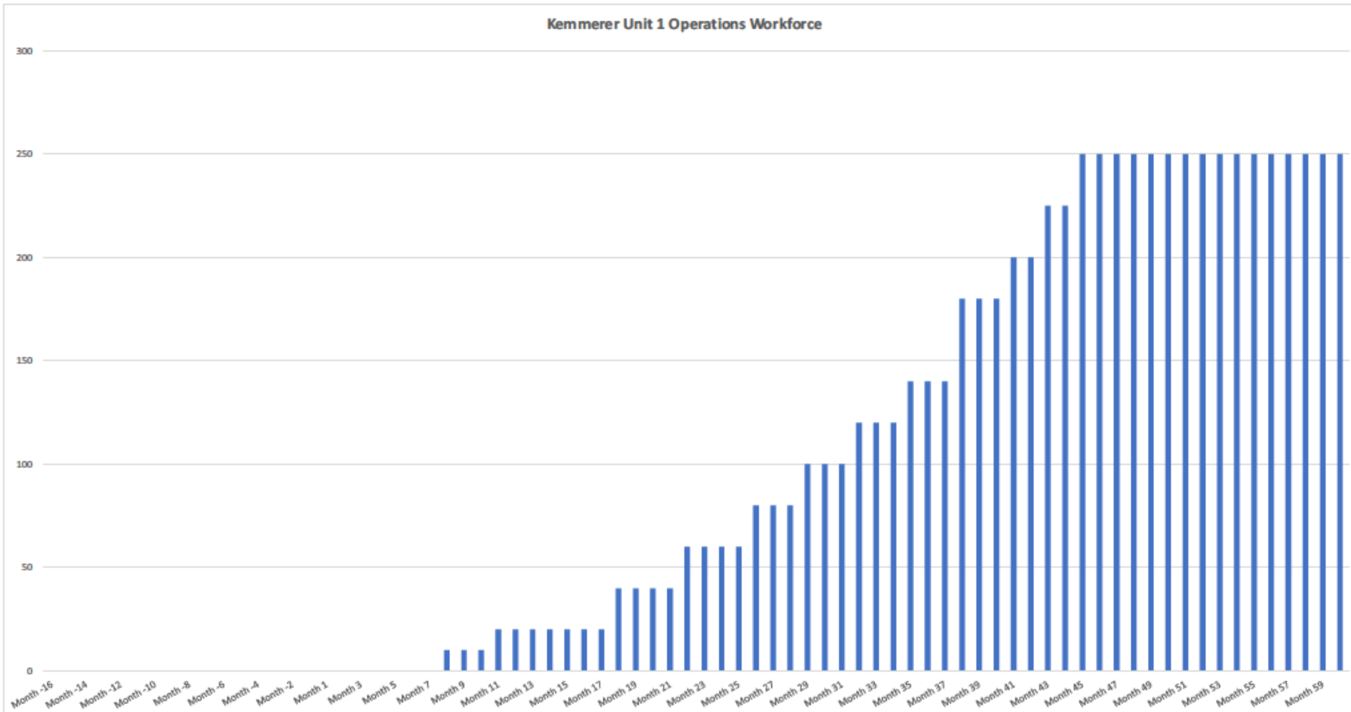
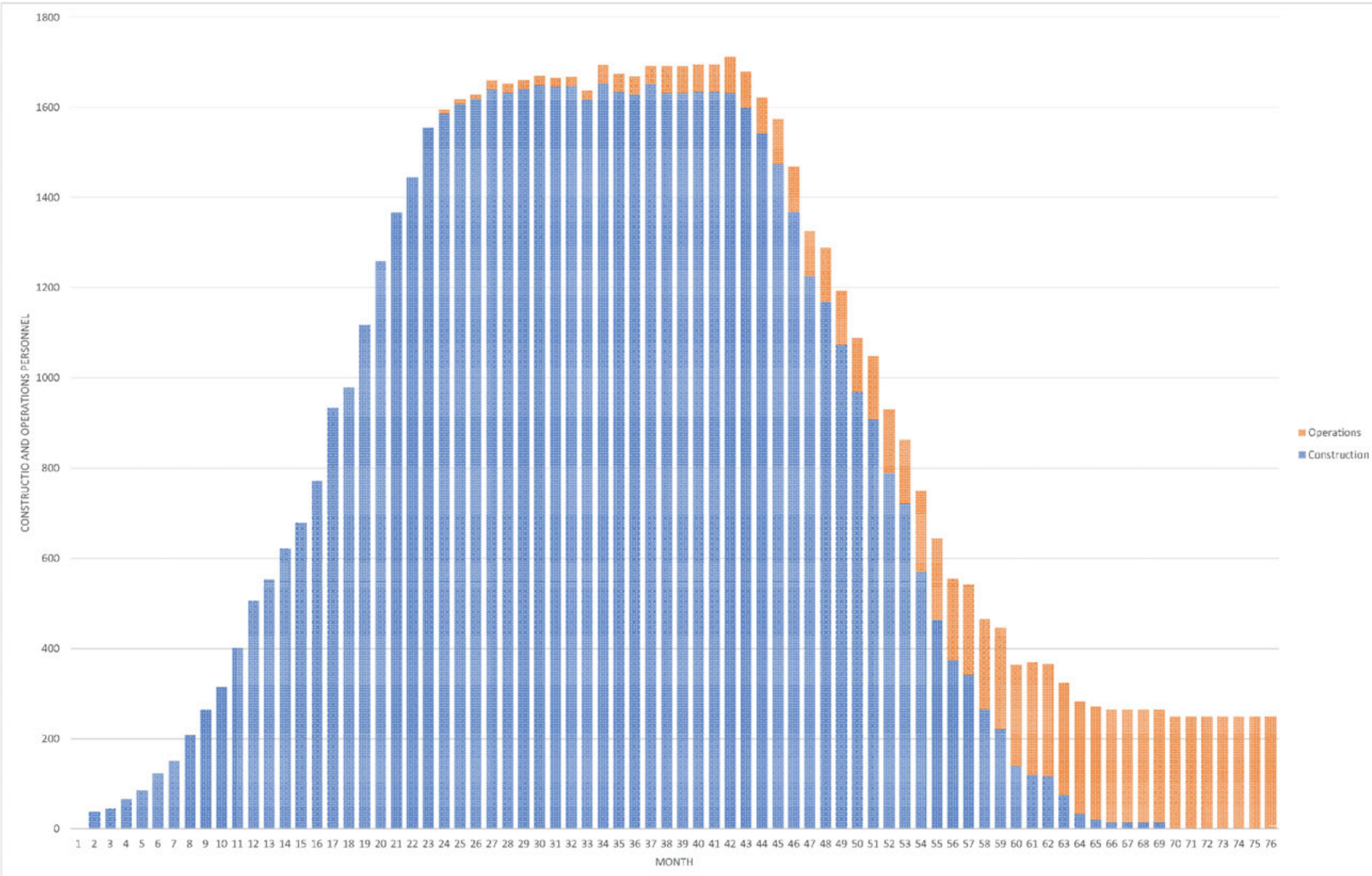


Figure 3.3-4 Projected Onsite Construction and Operations Workforce by Month



3.4 Operational Activities

The operational activities associated with Kemmerer Unit 1 include environmental interfaces, radioactive waste management, and non-radioactive waste management.

3.4.1 Plant Environmental Interfaces During Operation

3.4.1.1 Water Interfaces

3.4.1.1.1 Raw Water Consumption

Naughton Power Plant receives its raw water supply from the Hams Fork River, a tributary of the Green River, which is fed by the Viva Naughton Reservoir. The raw water is pumped from the Hams Fork River pumping station to the Naughton Power Plant Raw Water Settling Basin from where water is drawn into another pump-house that delivers water to Naughton Power Plant.

Kemmerer Unit 1 will be supplied with raw water by the Naughton Power Plant Raw Water Settling Basin, as detailed in Section 3.2.2.4. A new pump located at the Naughton Raw Water Settling Basin will pump water to a pipeline connected to Kemmerer Unit 1, as illustrated in Figure 3.1-5. The water from the Raw Water Settling Basin will provide water for the Heat Rejection System, condensate makeup, Potable Water System, fire protection system, demineralized water system, service water, and other miscellaneous uses for both the Nuclear Island (NI) and Energy Island (EI). Plant water use is shown on Figure 3.2-2.

The Kemmerer Unit 1 heat rejection system uses a closed-cycle, mechanical draft cooling tower as a heat sink for the two Condensate and Feedwater System (CFW) condensers, the Energy Island Water System (EWS) closed cooling water (CCW) heat exchangers, and the Nuclear Island Water System (NWS) CCW heat exchangers. Makeup water will be required to replenish circulating water lost to evaporation, blowdown, and drift.

PacifiCorp Water Rights and Naughton Power Plant Water Consumption:

- PacifiCorp manages the Viva Naughton Reservoir. The Reservoir holds approximately 45,000 acre-feet (55,506,600 cubic meters [m^3]). PacifiCorp stores water in the Reservoir pursuant to Permit Numbers 6418R and 7476R issued by the Wyoming State Engineer's Office for beneficial uses related to the operation of a steam electric generating plant (i.e., Naughton Power Plant).
- The maximum capacity of the pump system that moves water from Hams Fork River to the raw water settling basin is 8,749 gallons per minute (33.1 m^3 per minute) (approximately 19.7 cubic feet per second [0.558 m^3 per second] or 14,280 acre-feet per year [17,614,094m^3/year]).
- The average existing Naughton Power Plant water usage is 4,238 gallons per minute (16.0 m^3 per minute), 9.44 cubic feet per second (0.267 m^3 per second) or approximately 6,836 acre-feet per year (8,432,069 m^3 per year).
- The reported peak Naughton Power Plant flows are 10,344 gallons per minute (39.2 m^3 per minute). These peak flows occur briefly and infrequently.

3.4.1.1.2 Plant Water Demand

Table 3.2-1 presents water use streams along with their minimum, average, and maximum water consumption rates for the Kemmerer Unit 1 NI and EI water systems. Water demands include makeup water for the Heat Rejection System, Condensate and Feedwater System, and service water, as well as water supply for the potable water, fire protection, and the demineralized water systems feeding both the NI and EI. Normal values listed are expected values for normal plant operation. Maximum values are those expected to account for daily variations in operation conditions.

Average and maximum water demands for Naughton Power Plant and Kemmerer Unit 1 are provided in Table 3.4-1 and Table 3.4-2.

3.4.1.1.3 Plant Water Discharge

Table 3.2-1 identifies cooling water and waste water discharge streams and estimated flows, including losses through cooling evaporation and drift. The information provided also includes estimates for the waste water flows from the NI and EI, including sanitary waste, miscellaneous drains, and demineralizer waste discharges. Average values listed are expected values for normal plant operation. Maximum values are those expected to account for daily variations in operation conditions. Flow rates given are not necessarily concurrent.

Sumps will be directed to the waste water sump. The cooling tower blowdown, effluents from the Sanitary Waste System, and water treatment reject will be sent directly to the waste water sump. Following any required treatment in the waste water sump, the plant effluent will be discharged to North Fork Little Muddy Creek.

During building activities, the waste water system will collect system wastes produced during miscellaneous system flushing. Wastes will be treated to meet permit limits before discharge to North Fork Little Muddy Creek. Alternatively, drain wastes may be released to an existing suitable site facility or collected in tanks and disposed of in accordance with local regulation using appropriate licensed haulers.

The maximum waste water discharge flow rate to North Fork Little Muddy Creek will be approximately 1,118 gallons per minute (4,232 liters per minute).

3.4.1.2 Land Interfaces

3.4.1.2.1 Transmission

Two new 230-kV transmission lines will be installed from Kemmerer Unit 1 to the existing Naughton Power Plant substation. Figure 3.1-4 identifies the layout of the transmission lines via the transmission and co-located macro-corridors.

According to the November 2022 PacifiCorp Cluster Study Report, the “Naughton – Ben Lomond 345-kV transmission line” that will connect the Kemmerer Unit 1 substation to Naughton Power Plant substation, requires two new 88-mile (142-kilometer), 345-kV transmission lines. The route will generally be north from Kemmerer Unit 1, west to the existing power lines and then north to Naughton Power Plant substation as shown in Figure 3.1-4 (Reference 3.4-2). Impacts to land resources from the installation of transmission infrastructure are detailed in Section 5.1.

Transmission maintenance will be conducted in accordance with PacifiCorp policy. PacifiCorp will provide more guidance on inspections and maintenance once decisions are made on the specific equipment to be installed.

3.4.1.3 Air Interfaces

Kemmerer Unit 1 includes various stacks and vents associated with gaseous effluent release and diesel emissions. These are shown on Figure 3.1-3. The height of both Reactor Air Cooling System (RAC) stacks is approximately 127 feet (38.8 meters). The height of the plant stack, located next to the FHB, is approximately 102 feet (30.8 meters).

There are two Standby Diesel Generators, each with an electric output of no more than 6,000 kilowatts, for plant-specific loads for investment protection, as discussed in PSAR Section 1.1.4.3.6. These Standby Diesel Generators will use American Society for Testing and Materials D-975 -21 Grade 1-D S15 ultra-low sulfur diesel fuel and are each expected to run a maximum of 100 hours, annually. Estimated emissions from the Standby Diesel Generators are provided in Table 3.4-3.

The Auxiliary Boiler will be used during startup and shutdown and will use the same ultra-low sulfur diesel fuel as the Standby Diesel Generators and be a point of emissions. Design of the Auxiliary Boiler has not yet progressed to a point where size or estimated run time is known.

3.4.1.4 Summary of Plant Environmental Interfaces During Operation

A summary of environmental interfaces during plant operations is provided in Table 3.4-4 which includes section, table, and figure reference numbers where this information is discussed in more detail.

3.4.2 Radioactive Waste Management

Radioisotopes are generated during reactor operation through the fission and activation of nuclei. Fission products may enter the reactor coolant through leaks in the fuel cladding or diffusion. Activated core assembly structural materials may accumulate in liquid coolants via gradual corrosion. Coolant and the reactor cover gas may also be activated by neutrons. Radioisotopes may enter the environment through radioactive waste management systems in a controlled fashion, through small system leaks, or through breaching of systems for maintenance. Radioactive waste generated during plant operation can be solid, liquid, or gaseous.

Radioactive waste management systems (radwaste systems) are designed to minimize releases from reactor operation to as low as reasonably achievable. Radwaste systems are designed and maintained in support of compliance with 10 CFR 20. Design of radwaste systems is informed by 10 CFR 50, Appendix I. The offsite dose impacts from normal operation of the facility are provided in Section 5.9.

3.4.2.1 Liquid Radwaste Processing System

The Liquid Radwaste Processing System (RWL) is designed to collect, segregate, process, store, monitor, and sample liquid radioactive waste generated from normal operation, including anticipated operational occurrences. The RWL is designed for zero liquid release through the reuse or evaporation of processed liquid waste and thus has no release points.

The sources of potentially contaminated liquid routed to the RWL include:

- Fuel Handling Building sump, which collects from the following:
  - Spend Fuel Pool (SFP) cooling and purification leakage local sumps
  - SFP liner leakage sump
  - Truck bay local sump
  - Solid Radwaste Processing System (RWS) dewatering leakage sump
  - RAC towers rainwater collection sumps
  - Gaseous Radwaste Processing System (RWG) enclosure fire sprinkler sump
  - Various Fuel Handling Building floor drains
- Sampling chemistry sink
- Fuel Auxiliary Building RWL leakage sump
- Water Pool Fuel Handling System spent resins
- Spent resins storage tank leakage sump
- Resin dewatering from RWS
- NI Heating Ventilation and Air Conditioning System (NHV) dehumidifier condensate
- Process radiation monitor flush line drains
- Personnel laundry decontamination
- Decontamination hand washing and showers
- Equipment decontamination

Operational experience in other spent fuel pools has shown activated corrosion and fission products can be present in spent fuel pools. Such products could be present in the SFP during operation of Kemmerer Unit 1. Residual tritium in the pins will diffuse through the fuel and cladding into the SFP. The radionuclides from the SFP will be transported to the RWL. Expected activities are detailed in PSAR Section 9.1.

3.4.2.1.1 System Description

The RWL is depicted in PSAR Figure 9.1-1. Potentially contaminated water entering the RWL is directed to the waste holdup tanks for storage before processing. The RWL contains tanks, pumps, demineralizers, and filters. During processing, the holdup tank contents are passed through a preconditioning filter, a tubular ultrafilter, a two-pass reverse osmosis filter, and a demineralizer before entering the monitor tank. In normal operation, the monitor tank contents are directed to the SFP as makeup water or to the evaporator. If the activity in the monitor tank is too high for the liquid to be recycled or evaporated, it is redirected to the waste holdup tank for further processing.

The RWL spent resin storage tanks receive spent resin from the demineralizer and the Water Pool Fuel Handling System resin tanks. Spent resin in the storage tanks is fluffed with demineralized water and flushed to the RWS dewatering skid. Liquid returned from the dewatering skid is directed to the waste holdup tank.

3.4.2.1.2 Radioactive Releases

No liquid radioactive waste is released from the RWL. All liquid from the RWL is provided as makeup water to the SFP. Excess clean water is evaporated and the vapor is released to the atmosphere via the NHV. Solids collected from filtration, demineralization, or evaporation are sent for processing in the RWS.

Release of liquid effluent containing radioactive materials is limited to trace amounts of tritium which could be released in the cooling tower blowdown. This would require tritium produced in the reactor to diffuse out of the fuel and cladding, migrate through the plant's sodium and salt systems and, eventually, into the steam generator, where it could then migrate into the steam generator blowdown and be directed to the cooling tower blowdown. As described in Section 5.9.2.1, quantities released via this path would be indistinguishable from background.

3.4.2.2 Gaseous Radwaste Processing System

During reactor operation, radioactive isotopes are generated in the reactor and waste streams are directed to the RWG. The RWG is designed to collect and process the gaseous waste streams. The RWG provides holdup for the decay of short-lived radioactive isotopes and additional holdup for longer-lived noble gas isotopes, such as krypton and xenon, through the use of a carbon delay bed prior to release to the environment. Holdup times in the carbon delay beds are provided in PSAR Table 9.1-6.

The RWG filters particulate carryover, provides hold-up to allow radioactive decay, and conveys it to the NHV for release to the environment through the plant exhaust stack as a monitored release. Gaseous release activities and resultant radiological consequences are provided in PSAR Section 9.1.

3.4.2.2.1 System Description

The RWG, depicted in PSAR Figure 7.4.1-1, is located below grade in the Fuel Handling Building within the NI and is a passive, once-through, ambient temperature charcoal delay system. Gas is drawn into the RWG vacuum tank by a compressor and then into the holdup tank. From the holdup tank, the conditioned waste gas flows into one of four charcoal beds, configured in parallel. Each delay bed contains activated charcoal optimized for xenon and krypton retention. Following the charcoal beds, there is a controlled release to the NHV stack, which provides a monitored effluent path to the environment.

Each charcoal bed accepts 3 standard cubic feet per minute of flow, with the maximum flow within the RWG being 12 standard cubic feet per minute. Each charcoal bed contains 10,000 pounds (4,536 kilograms) of charcoal. Charcoal bed delay times are presented in PSAR Section 9.1.

3.4.2.2.2 Radioactive Releases

Releases of gaseous radioactive effluent occur due to the following:

- Venting of RAC ventilation discharges from the NI buildings by way of the NHV which collects leakage from various systems and gaseous discharge from the RWL
- RWG discharges
- Tritium diffusion from steam generator and cold salt storage tank cover gas
- Intermediate Heat Transport System venting to NHV
- Primary Heat Transport System venting to NHV
- SFP venting to NHV
- Pool Immersion Cell venting to NHV
- Secondary cover gas venting to NHV
- Primary cover gas venting to NHV
- Sodium-Air Heat Exchanger

3.4.2.2.3 Estimated Annual Releases

Annual gaseous releases from Kemmerer Unit 1 are provided in PSAR Table 9.1-1. All releases are conservatively modeled to be at ground level.

3.4.2.2.4 Release Points

Gaseous effluents are released through the plant stack, located in the NI, which accepts output from the NHV and the RWG. Other release points within the NI include the Sodium-Air Heat Exchanger and the RAC. Release points in the EI include tritium diffusion through the steam generator and the cold salt storage tank. Section 3.4.1.3 describes air interfaces of Kemmerer Unit 1.

3.4.2.3 Solid Radwaste Processing System

Wastes are generated through normal plant operation, including anticipated operational occurrences. Waste types include dry active waste, such as that identified in Section 3.4.2.3.1, and wet waste. Spent resins are considered to be wet wastes.

The RWS collects, processes, and packages waste resulting from normal plant operation. The system does not handle large radioactive waste materials such as core assemblies, spent fuel, and contaminated equipment. The construction and use of an Independent Spent Fuel Storage Installation is anticipated; Section 5.1 presents the anticipated need date and projected size.

3.4.2.3.1 System Description

The RWS, depicted in PSAR Figure 9.3-1, is located in the Fuel Handling Building and includes a compaction skid, a dewatering skid, and a storage area. The RWS compaction skid accepts compactable wastes and compacts the waste prior to storage. Drums are used for both compactable and non-compactable dry active waste. The storage area is sized to accommodate one fuel cycle's worth of waste.

Dry active wastes include:

- Ventilation filters
- Contaminated tools
- Plastics
- Miscellaneous dry materials (wood, cloth, paper)

Relatively long-lived isotopes will constitute a significant fraction of the total activity, thus radioactive decay in storage will be minimal. Activities and yearly waste generation volumes are included in Table 6.2-6.

Wastes are classified in accordance with 10 CFR 61.55. Class A, B, and C low-level wastes are shipped as described in Section 6.2.

3.4.3 Nonradioactive Waste Management

Typical non-radioactive waste streams include cooling water that may contain water treatment chemicals or biocides, water-treatment wastes, waste from floor and equipment drains, stormwater runoff, water pumped from excavations during construction, trash, hazardous waste, effluents from the sanitary sewer system, and miscellaneous gaseous, liquid, and solid effluents.

3.4.3.1 Effluents Containing Chemicals or Biocides

Chemicals will be used to control water quality, scale, corrosion and biological fouling. Sources of non-radioactive effluents will include plant blowdown, sanitary wastes, floor and equipment drains, and stormwater runoff. Proper water chemistry for plant operation requires the treatment of source water from the Naughton Power Plant Raw Water Storage Pond that will be used in the various plant water systems such as circulating water, service water, potable water, and demineralized water systems.

Systems that generate wastewater streams are detailed in Section 3.2. Wastewater streams generated from operations will include:

- Electrodeionization reject and reverse osmosis reject from the demineralized water subsystem
- Sanitary waste from restrooms, kitchens, showers, and service sinks from the potable water subsystem
- Extended aeration skid effluent, Heat Rejection System cooling tower basin blowdown, and water treatment reverse osmosis reject from the wastewater subsystem

- Process fluid from the equipment and floor drains subsystem

Expected flowrates are provided in Figure 3.2-2. Annual amounts, frequencies, and concentration details will be provided at the operating license stage.

3.4.3.1.1 Sanitary System Effluents

Sanitary waste produced during construction activities will be generated through the use of portable toilets and restroom facilities onsite and will be emptied frequently by a licensed hauler. Sanitary waste produced from restrooms, kitchens, showers, and service sinks during plant operations will be collected and treated. In each applicable building, sanitary waste flows by gravity to the respective building lift station. Each lift station is at a low point in the sanitary waste subsystem and will have pumps to transfer waste streams for processing. Each lift station pump will convey sanitary waste to the extended aeration skid for treatment and then to the waste water subsystem for discharge.

The specific chemicals and biocides to be used will depend upon the characteristics of the water to be treated and the design requirements of the subsystems described above. The anticipated constituents and their concentrations in the facility’s nonradioactive liquid waste discharges are provided in Table 3.4-5.

3.4.3.1.2 Effluent from Floor and Equipment Drains System

Process fluid from equipment and floor drains will be collected in building sumps. Each sump will be equipped with sump pumps to convey the collected fluid to an oil and water separator, if required, and ultimately to the waste water sump. The reject and backwash sump in the Water Treatment Building will be routed directly to the waste water sump.

3.4.3.1.3 Water Discharge - Waste Water System

Extended aeration skid effluent, Heat Rejection System cooling tower basin blowdown, floor and equipment drains, and water treatment reject will be collected in the waste water sump, where mixing with a neutralizing acid or caustic will occur.

The projected wastewater plant discharge from the Kemmerer Unit 1 Site to North Fork Little Muddy Creek is included in Figure 3.2-2 and is estimated at a maximum flow rate of 1,118 gpm.

The rates of inflow and blowdown of the water systems will be managed, and effluents from the systems will be processed to minimize the concentrations of the chemicals and biocides contained in facility discharges. However, facility discharges may contain low-level concentrations of chemicals, biocides, or both. The chemical concentrations in effluent streams will be controlled through engineering and operational and administrative controls to meet the requirements of the Wyoming Pollutant Discharge Elimination System permit.

3.4.3.2 Other Effluents

Miscellaneous nonradioactive gaseous, liquid, and solid effluents not addressed in Section 3.4.3.1 that are discharged to the environment are described in this section.

3.4.3.2.1 Gaseous Effluents

The primary sources of gaseous emissions from auxiliary systems will be from the standby diesel generators. The gaseous effluents expected from a diesel generator will include particulate matter, sulfur oxides, carbon dioxide, carbon monoxide, hydrocarbons, and nitrous oxides.

Proposed chemicals producing gaseous effluent are shown in Table 3.4-3. The plant will include various stacks and vents associated with plant operations for release of gaseous effluent and diesel emissions. These are identified in Figure 3.1-3. Emissions from all sources of gaseous effluent will be estimated when inputs become available.

Two standby diesel generators will be onsite. The standby diesel generator enclosure that houses both standby diesel generators will be located west of the Steam Generator Building. Each generator will run in the event of an emergency and will produce a gaseous effluent stream containing carbon monoxide, carbon dioxide, nitrous oxide, particulate matter, and sulfur dioxide emissions. Based on 100 hours of use per generator per year, quantities of effluent are shown in Table 3.4-3. The ultra-low sulfur diesel fuel used in these generators will comply with federal emissions standard for sulfur oxide compounds and all applicable U.S. Environmental Protection Agency and State guidelines.

Argon and nitrogen will be used as plant process gases. The argon gas distribution and storage system distributes argon as the cover gas for sodium containing systems. These gases would likely be emitted into the atmosphere in insignificant quantities should any leaks in equipment, piping, valves, or seals occur.

3.4.3.2.2 Liquid Effluents (Not Containing Chemicals or Biocides)

Stormwater and snow melt removal will occur throughout the execution of the project. Water from excavations will be pumped and filtered through in line filtering or through the project established silt fence boundary. The site will install stormwater ponds during the construction sequence. The project will also install a series of catch basins and stormwater ponds to collect run off during construction and operations.

The Kemmerer Unit 1 Storm Drainage System will be comprised of catch basins, manholes, storm drainpipe, and three stormwater detention basins (two on the east side of the site and one on the west side of the site). Water will be drained away from buildings and roads via sheet flow to catch basins. From there, stormwater pipes will convey the water into the stormwater detention ponds. In the stormwater basins, release will be controlled via a basin outlet structure with properly sized orifices. In case of a riser failure or rainfall events exceeding the design storm, emergency spillways will be provided to prevent over topping. Approximately half of the runoff from the NI will discharge to a stormwater basin to the east.

As detailed in Section 3.2.2.13, the permanent stormwater management basins for the site will make use of the sediment basins used during the construction phase of the project. After construction activities are complete, the basins will be inspected, and any remaining built-up of sediment will be removed prior to their conversion as permanent stormwater detention basins. Runoff from the site during operation will be directed to the permanent stormwater management basins where the sediment in the runoff will settle out prior to runoff being discharged to nearby water courses. Maintenance activities will include inspecting and clearing culverts, cleaning catch basins and stormwater basins, and keeping paved areas clear of debris.

Anticipated stormwater discharges leaving the site to surface water resources will comply with the Wyoming Pollutant Discharge Elimination System permit as well as Federal and State water quality standards.

3.4.3.2.3 Solid Effluents

Building activities will generate waste from clearing and grubbing and from general construction. Nonradioactive solid waste will include typical industrial wastes such as metal, wood, paper, and trash (food waste and office wastes), as well as process wastes such as nonradioactive resins, filters, and sludge. Where practicable, solid waste will be recycled based on the capacity of local facilities, as described in Section 4.10. The facility will generate used oil from equipment maintenance. Used oil wastes will be disposed of using an approved vendor.

Universal wastes (such as lamps, batteries, pesticides, and aerosol cans) generated onsite will be managed using an approved vendor in accordance with local rules and regulations.

Based on comparable reactor size, the facility is expected to produce a similar annual amount, approximately 3,500 tons, of nonradioactive, nonhazardous solid waste as described in NUREG-2226 (Reference 3.4-3).

3.4.3.2.4 Hazardous Waste and Mixed Waste

Considering the definitions of hazardous wastes and mixed wastes from 40 CFR Part 261, operation of Kemmerer Unit 1 is expected to produce waste in quantities similar to those described in NUREG-2226 (Reference 3.4-3). It is expected that Kemmerer Unit 1 will be classified as a Small Quantity Generator of Hazardous Wastes. Hazardous Wastes will be disposed of by a licensed hazardous-waste management facility. In accordance with hazardous material management regulations in 40 CFR 261 and 40 CFR 265, onsite storage of hazardous and mixed wastes are limited. Hazardous and mixed wastes will be shipped offsite for treatment or disposal after a period of accumulation.

References

3.4-1 (PacifiCorp 2023). PacifiCorp and PSE. “Updated Technical Report - Naughton Power Plant Raw Water Supply System Study,” PacifiCorp, July 2023. Section III - Existing System. Pages 3-4.

3.4-2 (PacifiCorp 2022). PacifiCorp. “Generation Interconnection Cluster 2 Study Report Cluster Area 7,” November 14, 2022.

3.4-3 (NRC 2019) U.S. Nuclear Regulatory Commission. “Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site.” NUREG-2226. 2019. Final Report.

Table 3.4-1 Average Water Demand for Naughton Power Plant and Kemmerer Unit 1

Description	Average Demand (gallons per minute)
Naughton Power Plant[a]	4,238
Coal Mine (Kemmerer Mine)[a]	103
Evaporation (Losses)	64
Kemmerer Unit 1 (Total Water Needs)	3,689[b]
Total	8,094

a. From PacifiCorp 2023

b. See Table 3.2-1

Table 3.4-2 Maximum Water Demand for Naughton Power Plant and Kemmerer Unit 1

Description	Maximum Demand (gallons per minute)
Naughton Power Plant[a]	9,832
Coal Mine (Kemmerer Mine)[a]	448
Evaporation (Losses)[a]	64
Kemmerer Unit 1 (Total Water Needs)	5,270[b]
Total	15,614

a. From PacifiCorp 2023

b. According to Kemmerer Unit 1 Plant Water Use/Balance (Table 3.2-1)

Table 3.4-3 Projected Maximum Annual Emissions from Standby Diesel Generators

Pollutant Discharged	Annual Emissions per Generator (pounds)[a]	Plant Annual Emissions, Two Generators (pounds)[a]
Sulfur Dioxide	11	22
Nitrogen Oxides	22,000	44,000
Particulate Matter	1,000	2,000
Carbon Dioxide	1,100,000	2,200,000
Carbon Monoxide	5,000	10,000

a. Calculated values converted from tons and rounded up

Table 3.4-4 Summary of Plant Environmental Interfaces During Operations (Sheet 1 of 2)

Resource Type	Operational Interface Point Description	Reference Section No.	Table No.	Figure No.
Water	Quantitative water-use diagram with anticipated flow rates to and from the plant water systems	Section 3.2.2.4		Figure 3.2-2
	Anticipated normal operational flow rates and maximum flow rates	Section 3.4.1	Table 3.4-1, Table 3.4-2	
	Water balance flow diagram which includes all water systems for Kemmerer Unit 1 operations	Section 3.2.2.4 to Section 3.2.2.12		Figure 3.2-2
	Description of intake operation, water intake systems	Section 3.2.2.4		Figure 3.2-3
	Plant discharge outfall to North Fork Little Muddy Creek	Section 3.1.1.2, Section 3.2.2.12		Figure 3.1-4, Figure 3.2-2
	Stormwater discharge from NI & EI Stormwater Pond on the west side	Section 3.1.1.3, Section 3.2.2.13	Table 3.3-2, Table 3.3-4	Figure 3.1-3, Figure 3.1-4
	NI and EI Stormwater discharge from the NI Stormwater Pond and EI Stormwater Pond on the northeast and southeast side	Section 3.1.1.3, Section 3.2.2.13	Table 3.3-2, Table 3.3-4	Figure 3.1-3, Figure 3.1-4
	Pertinent temperatures and methods used for estimating evaporation and drift rates	Section 2.7		
	Cooling tower blowdown volume, flow-rates, temperature range, number of cycles of concentration assumed for operations	Section 2.7, Section 3.2.2.3		
	Description of chemicals for intake and discharge treatment, including temperature and chemical constituent concentration in wastewater at the plant discharge outfall location	Section 3.4.3	Table 3.4-5, Table 3.4-6	
	Maintenance procedures and frequency for intake and discharge structures, including stormwater management systems	Section 3.2.2.13		

Table 3.4-4 Summary of Plant Environmental Interfaces During Operations
(Sheet 2 of 2)

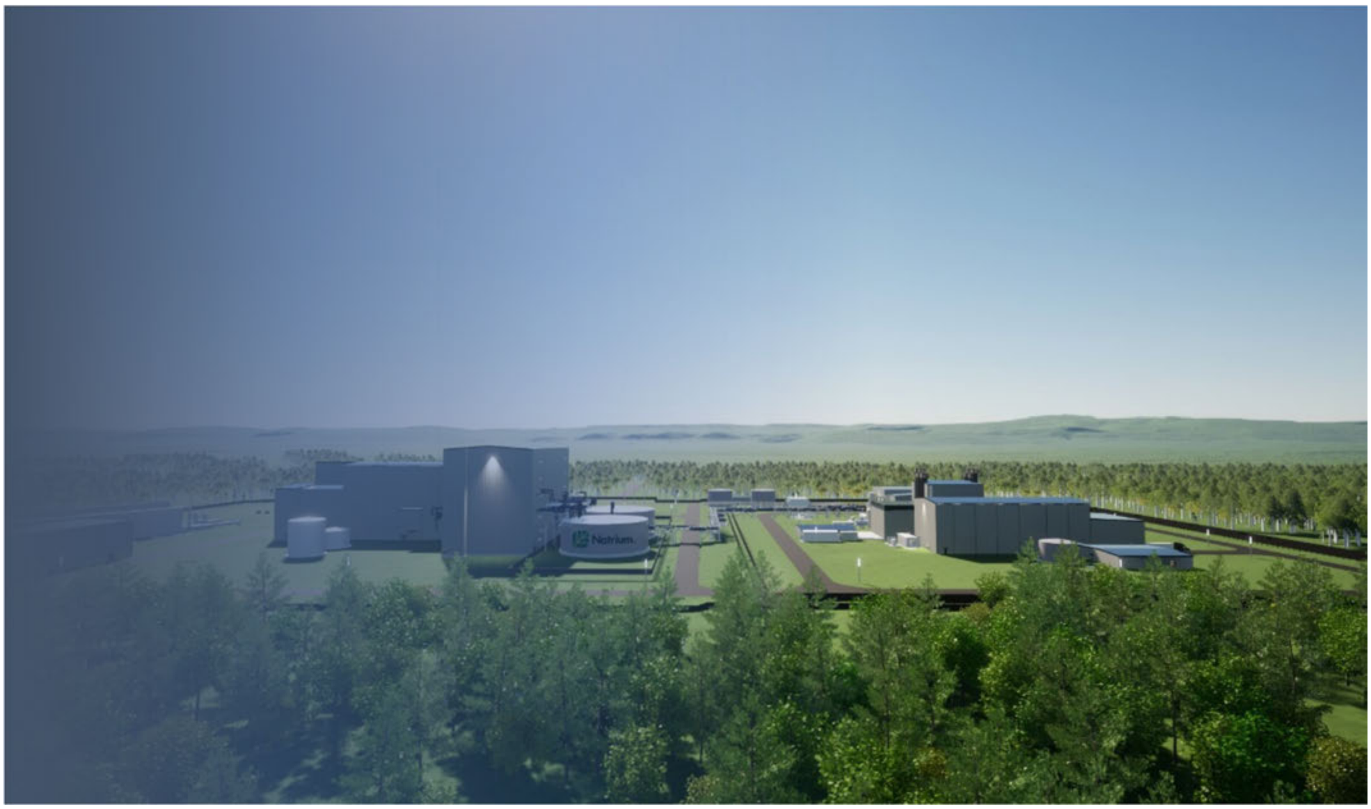
Resource Type	Operational Interface Point Description	Reference Section No.	Table No.	Figure No.
Land	Transmission & water pipeline - location and extent information for macro-corridors	Section 3.1.1.4		Figure 3.1-5
	Transmission - voltage, number of transmission facilities, proposed modifications to existing corridors and new transmission lines	Section 3.2, Section 3.4.1.2.1		
	Transmission - maintenance procedures and frequency for transmission corridors, switchyards, roads, and other associated infrastructure	Section 3.4.1.2.1		
Air	Emissions Points #1 & 2 - Projected maximum annual emissions from Standby Diesel Generators (2)	Section 3.1, Section 3.2, Section 3.4.1.3	Table 3.4-3	Figure 3.1-3
	Emissions Point #3 - Cooling Tower (TFB.1)	Section 3.1, Section 3.2		Figure 3.1-3
	Emissions Point #4 - Fire tanks and pump buildings (EI Yard System)	Section 3.1, Section 3.2		Figure 3.1-3
	Emissions Point #5 - Reactor Building North Stacks (Reactor Air Cooling System)	Section 3.1, Section 3.4.1.3		Figure 3.1-3
	Emissions Point #6 - Reactor Building South Stacks (Reactor Air Cooling System)	Section 3.1, Section 3.4.1.3		Figure 3.1-3
	Emissions Point # 7 & 8 - Security Diesel Generator			Figure 3.1-3
	Emissions Point #9 - Combined Plant Stack	Section 3.4.1.3		
	Emissions Point #10 - Auxiliary Boiler	Section 3.1		Figure 3.1-3
	Emissions Point #11 - Salt Tanks	Section 3.1, Section 3.2		Figure 3.1-3

Table 3.4-5 Proposed Chemicals for Kemmerer Unit 1 Waste Water Treatment (Liquid Effluent Streams)

System and Location	Chemical Name	Function
Energy Island Water Systems (EWS) - Water Treatment	Sodium Hypochlorite	Potable Water Pipe Disinfection
	Sodium Bisulfite	Sodium Hypochlorite Neutralization
	Anti-Scalant	Reverse Osmosis Fouling Prevention
Energy Island Water Systems (EWS) - Wastewater Treatment	Sulfuric Acid	Wastewater pH Control (decrease)
	Sodium Hydroxide	Wastewater pH Control (Increase)
Energy Island Water Systems (EWS) - Turbine Building	Sodium Hypochlorite	Closed Loop Corrosion Inhibitor
Nuclear Island Water Systems (NWS) - Closed Loop Water System	Corrosion Inhibitor	Closed Loop Corrosion Inhibitor
Heat Rejection System (HRS) - Cooling Tower	Depositrol BL5601	Corrosion and Descaling
	NALCO 71D5 Plus	Descaling
	Sodium Hypochlorite	Biocide
	Sulfuric Acid, >51% Acid	pH Control
Steam Turbine System (STS)	Sodium Hydroxide or Ethanolamine (ETA) or Methoxypropylamine (MOPA) or Morpholine	Auxiliary Boiler pH Control (increase)
	Carbohydrazide or Hydrazine	Auxiliary Boiler Oxygen Scavenger
	Lube, Seal, Control Oil	Steam Turbine Generator Sealing, Cooling, and Control
Energy Island Air and Gas Distribution Systems (EGS)	Nitrogen	Laying Up Auxiliary Boiler and Purging Fuel Line
	Hydrogen	Generator Cooling
	Carbon Dioxide	Generator Purging

Table 3.4-6 Chemicals Producing Gaseous Effluent Streams

System & Location	Chemical Name / Function
Nuclear Island Air and Gas Distribution Systems (NGS)	Argon / Plant Process Gas
	Nitrogen / Plant Process Gas
Energy Island Fire Protection System (EFP)	Diesel Fuel (ASTM D-975-21 Grade 1-D S15 ultra-low sulfur diesel) / Standby Diesel Generator Fuel
Nuclear Island Fire Protection Systems (NFP)	Dodecafluor-2-methyl-pentane-3-one (3M Novec 1230) / Sodium Fire Protection and Suppression
Energy Island Auxiliary Electrical System (EES)	Diesel Fuel (ASTM D-975-21 Grade 1-D S15 ultra-low sulfur diesel) / Standby Diesel Generator Fuel



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ER, Chapter 4

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

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Chapter 4 Environmental Impacts from Construction of the Proposed Project

4.0 Environmental Impacts from Construction of the Proposed Project

The potential environmental impacts as a result of building activities, which includes all preconstruction and construction activities for the proposed Kemmerer Unit 1 Site, as specified in 10 Code of Federal Regulations (CFR) Part 51.45(b)(1) and 51.45(c) are described in this chapter. For each impact category or impact to a resource area, measures and controls that would be used to mitigate and limit adverse environmental impacts are identified.

Construction activities discussed in this chapter are consistent with the U.S. Nuclear Regulatory Commission's definition of "construction" in 10 CFR 51.4 and include activities related to the installation of structures, systems, and components related to safety, security, fire protection, or onsite emergency facilities. "Preconstruction" activities include site exploration, preparation for construction (including clearing, grading, and establishing temporary roads), excavation, and erection of temporary construction support buildings.

A schedule of building activities is included in Section 1.3 and Section 3.3.

This chapter is divided into the following sections:

- Land Use- Section 4.1
- Water Resources (Surface Water and Groundwater)- Section 4.2
- Ecological Resources- Section 4.3
- Socioeconomics- Section 4.4
- Environmental Justice- Section 4.5
- Historic and Cultural Resources- Section 4.6
- Air Resources- Section 4.7
- Nonradiological Health- Section 4.8
- Radiological Health- Section 4.9
- Nonradioactive Waste Management- Section 4.10
- Measures and Controls to Limit Adverse Impacts During Construction Activities- Section 4.11

Environmental impacts are analyzed considering the significance level of potential impact to each resource (i.e., SMALL, MODERATE, or LARGE). A significance level is assigned consistent with the criteria that the U.S. Nuclear Regulatory Commission established in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Footnote 3, as follows:

- SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource.
- LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

Unless the impact is identified as beneficial, the impact is adverse. In the case of “SMALL,” the impact may be negligible. The definitions of significance are as defined in Section 1.0.

These sections present the potential environmental impacts of building activities. Based on analyzed impacts, a significance level of potential impact to each resource is assigned. In addition, this section presents ways to avoid, minimize, or mitigate adverse impacts resulting from Kemmerer Unit 1 building activities.

4.1 Land Use

Impacts of building Kemmerer Unit 1 and associated transmission and water supply pipeline corridors on land use at the site and the 6-mile (10-kilometer) vicinity are described in this section.

4.1.1 Onsite Impacts

The proposed reactor and the supporting facilities will be located on the Kemmerer Unit 1 Site (Figure 3.3-1). The land is currently shrub/scrub with a small portion of wetlands along North Fork Little Muddy Creek (Table 2.1-1). Construction will occur on land that, except for occasional livestock grazing and vehicle traffic over dirt roads, has not been previously disturbed. There is an abandoned segment of the former rail line to the Cumberland Mine to the south that crosses the site.

A total of approximately 218 acres (88.2 hectares) will be disturbed by preconstruction and construction activities. The land that will be disturbed in building Kemmerer Unit 1 and supporting facilities is shown in Figure 3.3-1. A tabular summary of the estimated acres disturbed for each of the specific construction or construction support areas is included in Table 3.3-2. The construction laydown areas and construction parking area will be covered with geotextile fabric and aggregate rock as part of the construction effort (Figure 3.3-1). Given the location of these construction support areas and the geotextile and aggregate foundation, these areas are expected to serve plant operations and maintenance after building activities are concluded.

Table 3.3-3 categorizes earthwork activities. Initial earthwork activities include clearing, grubbing, and grading. The disturbed acres will be cleared, grubbed, and graded (cut and fill). Excavation activities will include deep excavation for the reactor in the Nuclear Island area. Aside from deep excavation for the reactor, shallow excavations such as trenching will be employed for laying piping. Table 3.3-4 presents the soil quantities for grading cut and fill activities. Excavated material will be used as common fill. Excavated material not suitable for fill will be disposed of in accordance with regulatory requirements. As shown in Figure 3.3-1, a spoils area will be established south of the South Laydown Area.

All site preparation and construction activities will be conducted in accordance with applicable Federal, State, and local regulations. The necessary permits and authorizations will be acquired and will implement environmental controls such as stormwater management systems and spill containment controls in applicable areas before beginning earth-disturbing activities. Site preparation and construction activities that will affect land use include clearing, grubbing, grading and excavating, and stockpiling soils. Disturbed areas will be stabilized and contoured in accordance with design specifications. When necessary, revegetation will comply with site maintenance and safety requirements. Methods to stabilize areas and prevent erosion or sedimentation will comply with applicable laws, regulations, and permit requirements; good engineering and construction practices; and recognized environmental best management practices, and industry guidance will be followed to reduce stormwater quantity, improve stormwater quality, and protect receiving waters and downstream areas.

Mitigation measures within the site, designed to lessen the impact of construction activities, will be specific to erosion control, dust control, controlled plant access for personnel and vehicular traffic, and restricted construction zones. Initial site preparation will consist of clearing, grubbing, cut and fill grading, and excavating. Construction infrastructure, such as roads, a concrete batch plant, offices, warehouses, unloading facilities, water and power supply areas, and drainage measures, will be built or installed following site preparation activities. Grading and drainage will be designed to avoid erosion during the construction period.

As presented in Section 2.1, the site is zoned as industrial; therefore, the proposed land use matches the zoning designation. The Lincoln County Comprehensive Plan includes the land use goal to promote the development of residential, commercial, and industrial land uses in and around established central services in the County (Reference 4.1-1). Kemmerer Unit 1 will be developed along a major highway, in close proximity to the county's largest city, in an area with existing industry, and will utilize existing water supplies for construction and operations. The proposed action is in keeping with local zoning and land use goals.

As mentioned above, the site is grazed by livestock on occasion. By law, Wyoming is a "fence out" state, which means that landowners are responsible for protecting their own property from ranging livestock. A stock-owner is not liable for trespass or damage if a property is not adequately protected by a "lawful fence" (Wyoming Statute §11-28-102). The "fence out" rule applies to cattle and domestic bison, but Wyoming is a "fence in" state for sheep. The fenced portions of the Kemmerer Unit 1 Site will disrupt the open range nature of the region. However, the site is a small fraction of the open rangeland in the vicinity and surrounding region. As land that is zoned as industrial, the civic purpose of the land is for industrial development rather than agricultural use.

As stated in Section 2.1, United States Sodium Fast Reactor Owner, LLC owns the mineral rights for the site. The vicinity has potentially exploitable minerals including bentonite, coal, phosphorus, and sulfur, as well as oil and gas (Reference 4.1-3). However, there are no mines or oil and gas wells in or adjacent to the site. The nearest active mineral extraction site is the Kemmerer Mine with the closest point of the Kemmerer Mine's permit boundary being approximately 2.2 miles (3.5 kilometers) from the Kemmerer Unit 1 Site (Section 2.1.1.2).

In summary, although approximately 218 acres (88.2 hectares) will be disturbed, there is abundant similar land in Lincoln and surrounding counties. Moreover, the proposed development of the site is consistent with the property's industrial zoning designation and consistent with the goals and objectives of the Lincoln County Comprehensive Plan to promote industrial development along US 189 in the southern portion of Lincoln County (Reference 4.1-2). Therefore, land use impacts from construction activities on the Kemmerer Unit 1 Site will be SMALL and not require mitigation.

4.1.2 Offsite Impacts

The proposed transmission lines and water supply pipeline will connect the proposed Kemmerer Unit 1 to the existing Naughton Power Plant. The routes will be determined within the macro-corridors depicted on Figure 2.1-7. As discussed in Section 2.1.2, the macro-corridors cross land that is owned by three entities. Easements and land access for installation of the transmission lines and pipeline are being sought.

The macro-corridors cross land that is currently classified as rangeland, a small portion of wetlands, and is developed (Table 2.1-1). A portion of macro-corridors falls within the Kemmerer Mine permit boundary (Figure 2.1-7). Construction activities within the mine permit boundary are subject to the Mine Safety and Health Administration's mandatory safety standards for surface coal mines and surface work areas of underground coal mines (30 Code of Federal Regulations 77). No other active mines or oil and gas wells are located in or adjacent to the macro-corridors (Reference 4.1-3).

The macro-corridors cross both previously disturbed and undeveloped areas. The north-south leg of the common macro-corridor crosses largely undisturbed land. The east-west leg of the common macro-corridor crosses varying degrees of land disturbance due to the Union Pacific rail line, US 189, County Road 304, disturbed areas of Naughton Power Plant, and portions of the Kemmerer Mine permit boundary shown in Figure 2.1-7. This leg of the common macro-corridor also crosses the FMC Corporation property north of the former Kemmerer Coke Plant. The north-south electric and water macro-corridors cross land that is disturbed by Naughton Power Plant and Kemmerer Mine.

The macro-corridors include a total of 511 acres (208 hectares), but only a portion of this acreage will be disturbed by construction of the transmission lines and water supply pipeline. Construction of the transmission corridor will disturb approximately 180 acres (73 hectares) assuming a width of 250 feet (76 meters). An additional 7 acres (3 hectares) will be needed for laydown and pulling the lines. The water supply pipeline corridor will disturb approximately 36 acres (15 hectares) assuming a width of 50 feet (20 meters). Figure 2.1-10 provides a land use map of the area through which the proposed pipeline and transmission corridors will be constructed. Actual land use in the corridors will be available once the routes are finalized, but land use is expected to be primarily shrub/scrub. The routing is expected to avoid the wetlands, streams, roads, and railroads along the macro-corridors where practicable and use construction techniques such as horizontal directional drilling to minimize impacts to resources that cannot be avoided. Impacts to wetlands, streams, and floodplains are discussed in Sections 4.2 and 4.3.

Equipment will access the corridors at designated locations and be confined to approved areas of disturbance. Land clearing debris and spoils and other construction waste will be disposed of in accordance with regulatory requirements.

Site preparation and construction activities will be conducted in accordance with applicable Federal, State, and local regulations. The necessary permits and authorizations will be acquired and will implement environmental controls such as stormwater management systems and spill containment controls in applicable areas before beginning earth-disturbing activities. Disturbed areas will be stabilized and contoured in accordance applicable laws, regulations, and permit requirements; good engineering and construction practices; and recognized environmental best management pratices. When necessary, revegetation will comply with corridor maintenance, landowner, and local requirements.

Construction is not expected to disrupt existing land uses or private land access along the route except for temporary disruption of grazing along portions of the route. Construction tie-ins at Naughton Power Plant will take place within previously disturbed areas.

As presented in Section 2.1.2, the macro-corridors are zoned as industrial except for one land section (T20N, R116W, Section 8) along the common macro-corridor that is zoned as rural. The corridors with the established easements will be compatible with industrial and rural zoning.

In summary, construction of the transmission lines and water supply pipeline will disturb 223 acres (90.2 hectares) in the offsite area. The right-of-ways will be compatible with certain land uses such as grazing and not compatible with others such as mining. Easements and land access for installation of the transmission lines and pipeline are being sought. Given that there is abundant, similar land in Lincoln and surrounding counties, land use impacts from construction of the transmission lines and water supply pipeline will be SMALL and not require mitigation.

References

4.1-1 (Lincoln County 2006) Lincoln County. “Comprehensive Plan Lincoln County, Wyoming.” Available at https://www.lincolncountywy.gov/government/planning_engineering/documents_forms.php#outer-204sub-205. Accessed March 4, 2023.

4.1-2 (Lincoln County PZC 2022) Lincoln County Planning and Zoning Commission. “Staff Report Rezone Plan Amendment Proposal.” April 27, 2022.

4.1-3 (Wyoming GIS Center 2023) Wyoming Geographic Information Science Center of the University of Wyoming. Natural Resource and Energy Explorer. Available at https://nrex.wyo.gov. Accessed March 15, 2023.

4.2 Water Resources (Surface Water and Groundwater)

Surface water and groundwater hydrology that could affect, or be affected by, the building activities for Kemmerer Unit 1 are described in this section. A detailed description of building activities, methods, and durations is provided in Section 1.3 and Section 3.3. The site-specific and regional data on the physical and hydrologic characteristics are also summarized to provide the basis for an evaluation of impacts on water bodies, aquifers, aquitards, aquatic ecosystems, and social and economic structures of the area.

4.2.1 Hydrologic Alterations

The hydrological alterations that could result from building activities of the site are described in this section. Figure 3.1-4 shows the site plan for Kemmerer Unit 1 and Figure 3.3-1 shows the construction facilities plan, which provides a basis for impact determinations.

4.2.1.1 Surface Water Hydrologic Alterations During Building Activities

The following preconstruction and building activities have the potential to impact the hydrology at the site:

- Clearing land and installing infrastructure such as roads and stormwater conveyance and detention systems
- Cutting and filling to raise the surface grade
- Constructing new buildings and structures (see all proposed plant structures and systems described in Chapter 3), roads, and parking lots
- Constructing transmission towers
- Constructing raw water transfer pumps located downstream of Naughton Power Plant Raw Water Settling Basin and the new discharge outfall structure into North Fork Little Muddy Creek
- Disturbing currently vegetated areas and wetlands for construction laydown areas, concrete batch plants, sand and gravel stockpiles, and construction-phase parking areas
- Dewatering for foundation excavations during building activities

Anticipated hydrologic alterations to surface waters during building activities of the site will be temporary and are not expected to be significant. The potential surface water hydrological impacts of these activities are described below.

Anticipated building activities that may affect surface water hydrology at the site include clearing and grubbing, dewatering, grading, excavation, and stockpiling soils. The nature and sequencing of these activities are explained in more detail in Section 3.3. In the clearing and grubbing phase (Phase B of earthworks), topsoil and organic material will be removed. Stripping will include up to 12 inches (30 centimeters) of soil according to site topography.

Materials excavated from the site will be stockpiled and could be used as fill on site. Drainage from the spoils piles will be controlled through measures such as berms, riprap, sedimentation filters, and detention ponds in compliance with the Stormwater Pollution Prevention Plan (SWPPP). Sediment basins will be installed for removal and collection of surface water to prevent sediment-laden water from entering regulated wetlands and waterways. Silt fence and erosion controls will be installed to minimize fines content in stormwater runoff leaving the site and potentially impacting surrounding wetlands and drainage flow paths.

As presented in Table 1.4-1, prior to commencing building activities, necessary permissions, permits, licenses, and other regulatory approvals will be obtained. All building activities will be conducted in accordance with all applicable Federal, State, and local regulations.

Wyoming Department of Environmental Quality (WYDEQ) requires operators who plan to discharge stormwater from construction sites that disturb five or more acres (by “clearing, grading, or excavation”) to obtain a Wyoming Pollutant Discharge Elimination System (WYPDES) Large Construction General Permit (Permit WYR100000). Holders of these permits are expected to minimize or eliminate pollutants, including sediment, in stormwater runoff from construction sites. A SWPPP must be completed and submitted to WYDEQ no less than 30 days before construction commences. The SWPPP should identify potential sources of stormwater pollution, such as material storage areas, soil stockpiles, borrow areas, equipment storage and maintenance areas, bulk fuel storage areas, and vehicle fueling areas.

Best construction management practices detailed in the SWPPP for the Large Construction General permit and approved by WYDEQ will limit impacts to water resources. The same best management practices (BMPs) will also limit potential impacts from stormwater runoff. Because there will be no direct impacts to wetlands and construction will be carried out using agency-approved BMPs, impacts on wetlands at and near the Kemmerer Unit 1 Site are anticipated to be SMALL. No mitigation is warranted beyond the agency-required measures discussed in Section 4.3.

4.2.1.2 Offsite Impacts

4.2.1.2.1 Power Transmission Line and Water Pipeline

The installation of the power transmission line and water pipeline will disturb 223 acres (90.2 hectares) (see Section 4.1). Installation of the power transmission line will disturb approximately 180 acres (73 hectares) assuming a width of 250 feet (76 meters) and will occur within the 230 kV transmission line right of way. The water supply pipeline corridor will disturb approximately 36 acres (15 hectares) assuming a width of 50 feet (15 meters). An additional 7 acres (3 hectares) (two areas, each approximately 400 feet by 400 feet [120 meters by 120 meters]) will be needed at the end of the transmission corridor legs for laydown and pulling of the wires during building activities.

The routing of pipelines in the macro-corridor is expected to avoid the wetlands, streams, roads, and railroads where practicable, and use construction techniques such as Horizontal Directional Drilling to minimize impacts to resources that cannot be avoided (see Section 4.1). All construction equipment will access the corridors at designated locations and be confined to approved areas of disturbance to minimize impacts to wetlands, waterways, and 100-year floodplains to the greatest extent possible. Land clearing debris and spoils and other construction waste will be disposed of in accordance with regulatory requirements.

4.2.1.3 Onsite Areas

4.2.1.3.1 Disturbance in Plant Area

The project will disturb 218 acres (88.2 hectares) within the plant area at the Kemmerer Unit 1 Site as described in Section 4.1. The 218 acres (88.2 hectares) of onsite disturbance area will entirely overlap all temporary disturbance areas anticipated for Kemmerer Unit 1 building activities (e.g., laydown areas for staging materials and assembling project components).

4.2.1.4 Stormwater Erosion and Sediment Control

Erosion and sediment control measures including sediment basins, silt fences, and other BMPs are described in Section 3.3. These control measures will be installed during the preconstruction stage to minimize sediment contents generated during land disturbance activities leaving the site and impacting wetlands and offsite drainages. Sediment basins will be converted to stormwater management ponds at the completion of building activities to control discharge flow rate during storm events to below the pre-development condition. No impacts to wetlands, waterways, or 100-year floodplains are anticipated for the installation of temporary or permanent stormwater management facilities.

Stormwater generated onsite in the main plant areas during building activities will be collected in sediment basins prior to offsite releases. Laydown areas will be protected by silt fences to trap sediment carried in the runoff before it flows offsite as sheet flow. Stormwater discharge will follow natural drainage and subsequently return back to North Fork Little Muddy Creek and its tributaries to preserve the existing surface water resources to the greatest extent practicable. Outfalls of sediment basins will be placed outside of delineated wetland boundaries and will be protected by riprap aprons to minimize downstream erosions. All areas disturbed for the installation of stormwater facilities will be restored after construction is complete.

4.2.1.5 Access Roads

Road improvements and impacts to water resources are described in Section 4.3.2.1. One of the three ephemeral streams delineated on site will require three road crossings for site access, one permanent and two temporary for construction; these impacts will be permitted under Nationwide Permit 14 (Linear Transportation Projects). The site entrance road and temporary road for site entrance will be built prior to Kemmerer Unit 1 building activities. The current footprint of preconstruction and building activities for construction of the remote laydown area access road will impact approximately 0.5 acres (0.2 hectares) of 100-year floodplains and less than 0.5 acres (0.2 hectares) of ephemeral waterways. Hydrological impacts from flood alterations due to the plant road crossings are described in Section 5.2.1.1.2.

4.2.1.6 Plant Discharge

The combined plant discharge, which includes industrial discharge from the Water Treatment Building will be combined with outflow from a stormwater management pond on the Energy Island for release to a discharge outfall. A broad apron of riprap designed to dissipate energy will be placed at the outlet to prevent soil erosion down-gradient from the outfall structure. The rip-rap apron will be underlain by gravel placed on a geotextile filter fabric to prevent soil erosion underneath the structure. The outfall will be located outside of the delineated wetland boundary and the 100-year floodplain such that there will be no impacts to riparian wetlands or 100-year floodplains.

No in-stream construction on North Fork Little Muddy Creek will be required. Existing wetlands, waterways, and floodplains are described in Sections 2.2 and 2.5.

4.2.1.7 Summary of Surface Water Impacts

Preconstruction and building activities at the Kemmerer Unit 1 Site will impact approximately 0.5 acres (0.2 hectares) within the 100-year floodplain and less than 0.5 acres (0.2 hectares) of impact to ephemeral waterways. No impacts to wetlands are expected for onsite building activities. Temporary impacts will be determined at a later time when the design matures. All water resource impact areas will be re-vegetated and restored following completion of construction.

Ground-disturbing activities that have the potential to affect surface water resources will be permitted by applicable Federal, State, and local regulations and guided by an approved SWPPP. The SWPPP will also contain a plan for the building activities. BMPs from the WYPDES General Construction Permit will be implemented to best protect surface water resources. Based on the nature of the proposed preconstruction activities and building activities, the anticipated impact areas to surface water resources, and required permits based on impact thresholds, impacts to surface water hydrology during building activity are anticipated to be SMALL and do not warrant mitigation beyond those best practices required by the permits.

4.2.1.8 Groundwater Hydrologic Alterations During Building Activities

No alterations to the groundwater resource are expected during building activities because excavations will occur within the Hilliard Shale. This geologic formation is recognized as an aquitard, which by definition is not capable of providing groundwater in sufficient quantity to be economically feasible as a source of water.

Section 3.3 and PSAR Section 2.5.3.1.11 describe the temporary dewatering required to maintain dry working conditions for excavation and construction of the foundations for the Kemmerer Unit 1 Nuclear Island and Energy Island structures. Temporary dewatering will be accomplished using sump pumps in the base of excavations and possibly inclined drains in the excavated rock faces. These dewatering methods are localized to the Nuclear Island and Energy Island excavation areas and to the areas immediately in the vicinity of the Nuclear Island and Energy Island excavations. All dewatering flows will be routed to one of the stormwater detention ponds (either existing or planned to be installed as part of initial building activities construction). All dewatering practices will be compliant with State and Federal standards.

Subsidence is not expected to occur. This phenomenon is associated with extraction of large quantities of subsurface fluid (water, oil, or gas) with compressible materials overlying the fluid reservoir.

4.2.2 Water-Use Impacts

The potential impacts of water use during preconstruction and building activities are described in this section.

4.2.2.1 Surface Water Use Impacts During Building Activities

Surface water will be used during the preconstruction and building activity phases of the project for activities such as dust suppression and operation of a concrete batch plant. It is estimated that approximately 25.3 million gallons (95.8 million liters) of water will be needed for the duration of preconstruction and building activities. Water for use in the concrete batch plant will be trucked to the site from a water meter installed along US 189 supplied by Kemmerer-Diamondville Water Treatment Plant. Potable water will not be piped or trucked to the site. Bottled water will be provided on site for the construction workforce drinking water supply. Proposed water usage during building activities is presented in Table 3.3-6. Water availability at Kemmerer-Diamondville Water and Wastewater Joint Powers Board (KDWWJPB) is discussed in Sections 2.2 and 2.4. The KDWWJPB has 3.9 million gallons (15 million liters) per day of excess production capacity, which sufficiently covers the 25.3 million gallons (95.8 million liters) of water needed.

As discussed in Section 2.4, on average, only 0.4 percent of the excess production capacity at KDWWJPB will be needed for Kemmerer Unit 1, impacts to surface water use during preconstruction and building activities are anticipated to be SMALL and mitigation does not appear to be warranted.

4.2.2.2 Groundwater Use Impacts During Building Activities

As described in Section 4.2.1.8, the site is located above an aquitard; therefore, no groundwater will be impacted by building activities.

Dewatering will be required to provide for dry working conditions, and the pumped water may be used for dust control, compaction activities, or routed to North Fork of Little Muddy Creek in compliance with applicable federal, state, and local regulations.

Dewatering activities are expected to result in a temporary impact from drawdown adjacent to North Fork Little Muddy Creek, based on groundwater modeling.

4.2.3 Water-Quality Impacts

Potential impacts to water quality as a result of preconstruction and building activities include: increased soil erosion and sediment transport, changes in stormwater flow, and changes in water quality parameters, such as pH and temperature. The following sections discuss the potential effects of building activities on surface water and groundwater quality. Surface water users potentially affected by water quality impacts are discussed in Section 2.2. These users will not change during building activities.

4.2.3.1 Surface Water-Quality Impacts During Building Activities

Impacts to surface water quality can occur as the result of chemical spills, improper disposal of effluent from dewatering, and soil erosion due to ground disturbance during building activities. Additionally, accidental discharges of construction-related chemicals such as fuel, oil, or grease could occur. BMPs are employed to avoid spills and leaks according to the SWPPP. See Section 4.10 for anticipated water quality impacts from non-radiological releases to surface water resources. As stated in Section 2.3 and shown on Figure 2.2-1, one waterway is located near the site (North Fork Little Muddy Creek) and will be minimally affected by building activities.

Erosion and sediment control measures will be in place to protect water quality in surface water resources. Measures include control devices such as silt fence to minimize fines content in stormwater runoff from altering water quality in surrounding wetlands, waterways, and floodplains.

Ground-disturbing activities that have the potential to affect surface water quality will be permitted by applicable Federal, State, and local regulations and guided by an approved SWPPP. The SWPPP will also contain a plan for the building activities. BMPs from the WYPDES Large Construction General Permit will be implemented to best protect surface water resources. Any impacts to surface water quality during building activities are temporary and anticipated to be SMALL and do not warrant mitigation beyond those best practices required by permits.

4.2.3.2 Groundwater-Quality Impacts During Building Activities

Since the Kemmerer Unit 1 site is located above an aquitard, groundwater users within 5 miles of the site should not be affected by small, localized, and temporary impacts on groundwater quality during building activities.

Baseline groundwater chemistry was evaluated from 22 observation wells in addition to two surface water samples from North Fork of Little Muddy Creek. The results of the laboratory analysis are presented in Tables 2.5-33a through Table 2.5-34 of PSAR Section 2.5.3.1.5. The background chemistry shows high concentrations of the major anions and cations along with high total dissolved solids concentrations.

Dewatering associated with building activities is not anticipated to alter the groundwater chemistry. See more information in PSAR Section 2.5.3.1.5.

Groundwater pumped from excavations will be held, and the water will be used on site for dust suppression or other beneficial uses or discharge in accordance with a Temporary Discharge Permit from WYDEQ. Using the water for dust suppression requires a Permit to Appropriate Groundwater through the State Engineer’s Office.

It is anticipated that gasoline, diesel fuel, hydraulic lubricants, and other similar products that will be used for construction equipment do not impact groundwater quality. Non-radiological releases of these chemicals that could affect groundwater quality are described in Section 4.10. BMPs will be employed during construction to minimize potential discharges of these non-radiological releases to the environment.

In the unlikely event small amounts of contaminants are released into the environment, they will have only a small, localized, temporary impact on groundwater. In conclusion, because engineering controls which prevent or minimize the release of harmful effluents will be used and effluent concentrations will be maintained at levels below permitted limits established to be protective of water quality and aquatic life, any impacts to groundwater quality are anticipated to be SMALL and do not warrant mitigation beyond those described in this section or required by a permit.

4.2.4 Water Monitoring

The hydrological monitoring required for building activities associated with the site are described in this section. Discussions related to historic and current water use at the site are found in Section 2.3. Water use at the site is discussed in Section 3.3. Potential discharges from the site are discussed in Section 3.4. Baseline environmental water quality is described in Section 2.2.

As shown in Figure 3.1-4, effluent from the site discharges to North Fork Little Muddy Creek. Effluent discharges to navigable water bodies are governed by several regulations including the Clean Water Act, 40 Code of Federal Regulations Part 122, 40 Code of Federal Regulations Part 423, and WYDEQ water quality standards through the WYPDES permit. In order to discharge effluents to Waters of the U.S., a National Pollutant Discharge Elimination System permit (specifically, a WYPDES permit in the State of Wyoming) pursuant to Section 402 of the Clean Water Act is required. Prerequisites for obtaining an WYPDES permit include collecting adequate baseline monitoring samples and providing a plan for collection of operational monitoring samples. The proposed hydrological monitoring for the site is divided into four phases as outlined below:

1. Site preparation and preapplication monitoring on a seasonal basis to verify the existing hydrologic conditions, validate the design assumptions for hydrologic impacts, and validate the baseline hydrologic descriptions presented in Section 2.2

2. Building activity monitoring to assess anticipated impacts from building activities and to identify unexpected impacts

3. Preoperational monitoring to establish a post-construction baseline as a point of comparison in order to identify hydrologic impacts that may result from operation of Kemmerer Unit 1

4. Operational monitoring to assess impacts to water quality resulting from operation of the site

The potential impacts to surface water and groundwater resources, water quality, and water users during construction are SMALL.

4.2.4.1 Surface Water Monitoring During Building Activities

Surface water monitoring during building activities will be compliant with Wyoming State water quality standards and follow BMPs, including those required in the WYPDES Large Construction General Permit.

Typical surface water discharges that may occur during preconstruction and building activities include stormwater runoff and dewatering discharges. A SWPPP will be used in conjunction with BMPs such as silt fence and use of hay bales on site to limit erosion and sedimentation to surface waters.

Any discharges of water during building activities are subject to monitoring to ensure compliance with a WYPDES permit. Types of monitoring may include the following:

- Temperature of the discharge
- Radiological assessment of the nearby biosphere that aims to detect radiation and radioactive materials
- Water quality monitoring (includes monitoring for release of volatile compounds, pesticides, metals, hydrocarbons, Total Suspended Solids, and other constituents to surface or groundwater)
- Ecological monitoring (focuses on terrestrial ecology, land use, and aquatic ecology)

Radiological assessments will be conducted in accordance with the Radiological Environmental Monitoring Program as described in Section 2.9. Water quality monitoring will be performed according to the WYPDES permit requirements. Ecological monitoring will comply with WYDEQ and United States Army Corps of Engineers permit requirements.

4.2.4.2 Groundwater Monitoring During Construction

A total of 52 observation wells have been installed at 24 site locations, with four of the locations consisting of three-well clusters, and 20 of the locations consisting of two-well clusters. The purpose of the observation wells is to evaluate seasonal variations in groundwater levels as well as vertical hydraulic gradients. Additional details concerning the observation well locations, depths, and water level measurements are presented in PSAR Section 2.5.3.1.6. Results of the data analysis to evaluate groundwater contour maps along with vertical and horizontal hydraulic gradients are presented in PSAR Section 2.5.3.1.7.

During construction, it may be necessary to abandon some of the observation wells as they are located where structures are to be built. For those that do not need to be abandoned, it is proposed that monitoring continues throughout construction. Additional observation wells may be installed to supplement the remaining wells, ensuring that adequate coverage across the site is provided.

4.3 Ecological Resources

Impacts to ecological resources that could result from construction of Kemmerer Unit 1 and associated linear utilities are described in this Section. Proposed building activities, including site preparation and the construction of facilities and ancillary infrastructure are described in Section 3.3. Preconstruction activities for Kemmerer Unit 1 are expected to begin April 2025 with clearing, grubbing, and grading of the site completed within a few months, which is important to this evaluation because the timing and duration of these activities can influence ecological impacts. Most ecological impacts will be associated with this site preparation work in 2025 and, to a lesser extent, construction of the water supply pipeline and transmission lines, projects that are expected to be carried out between 2027 and 2030.

4.3.1 Terrestrial and Wetland Impacts

Section 2.3.1 contains a detailed description of the terrestrial communities of the site and vicinity, including those of the proposed utility corridors. This provides the ecological baseline against which the potential impacts of land disturbance and construction activities are measured.

4.3.1.1 Terrestrial Habitats

4.3.1.1.1 Site

Section 2.3.1 describes the proposed site consists primarily of big sagebrush shrubland with additional minor components of sagebrush steppe, saltbush shrubland, and greasewood flat habitats. Wyoming is an “open range” state, so ranchers are free to graze cattle in unfenced areas or herd sheep (which must be tended) through them. Sheep and cattle have grazed in the site vicinity for decades, and there are signs of livestock usage throughout, including some well-worn trails and trampled stream banks. Although the wildlife habitat is less than pristine, an array of songbirds, waterbirds, and birds of prey forage, nest, roost, and rest in the vicinity (see Section 2.3.1). Small mammals (prairie dogs and ground squirrels) are abundant and larger mammals, including pronghorn, mule deer, and elk, are occasionally observed in the area.

Construction activities would result in the clearing and grubbing of portions of the site shown in Figure 3.3-1. Construction of Kemmerer Unit 1 would result in approximately 218 acres (88.2 hectares) being disturbed (and represent the maximum possible area of soil exposed at one time) on site during the construction phase. Approximately 138.8 acres (56.2 hectares) of inter-mountain basin big sagebrush shrubland and approximately 78.9 acres (31.9 hectares) of greasewood flats would be disturbed. Section 4.3.1.1.2 describes there being no impacts to plant communities outside of the site, with the exception of those areas associated with the water supply pipeline and transmission system.

The entire 218 acres (88.2 hectares) would be cleared of vegetation and converted to industrial use (see Figure 3.3-1). While facilities will not occupy the entire 218 acres (88.2 hectares), there are no plans to re-vegetate or restore the temporarily disturbed areas, including the construction parking lots, laydown areas, and spoils storage areas. Soils in these areas will likely be stabilized with a geotextile and covered with gravel. Clearing and grading methods, management of excavated soils, and disposition of construction wastes are described in Section 3.3.1.1.

Plants and plant communities on the site are typical of sagebrush-shrub habitats in the region. No listed, rare, or unusual plant species were observed by biologists who conducted Terrestrial Visual Encounter Surveys in 2022 and 2023 (Reference 4.3-13; Reference 4.3-14). Because the vegetation communities within the site are found throughout Lincoln County and the Wyoming Basin, the affected area at the site would be a very small percentage of the total acreage of these vegetation types in the region. While construction would eliminate approximately 218 acres (88.2 hectares) of habitat within the site, it would not noticeably reduce the regional diversity of plants, plant communities, or the wildlife species that inhabit them. Impacts of site construction on vegetation communities are therefore anticipated to be SMALL.

4.3.1.1.2 Offsite Areas

A new water supply pipeline will be built to connect proposed Kemmerer Unit 1 to the existing Raw Water Settling Basin at the Naughton Power Plant; two new transmission lines will be built to connect Kemmerer Unit 1 to the Naughton Power Plant's substation (see Figure 2.1-10). Construction of the water supply pipeline and transmission lines is not expected to disturb the entirety of the common macro-corridor (314.7 acres [127.4 hectares]), water macro-corridor (102.6 acres [41.5 hectares]), and electrical macro-corridor (94.0 acres [38.0 hectares]). The water supply pipeline corridor would disturb approximately 36 acres (15 hectares), assuming a right-of-way (ROW) width of 50 feet (17 meters) (see Section 3.3.1.7). The transmission corridor would disturb approximately 180 acres (72.8 hectares), assuming a ROW width of 250 feet (76.2 meters). An additional 7 acres (2.8 hectares) would be needed for laydown and pulling the lines at the end of the line segments (see Section 3.3.1.7). These offsite areas will be temporarily disturbed but stabilized and revegetated when construction has been completed.

The pipeline ROW would be cleared and leveled using conventional construction equipment, including bulldozers, loaders, graders, backhoes, and excavators. The pipeline will be installed via open cut methods (trenching), except where there are streams and wetlands, in which case the pipeline will be installed via Horizontal directional drilling (HDD).

Every effort will be made to limit the area disturbed for pipeline construction, thus the amount of native vegetation disturbed. When possible, topsoil and subsoil would be segregated, so that trenches can be filled in reverse order, with subsoil beneath topsoil. Once the pipe has been installed and the trench backfilled, the disturbed areas will be revegetated with native perennial grasses and forbs recommended by resource agencies. Soils will be amended as necessary, based on recommendations of resource agency staff, to encourage rapid establishment of ground cover. Temporary laydown areas, materials storage areas, or parking areas used during pipeline construction will be treated (dragged, ripped, tilled, disked) as necessary to loosen compacted soils, then re-vegetated as described before.

Transmission lines will be installed as overhead powerlines, spanning wetlands and streams. Because the terrain is relatively level along the macro-corridors and most vegetation is low growing (no trees are present in site vicinity outside of the Hams Fork floodplain), it may not be necessary to clear the ROWs, or major portions of the ROWs. However, even if extensive clearing for ROWs is not required, erecting towers and stringing conductors will necessitate the use of heavy equipment in the corridors, which will damage native vegetation. This damage will be temporary and will be mitigated by working when ground is dry or during colder parts of the year when most native plants (e.g., sagebrush) are in dormancy (Reference 4.3-11).

Based on similar projects in the western United States, less than 0.25 acres (0.10 hectares) would be required for each tower foundation or base. A slightly larger area would be disturbed during clearing and grading of the tower locations. Adjacent areas disturbed during tower construction would be stabilized and re-vegetated. Transmission towers will be sited to avoid environmentally sensitive areas such as streams and wetlands.

Wyoming Game and Fish Department (WGFD) identified invasive plants as one of the primary threats to sagebrush-shrubland ecosystems (Reference 4.3-23), noting that they compete with native species for water and nutrients, increase erosion, and reduce habitat quality for sagebrush-associated wildlife. Cheatgrass, in particular, represents a serious threat to sagebrush communities because it increases the frequency, intensity, and extent of hot wildfires. These hot cheatgrass fires eliminate sagebrush and allied grasses that are adapted to less-intense and less-frequent wildfires (Reference 4.3-23).

Invasive plants often colonize areas of bare soil that have been created by construction earth-moving and overgrazing. Prevention, early detection, and rapid control are required to prevent establishment of invasive plants. Introduction and establishment of invasive plants and noxious weeds will be prevented by cleaning vehicles and equipment prior to movement to a new location to minimize the potential for transporting seeds, in accordance with WGFD recommendations (see Appendix A).

Quickly establishing ground cover with native grasses, forbs, and shrubs is especially important. A strategy for doing so will be developed and detailed in the Stormwater Pollution Prevention Plan (SWPPP) required by Wyoming Department of Environment Quality's (WYDEQ) *Large Construction General* Wyoming Pollutant Discharge Elimination System (WYPDES) *Permit for Storm Water Discharges Associated with Large Construction Activities*. Monitoring of revegetated areas to ensure that plantings of native species are successful will also take place. Any invasive species discovered during this monitoring should be removed physically or with approved herbicides, or both, depending on WYDEQ recommendations.

The Fact Sheet for Large Construction General Permits (Reference 4.3-21) notes that the “entire site” must achieve a “finally stabilized” condition before permit coverage may be terminated or allowed to expire. Final stabilization means that areas of the construction site that do not have permanent structures such as buildings or roads must be re-vegetated with perennial vegetation to a uniform 70 percent of natural background cover. The Fact Sheet goes on to say that:

> “*In Wyoming’s largely semi-arid climate, the time necessary to achieve a ‘finally stabilized’ condition often requires permit coverage well beyond the end of the conventional earthwork and facility construction phase to ensure that vegetation or other site stabilization measures are in place.*”

In summary, construction of linear utilities would result in both short-term and long-term impacts on vegetation communities. Construction of the water supply pipeline would necessitate disturbing approximately 36 acres (15 hectares) of sagebrush-shrubland, but the entire area of disturbance would be re-planted with native perennial grasses and forbs. Construction of the transmission lines would involve a generally lower level of disturbance but would result in the loss of some sagebrush-shrubland for transmission towers. Revegetation of the transmission ROWs would aim to establish sustainable plant communities that are compatible with the electric facilities (i.e., stable, low-growing plant ecotypes that reduce fire risk and maintain safe access to the line and associated facilities). Regional diversity of plants and plant communities will not be significantly impacted. Overall, impacts on vegetation communities is anticipated to be SMALL and will not warrant additional mitigation.

4.3.1.2 Wetlands

During construction, several activities will be directed at protecting the aquatic environment, including using BMPs to reduce the risk of stormwater runoff, erosion, and pollutant spills, which will be outlined in the SWPPP and Spill Prevention, Control and Countermeasures (SPCC) Plan for the Kemmerer Unit 1 Site. The requirements for the SWPPP and the SPCC Plan are described in more detail in Section 4.3.2. The primary source for BMPs will be the Erosion and Sediment Control Best Management Practices for the City of Casper, Wyoming (Reference 4.3-2), to which WYDEQ refers applicants for construction stormwater permits. No direct impacts to wetlands are anticipated.

4.3.1.2.1 Site

Wetlands function as breeding habitat, foraging habitat, protective cover, and water sources for a variety of wildlife, and are considered “important habitats”. As discussed in Section 2.3.1, the acreage, as well as function and value, of depressional wetlands and streams within the site were assessed in June, September, and October 2022. Approximately 0.6 miles (1 kilometer) of North Fork Little Muddy Creek makes up the eastern boundary of the site. Approximately 7.1 acres (2.9 hectares) of riparian Palustrine Emergent wetlands were identified along the floodplain of North Fork Little Muddy Creek. This area is downgradient from the proposed construction site and could be indirectly impacted by construction activities. As shown in Figure 3.3-1, the disturbance would not directly impact wetlands.

As discussed in Section 4.2.1.1, it will be necessary to dewater excavations and building foundations during construction of Kemmerer Unit 1 to maintain dry working conditions. These excavations will be within the Hilliard Shale, a geological unit designated as an aquitard. Groundwater will seep into excavations and collect in sumps, from where it will be pumped to one of the stormwater retention ponds and then drain to North Fork Little Muddy Creek if not needed for construction activities such as dust suppression and compaction. Based on numerical modeling, the dewatering will temporarily draw down the water table in the area of the excavation, an effect that is expected to extend as far as the margin of North Fork Little Muddy Creek. It is unclear to what extent North Fork Little Muddy Creek and its wetlands are sustained by shallow groundwater. The dewatering could temporarily reduce groundwater inflows to these riparian wetlands.

Approximately 1.1 miles (1.8 kilometers) of ephemeral streams drain the site and are tributaries to North Fork Little Muddy Creek. Assessment of these streams suggests that most, if not all, lack regular or seasonal water flows. As ephemeral and intermittent waterbodies whose existence is largely dependent on rainfall and the effluent from Naughton Power Plant, their value to local wildlife varies seasonally with timing and abundance of rainfall. One of the three ephemeral streams delineated on site will require three road crossings; these impacts fall below the 0.5-acre (0.2-hectare) threshold for a United States Army Corps of Engineers Nationwide Permit (NWP) and will be permitted under Nationwide Permit 14 (Linear Transportation Projects).

To the extent possible, sensitive habitats like wetlands and streams would be avoided during site construction. However, a pipeline and discharge structure would be constructed to convey plant wastewater and blowdown to North Fork Little Muddy Creek. The combined discharge would flow into a flared concrete discharge structure and then onto a broad apron of riprap designed to dissipate energy (flow velocity) and prevent soil erosion down-gradient from the structure. The rip-rap apron would be underlain by gravel placed on a geotextile filter fabric to prevent soil erosion underneath the structure. The discharge structure (including rock apron) would be located so that the riparian wetland associated with North Fork Little Muddy Creek is not directly impacted. Based on the current design, which is preliminary, the discharge structure would be outside of the delineated wetland line.

Best construction management practices detailed in the SWPPP for the Large Construction General WYPDES permit and approved by WYDEQ would limit indirect impacts to these riparian wetlands. The same BMPs would also limit potential indirect impacts from stormwater runoff. Because there would be no direct impacts to wetlands and construction would be carried out using agency-approved BMPs, impacts on wetlands on the Kemmerer Unit 1 Site are anticipated to be SMALL, and no mitigation beyond the agency-required measures discussed throughout this section will be required.

4.3.1.2.2 Offsite Areas

The acreage, as well as function and value, of depressional wetlands and streams within the offsite areas were assessed in June, September, and October 2022. Two ephemeral streams (1,945 linear feet [593 linear meters]), two intermittent streams (1,069 linear feet [326 linear meters]), two perennial streams (1,498 linear feet [457 linear meters]), and four wetlands (4.4 acres [1.8 hectares]) are crossed by the common macro-corridor. Two wetlands (4.8 acres [1.9 hectares]) cross both the water and electrical macro-corridors, and an additional two wetlands (0.7 acres [0.3 hectares]) fall along the electrical macro-corridor. Two ephemeral streams (162 linear feet [49.4 linear meters]) flow within the water macro-corridor, and two perennial streams (598 linear feet [182 linear meters]) cross the electrical macro-corridor. Direct impacts to wetlands and streams along the macro-corridors will be avoided via HDD (water supply pipeline) or spanning overhead (transmission lines). During construction, wetlands and waterways could be indirectly impacted by runoff and sedimentation, but these impacts would be temporary and mitigated to the extent practicable by environmental BMPs.

Mitigation measures to maintain natural drainage patterns and limit erosion and sedimentation would include maintenance of vegetation cover and use of BMPs such as silt fences, mulching, and seeding.

Aquatic features within the offsite areas are heavily influenced by operations of the nearby Kemmerer mine and the Naughton Power Plant. No unique or high-quality wetland habitats are present (Reference 4.3-15). No direct impacts to offsite wetlands are anticipated. Indirect impacts to offsite wetlands will be limited by the SWPPP and BMPs. Therefore, building linear utilities in offsite areas are anticipated to have impacts on wetlands that are negligible to SMALL and do not appear to warrant mitigation beyond that required by permitting agencies.

4.3.1.3 Wildlife

4.3.1.3.1 Site

There are 218 acres (88.2 hectares) of primarily sagebrush shrubland that would be altered by site development and converted to industrial use. This habitat loss would affect wildlife abundance and distribution locally but is not expected to have a discernible regional impact. The site lies within the Cumberland Flats and, encompasses approximately 68,000 acres (27,519 hectares) of sagebrush-shrub habitat (see Section 2.3.1).

Clearing and grading associated with site preparation could have both direct impacts (some smaller, less-mobile rodents and reptiles could be crushed by equipment or buried by fill dirt) and indirect impacts (noise from heavy equipment will disturb birds and larger mammals in the vicinity). According to Golden et al. (Reference 4.3-5), at construction sites with several pieces of earth-moving equipment operating simultaneously, noise levels can be as high as 100 A-weighted decibels at 100 feet (30 meters) from the noise source, but the noise attenuates over a relatively short distance. For example, at a distance of 400 feet (120 meters) from a 100 A-weighted decibels construction noise source, noise levels will typically drop to within the 60-80 A-weighted decibels range (Reference 4.3-5). This is generally below noise levels known to startle waterfowl and small mammals.

Measures to reduce noise and vibration levels during construction include staggering work activities, and use of noise dampeners and noise control equipment on vehicles and equipment. Construction activities would, to the extent practicable, be scheduled to minimize impacts to ground-nesting birds in compliance with the Migratory Bird Treaty Act. If it is infeasible to carry out construction activities outside of the avian nesting season, nest clearing surveys for migratory birds will be conducted during the 72 hour period prior to ground disturbance, as recommended by WGFD (see Appendix A). Assuming reasonable noise control measures are employed and construction activities are scheduled to minimize impacts to ground- and shrub-nesting birds, impacts to wildlife should be temporary and minor.

Avian collisions with equipment (cranes), structures (buildings, fences, etc.) during construction could result in mortalities. The 60 meter (200 foot) meteorological tower will be the tallest structure on Kemmerer Unit 1 Site, but some construction cranes could be as high or higher. The likelihood of avian collisions depends on the height and positioning of the man-made structures as well as the size and behavior of the birds, general landscape features, and weather conditions (Reference 4.3-7). Construction activities and noise can also affect avian movements and increase the probability of collisions. Weather conditions resulting in poor visibility can result in avian mortalities because of collisions; however, these losses have not been found to significantly impact common or abundant species. Therefore, avian collisions with buildings and equipment during construction of Kemmerer Unit 1 are expected to be infrequent and any impacts from these collisions would be minor.

Direction and intensity of lighting during facility construction and operation can alter the behavior of birds and mammals; however, lighting would be required for safe construction. To the extent safe operations permit, unnecessary lights would be turned off at night, lights would be shielded (directing light downward), and lower-powered lights would be used during peak migration periods, as recommended by WGFD (see Appendix A).

Although regarded as more of a human health concern, fugitive dust can also have harmful effects on plants and animals. High levels of dust can coat plant leaves and inhibit photosynthesis and transpiration. Impacts on wildlife can be direct (affecting respiration or vision) or indirect (rendering foraging, feeding, nesting, denning areas unusable). Dust control measures are always important at construction sites, but are especially important in arid regions like southwest Wyoming, where soil can become extremely dry and subject to transport by high winds (Reference 4.3-4). Standard dust control measures would be employed to minimize health impacts to workers, but would also benefit plants and wildlife. These would include (1) covering or watering soil stockpiles, (2) applying water or approved chemical dust suppressants to unpaved and gravel roads, and (3) limiting vehicle speeds on unpaved and gravel roads in construction zones.

Some limited mortality of common small mammals and reptiles is expected during site clearing and grading, as is disturbance and displacement of common birds and larger mammals. Avian collisions with tall structures could occur during construction, particularly during periods of poor visibility. Animal-vehicle collisions could occur on site during construction, but are more likely to occur on the highway that adjoins the site because of higher travel speeds. Construction of Kemmerer Unit 1 is therefore anticipated to have SMALL impacts on wildlife, provided the mitigation measures described in this section are implemented. Additional mitigation does not appear to be warranted.

4.3.1.3.2 Offsite Areas

Construction activities associated with the new water supply pipeline and transmission lines would include clearing of new corridors (to the extent necessary), trenching for the pipeline, laying pipe, erecting new transmission towers, stringing or “pulling” conductors, and possibly creating some temporary roads or staging areas for construction equipment and material. Wildlife species occurring in the vicinity of the proposed water supply pipeline and transmission lines are similar to those of the site and the impacts to these species from construction noise and activity would also be similar to those discussed in Section 4.3.1.3.1. Most wildlife (e.g., songbirds, birds of prey, jackrabbits, coyotes, large ungulates) in the area are highly mobile and will simply leave an area to avoid construction noise and activity. Wildlife are expected to return to these macro-corridor areas following construction, particularly if efforts are made to create or improve wildlife habitat (e.g., by installing nest boxes for songbirds and kestrels).

Clearing of new corridors would include the use of BMPs to reduce impacts to sensitive habitats. BMPs include employment of silt fences, mulching, slope texturing, vegetated buffer strips, re-seeding areas of disturbed soils, and avoidance of wetlands and other sensitive habitats to the extent possible.

Assuming reasonable noise control measures are employed and construction activities are scheduled to minimize impacts to ground- and shrub-nesting birds, impacts to wildlife from construction of linear utilities are expected to be temporary and SMALL. Additional mitigation does not appear to be warranted.

4.3.1.4 Important Species and Habitats

Section 2.3.1.4 describes the important terrestrial species and habitats known to occur within the site, vicinity, and macro-corridors. Desktop review of the scientific literature and information on resource agency websites (e.g., the Wyoming Natural Diversity Database) in conjunction with 2022 and 2023 wildlife surveys suggest that only one Federally-protected species, Ute ladies'-tresses (ULT), could be present. No Federally-listed plant or animal species was observed during wildlife surveys conducted to date (Reference 4.3-13; Reference 4.3-14). No ULT or other similar orchid species were observed during the species-specific ULT surveys in 2022 and 2023 (Reference 4.3-17; Reference 4.3-16).

A pipeline from the Kemmerer Unit 1 wastewater basin to North Fork Little Muddy Creek is planned (see Section 4.3.1.2). This pipeline will approach, but not encroach on the riparian wetland along North Fork Little Muddy Creek, an area described as marginally suitable for ULT in the 2022 ULT survey report (Reference 4.3-17). Based on the known distribution of the species in Wyoming and the quality of the North Fork Little Muddy Creek riparian habitat, finding ULT in the area is regarded as highly unlikely. However, should biologists discover ULT during the 2024 survey, reviews of the pipeline route and discharge structure design to ensure that ULT are protected will take place in consultation with the United States Fish and Wildlife Service (USFWS).

The monarch butterfly, a candidate for Federal listing, has been observed across the state of Wyoming and is believed to move through Lincoln County during seasonal migrations. Conservation measures for candidate species are voluntary, but protection provided to candidate species could preclude listing in the future. The USFWS recommended mapping potential monarch habitat in the project area and documenting incidentally observed monarchs and locations in the project vicinity where milkweed occurs (see Appendix A). No milkweed plants and no monarchs were observed during the 2022 and 2023 wildlife surveys (Reference 4.3-13; Reference 4.3-14).

4.3.1.4.1 Birds

In 2022 and 2023, bald and golden eagles were observed in the site vicinity (Reference 4.3-13; Reference 4.3-14). These species are Federally protected under the Bald and Golden Eagle protection act and the Migratory Bird Treaty Act; they are also USFWS Birds of Conservation and Wyoming designated Species of Greatest Conservation Need (SGCN).

Wyoming Natural Diversity Database reported 161 sightings of golden eagle within the 6-mile (9.6-kilometer) vicinity since 1977 and 13 sightings of bald eagle within the vicinity since 1982 (Reference 4.3-24). The eagles likely use Hams Fork and associated wetlands northeast of the site, and frequent the Naughton Power Plant ponds as stopover habitat and surrounding site vicinity to prey on the abundant white-tailed prairie dog known to occur in the area (101 sightings since 1978). The golden eagle has an abundance of high-quality habitat in Wyoming due to the prevalence of undisturbed landscapes with high wind speeds, moderate aridity, and relatively little forest cover (Reference 4.3-9; Reference 4.3-23). It uses a wide variety of habitats including sagebrush steppe, desert shrubland, and lower elevation riparian areas, which are habitats that occur within the site vicinity.

Formerly listed as an endangered species, the bald eagle nationwide (except in parts of Arizona) was Federally de-listed in 2007. USFWS guidelines for bald eagle management suggest a 660-foot (200-meter) disturbance buffer around eagle nests during the breeding season (Reference 4.3-18). The restricted area is recommended because bald eagles are extremely sensitive to human activity during the first 12 weeks of the breeding season. The USFWS Wyoming Ecological Services Office recommends a 1-mile (1.6-kilometer) disturbance buffer for bald eagle nests and a 0.5-mile (0.8-kilometer) buffer for golden eagles from January 15 to July 31 (Reference 4.3-19).

Based on a USFWS recommendation (see Appendix A), project biologists conducted a ground-based survey of eagle and raptor nests in June 2023. The site, macro-corridors, and an additional 2-mile (3.2-kilometer) buffer area were searched. Two golden eagle nests were observed approximately 0.75 miles (1.1 kilometers) southeast of the site (Reference 4.3-14), which is outside of the 0.5 mile-buffer recommended by the USFWS. No bald eagle nests were observed. Four active red-tailed hawk nests were also recorded just outside the site and macro-corridors during the 2023 raptor and eagle nest survey, as discussed in Section 2.3.1. Assuming nests are still active during construction, they will be protected with a 0.25-mile (0.40-kilometer) buffer zone where no ground disturbance is allowed, consistent with the USFWS Wyoming Ecological Services Field Office's recommendations (Reference 4.3-19).

WGFD recommended that surveys for nesting raptors be performed within 1 mile (1.6 kilometers) of the project area prior to any vegetation clearing or ground-disturbing activities (see Appendix A). They noted that burrowing owls, which nest in prairie dog burrows, require specialized surveys to ensure detection. Project biologists discovered a pair of burrowing owls nesting in the utility corridor south of the Naughton Power Plant in June 2023 (Reference 4.3-14). Nest-clearing surveys for burrowing owls will be conducted in areas of the site with prairie dog burrows in the 72 hour period prior to construction, consistent with WGFD recommendations (see Appendix A). If active owl nests are discovered, they will be protected with a 0.25-mile (0.40-kilometer) buffer zone where no ground disturbance is allowed, consistent with the USFWS Wyoming Ecological Services Field Office's recommendations (Reference 4.3-19).

In addition to the two eagle species, 13 avian species designated SGCN were observed during the 2022 and 2023 Terrestrial Visual Encounter Surveys within the project vicinity, many of which are dependent on the sagebrush-steppe habitat. Many sagebrush-associated bird species respond negatively to disturbances such as infrastructure development or removal of sagebrush by mechanical thinning, mowing, or herbicide application, as it reduces sagebrush cover that provides nesting and foraging habitat (Reference 4.3-12). The Brewer's sparrow, sage-thrasher, and greater sage-grouse are considered "sagebrush-obligate" species, meaning they depend uniquely on sagebrush habitat to meet one or more seasonal habitat requirements. Brewer's sparrow and sage-thrasher prefer tall, mature stands of big sagebrush, and require large patches of sagebrush with dense shrub cover (Reference 4.3-1); both species were commonly observed during the 2022 and 2023 surveys, indicating that there is suitable sagebrush habitat (in large patches) in the site vicinity.

The greater sage-grouse is an iconic western species that has in recent years become the focus of agency conservation efforts because the health of its populations is indicative of the health of sagebrush-dominated ecosystems. Sage-grouse habitat use varies by season. In general, breeding habitats (i.e., spring habitat) and brood rearing habitats (i.e., summer habitat) are characterized by 10 to 25 percent sagebrush cover on average, with an abundant grass and forb understory of greater than 15 percent cover. Winter habitat consists of relatively large areas of sagebrush with 10 to 30 percent canopy cover on average, which provides cover and forage for grouse above the snow (Reference 4.3-3). The site and associated macro-corridors do not fall within the State of Wyoming designated Core Population Areas, but they are located within 0.5 miles (0.8 kilometers) of a Core Population Area and within 3.7 miles (6.0 kilometers) of an occupied lek. According to the Wyoming Natural Diversity Database data query, there are at least 1,009 records of greater sage-grouse in the 6-mile (9.7-kilometer) vicinity. Because the sage-grouse is a ground nester, this species is sensitive to the type of ground-clearing activities that would occur during construction; all lekking habitat will be avoided according to site design.

As discussed in Section 4.3.1.1.1, construction of Kemmerer Unit 1 will eliminate 138 acres (55.8 hectares) of sagebrush shrubland. The loss of sagebrush shrub is expected to reduce, at least marginally, reproductive success of sagebrush-obligate wildlife species such as sage thrasher, Brewer's sparrow, and greater sage-grouse in the site vicinity. Construction of the linear utilities will also disturb sagebrush-shrub habitat, but virtually all of this acreage will be re-vegetated with native perennial grasses and forbs.

The three sagebrush-obligate avian species will be most affected by construction, as they nest in sagebrush shrubland. Another avian SGCN, the loggerhead shrike, also nests and forages in sagebrush shrubland and will be affected similarly. Seven of the SGCN observed during surveys (see Table 2.3-3) were waterbirds, wading birds, or marsh-dwelling birds and would not be impacted directly by construction. They could be disturbed, however, by construction noise and activity; nesting success could be affected.

Five of the SGCN observed during surveys were birds of prey, or raptors (see Table 2.3-3). Both the USFWS and WGFD expressed concerns about raptors and raptor nests in their letters and asked that surveys of nesting raptors be conducted in advance of land-clearing and ground-disturbing work. Should raptor nests (nests of any migratory bird, for that matter) be found "on or near the project area" (see USFWS letter of May 1, 2023, Appendix A), The USFWS will be worked closely with to ensure that protections (e.g., buffer zones around nests) are in place.

Construction activities could affect other migratory birds during nesting season. Nest desertion, missed feedings, neglect of chicks, premature fledging of older nestlings, and increased exposure to predators are potential indirect impacts to birds during the construction phase of the project. These impacts are experienced at the level of the individual or small groups of individuals; the likelihood that such losses on the site would influence population levels in the general area is negligible.

To the extent possible, agency recommendations with regard to scheduling land-disturbing work outside of peak nesting periods will be followed. Project biologists have conducted seasonal surveys of birds in order to better understand their distribution and abundance in the site vicinity and have conducted raptor nest surveys to identify preferred nest sites. During the avian nesting period, clearance surveys will be conducted in the 72 hour period before land-clearing begins so that active nests of migratory birds can be identified, flagged, and avoided. Should it prove to be infeasible to avoid the nest of a migratory bird, consultation with the Wyoming Ecological Services Office of the USFWS about possible remedies, including the issuance of an incidental take permit will take place. Given that these avian studies have been conducted and avoiding or mitigating impacts to birds protected under the Migratory Bird Treaty Act is committed to, impacts to migratory birds are anticipated to be SMALL.

4.3.1.4.2 Small Mammals

While not a listed species under the Environmental Site Assessment, the white-tailed prairie dog is a Wyoming designated SGCN due to its essential role in the sagebrush-steppe ecosystem. Many other species, including some SGCN and birds of conservation concern, depend on prairie dog burrows for shelter and breeding.

White-tailed prairie dogs identify predators visually; therefore, they typically occur in areas that contain short shrub and herbaceous vegetation, on which they also forage. They are active above ground during the spring and summer and hibernate during the fall and winter. The potential impacts to the white-tailed prairie dog from construction include direct mortality, disturbance, and loss or modification of habitat. Prairie dogs, or their burrows could be crushed by construction equipment and foraging habitat could be impacted during construction. Construction-related noise and dust disturbance could make habitat temporarily unsuitable for the species. Occupied habitats identified during preconstruction surveys would be avoided to the extent practicable. Some prairie dogs (and ground squirrels) will likely be eliminated by heavy equipment while others will be driven from the area by disturbance into adjacent areas of sagebrush-shrub, making them more vulnerable to predators as they search for cover or dig new burrows. However, because they are common to ubiquitous in the area and region and have a relatively high reproductive potential (compared to larger mammals) impacts to prairie dogs in the site vicinity are anticipated to be temporary and SMALL.

4.3.1.4.3 Big Game Species

Common big game species in the site vicinity are pronghorn, elk, and mule deer (see Section 2.3.1). Non-forest habitat types provide most of the forage for big game, support migration corridors, and provide crucial winter range for these species. Large mammals are highly mobile and will generally avoid the noise, movement, and smells of active construction sites. There would be some physiological stress and minor energetic expenses associated with avoiding construction zones and locating alternative habitats in the vicinity. Pronghorn, elk, and mule deer are expected to resume using the macro-corridor areas following construction, once human activity has diminished and native vegetation has become re-established. The Kemmerer Unit 1 Site will be unavailable to big game when work on facilities and infrastructure has been completed.

As discussed in Section 2.3.1.4, the site and most of the macro-corridors fall within the WGFD-designated crucial winter, yearlong range for pronghorn. Effort will be made to minimize impacts to pronghorn, including limiting the use of fencing, where practicable, during construction and installing wildlife-friendly fencing where appropriate, as recommended by WGFD (see Appendix A). Other possible measures to reduce impacts to pronghorn would include seeding highway rights-of-way with less-palatable vegetation and limiting vehicle speeds to 25 miles per hour (40 kilometers per hour) on all unsurfaced access roads during the construction period. Given that mitigation measures will be employed to reduce the likelihood of entanglement with fences and animal-vehicle collisions, construction impacts to big game species including pronghorn are anticipated to be SMALL.

Construction impacts to wildlife discussed in Section 4.3.1.3 also apply to the important species considered above. Informal consultations with Federal and State agencies (USFWS, WGFD) were conducted regarding endangered and threatened species and species of greatest conservation need, and the project will continue to consult with them regarding protected species. Permit conditions and executive orders that relate to the timing of construction activities to ensure that big game species are protected will be obeyed.

4.3.2 Aquatic Impacts

This section assesses potential impacts of Kemmerer Unit 1 construction on the aquatic communities of North Fork Little Muddy Creek and its tributaries, the only waterbodies likely to be affected. Section 2.3.2 describes these aquatic communities as well as the aquatic communities of Hams Fork, which, based on current plans, would not be affected by construction of Kemmerer Unit 1 or related infrastructure development.

4.3.2.1 Kemmerer Unit 1 Site Construction

As described in Section 2.3.2 and Section 4.3.1.2.1, the Kemmerer Unit 1 Site is drained by several ephemeral streams that convey water only occasionally, after heavy rains. These streams, known colloquially as “dry washes,” contain no aquatic life, and are of interest because the water they sometimes convey flows into North Fork Little Muddy Creek and indirectly affects aquatic life there.

As described in Section 4.2, the WYDEQ requires operators who plan to discharge stormwater from construction sites that disturb five or more acres (by “clearing, grading, or excavation”) to obtain a WYPDES Large Construction General Permit for Storm Water Discharges (Permit WYR100000). Holders of these permits are expected to minimize or eliminate pollutants, including sediment, in stormwater runoff from construction sites. A SWPPP must be completed and submitted to WYDEQ no less than 30 days before construction commences. The SWPPP should identify potential sources of stormwater pollution, such as material storage areas, soil stockpiles, borrow areas, equipment storage and maintenance areas, bulk fuel storage areas, and vehicle fueling areas.

The SWPPP must also identify BMPs, including sound conservation and engineering practices, that would be used to minimize pollution in stormwater runoff. These BMPs would encompass conventional erosion control and stabilization practices and sediment control practices as described in Section 4.2. WYDEQ recommends that applicants for WYPDES Large Construction General Permits for Storm Water Discharges employ BMPs described in the *Erosion and Sediment Control Best Management Practices* manual (Reference 4.3-2) and *A Guide to Temporary Erosion-Control Measures for Contractors, Designers and Inspectors* (Reference 4.3-10). Reviewed were these documents, the Wyoming Department of Transportation's *Pollution Controls and Best Management Practices for Storm Water During Construction* (WDOT undated), the *Idaho Catalog of Storm Water Best Management Practices* (Reference 4.3-6) and the Montana Department of Transportation's *Erosion and Sediment Control Best Management Practices Manual* (Reference 4.3-8) and others in developing stormwater management strategies for construction of Kemmerer Unit 1.

In addition to the indirect impacts from construction of the discharge structure, there would be indirect impacts from preconstruction activities, and especially site preparation. Section 3.3 describes a range of proposed preconstruction activities that would be carried out over the 2024 to 2029 period including site preparation (clearing, grubbing, grading), installation of fencing and other access control measures, construction of service buildings (shops, warehouses, equipment storage sheds, office buildings) intended to support construction of the facility, and development of infrastructure (roads, parking lots, railroad spurs, potable water systems, and sewage treatment facilities).

Most of these preconstruction activities would take place in upland areas and would be carried out in such a way as to preclude, under normal circumstances, impacts to downgradient wetlands (discussed in Section 4.3.1) and surface waters. Three preconstruction activities associated with site development do appear to have at least modest potential for indirectly impacting water quality and thus the aquatic communities of North Fork Little Muddy Creek and its tributaries: (1) clearing and grading for the South Construction Laydown Area, which is a relatively short distance from North Fork Little Muddy Creek, (2) stockpiling excavated material in a spoils area in the southern-most part of the same Laydown Area, and (3) earth-moving and soil disturbance associated with building the entrance road.

Approximately 42 acres (17 hectares) (Section 3.3) would be cleared, grubbed, and graded to create the South Construction Laydown Area using conventional earth-moving equipment including bulldozers, tracked and wheeled loaders, and graders. The spoils area will be established within the South Construction Laydown Area and will be used to store excavated material that is suitable for fill. The entrance road will connect US 189 and the southern part of the site. Construction of the entrance road will necessitate the use of heavy equipment in the floodplain of an ephemeral stream to install a culvert, build an embankment, and create a roadway atop the embankment.

The potentially damaging effects of construction-generated sediment on aquatic ecosystems have been widely studied and documented (Reference 4.3-20). Three major groups of aquatic organisms are typically affected: (1) aquatic plants (both periphyton and vascular plants), (2) benthic macroinvertebrates, and (3) fish. Turbidity associated with suspended sediments reduces photosynthetic activity in both periphyton and rooted aquatic plants. Deposited sediments can smother these plants. Suspended sediment can interfere with respiration and filter feeding of macrobenthos (especially mussels and aquatic insect larvae), while heavy deposition of sediment on the streambed can blanket both surficial and interstitial habitats of these organisms. Suspended sediment in streams can interfere with respiration and feeding in both young and adult fish; however, juvenile and adult fish are generally able to move from areas with high levels of suspended sediment and to areas with lower levels. Deposited sediment could render formerly prime areas unsuitable for spawning or, if deposited after spawning has been completed, may destroy eggs and fry (Reference 4.3-20).

WYDEQ approved best construction management practices will be employed during site construction to control erosion and limit the amount of soil and sediment-laden water entering North Fork Little Muddy Creek and its tributaries. Erosion control and stabilization practices could include mulching, geotextiles, chemical stabilization (soil binders), buffer strips, and establishment of temporary or permanent vegetation. Sediment controls could include silt fences, vegetative buffer strips, sediment traps, and sediment basins, as dictated by site conditions.

Petroleum products (including lubricants, diesel fuel, kerosene, and hydraulic fluids) are sometimes spilled at construction sites as a result of equipment failure (split hydraulic lines, broken fittings) or human error (overfilled tanks). Petroleum products can, depending on their volatility and chemical makeup, be extremely toxic to aquatic organisms, with effects that may be acute (crude oil and heavy fuel oils smothering aquatic insects and shellfish) or chronic (petroleum residues interfering with reproduction or reducing resistance to disease). Several factors tend to limit impacts of construction site petroleum spills on aquatic communities. First, spills generally occur in upland areas of construction sites (laydown yards, parking lots, staging areas, fuel depots) where spill control and cleanup are relatively straightforward. Second, the volumes of fuels and lubricants spilled at construction sites tend to be small: tens of gallons rather than hundreds or thousands of gallons.

To ensure that nearby streams and aquatic communities are not harmed by petroleum products or other industrial chemicals, certain activities that involve the use of petroleum products and solvents to designated areas, such as the laydown, fabrication, and shop areas mentioned in Section 3.3 will be restriced. Fuel, lubricants, and chemicals would be stored in locations with spill containment equipment appropriate to the volume of petroleum products or other chemicals stored there. Although not specifically required by State regulations, a construction-phase SPCC Plan will be implemented to ensure that personnel are trained to respond to petroleum and chemical spills and that necessary spill control equipment is on the site and immediately accessible. Given that (1) refueling, lubrication, cleaning, and degreasing of vehicles and heavy equipment would take place in restricted areas of the site well removed from waterways and (2) an SPCC Plan would ensure that trained personnel with spill control equipment are on hand to deal quickly with spills, it is unlikely that spilled petroleum products or industrial chemicals would make their way into down-gradient waterways to harm aquatic habitats or aquatic organisms.

While BMPs would be used to avoid and mitigate construction impacts to North Fork Little Muddy Creek, some disturbed soil from site construction would likely be carried into the stream with stormwater runoff. Construction-related sedimentation could, depending on the effectiveness of mandated erosion controls, have a small, localized effect on common benthic macroinvertebrates. Impacts to fish would depend on streamflows during the construction period but would likely be limited to displacement of individuals (fish moving upstream or downstream in response to turbidity or sediment deposition).

Current plans call for dewatering excavations during site construction. Groundwater pumped from excavations will be routed to North Fork Little Muddy Creek via the stormwater conveyance system. Groundwater in the area is of poor quality and will almost certainly require some level of treatment to meet State water quality standards. Because discharges from dewatering operations will meet applicable State water quality standards that are protective of aquatic communities, impacts from these operations on aquatic biota should be negligible.

Biologists conducted baseline surveys of North Fork Little Muddy Creek to document preconstruction water quality conditions, characterize existing aquatic habitats and communities, and determine if any rare or special-status aquatic species were present (see Section 2.3.2). North Fork Little Muddy Creek contains hardy minnow species (e.g., redside shiner (*Richardsonius balteatus*), speckled dace (*Rhinichthys osculus*), longnose dace (*Rhinichthys cataractae*)) and sucker species (e.g., white sucker (*Catostomus commersoni*), mountain sucker (*Catostomus platyrhynchus*)) adapted to the region’s extreme and unpredictable environmental conditions. No rare or special-status fish species were collected by biologists conducting baseline surveys in 2022 and 2023. One fish species designated a SGCN by WGFD, the roundtail chub (*Gila robusta*), was collected in North Fork Little Muddy Creek several miles downstream of the Kemmerer Unit 1 Site as recently as 2018 by WGFD biologists.

4.3.2.2 Offsite Construction

Kemmerer Unit 1 and the Naughton Power Plant will be connected with a water supply pipeline and two transmission lines to take advantage of existing water supply and electrical infrastructure. As shown in Figure 2.1-10, the pipeline and transmission lines will share a common north-south corridor, a common east-west corridor, and then diverge southwest of Naughton Power Plant, with the water supply pipeline extending north-northwest to the Naughton Power Plant Raw Water Settling Basin and the transmission lines extending north-northeast to the Naughton Power Plant switchyard.

The current design calls for the installation of approximately 6 miles (10 kilometers) of pipe. The proposed pipeline will be installed using standard trenching technology, and depth will depend on topography and site-specific conditions.

Because a substantial volume of soil would be displaced during clearing and grading of pipeline ROW and excavated during trenching operations, special attention would be paid to the placement and management of soil stockpiles. Soil stockpiles will be placed outside of the active construction zone in locations that don’t interfere with natural drainage patterns. If feasible, stockpiles will be placed a minimum of 50 feet (15 meters) away from watercourses. To reduce soil erosion from wind and precipitation, active soil stockpiles will be covered with tarps or plastic sheeting when not in use. Less active or inactive soil stockpiles will be mulched and seeded with fast-growing grasses or mulched and sprayed with a soil-binding chemical or “tackifier.” Temporary sediment control barriers will be placed around stockpile perimeters to divert stormwater and prevent runoff from the stockpile. Sediment control barriers for active stockpiles would include an upgradient access point for workers and equipment. Recommended perimeter sediment controls include berms, dikes, fiber rolls, biofilter bags (“socks”), and silt fences.

Reclamation of the pipeline corridor would involve replacing stockpiled subsoil and topsoil, grading as necessary to prevent erosion, and re-establishing vegetation, as described in Section 4.3.1.1.2. The methods employed to re-establish vegetation would be based on local conditions and recommendations of resource agencies. It could be necessary to amend soils to facilitate germination of seeds and speed the establishment of vegetation. Unless directed to do otherwise by resource agency experts, native seeds or seed mixes would be used and will be sown using a broadcast spreader, seed drill, or hydroseeder, depending on the seed or seed mix and site conditions. Post-construction inspections would be conducted to ensure successful revegetation.

The water supply pipeline will cross as many as six small streams. HDD will be employed rather than open-cut methods to avoid direct impacts to wetlands and streams during pipeline construction. Open-cut crossing involves digging a trench across the stream bottom to hold the pipe. HDD involves drilling a tunnel under the stream through which pipe is passed. HDD has obvious advantages over open-cut trenching with regard to potential environmental impacts. While open-cut crossing requires extensive disturbance of stream banks and stream bottom, HDD involves negligible disturbance of either. Two relatively small areas on either side of the stream are disturbed: an entry point (where drill rig, mud shaker, and other equipment are stationed) and an exit point (where pipe is staged). Also, the volume of excavated material (from both dry land and stream bottom) is greatly reduced, and therefore the likelihood that excavated soil will be carried into the stream with stormwater.

Although every effort would be made to avoid and mitigate impacts to the streams, it is possible that some disturbed soil from pipeline construction would be carried into streams with stormwater runoff. Impacts to the streams could include some minor local degradation of benthic macroinvertebrate habitat. Fish, being more mobile, would be less affected. In general, and when not constrained by a barrier, adult and juvenile fish temporarily abandon stream segments with elevated turbidity and suspended solids levels, dispersing to areas upstream or downstream that offer better water quality and more plentiful macroinvertebrate food. As conditions improve, they generally re-colonize the areas that were abandoned.

The proposed transmission lines would be built across land that is sagebrush-shrubland, for the most part, with the final (northern) leg crossing areas previously disturbed by Kemmerer Mine operations, transmission lines, and Naughton Power Plant operations. Transmission lines will be installed as overhead powerlines, spanning wetlands and streams. Because the terrain is relatively level along the macro-corridors and most vegetation is low growing (no trees are present), large-scale clearing and grading is not anticipated. Some limited clearing and grading will be necessary at tower sites, and may be necessary elsewhere (for temporary access roads and construction staging areas). Also, erecting towers and stringing conductors will necessitate the use of heavy equipment in the corridors, which could damage vegetation and create conditions conducive to erosion.

Construction-phase access roads will be unimproved dirt tracks and will be routed to avoid watercourses. The same unimproved access roads would be used for ongoing transmission system maintenance. To the extent possible, vacant but previously disturbed areas around Naughton Power Plant and Kemmerer Unit 1 would be used for equipment staging and material laydown areas, but it could be necessary to establish a construction staging area along the transmission corridor. The need for a staging area or areas would be determined by the construction contractor during the construction phase. Should staging areas or laydown areas be necessary, they would be placed in locations that are not prone to erosion or near watercourses.

The depth of excavation for the transmission tower foundations has not been determined, and will depend on soils, underlying geology, and terrain. Material (soils and rock) removed for tower foundations will be stockpiled, as in the discussion of the water supply pipeline, for use as fill. The ultimate disposition of stockpiled material will depend on its characteristics and potential for use as fill elsewhere. BMPs will be used to protect stockpiles from the elements and to limit erosion and sedimentation.

The proposed route of the new transmission lines would cross several wetlands and small streams, but these sensitive areas could be easily spanned with the standard steel towers that are under consideration. Transmission towers would be erected on the high ground on either side of any sensitive feature.

Soil erosion from ground-disturbing activities during transmission line construction would be controlled through the development and implementation of a SWPPP with approved BMPs. A spill prevention plan would be developed that would reduce the likelihood of a spill of a petroleum product or hazardous material and limit the impact to aquatic communities of any small spill that occurs. Areas of ground disturbance would be stabilized immediately after construction and subsequently revegetated. In summary, transmission line construction is expected to have a negligible impact on aquatic life in North Fork Little Muddy Creek and its small tributaries.

North Fork Little Muddy Creek, notwithstanding its 3B Surface Water Classification, supports a surprisingly diverse fish community, including at least one Wyoming SGCN, the roundtail chub. Wyoming's Surface Water Quality Standards, which include (Chapter 1, Section 32) specific protections for aquatic communities will be complied with:

> "Class 1, 2, and 3 waters of the State must be free from substances, whether attributable to human-induced point source discharges or nonpoint source activities, which will adversely alter the structure and function of indigenous or intentionally introduced aquatic communities."

In summary, impacts from site and linear utility construction on the aquatic communities of North Fork Little Muddy Creek would be limited to short-term increases in stream turbidity and sediment loads. These temporary changes in water quality would have a small, localized effect on benthic macroinvertebrate and fish populations that are adapted to the region's weather extremes and unpredictable stream flows. No Federally- or State-protected aquatic species, no recreational or commercial fisheries, and no “important” aquatic habitats as defined in Regulatory Guide 4.24, Revision 0, “Aquatic Environmental Studies for Nuclear Power Stations,” would be affected. Based on the fact that most land-disturbing activities would be of confined to upland areas, permitted and overseen by Federal and State conservation agencies, and guided by an WYDEQ-approved SWPPP, impacts to aquatic communities from project construction are anticipated to be SMALL and transient in nature. No mitigation are anticipated to be warranted beyond the agency-required measures discussed throughout this section.

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4.4 Socioeconomics

The socioeconomics evaluation assesses the impacts of construction activities and workforce demands on the region's resources, with special emphasis on the demographic and economic regions. The scope of the analysis is guided by the magnitude and nature of the expected impacts and by the site-specific community characteristics that may be affected by this activity.

As presented in Section 3.3, the Kemmerer Unit 1 site preparation activities are expected to begin as early as April 2025 and construction begins 16 months later. Fuel load is scheduled for as early as July 2030. The projected commercial operation date for Kemmerer Unit 1 is by the end of 2031.

Section 4.4.1 presents an assessment of the physical impacts of construction. Section 4.4.2 through Section 4.4.4 present assessments of the social and economic impacts of construction on community resources. Resource areas include demography, economy, taxes, land use, transportation, aesthetics and recreation, housing, and public services.

4.4.1 Physical Impacts

Potential sources of impacts include noise, odors, exhaust, and visual intrusions. These physical impacts will be managed to comply with applicable Federal, State, and local environmental regulations and would not significantly affect Kemmerer Unit 1 and its vicinity.

4.4.1.1 Groups or Physical Features Vulnerable to Physical Impacts

4.4.1.1.1 People

According to 2020 census data, approximately 3,128 people live within 10 miles (16 kilometers) of the proposed site. The resident population is concentrated in Kemmerer-Diamondville. Population distribution details are given in Section 2.4.1. The nearest residence is approximately 2.8 miles (4.5 kilometers) from the site. As described in Section 2.4.1.4, there are transient populations (i.e., employees at nearby industrial and commercial businesses, migrant workers, recreational visitors, tourists) within the 10-mile vicinity (16-kilometer). The sum of the 2020 residential and estimated transient populations for the 10-mile (16-kilometer) radius is 5,758 persons.

People who could be vulnerable to noise, fugitive dust, and exhaust emissions resulting from preconstruction and construction activities are listed below in order of most vulnerable to least vulnerable:

- Construction workers and onsite personnel working at the proposed site and the offsite transmission and water supply pipeline corridors
- Transient populations (i.e., employees at nearby industrial and commercial businesses, migrant workers, recreational visitors, tourists)

Construction workers and onsite personnel will receive training and personal protective equipment to minimize the risk of potentially harmful exposures. Emergency first-aid care will be available at the construction site and offsite locations. Regular health and safety monitoring will be conducted during preconstruction and construction activities.

People living in the vicinity of the site will not experience physical impacts greater than those that would be considered an annoyance or nuisance. The construction activities will be performed in compliance with local, State, and Federal regulations and site-specific permit conditions.

Implementing noise and vibration impact mitigation procedures, restricting construction traffic to specific routes, using equipment and methods that reduce the production of vibrations (e.g., dampeners, staggering activities), and verifying that noise control equipment on vehicles and equipment is in proper working order will minimize atypical noise and vibration-generating activities such as pile driving.

Fugitive dust and odors will be generated as a result of normal construction activities. Odors from exhaust emissions would dissipate onsite. Mitigation measures to minimize fugitive and vehicular emissions (including paving disturbed areas, spraying water for dust suppression, covering truck loads and debris stockpiles, limiting vehicle speeds, and regularly inspecting emission control equipment) could be instituted.

Additional mitigation measures will be considered on a case-by-case basis. Equipment will be serviced regularly and operated in accordance with local, State, and Federal emission requirements, as discussed in Section 4.4.1.3. Given the fugitive and exhaust emission control measures discussed above, no discernible impact on the local air quality is expected.

As discussed in Section 4.1.2, new transmission lines and a water supply pipeline will be constructed connecting Kemmerer Unit 1 with the Naughton Power Plant. The transmission lines and pipeline construction is much smaller than plant construction and will be dispersed over approximately 7.8 miles (13 kilometers) of utility corridors (4.1 miles [6.6 kilometers] of common corridor and 1.8 and 1.9 miles [2.9 and 3.1 kilometers] of transmission and water supply pipeline corridors). Many of the corridors are in areas that have been disturbed for industrial use. The socioeconomic impacts of the project as a whole are inclusive of the electrical transmission lines and pipeline construction. Section 4.1.2, 4.3.1.1, 4.3.1.2, and 4.3.2.2 address the land use and ecological implications of transmission line construction. Any effects of physical impacts to people from construction activities are anticipated to be SMALL and mitigation does not appear to be warranted.

4.4.1.1.2 Physical Features

The infrastructure features of the project vicinity are described in Section 2.1.1.2 and include roadways, rail lines, natural gas pipeline, and electrical transmission lines. Of these, US 189, the Union Pacific Skull Point Spur, and electrical transmission lines are adjacent to the site and the proposed transmission and water pipeline corridors (Figure 2.1-1).

The closest buildings to the site are small industrial sites (e.g., HilCorp Energy Company, Ovintiv Service Inc.) located near CR 325 (Skull Point Road), approximately 1.8 miles (2.9 kilometers) from the site. The closest large industrial site is the Naughton Power Plant which is approximately 3.8 miles (6.1 kilometers) northwest of the site and adjacent to portions of the transmission and water supply corridors. The Kemmerer Mine has operations adjacent to the Naughton Power Plant. The closest residence is located south of US 30 approximately 2.8 miles (4.5 kilometers) northeast of the site.

As the vicinity includes industrial operations including coal mining and handling, the physical features within the vicinity, particularly those adjacent to the large industrial facilities, are typically subjected to fugitive dust, noise, and vibration. Physical features that could be vulnerable to project-related construction activities are those on and adjacent to the site and common macro-corridor (rail lines, US 189, and the electrical distribution line adjacent to US 189). The proposed electrical corridor and water supply corridor are in very close proximity to the existing industrial operations; therefore, construction activities in these areas will not be expected to significantly contribute to the vulnerability of adjacent physical features to noise, vibrations, and dust. In addition, US 189 will be the transportation route for shipments and commuters accessing the site and will carry the entirety of the associated traffic.

4.4.1.2 Noise and Vibration

As discussed in Section 2.1, activities in the site vicinity includes surface mining and power plant operations, both of which result in high noise levels at times. The site vicinity includes public lands open for hunting that would experience seasonal gunfire sounds. Therefore, high noise and vibration levels are typical in the vicinity. There are no noise restrictions or limits associated within the industrial zoning districts in Lincoln County. Lincoln County has established a guideline nuisance noise limit of 60 A-weighted decibels (dBA) beyond the property line for certain special use categories (Lincoln County 2020). No noise survey has been conducted in the area. The Environmental Protection Agency (EPA) 1974 characterized sound levels of various residential setting from of a small town or quiet suburban area at 46 to 53 dBA to an urban apartment next to a freeway at 78 dBA (EPA 1974). The EPA did not characterize outdoor noise levels for existing industrial settings. The EPA identified 70 dBA as the yearly average equivalent sound level for an outdoor industrial setting to protect the public health and welfare.

Construction work hours will be scheduled for day shift, Monday through Friday, 10 hours per day and 8 hours on Saturday or Sunday. Construction activities will involve operation of excavators, bulldozers, backhoes, graders, front-end loaders, dump trucks, and similar equipment. Section 3.3 describes the building activities and presents a list of earth-moving equipment in Table 3.3-5. The noise levels from construction activities will fluctuate depending on the number and type of vehicles and equipment in use at a given period. The Kemmerer Unit 1 construction activities could include the use of explosives.

Construction workers and onsite personnel willreceive training and personal protective equipment to minimize the risk of exposure to potentially harmful noise levels. Construction activities will be conducted in compliance with Occupational Safety and Health Administration (OSHA) regulations for occupational noise exposure and hearing protection (29 Code of Federal Regulations 1926.52 and 1926.101). Noise and vibration mitigation measures such as noise control equipment on vehicles and equipment (e.g., dampeners) and staggering construction activities could be used as needed to ensure noise levels remain within OSHA exposure standards.

NRC (Reference 4.4-8) assessed the noise levels from decommissioning a nuclear power plant, characterizing the noise created by decommissioning activities as similar to noise associated with construction and industrial activities. Table 4-5 of the Decommissioning Generic Environmental Impact Statement presents predicted noise level ranges at various distances. Only one source, a rail engine with sound level reaching 74 dBA, exceeded 65 dBA at approximately 2,700 feet (820 meters) (slightly over 0.5 miles [0.8 kilometers]). The Nuclear Regulatory Commission (NRC) also considered the higher noise levels of pneumatic drills or explosives and concluded that their noise impacts may be minimized by proper scheduling due to the short duration and isolated use of such methods. The consideration of these higher noise activities did not alter the NRC's conclusion that it is unlikely that the noise associated with most decommissioning construction activities will be of sufficient strength to be environmentally detectable or to destabilize the environment (Reference 4.4-8, Section O.1.14).

Activities in the site vicinity include surface mining and power plant operations, both of which produce high noise and vibration levels at times. Therefore, high noise levels and vibration levels are typical in the vicinity. The nearest residence is 2.8 miles (4.5 kilometers) away, and the closest residential community is farther away in Diamondville. As mentioned above, the physical features that could be vulnerable to vibration from project-related construction activities are those on and adjacent to the site and utility corridors (e.g., rail lines, US 189, and the electrical distribution line near the US 189 right of way). These features would routinely experience the physical effects of heavy traffic and its associated noise and vibration. Any effects of physical impacts to people and physical features from preconstruction and construction activities is anticipated to be SMALL and not warrant mitigation.

The human health impacts from noise are discussed in more detail in Section 4.8.2.

4.4.1.3 Air Quality-Related Effects

The National Ambient Air Quality Standards (NAAQS) define ambient concentration standards for "criteria pollutants." EPA-designated attainment areas are those areas of the United States with air quality as good as or better than the NAAQS criteria. Areas having air quality that is worse than the NAAQS criteria are designated by the EPA as nonattainment areas. The site and vicinity are located in an area classified as attainment areas under the NAAQS (Reference 4.4-4, Reference 4.4-5). Activities occurring in the site vicinity include surface mining and industrial operations, both of which result in fugitive dust and other air emissions.

Fugitive dust and odors will be generated as a result of normal preconstruction and construction activities. Fugitive dust and fine particulate matter emissions, including those less than 10 microns (PM_{10}) in size, would be generated during earth-moving and material-handling activities. Construction equipment and offsite vehicles used for hauling debris, equipment, and supplies also produce emissions. Equipment will be serviced regularly and operated in accordance with local, State, and Federal emission requirements. Mitigation measures to minimize fugitive and vehicular emissions (including paving disturbed areas, spraying water for dust suppression, covering truck loads and debris stockpiles, limiting vehicle speed, and regularly inspecting emission control equipment) could be instituted. Additional mitigation control measures could be implemented as necessary.

Temporary and minor impacts to local ambient air quality could occur as a result of normal construction activities. Section 4.7 discusses air quality impacts of preconstruction and construction activities. Section 4.8.1 discusses the impacts of greenhouse gas emissions, fugitive dust, and other particulate matter relative to worker and public health and mitigating measures. Given the presence of industry in the area that would intermittently generate fugitive dust and the implementation of the fugitive dust and exhaust emission control measures discussed above, no discernible impact on the local air quality is expected. Odors resulting from exhaust emissions should dissipate due to distance prior to reaching offsite workplaces or residences. Construction workers and onsite personnel will receive training and personal protective equipment to minimize the risk of exposure to potentially harmful air emissions. Construction activities will be conducted in compliance with OSHA regulations for occupational exposure and respiratory protection (29 Code of Federal Regulations 1926). Physical impacts to people and physical features from preconstruction and construction activities are anticipated to be SMALL and mitigation is not warranted.

4.4.1.4 Transportation

A multi-lane entrance road will be constructed as part of the Sodium Test and Fill Facility project and provide access to both the Sodium Test and Fill Facility and Kemmerer Unit 1 sites. The intersection with US 189 and improvements and signage along US 189 will require Wyoming Department of Transportation (WYDOT) approvals and will be constructed to meet WYDOT specifications. The proposed intersection with US 189 is described in Section 3.3.1.2.

Certain reactor components and equipment exceed highway weight and size limits and will need to be transported to the site as heavy-haul, oversize cargo, or both. Heavy-haul and oversize loads will be scheduled in advance with specific routes. Route surveys will be performed to plan routes and logistics for heavy-haul and oversize cargo.

The project-related increased traffic on US 189 could result in some accelerated deterioration. Other area roadways could experience some as well, but the effects will be dispersed, and deterioration would not be easily attributable to preconstruction and construction traffic. WYDOT is responsible for maintaining approximately 7,000 miles (10,000 kilometers) of roadways in the State highway system inclusive of federal highways such as US 189. The WYDOT 2021-2022 biennial budget included approximately $890 million in federal funds (Reference 4.4-12). US 189 from its intersection with I-80 to its intersection with US 30 is approximately 34 miles (55 kilometers) (Reference 4.4-11), which is approximately 0.5 percent of the roadway miles for which WYDOT is responsible. Any necessary acceleration of the routine maintenance schedule for US 189 contributed to by project-related preconstruction and construction traffic will have a SMALL impact to highway maintenance in Wyoming. Local ordinances requiring an applicant to contribute to transportation infrastructure improvements or repairs to support the project do not apply to maintenance of a federal highway. The project will fund construction of the US 189 intersection at the site entrance. Unless specifically exempted by the access permit issued by WYDOT for the intersection, maintenance and repair of the intersection within the highway right of way will be WYDOT’s responsibility per 13 Washington Administrative Code 9.

4.4.1.5 Aesthetics

The site is in a rural area zoned industrial with nearby industry. The dominant land cover on the site and in the vicinity is rangeland, as described in Section 2.1. The site and vicinity are located on the Cumberland Flats with ridges to the east and west as shown in Figure 2.1-5. Construction activities are described in detail in Section 3.3. These construction activities will result in aesthetic impacts. Facilities including the parking lot, construction laydown and fabrication areas, offices, and other buildings will be constructed to support construction activities. A concrete batch plant and cranes will also be erected onsite. The reactor, steam generator, and turbine buildings will be among the tallest structures when completed, aside from the meteorological tower. The completed transmission lines from Kemmerer Unit 1 to Naughton Power Plant will also be part of the viewscape when completed. Construction will be easily visible from US 189 and could be visible throughout the Cumberland Flats. The construction activities are scheduled to be conducted during a day shift, so project lighting and noise will be less intrusive than if construction was on a 24-hour basis. The nighttime lighting and noise sources are not expected to be noticeably more intrusive than the existing industry lighting and noise in the vicinity.

No schools or residential subdivisions were identified within the project area or in the vicinity of the proposed site. The public land within the Cumberland Flats is open range land where hunting is permitted. Visual aesthetic impacts are anticipated to be SMALL and do not warrant mitigation.

Visual impacts to historic properties are described in Section 4.6.

4.4.2 Demographic Impacts

During construction, there will be both construction and operations workforces on the site. For socioeconomic analyses, the residential distribution of the nearby PacifiCorp Naughton Power Plant workforce was examined to approximate the residential distribution of the Kemmerer Unit 1 workforces. As of July 2022, approximately 92 percent of Naughton Power Plant employees resided within three counties: Lincoln (67 percent), Uinta (21 percent), and Sweetwater (4 percent)[1]. However, housing constraints in Lincoln and Uinta Counties prevent distribution of the Kemmerer Unit 1 workforces using Naughton Power Plant percentages. Therefore, Kemmerer Unit 1 distribution percentages are based on housing availability in the three-county economic region and are as follows: Lincoln County, 41 percent; Uinta County, 32 percent; and Sweetwater County, 28 percent[2]. These assumptions are based on the workforce information found in Table 4.4-1 and the housing analysis presented in Section 2.4.2.6. The calculation of the workforce distribution percentages is presented in Section 4.4.4.3.

There are 1,632 construction workers anticipated to be employed at the peak of construction in 2028 (Table 3.3-6). Figure 3.3-2 illustrates the distribution of the construction workforce over the anticipated construction period.

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1. The remaining 8 percent were distributed across at least five other counties, with less than three percent per county. The 8 percent of workers and their family members represented very small percentages of their counties' 2020 populations, so those counties are not included in this analysis.

2. Total appears to equate to 101 percent due to rounding.

Operations workers will be present on site before the completion of construction (Figure 3.3-3). Figure 3.3-4 illustrates this overlap of workforces[3]. At the peak of construction, there will be 1,632 construction workers and 80 operations workers, for a total of 1,712 workers. The nature of the two types of workforces is different and may cause differing impacts to the vicinity and region. In the following sections, these two workforces are analyzed together or separately.

Important drivers of socioeconomic impacts are the number of in-migrating workers and family members and where they settle. Assumptions regarding workforce migration patterns, family characteristics, and post-construction retention are presented in Table 4.4-1 and Table 4.4-2.

The economic region's construction workforce is relatively small, with 4,079 construction workers in 2020 (Table 2.4-9), and its unemployment rate is relatively low, at 5 percent (Table 2.4-8). Also, some nuclear plant construction workers have specialized skills beyond those of residential and commercial building construction workers. Therefore, it is conservatively assumed that 95 percent of the construction and 100 percent of the operations workforces would migrate into the economic region (Table 4.4-1). This equates to an in-migration of 1,630 workers (95 percent of 1,632 construction workers and 100 percent of 80 operations workers).

Many local and regional workers will be recruited, trained, and mentored as possible while expanding to a nationwide search. Recruitment, training, apprenticeship, and mentorship programs will be developed through relationships with industry trade associations, trade councils, union groups, construction industry employer associations, State and local governments, and economic development groups. Special emphasis will be placed on recruiting local residents, youth, women, veterans, and members of local and regional cultural groups, among others.

Although the 1,630 in-migrating workers could elect to move to any of the nine counties that lie wholly or partially within 50 miles (80 kilometers) of the site, it is conservatively assumed that 100 percent of the workers will reside in the three-county economic region.

Table 4.4-1 presents the assumptions for workforce migration and family composition during the peak construction period, based on the in-migration of 1,630 workers. The construction of Kemmerer Unit 1 is estimated to be completed by 2030 (Section 3.3). The 2020 population of the demographic region was 30,950 and is projected to grow to approximately 31,746 by 2030 (Table 2.4-1). The 2020 population in the economic region was approximately 82,303 and is projected to grow to approximately 82,671 by 2030 (Table 2.4-4).

The in-migration of 1,630 workers will create new indirect jobs in the area because of the "multiplier" effect. Regional input-output multipliers are economic tools that provide a way to estimate the total impact that an initial change in economic activity has on an economy. They are based on the idea that an initial change in economic activity results in diminishing rounds of new spending. Spending diminishes because of "leakages" from the economy in the form of savings, taxes, and imports.

3. Section 5.4.2 provides analyses of operations workforce impacts caused by the peak operations workforce.

The U.S. Department of Commerce's Bureau of Economic Analysis provides multipliers for industry jobs and earnings (Reference 4.4-1). Their economic model, RIMS II, incorporates buying and selling linkages among regional industries and provides multipliers by industry sector to estimate the impacts of changes in that sector to a regional economy. Type II multipliers were used because they account for interindustry- and household-spending caused by final-demand industry changes. Economic region-specific multipliers for both the nonresidential construction and electric power generation, transmission, and distribution final demand industries were used to estimate the indirect jobs and earnings generated by the influx of the Kemmerer Unit 1 workforces.

Table 4.4-2 provides direct and indirect employment data for the economic region. The multipliers predict that for every in-migrating construction worker, an additional 0.3994 jobs will be created. For every in-migrating operations worker, 1.9659 jobs will be created. During the peak of construction, the in-migration of 1,550 construction workers will generate 619 indirect jobs, and the in-migration of 80 operations workers will create 157 indirect jobs (Table 4.4-2). In total, the in-migration of 1,550 construction and 80 operations workers will create 777 indirect jobs (Table 4.4-2).

This analysis assumes that all in-migrating workforces will settle in the economic region, and therefore, all indirect jobs will be located in the economic region. A share of the indirect jobs will be filled by the economic region's existing labor force. In 2021, there were 1,892 unemployed people in the economic region, 58 percent of which were in Sweetwater County (Table 2.4-8). It is conservatively assumed that 25 percent of the 1,892 local unemployed workers (473 workers) will be available to fill the indirect jobs (Table 4.4-2)

In addition to local unemployed workers, some indirect jobs could be filled by workers temporarily relocating to the area to take these positions. For the analysis, it is assumed that the remaining indirect jobs (304) will be filled by workers migrating into the economic region. Table 4.4-2 presents these assumptions and calculations.

Regarding the family characteristics of the construction and operations workforces, the following is assumed:

- 37 percent of construction workers will bring families
- 80 percent of operations workers will bring families
- Average worker family size is 3.2 (including the worker)
- Average number of children under 18, per worker family, is 0.88

Therefore, of 1,934 in-migrating construction, operations, and indirect workers, 877 will bring families and 1,057 will not (Table 4.4-1). The average size of a family in the U.S. was 3.2 in 2021 (Table 4.4-1). The average size of a family in Wyoming was 3.05 in 2021 (Reference 4.4-9). It is conservatively assumed that the average size of an in migrating worker family will be 3.2. Hence, 877 in-migrating construction, operations, and indirect workers will bring a total of 1,930 family members. The average number of school-age children per family in the U.S. was 0.87 in 2021 (Reference 4.4-10). The average number of school-age children[4] per family in WY was 0.88 in

2021 (Table 4.4-1). It is conservatively assumed that the average number of school-age children per in-migrating worker family is 0.88. Hence, 877 in-migrating families will include 768 school-age children (Table 4.4-1).

When the population increases from the three sets of in-migrating workers and family members are summed, the economic region population during the construction peak will increase by 3,864 people. Using the distribution percentages based on housing availability introduced above, an estimated 1,580 people from this total will reside in Lincoln County. This number represents an 8.1 percent increase in the 2020 population (19,581) of Lincoln County and a 7.5 percent increase in the projected 2030 population (21,049) of Lincoln County (Table 2.4-4). However, not all of Lincoln County is included in the economic region. Hence, a more appropriate comparison is made to the combined 2020 populations of Kemmerer, Diamondville, Cokeville, and LaBarge, the Lincoln County municipalities within commuting distance of the site, 3,831. An increase of 1,580 workers and family members will represent a 41.2 percent increase in the combined populations of those municipalities.

Of the 3,864 in-migrating workers and family members, 32 percent, or 1,218, will reside in Uinta County. This number represents a 6.0 percent increase in the 2020 population (20,450) of Uinta County and a 6.1 percent increase in the projected 2030 population (20,012) of Uinta County (Table 2.4-4). The remaining in-migrants, 1,067 workers and family members, will locate to Sweetwater County and represent 2.5 and 2.6 percent increases in the county's 2020 and projected 2030 populations of 42,272 and 41,610 (Table 2.4-4).

Upon construction completion, few, if any, of the in-migrating construction workers temporarily relocating to work on the project are expected to permanently relocate to the area. It is possible, however, other economic growth in the economic region could reduce the out-migration of these workers. Kemmerer Unit 1 operations, as well as other potential projects in the area, are discussed in Chapter 7 Cumulative Impacts.

4.4.3 Economic Impacts to the Community

4.4.3.1 Economy

The impacts of construction on the local and regional economy depend on the current and projected economy and population of the economic region.

In NUREG-1437 (Reference 4.4-7), the NRC presents its method for defining the impact significance of economic effects. Economic effects are considered SMALL if peak plant-related employment accounts for less than 5 percent of total study area employment. Effects are considered MODERATE if peak plant-related employment accounts for 5 to 10 percent of total study area employment. Effects are considered LARGE if peak plant-related employment accounts for more than 10 percent of total study area employment. In this context, "plant-related employment" refers to area residents employed at the nuclear power plant or at indirect jobs resulting from a nuclear plant's presence. Employees who live outside the study area and work at the plant are not included.

4. Children under the age of 18.

4.4.3.1.1 Employment Impacts

As stated previously, in 2020, there were 4,079 construction jobs in the economic region, representing approximately 8.6 percent of all economic region jobs (Table 2.4-9). During the peak of construction, approximately 1,550 construction workers will migrate into the economic region, and the remaining 82 construction workers will already reside there (Table 4.4-1). The 82 construction workers will represent 2 percent of economic region construction jobs and 8.1 percent of the economic region workforce in Sector 237, Heavy and Civil Engineering Construction, in 2021.

Section 4.4.2 describes employment multipliers, which predict 1,630 in-migrating construction and operations workers will create 777 indirect jobs in the region. Added together, direct and indirect jobs total 2,407 new jobs in the economic region at construction peak (Table 4.4-2). It is estimated 473 indirect jobs will be filled by unemployed workers already residing in the economic region, and the remaining 304 indirect jobs will be filled by workers migrating into the economic region. Therefore, a total of 1,934 workers will relocate to the economic region during the construction peak (1,550+80+304), representing a 5.4 percent increase in the economic region's 2021 employment, which was 35,903 (Table 2.4-8, Table 4.4-1, and Table 4.4-2). In Lincoln County, where the impact is anticipated to be greatest, 791 (41 percent of 1,934) workers will represent an 8.6 percent increase in the county's 2021 employment, which was 9,154 (Table 2.4-8). The impact of the increase in Lincoln County employment will be MODERATE and beneficial; the impacts to the economic region employment will be SMALL to MODERATE and beneficial.

4.4.3.1.2 Earnings Impacts

The Bureau of Economic Analysis Regional Input-Output Modeling System II program, described in Section 4.4.2, also calculates earnings multipliers. This analysis uses the detailed earnings multipliers for the nonresidential construction and electric power generation, transmission, and distribution industry sectors to estimate the impacts to the economic region from expenditures by in-migrating construction and operations workers. For every dollar spent by a construction in-migrant, an additional 0.3235 dollars will be circulated in the regional economy, while each dollar spent by an operations in-migrant will result in the circulation of an additional 0.9050 dollars in the economic region economy (Reference 4.4-1). Earnings multipliers are higher for operations workers because they have higher average wages, a tendency to spend a greater portion of their wages in the region, and more permanence in the region. Because there are more dollars flowing through the region, they have a greater impact.

<u>Construction In-Migrants</u>

The Bureau of Labor Statistics collects employment and wage data by occupational category. To assess impacts to the economic region by the construction in-migrants, wage data for Industrial Sector 237, Heavy and Civil Engineering Construction, was obtained from the Bureau of Labor Statistics' *Quarterly Census of Employment and Wages*. Table 2.4-11 shows that the average annual wage in 2021 for construction workers in the economic region counties ranged from

$59,998 in Lincoln County to $64,536 in Sweetwater County. A weighted average annual wage of $63,332 was computed for the economic region. Table 2.4-11 also shows the sector's average annual wages for comparison areas, Wyoming and the United States.

The estimated average monthly wage of $5,277 ($63,322 divided by 12) was multiplied by the number of in-migrants each month and then summed to calculate total dollars earned by the in-migrants. Table 4.4-3 provides the total in-migrating construction worker wages for each month during the construction period. The wage total for the 69 month construction period will be about $301.4 million (Table 4.4-3). The impact of these wages on the economic region economy depends on the proportion of their wages that workers will spend in the economic region.

Because of uncertainty surrounding this proportion, a sensitivity analysis was conducted to further assess the dollar impact on the economic region by a range of percentages spent in the region (Table 4.4-4). The earnings multiplier (1.3235) for the nonresidential construction industry in the economic region was applied to the wages (Reference 4.4-1). According to these calculations, the total economic impact of construction in-migrant wages will range from $39,892,904, if only 10 percent were spent in the economic region, to $398,929,037, if 100 percent were spent.

To illustrate the magnitude of the impacts, the total wages for each year during the construction period were computed, based on a conservative assumption that workers will spend 50 percent of their wages in the economic region. A multiplier to these wages was applied and compared the annual totals to total personal income in the economic region for 2021. As presented in Table 4.4-5, these estimates predict that the spent wages will represent the following increases in economic region total personal income: 0.2 percent in Year 1, 1.4 percent in Year 3, and 0.03 percent in the final (partial) year of construction. Impacts to the economic region economy are expected to be SMALL and beneficial. However, it should be noted that these impacts could be slightly overstated. Because there is the potential for growth in personal income in the economic region, independent of the Kemmerer Unit 1 project, construction worker wages could represent a decreasing proportion of total income in the future. Also, impacts will vary if more or less than 50 percent of worker wages were spent in the economic region. In all of these cases, however, impacts to the economic region economy are expected to be SMALL and beneficial.

Another local economic impact will result from possible increases in the earnings of the Kemmerer Unit 1 construction workers already residing in the economic region. The size of this impact will depend on the amount by which their wages will be increased by working on this project. It is also possible that regional construction wages will rise because overall demand for construction workers will increase. There may be other construction projects taking place simultaneously. Chapter 7, Cumulative Impacts presents reasonably foreseeable projects that may occur in the area.

Operations In-Migrants

To estimate impacts to the economic region economy by the operations in-migrants, national wage data was obtained for North American Industry Classification Sector 221113, Nuclear Electric Power Generation from the Bureau of Labor Statistics' *Quarterly Census of Employment and Wages*. The average annual wage for this category was $155,840 in the U.S. (Table 2.4-12). There are no wage data in this category for Wyoming.

The methodology for predicting operations in-migrant impacts is the same as that used for predicting construction in-migrant impacts. The estimated average monthly wage of $12,987 ($155,840 divided by 12) was multiplied by the number of in-migrants each month and then summed to calculate total dollars earned by the in-migrants. Table 4.4-6 provides these calculations and shows that total operations worker wages during the construction period will be $71,816,267. During the final month of the construction period, average operations worker wages will total $3,246,667.

A sensitivity analysis was applied to compute impacts based on the proportion of wages spent in the economic region, and the earnings multiplier for electric power generation, transmission, and distribution industry workers (1.905) was applied (Table 4.4-7). This analysis found that impacts to the economic region economy from operations worker wages will range from $13,680,999 to $136,809,988 over the construction period, depending on the percentage spent (Table 4.4-7).

Total wages were then computed by year. Based on the conservative assumption that workers will spend 50 percent of their wages in the economic region, the multiplier to these values was applied, and compared the annual totals to total personal income in the economic region for 2021. The results are shown in Table 4.4-8. As noted previously, these impacts could be slightly overstated due to possible growth in economic region total personal income (independent of the Kemmerer Unit 1 project), and impacts will vary if workers spent more or less than 50 percent of wages in the economic region. Total operations worker wages will increase steadily through the construction period as new workers will arrive on site. Their contributions to personal income (2021) in the economic region will range from 0 percent in the first year (when no operations workers are present) to 0.6 percent in Year 6. Impacts to the economic region economy during the construction period are anticipated to be SMALL and beneficial.

Combined Impacts

In all, construction and operations workers will earn a total of more than $373 million over the 6-year construction period (Table 4.4-9).

Depending on the proportion of wages spent in the economic region, the impact to the region's economy will be between $53.5 and $535.7 million (a SMALL impact). Unemployment could be reduced by up to 25 percent (a LARGE impact) (Table 4.4-2 and Table 4.4-9). In addition, the injection of new income will create jobs in the economic region economy and create business opportunities for housing- and service-related industries. While the magnitude of those impacts cannot be predicted at this time, it is assumed that the impacts will be SMALL. All impacts will be beneficial.

Annual impacts are conservatively estimated to range from $7.3 million in Year 1, to a peak of $72 million in Year 4, to $29.2 million in the final year of construction. As shown in Table 4.4-10, these wages and their "multiplied" impacts will increase total personal income in the economic region by 0.2 percent in Year 1, 1.6 percent in Year 4, and 0.6 percent in Year 6 when compared to the region's personal income in 2021. Annual impacts to the economic region economy are expected to be SMALL and beneficial.

Because of the predicted distribution of the in-migrants, Lincoln, Uinta, and Sweetwater Counties will experience roughly 41 percent, 32 percent, and 28 percent of these effects (Section 4.4.2). Lincoln County will be the most affected. Impacts to Uinta and Sweetwater Counties will be more diffuse because their populations and economic bases are larger.

End of Construction Period

After construction is complete it is estimated almost 100 percent of the construction worker in-migrants will leave the economic region (Table 3.3-6). The loss of construction jobs, population, and wage income will be considered a SMALL to MODERATE adverse impact to the economic region and a MODERATE adverse impact to Lincoln County.

However, Figure 3.3-4 indicates that the out-migration will occur gradually over the last couple of years of the construction phase, and the loss of construction workers will be partially offset by the in-migrating operations workers. The gradual nature of the decline in the construction workforce will mitigate the impact to communities in the economic region from the destabilizing effects of a sudden decrease in workers and their families. Another mitigating factor will be the higher average annual wages and associated multiplier effects expected with the operations workers.

Communication with local and regional government authorities and the media will be maintained to disseminate Kemmerer Unit 1 construction and operations related information that could have socioeconomic impacts on the region, enabling governments, businesses, and individuals to make informed decisions and economic choices.

Even before the construction worker influx, local agencies, organizations, businesses, and individuals are acting with the understanding that much of the positive economic impact of the construction of Kemmerer Unit 1 will be temporary and is expected to diminish when the construction is complete. Therefore, Kemmerer Unit 1 impacts to the economic region economy will likely be mitigated to SMALL and to the Lincoln County economy, SMALL to MODERATE.

Impacts of the out-migration of the construction workforce on specific socioeconomic resources in the economic region are included in the following sections.

4.4.3.2 Taxes

Construction-related activities, purchases, and workforce expenditures will generate several types of taxes, including sales and use, property, and others. Increased tax collections are viewed as a benefit to the State of Wyoming and to the local jurisdictions in the economic region.

In NUREG-1437 (Reference 4.4-7), the NRC presents its method for defining the impact significance of tax revenue impacts. Although these criteria are focused on property taxes, the impact ranges can also be applied to other types of taxes. This methodology was reviewed and determined the significance levels were appropriate to apply to an assessment of tax impacts resulting from new construction. Impact levels associated with taxes are defined as follows.

Impacts are SMALL when new tax payments by the nuclear plant constitute less than 10 percent of total revenues for local taxing jurisdictions. The additional revenues provided by direct and indirect plant payments on refurbishment-related improvements result in little or no change in local property tax rates and the provision of public services.

Impacts are MODERATE when new tax payments by the nuclear plant constitute 10 percent to 20 percent of total revenues for local taxing jurisdictions. The additional revenues provided by direct and indirect plant payments on refurbishment-related improvements result in lower property tax levies and increased services by local municipalities.

Impacts are LARGE when new tax payments by the nuclear plant represent more than 20 percent of total revenues for local taxing jurisdictions. Local property tax levies can be lowered substantially, the payment of debt for any substantial infrastructure improvements made in the past can easily be made, and future improvements can continue.

4.4.3.2.1 Personal and Corporate Income Taxes

As noted in Section 2.4.2.2.2, Wyoming has no personal or corporate income tax so there will be no income tax-related impacts to State or local revenues during construction.

4.4.3.2.2 Sales and Use Taxes

Wyoming and the local governments in the economic region will experience an increase in sales and use tax collections. Sales and use taxes will be generated by construction expenditures for Kemmerer Unit 1 and by retail purchases by the construction, operations, and indirect workforces during construction.

<u>Expenditures by Workforce During Construction Peak</u>

As stated previously, workers and their family members will constitute a population influx of 3,864 people (Table 4.4-1 and Table 4.4-2). Projected populations for the economic region counties and State using Wyoming Economic Analysis Division-generated growth rates are listed in Table 2.4-4. According to these projections, the new residents in the economic region will represent a 4.7 percent increase in the projected economic region population of 82,671, in 2030 (the decennial year nearest 2028, the peak construction year).

Retail expenditures (restaurants, hotels, merchant sales, and other items) by the in-migrating direct and indirect workforces will yield an increase in sales and use tax revenues. Also, the multiplier effect of new jobs in the region will result in higher personal income for some current residents, leading to more disposable income and greater expenditures for items subject to sales or use taxes (Section 4.4.3.1).

As noted in Section 2.4.2.2.2, taxable goods and services in Wyoming are subject to the State sales or use tax of 4 percent. Sixty-nine percent of the tax is directed to the State's general fund and 31 percent is returned to the counties of origin. The State received $493,101,908 in sales and use tax revenues in Fiscal Year 2021 (Table 2.4-14). Direct and indirect taxable purchases associated with the peak construction period workforce will yield a relatively SMALL but beneficial impact to the State.

The share of the State sales and use tax (31 percent) that is returned to the counties of origin is distributed between the counties and their municipalities, using a population-based formula. The revenues are used to fund local government operations, infrastructure, and other services. Purchases made in the economic region's counties are also subject to each county's 1 percent general purpose option tax (Table 2.4-17). Lincoln County's general purpose option tax revenues (also distributed by Lincoln County to its municipalities, using the same population-based formula) are used to fund county and municipal government operations, infrastructure construction and maintenance, and other services (Table 2.4-15 and Table 2.4-16).

The magnitude of the impact depends on the economic region counties' availability of goods and services and size of their tax bases. The projected Lincoln, Uinta, and Sweetwater Counties' sales and use tax collections from 2022 to 2030 using average annual growth rates based on county sales and use tax revenues from 2011 to 2021 are shown in Table 2.4-18. The projections are shown in Table 4.4-11. In 2028, the peak year of construction, Lincoln, Uinta, and Sweetwater Counties' projected total sales and use tax collections will be approximately $30 million, $24 million, and $56 million. In 2028, project workforce wages are expected to total approximately $105.9 million. If 100 percent of those wages were spent within the economic region, they will generate approximately $5.3 million in sales taxes, at a 5 percent sales and use tax rate. The county and municipality portion of the total sales and use tax rate of 5 percent is 2.24 percent. Applying the 2.24 percent sales and use tax rate to $105.9 million equates to approximately $2.4 million in taxes. The remaining $2.9 million in taxes will go to the State. A $2.4 million increase in the projected 2028 sales and use tax revenues of the economic region counties will represent a 2.2 percent increase in those counties' sales and use tax revenues. Based on these figures, direct and indirect taxable purchases associated with the peak construction period workforce will yield small, but beneficial impacts to the State and the economic region counties and their municipalities. Therefore, revenues from purchases with workers' wages, and current residents' increased incomes, will provide SMALL beneficial impacts to the State and the local governments in the economic region.

<u>Expenditures for Construction Goods and Services</u>

In addition to sales and use taxes paid by workers and families, the region will experience an increase in the sales and use taxes collected from project-related expenditures for taxable construction materials, supplies, and services. Many of the goods and services needed to construct Kemmerer Unit 1 will be obtained from local businesses.

According to Wyoming Statute 39-15-105(a)(iii)(A), manufacturers may claim a sales tax exemption for services and tangible personal property consumed in production. "Sales of tangible personal property to a person engaged in the business of manufacturing, processing, or compounding when the tangible personal property purchased becomes an ingredient or component of the tangible personal property manufactured, processed, or compounded for sale or use and sales of containers, labels or shipping cases used for the tangible personal property so manufactured, processed or compounded." The subparagraph also applies to chemicals and catalysts used directly in manufacturing, processing, or compounding, which are consumed or destroyed during that process.

Wyoming Statutes 39-15-105 (a)(iii)(G) and 39-116-105 (a)(iii)(C) exempt "sales of fuel for use as boiler fuel in the production of electricity" from sales and use taxes. It is not yet known whether the nuclear materials used in the production of electricity at Kemmerer Unit 1 will be exempted from sales and use taxes.

These and other statutes may apply to the production of electric power and exempt a percentage of the materials and services purchased to construct Kemmerer Unit 1. The non-exempt construction purchases will be subject to sales and use taxes, 4 percent to the State of Wyoming and 1 percent to the counties and municipalities where project purchases are made and used.

The impact of expenditures in the economic region will depend on the size of the taxable expenditures and the size of a jurisdiction's baseline collections: the smaller a jurisdiction's baseline collections, the greater the beneficial impact from the construction expenditure.

To demonstrate the potential impact significance of construction-related sales and use tax payments to Lincoln County (the county with the greatest potential to be impacted), Estimated project-generated sales and use tax payments from the peak year of construction expenditures, 2027, are compared with Lincoln County's projected total sales and use tax collections for the same year.

The taxable materials and services expenditures are estimated to reach $244 million over the entire construction period. Based on this estimate, Table 4.4-12 presents estimated construction-related sales and use tax payments by construction year. By the third year of construction, 2027, project expenditures could generate $4,237,054 in sales and use taxes assuming most purchases are made in Lincoln County, most materials and services are used in Lincoln County, and most expenditures are taxable. The expenditures represent a 14 percent increase in total 2027 sales and use tax collections in Lincoln County, resulting in a MODERATE beneficial impact to the county and its municipalities. (An examination of the shares of payments that will be returned to Lincoln County and its municipalities, as distributions, reveals similar percentage increases: 16 percent in Lincoln County and 13 percent in Kemmerer and Diamondville combined). Of course, not all construction expenditures will be taxable and not all materials and services will be purchased or used in Lincoln County, so these impacts are likely overstated to the extent that some expenditures will be exempt from sales and use taxes and some materials and services will be purchased and used outside of Lincoln County.

At the State level, the State's share of $4,237,054 in sales and use tax payments represents a very small percentage of the State's projected $1.06 billion in sales and use tax collections in 2027 (Table 4.4-11), resulting in a very SMALL, beneficial impact to the State. Furthermore, through the Wyoming Department of Environmental Quality's impact assistance tax program, the

State's share of sales and use tax payments from project-related construction expenditures will be used to reimburse the local communities most impacted by the project's demands on housing and infrastructure.

4.4.3.2.3 Other Sales- and Use-Related Taxes

Lodging Tax

In addition to sales and use tax revenues, lodging tax revenues will accrue to the communities where project-related workers will temporarily reside. As presented in Section 2.4.2.2.2, the State and economic region jurisdictions can levy a lodging tax on the cost of sleeping accommodations lasting less than 30 days. Eighty percent of the State's lodging tax revenues and 90 percent of local government lodging tax revenues must be used to promote tourism.

Potential lodging tax revenues are not estimated here because lodging tax revenues are only levied on sleeping accommodations for guests staying less than 30 days. Most in-migrating workers are generally expected to stay longer than 30 days and, as a result, the project is not expected to generate substantial lodging tax revenues.

Further, project-related workers could displace baseline visitors seeking overnight accommodations, most of whom will pay this tax. The magnitude of impact will depend on the ratio of visitors to workers in each jurisdiction and the size of each jurisdiction's existing lodging tax base. Impacts to lodging tax collection will be adverse and could range from SMALL in Sweetwater County to LARGE in Lincoln and Uinta Counties.

4.4.3.2.4 Property Taxes

Counties and Special Districts

Property tax impacts will be experienced in two ways: through property taxes paid on behalf of the plant, and through property taxes paid by or on behalf of (by landlords) the in-migrating construction workforce.

As described in Section 2.4.2.2.2, Wyoming property tax assessments are made by county tax assessors and the Wyoming Department of Revenue. The Wyoming Department of Revenue assesses mines, rail car companies, public utilities, pipelines, and telecommunications companies. Appraisals are based on consideration of cost, income, and market value. All taxing jurisdictions (State, counties, cities, schools, and special districts) apply their individual mill levies to the assessed value of properties within their boundaries to determine the taxes owed.

The taxing jurisdictions of the proposed site are presented along with their 2021 mill rates below:

- Lincoln County School District #1: 46.40
- Lincoln County: 12
- South Lincoln Hospital: 4.0
- South Lincoln Special Cemetery District: 0.967
- Weed and Pest: 0.905

- South Lincoln Fire: 0.555
- Kemmerer Senior Center: 0.30
- Lincoln Conservation: 0

During the construction of the site, property tax valuation will be determined in accordance with State law and appraisal formulas, or some mutually agreed-upon valuation.

The parcel containing the site has historically been assessed as agricultural land. The former landowner's 2021 property tax payment to Lincoln County for the 334-acre (135-hectare) Kemmerer Unit 1 portion of the parcel is estimated to have been approximately $200 (Section 2.4.2.2). The expected assessment ratio for the 334 acres (135-hectares) will change to 11.5 percent (industrial). During the construction period, property taxes will be paid to Lincoln County and the other taxing jurisdictions listed above.

Potential property tax impacts are estimated in the following manner. First, the economic region counties' historical property tax levies for the 10-year period between 2011 and 2021 were examined. Both growth and decline were experienced across the various taxing jurisdictions. Table 4.4-13 presents these data, along with calculated average annual growth rates. The growth rates were applied to actual 2021 levies to project levies for the final year of construction.

It is estimated the total property tax by the final year of construction will be approximately $12.2 million (Table 4.4-14). Notably, these estimates do not reflect any negotiated tax arrangements, such as payments-in-lieu of taxes or other plant valuation agreements, between and the plant's taxing jurisdictions or the State. At this time, no such arrangements have been made, but they are routinely made by nuclear power producers and local and State governments.

Next, the estimated percentages were based on millage rates, of the plant's estimated total property tax payment that will be earmarked for each of the plant's taxing jurisdictions in the final year of construction (Table 4.4-15).

Last, the plant's property tax payments (from Table 4.4-15) were compared to the total property tax levies of the major property tax jurisdiction categories in Lincoln County (see Table 2.4-20). Results are presented in Table 4.4-16.

Results indicate a 30.1 percent increase in Lincoln County's projected property tax levies, a 24.3 percent increase in projected county-wide special district levies, and a 33.5 percent increase in projected county-wide education levies in the final year of construction. Based on NRC impact definitions provided at the outset of this section, property tax payments could be of LARGE significance and beneficial to all relevant taxing jurisdictions in Lincoln County. However, the impact to Lincoln County School District (LCSD) #1 is not expected to be large because the State employs two education equalization programs. Consequently, property tax impacts to LCSD #1 are expected to be SMALL and beneficial. More information on property taxes and the State's education equalization programs is presented in School Districts, below, and Section 4.4.4.4.6.

The second source of economic region property tax revenues is from increased property tax collections on housing for the in-migrating workforces. Property values will increase when undeveloped land is converted to residential and commercial uses. In anticipation of increased demand for housing, developers are planning to construct new housing, which will be added to the local property tax base.

A housing market analysis found inadequate temporary housing stock to support the in-migrating workforces at construction peak. New housing construction is planned and in various stages of development (e.g., proposal, zoning, plat approval). Increased demand for existing and new housing could drive housing prices up and increase the tax base, thus increasing values, assessments, and property taxes levied and collected, especially if demand exceeds supply. The change in tax revenues is not known at this time, but most of the 1,000 or more permanent units proposed for construction would be in the Kemmerer and Diamondville area. One thousand permanent housing units would represent a 53 percent increase in the total housing stock of the two municipalities (Table 2.4-25). Section 4.4.4.3 describes impacts to housing in more detail. The increased demand for housing could have LARGE and beneficial impacts on the property tax revenues of Lincoln County and the other property taxing jurisdictions containing Kemmerer and Diamondville. Impacts on Uinta County and its other property taxing jurisdictions are expected to be SMALL to MODERATE and beneficial. Impacts on Sweetwater County and its other property taxing jurisdictions are anticipated to be SMALL and beneficial, as Green River and Rock Springs are located furthest from the proposed site and Sweetwater County has a larger tax base.

School Districts

School district revenues in the economic region could be affected by the construction of Kemmerer Unit 1 in two ways:

- Increased property tax revenues from property within LCSD #1 boundaries
- Increased enrollments that trigger increased State equalization funding for affected school districts

Property tax revenue increases will come from Kemmerer Unit 1 and from a larger residential tax base. Section 4.4.4.4.6 addresses enrollment and capacity issues in schools, while Figure 2.4-5 shows a map of the school districts in the economic region.

As noted in Section 2.4.2.7.4, LCSD #1 and Uinta County School District #1 are the two school districts expected to be most financially impacted by Kemmerer Unit 1. The boundaries of LCSD #1 contain Kemmerer and Diamondville and the Kemmerer Unit 1 Site, so LCSD #1 will host the most workforce children, be a primary recipient of Kemmerer Unit 1 property taxes, and collect most of the property taxes generated by newly constructed housing. Most construction and operations workers not finding available housing in Kemmerer and Diamondville will reside in Evanston (Uinta County). Uinta County School District #1 boundaries contain the City of Evanston. The children of construction workers residing in Sweetwater County will likely attend Sweetwater County School Districts #1 and #2.

It is estimated the previous owner of the proposed site paid much less than $200 in property taxes to education tax jurisdictions (State and local) (Section 2.4.2.2.2). The payment represented a miniscule percentage of Lincoln County's education levies in 2021. Because the appraised valuation of the Kemmerer Unit 1 site will increase during the construction period, tax payments to the education taxing jurisdictions will increase.

It is estimated that Kemmerer Unit 1 property tax payments to jurisdictions levying an education tax would be minimal in the first year of construction and grow to $8,689,150 by the final year of construction, as the plant's value would increase (Table 4.4-15). This tax payment will represent a 61.6 percent increase in LCSD #1's 2020-2021 operating revenues of $14,115,177.

As discussed in Section 2.4.2.7.4, Wyoming's School Foundation Program enables the State to redirect money from school districts with excess local revenues to school districts with insufficient local revenues using a calculation that incorporates the school finance system's funding model and the characteristics of each school district's schools, staff, and students. Through the School Foundation Program, the State guarantees that school districts are appropriately funded to meet their operational and instructional obligations each year (their "guarantee"). While tax payment appears to have a large impact on LCSD #1 by potentially providing revenues beyond LCSD #1's guarantee, those excess revenues will presumably be recaptured and redirected by the State to less wealthy school districts. LCSD #1 will likely become a district that is no longer dependent on the State to meet its annual guarantee (Section 2.4.2.7.4). Therefore, education related property tax payments on behalf of Kemmerer Unit 1 are anticipated to provide a SMALL benefit to LCSD #1 and other school districts in the State.

In the economic region, the influx of workers and families will lead to larger enrollments, the largest of which will be in LCSD #1 and Uinta County School District #1. Kemmerer Unit 1 workers' school age children are expected to increase school district enrollments by 314 in Lincoln County, 242 in Uinta County, and 212 in Sweetwater County. The fiscal impacts of greater enrollment will be determined by a district's current physical capacity for additional students and any requirement to add teachers or facilities (Section 2.4.2.7.4).

In Lincoln County, there are only 66 available classroom seats in its only elementary school. In Evanston, 2 of 4 elementary schools are at more than 90 percent of capacity. In Green River, 1 of 4 elementary schools is at more than 90 percent of capacity. In Rock Springs, 5 of 7 elementary schools are at more than 90 percent of capacity. Four of those exceed capacity. Rock Springs also has 2 of 2 high schools at more than 90 percent of capacity (Section 2.4.2.7.4).

Project workforce children could stress resources at any of 9 elementary schools in Kemmerer, Evanston, Green River, and Rock Springs, and two high schools in Rock Springs. However, increased enrollments will likely increase those school districts' guarantees through the School Foundation Program, offsetting the added expenses of higher enrollment. Also, those schools' School Capitalization Construction program calculations could change, potentially generating funding to expand school facilities.

The fiscal impacts of greater enrollment are likely to be SMALL in all three counties' schools because the State's education equalization programs will provide the funding to mitigate adverse impacts. Mitigation does not appear to be warranted.

4.4.3.2.5 Other Relevant Taxes and Fees

Business (or Corporate) License Tax

Wyoming Statute 17-16-1630 authorizes the Wyoming Secretary of State to collect an annual tax from all business entities organized within Wyoming or that have obtained the right to transact business there. The tax is based on the assessed valuation of capital, property, and assets located and employed in the State. The tax is $60.00 or 0.02 percent of the total assessed valuation, whichever is greater. For Kemmerer Unit 1 a 0.02 percent of the estimated assessed value of the plant will be paid. It is estimated that by the end of construction, the plant's assessed value will reach about $187 million dollars. Applying the fee rate of 0.02 percent to the assessed value of $187 million dollars yields a fee of about $37,000. Business license revenues go to the State General Fund (Section 2.4.2.2.2). In Fiscal Year 2021, State General Fund and Budget Reserve Account revenues totaled $1.69 billion dollars (Table 2.4-14). The Corporate License Tax payment will create a negligibly SMALL beneficial impact on the State's general fund revenues.

Wyoming Impact Assistance Tax Program

Wyoming statutes provide for financial assistance for communities that host major construction projects within their boundaries. This is accomplished through the Wyoming Department of Environmental Quality's Industrial Siting division. The division oversees the provision of economic impact assistance payments that are designed to assist local governments in mitigating construction project impacts to their community resources.

With input from affected counties and their municipalities, the Industrial Siting Council (ISC) determines the size of an impact assistance payment, which is not to exceed 2.76 percent of a construction project's total estimated taxable material and service costs. The amount, 2.76 percent, represents the State's share of the 4 percent sales and use taxes generated by the project (69 percent of the Wyoming's 4 percent sales and use tax is 2.76 percent). In essence, the State returns its share of the sales and use taxes generated by the project to the communities that are most impacted by the project. These funds are transferred from the State's general fund to the county treasurer, who distributes the funds to the county and municipalities based on a ratio decided by the ISC (Section 2.4.2.2.2).

The estimated taxable materials and services costs of the Kemmerer Unit 1 project to reach about $244 million during construction. Given these costs, a maximum of about $6.7 million (2.76 percent of $244 million) could be distributed to the affected counties and municipalities over the course of construction. Depending on the size of the impact assistance payments and the sizes of the affected counties and municipalities' populations and economies, impacts will vary from SMALL to LARGE and be beneficial. The largest payments will be directed to municipalities in Lincoln and Uinta Counties as they are the jurisdictions that will host most of the Kemmerer Unit 1 construction workforce (Section 2.4.2.6). Lincoln and Uinta Counties are also the smallest counties in terms of population and economy. The estimated impacts in Lincoln and Uinta Counties are expected to be MODERATE to LARGE and beneficial.

Construction workers unable to find temporary housing in Lincoln and Uinta Counties will likely reside in Green River or Rock Springs. Sweetwater County is the largest of the three counties in population and economy. The workers needing to reside in Sweetwater County are not expected to stress community resources (except schools) to the same degree as that found in Lincoln and Uinta Counties. Impact assistance payments to Sweetwater County communities are expected to have SMALL beneficial impacts on county resources.

4.4.3.2.6 End of Construction Period

As noted previously, it is estimated that nearly 100 percent of the construction worker in-migrants will be expected to leave the economic region when construction is complete. This loss of population will have SMALL adverse impacts on sales and use tax collections, depending on the residential distribution and spending habits of the departing workers. Also, sales and use tax collections on construction-related materials and services will come to an end, yielding SMALL to MODERATE adverse impacts on local and State sales and use tax revenues.

There will be SMALL to LARGE beneficial impacts to the municipalities collecting lodging taxes on overnight accommodations because project workers will vacate those accommodations, increasing their availability to customers staying less than 30 days. The largest impacts will occur in Lincoln and Uinta counties.

By the end of construction, departing construction workers will leave behind a large number of vacant housing units, possibly 1,300 or more (Section 4.4.4.3.2). Unless re-occupied, the vacant units will likely decrease in value. Some units could go into mortgage default or foreclosure. All of these outcomes will impact local tax bases, reducing local housing values and tax payments to local property taxing bodies. Declines in property values in Kemmerer and Diamondville could result in LARGE adverse impacts to Lincoln County tax coffers, especially because most of the newly constructed units will be located there. SMALL to MODERATE adverse impacts are expected in Uinta County. In Sweetwater County, the effects will be least profound. It is anticipated about 400-500 housing units in the county will be vacated. Those units will represent about 23 percent (Section 4.4.4.3.3) of the county’s vacant and available units. While the vacancies could be noticeable, they are not expected to cause a significant decrease in housing prices or rents. Impacts to the property tax rolls in Sweetwater County will likely be SMALL.

While Kemmerer Unit 1 is being constructed, plant property values will be largely based on project costs. Once the plant begins operation, the plant’s value will be based on one or more of the following: sales comparison - fair market value, income capitalization, and cost. There may also be negotiated payments in lieu of taxes. It is likely that operations period property tax payments will mitigate most adverse impacts of the loss of construction period property taxes. Therefore, there will be few adverse impacts to the industrial property tax base in Lincoln County and Kemmerer Unit 1’s property tax recipients. Plant-related property tax payments will continue to be LARGE and beneficial to Lincoln County and its applicable property taxing entities.

By the end of construction, the project-related increase in demand for infrastructure and personnel in the economic region will decrease as the construction workforce would depart. The Industrial Siting Division of the Wyoming Department of Environmental Quality will have dispensed its economic impact assistance payments in their entirety. Government budgets will return to their normal baselines. Impacts to baseline government budgets are expected to be SMALL.

The adverse impacts in the economic region from the departure of the construction workforce will be mitigated to some extent by the entry of higher-wage operations workers and by operational expenditures and tax payments (Section 5.4.3). Timely information and communications will be maintained with local communities to keep them apprised of ongoing developments, enabling government agencies, organizations, businesses, and individuals to plan for the eventual loss of jobs, population, and tax revenues.

4.4.4 Community Infrastructure Impacts

4.4.4.1 Traffic

As mentioned earlier in Section 4.4.1.4, an intersection with US 189 is planned. The proposed intersection is designed to minimize disruptions in traffic flow; however, some traffic congestion will be expected during peak commuting hours.

The construction workforce numbers and their temporal distribution are discussed in Section 3.3. The peak 12 month average of construction workers is 1,639 workers. The residential distribution of the construction workforce is discussed in detail in Section 4.4.4.3.1 and is expected to be 41, 32, and 28 percent in Lincoln, Uinta, and Sweetwater counties. The workers residing in Lincoln County will travel south along US 189 to reach the site. Workers residing in Sweetwater County are assumed to reach US 189 via US 30 and travel south to the site. Workers commuting from Uinta County would reach the site traveling north on US 189. As summarized in Table 4.4-17, 1,131 commuting vehicles would travel southbound on US 189 to the site and 524 would travel northbound on US 189.

Construction day shift will have staggered start times. The 2021 and 2022 annual average daily traffic counts for the site area are presented in Table 2.8-2. The 2021 traffic counts are slightly higher than that of 2022 for all routes. The 2021 average daily traffic volume along US 189 is 1,041 north of the site (annual average daily traffic for US 189 at US 30 junction south to CR 304 West to Elkol) and 1,636 south of the site (annual average daily traffic for US 189 south of CR 304 to junction with WY 412). The increased traffic along US 189 will be noticeable; however, there is a relatively low volume of existing traffic, and planned US 189 improvements will facilitate traffic flow entering and exiting the site.

There will be additional daily traffic consisting of heavy vehicles such as semi-trucks, component delivery trucks, water trucks, and heavy machinery. Truck shipments are estimated at 95 per working day. Both truck deliveries and the workforce will access the site using the same paved entrance road. When possible, delivery times will be coordinated with the use patterns of the road and workforce shift changes to avoid traffic congestion and increase safety.

A traffic study will inform the design of the US 189 intersection and improvements and include additional recommendations for mitigating traffic congestion. The traffic study considers the peak workforce with two staggered start times, estimating that approximately 60 percent of the workforce and a few truck shipments (an estimated 980 vehicles) would arrive or depart at the peak a.m. and p.m. hours. Approximately 55 percent of the 980 vehicles (528 vehicles) would travel southbound on US 189 during the peak a.m. hour and the remaining 45 percent (432 vehicles) would be traveling northbound. These additional vehicles would result in noticeable additional traffic flow on US 189 based on the 2021 and 2022 traffic counts for US 189 (Table 2.8-1). The traffic study's analysis of projected vehicle traffic for 2026, inclusive of Kemmerer Unit 1 construction and Sodium Test and Fill Facility construction, estimates 569 vehicles traveling to the site southbound on US 189 during the peak a.m. hour and 527 vehicles northbound. The 2026 traffic analysis of 569 southbound vehicles estimates traffic congestion north of the site entrance to be level of service D (approaching unstable flow). The traffic study does not recommend mitigation measures beyond the design of the intersection because the level of service D will be temporary, applicable to peak traffic during construction of the Sodium Test and Fill Facility and Kemmerer Unit 1. While the traffic study looks at 569 vehicles, this is only slightly higher than the Kemmerer Unit 1 peak construction traffic estimated for the a.m. peak hour southbound traffic of 528 vehicles. In NUREG-1437 (Reference 4.4-7), NRC states level of service C and D are associated with MODERATE impacts because the operation of individual users begins to be severely restricted by other users and at level D small increases in traffic cause operational problems. Consequently, upgrading of roads or additional control systems may be required.

Improvements to US 189 will be installed per WYDOT approved design and implement traffic management controls and mitigation as required by WYDOT. Therefore, traffic impacts to US 189 will be MODERATE during peak commuting hours and SMALL otherwise.

Section 4.8.3 discusses accident-related consequences of additional traffic from construction workers.

4.4.4.2 Recreation

Section 2.4.2.5 presents location and utilization information on recreation areas and venues and tourism sites in the 10-mile vicinity. Section 4.4.1.5 analyzes the aesthetic impacts of the Kemmerer Unit 1 project.

4.4.4.2.1 Aesthetic Impacts to Recreation

As discussed in Section 2.4.2.5.1, the recreational opportunities in the 10-mile (16-kilometer) vicinity are mostly in Kemmerer and thus on the opposite side of the ridge that obstructs the view of the Cumberland Flats. The construction activities will not be visible, and distance and topography will allow noise from the construction activities to attenuate to levels not noticeable above ambient.

Within the Cumberland Flats is public land open to hunting. Thus, the project's construction activities could be visible or partially visible to hunters on these lands. The construction activities are scheduled to be conducted during a day shift, so project lighting and noise will be less intrusive than if construction was on a 24-hour basis. The nighttime lighting and noise sources are not expected to be noticeably more intrusive than the existing industry lighting and noise in the vicinity.

The aesthetic impacts to recreational opportunities resulting from preconstruction and construction of Kemmerer Unit 1 and the associated offsite utilities will be SMALL and do not warrant mitigation.

4.4.4.2.2 Use Impacts to Recreation

NUREG-1437 states impacts on tourism and recreation are considered SMALL if current facilities are adequate to handle local levels of demand, MODERATE if facilities are overcrowded during peak demand times, and LARGE if additional recreation areas are needed to meet ongoing demands (Reference 4.4-7).

Section 2.4.2.5 presents information about the existing recreational opportunities in the economic region. Where available, information about current utilization rates and capacities are provided.

The influx of workers during Kemmerer Unit 1 construction could impact the use of recreation opportunities within the 10-mile (16-kilometer) vicinity in two ways. One set of impacts will be caused by Kemmerer Unit 1 related population growth in the Kemmerer and Diamondville area. In-migrating workers and family members could increase the use of recreation areas and facilities that cater mostly to residents in the 10-mile (16-kilometer) region. The other set of impacts will be caused by construction workforce use of temporary accommodations in the economic region, preventing use of those accommodations by baseline recreators and tourists.

During the peak of construction, about 41 percent of the in-migrating 3,864 workers and family members (Table 4.4-1), 1,580 workers and family members, will represent a 41.2 percent increase in the combined 2020 populations of Kemmerer, Diamondville, Cokeville, and LaBarge, 3,831 (Table 2.4-4). Recreational areas, facilities, and venues used by local residents will be expected to increase by a similar percentage. With the exception of the golf club, there are no stated maximum capacities for recreators at the facilities and venues in the 10-mile radius. Impacts to those facilities will be SMALL. The Fossil Island Golf Club has a maximum daily capacity of about 200 golfers. During its busiest days in the summer (usually weekends), the club can approach maximum capacity. A 41.4 percent increase in customers (about 82 golfers) could displace 82 baseline customers during periods of high use. Impacts to baseline golf course customers are expected to be MODERATE.

The other set of impacts caused by the in-migrating workers are related to the workers’ use of the temporary accommodations in the economic region. Tourism destinations, like the Fossil Butte National Monument, JC Penney Museum, and the Fossil Country Frontier Museum, and events, like the Oyster Ridge Music Festival, could draw out-of-town tourists who might seek overnight accommodations. Project construction workers staying in temporary housing in Lincoln and Uinta Counties will likely keep those units at or near maximum capacity, especially during the peak of construction. For most of the construction period, out-of-town visitors and recreators could encounter difficulty in finding available hotels, motels, recreational vehicle (RV) parks, and campgrounds within a 10-mile radius and even further out.

One example is the Oyster Ridge Music Festival, the annual 2-day outdoor music concert that takes place in Herschler Triangle Park on the last weekend in July. Attendance exceeded 4,000 each day in 2021. Project-related occupancy of local overnight accommodations could impact out-of-town concert-goers who would seek overnight accommodations within reasonable driving distance of the venue. The combined 2020 populations of Kemmerer and Diamondville equate to about 3,000 people, suggesting 1,000 or more attendees could be from outside of the area. Kemmerer Unit 1 construction workers and families residing in temporary housing could displace a significant number of out-of-town baseline attendees. Impacts to in-town baseline attendees are expected to be SMALL. Impacts to out-of-town baseline attendees could be MODERATE and adverse.

Conclusion

A project-related population increase of 1,580 will increase the population of Kemmerer, Diamondville, Cokeville, and LaBarge by 41.2 percent. A 41.2 percent increase in the attendance and use of the facilities and events listed above would result in no more than SMALL impacts. There is excess capacity at most facilities and outdoor areas. A 41.2 percent increase in customers (about 82 golfers) could displace 82 baseline customers during periods of high use at the Fossil Island Golf Club, however. Impacts to baseline golf course customers are expected to be MODERATE and adverse.

For some out-of-town users of the tourism and event opportunities in the 10-mile (16-kilometer) vicinity, finding nearby overnight accommodations could be difficult during construction. Reservations at the hotels, motels, RV parks, and campgrounds within a reasonable distance of a tourism destination or event could be difficult to procure. Some patrons would need to find accommodations further away and some users could forgo their plans altogether. Impacts to these users could be MODERATE and adverse.

Mitigating Activities

Company efforts to alleviate potential housing shortages encountered by its workforces may also help address temporary housing shortages encountered by users of recreational opportunities in the vicinity of the site (Section 4.4.4.3.4). Reduced pressure on temporary housing could enable some recreators and visitors to procure the housing they will need to stay and enjoy the recreation opportunities in the area.

Also, during locally significant events construction could be suspended. Workers staying in temporary accommodations could be asked by accommodation owners to check out during the events, allowing recreators to occupy those units. In this manner, accommodation owners could continue to serve loyal customers.

4.4.4.3 Housing

In NUREG-1437 (Reference 4.4-7), the NRC states impacts on housing are considered to be of SMALL significance when a small and not easily discernible change in housing availability occurs, generally as a result of a very small demand increase or a very large housing market. Increases in rental rates or housing values in these areas will be expected to equal or slightly exceed the statewide inflation rate. No extraordinary construction or conversion of housing will occur where small impacts are foreseen.

The impacts on housing are considered to be of MODERATE significance when there is a discernible but short-lived reduction in available housing units because of project-induced in-migration. Rental rates and housing values will rise slightly faster than the inflation rate, but prices should realign quickly once new housing units became available or once project-related demand diminished. The new housing units added to the market during construction are easily absorbed into the market once project-related demand diminishes. Minor or temporary conversions of nonliving space to living space, such as converting garages to apartments, may occur. Also, there may be a temporary addition of new mobile home parks or expansions of existing parks.

The impacts on housing are considered to be of LARGE significance when project-related demand for housing units will result in very limited housing availability and will increase rental rates and housing values well above normal inflationary increases in the state. Such increases could make housing unavailable or less affordable to nonproject personnel. Substantial conversions of housing units, such as single-family houses to apartments, as well as substantial overbuilding so that these units cannot be absorbed into the housing market once project demand diminishes are also considered indicative of large impacts.

4.4.4.3.1 Construction

The peak of construction will occur in 2028, but the peak is part of a plateau where the project exceeds 1,600 workers for at least 20 months, starting in 2027 (Figure 3.3-4). The counties and municipalities most likely to house the Kemmerer Unit 1 workforces will be Kemmerer, Diamondville, Cokeville, and LaBarge in Lincoln County; all of Uinta County; and Green River and Rock Springs in Sweetwater County.

As stated in Section 4.4.2, housing constraints in Lincoln and Uinta Counties prevent distribution of the Kemmerer Unit 1 construction workforces using the same percentages as those of Naughton Power Plant. Therefore, distribution percentages are based on Naughton Power Plant distributions combined with housing availability in the economic region. Table 4.4-18 and Table 4.4-19 present the assumptions used to determine the amount of housing available to Kemmerer Unit 1 workforces during the construction phase of the project.

Table 4.4-18 provides an analysis of the total number of housing units required by Kemmerer Unit 1 and indirect workforces, at construction peak, based on the following assumptions:

- 95 percent of the construction and 100 percent of operations workforces will migrate into the 3-county region: 1,550 construction and 80 operations workers (Table 4.4-1)
- 38 percent of the estimated indirect workforce will migrate into the region: 304 workers (Table 4.4-2)
- 37 percent of construction workers will bring families (Table 4.4-1)
- 50 percent of construction workers not bringing families will share housing units
- None of the operations or indirect workers will share housing units

Based on these assumptions, in-migrating workers will require an estimated peak total of 1,689 housing units (Table 4.4-18).

Table 4.4-19 summarizes the vacant and available[5] housing data presented in Section 2.4.2.6. County-level data are provided for Uinta County, while municipality-level data are provided for Lincoln and Sweetwater Counties. A share of total housing in the economic region will be newly constructed housing. Most anticipated new housing construction is located in Kemmerer and Diamondville. Kemmerer and Diamondville are strongly encouraging the construction of more than 1,500 new housing units by private investors and entities (Section 2.4.2.6). City leaders and planning officials are in the process of rezoning some parcels of land from their current uses to residential single- and multi-family uses and commercial uses (Section 2.4.2.6). Is is conservatively assumed approximately 750 of the planned new units will be constructed and available to the project. Including the 750 newly constructed units, there would be 4,376 vacant and available housing units in the economic region (Table 4.4-19). Sixty-three percent of all units would be in Sweetwater County, while 21 and 16 percent would be in Lincoln and Uinta Counties.

For worker distribution assumptions and proposed action analyses, 75 percent is conservatively assumed of all vacant and available housing in the economic region will be available to the project, for a total of 3,282 units (Table 4.4-19). There could be significant variability in the number of units available from year to year, especially in Kemmerer and Diamondville, and it would not be safe to assume all housing in Lincoln and Uinta Counties would be available to the project.

Workers are expected to seek housing near the project area, thus the vacant and available housing units in the municipalities nearest the site are expected to be occupied first, followed by the units in Uinta County, and finally the units in Green River and Rock Springs. Using these assumptions, 41 percent of the Kemmerer Unit 1 workers will migrate into Lincoln County, 32 percent will find housing in Uinta County, and the remaining 28 percent will find housing in Sweetwater County (Table 4.4-19). More specifically, 690 units will house 791 workers in Lincoln County, 532 units will house 610 workers in Uinta County, and 466 units will house 534 workers in Sweetwater County (Table 4.4-19). It is important to note that 71 percent of the vacant and available units in Lincoln County will be newly constructed housing (Table 4.4-19).

The 80 operations and 304 indirect workers migrating into the economic region will likely choose permanent housing units that are for sale or rent: single family homes, multi-family units (i.e., townhomes, apartments, and condominiums), and mobile homes. Of the total number of permanent vacant units in the economic region in 2020, 277 were for sale and 1,633 were for rent (Table 4.4-19). There is ample housing for the operations and indirect workforces.

The 1,550 construction workers migrating into the economic region will likely choose temporary housing, in the form of hotels, motels, and RV parks. (A small number of construction workers will use permanent rental housing: there are 170 rental units in Lincoln and Uinta Counties and 1,463 rental units in Sweetwater County.) There are currently 1,082 hotel or motel rooms and 635 RV park spaces projected to be available in the economic region (Table 4.4-19). It is assumed 75 percent of this temporary housing will be available to the project, about 1,288 units (Table 4.4-19). If construction workers were to be unwilling to drive 90 minutes to the site each

5. The term “vacant” refers to vacant permanent housing units and the term “available” is used in reference to temporary housing available to project workers.

day, the rental units in Sweetwater County may not be sought. Temporary housing in Lincoln and Uinta Counties would be insufficient to house the entire construction workforce. However, even though most of the new housing proposed for construction in Kemmerer and Diamondville is in the form of houses, townhomes, condominiums, and apartments, construction workers unable to find temporary or rental housing could share the newly constructed permanent units, should those units become available for rent. Plus, there are plans for the construction of one or two hotels and an RV park in Kemmerer and Diamondville. Also, housing designated as seasonal, recreational, or occasional use (vacation) units could be made available, with lower rents and longer leases. The lead time to construct hotels and motels is considerable; the lead time to construct new residential units and to remodel existing units is shorter, and facilities to service mobile homes and RVs could be readied relatively quickly by the private market.

Rental housing options for in-migrating construction workers may also include other special living situations, such as short-term rental units and spare bedrooms in homes that residents would be willing to rent to construction workers. These types of potential housing opportunities are not included in the data presented in Table 4.4-19.

The occupation of 75 percent of Lincoln and Uinta counties' vacant and available housing could impact new and existing residents, expanding and new businesses and industries, and other construction projects in the area. Housing sought by these entities could be constrained. In Sweetwater County, the project will occupy about 22.6 percent of the units. While noticeable, impacts will be less profound than those in Lincoln and Uinta Counties.

Rental rates for housing units of all types, new and existing housing prices, and short-term and long-term hotel and motel leasing rates could rise because of increased demand. The magnitudes of any price increases will depend on the project schedule and the amount and pace of new housing construction. The median prices of housing in the economic region counties and municipalities are presented in Table 2.4-25 and Table 2.4-28. In 2020, the median price of an owner-occupied unit ranged from $181,600 in Uinta County to $253,400 in Lincoln County. The weighted median price for the economic region was $211,177. The median gross monthly rents ranged from $685 in Uinta County to $852 in Sweetwater County. In Kemmerer and Diamondville, the median prices of owner-occupied units were $143,000 and $106,800. The median gross monthly rents were $622 and $807. Increased prices and rents benefit housing owners, but they could adversely impact disadvantaged populations. An increase in new housing construction, however, could serve to counter price increases by increasing the housing supply and creating more competition for sellers.

The addition of 750 or more housing units will have another beneficial effect. Local taxing bodies (school districts, special districts, municipalities, and counties) will benefit from increased real property values and the addition of new units to the tax rolls, resulting in increased property tax revenues. This is especially true in Kemmerer and Diamondville, where most of the new housing will be constructed.

4.4.4.3.2 Post Construction

As presented in Section 4.4.2, it is assumed 100 percent of the in-migrating construction workforce will leave the economic region by the end of construction. Only operations workers and indirect workers would remain.

The vacated housing units could leave the economic region with excess housing. If most of the new housing is constructed, most excess housing will be in the Kemmerer and Diamondville area, with potentially 1,000 or more units[6]. In 2020, Kemmerer and Diamondville had a total of 1,890 housing units, 283 of which were vacant. One thousand new permanent housing units would represent a 53 percent increase in the total housing stock of the two municipalities and a 354 percent increase in their vacant housing. Without in-migrants from other sources to occupy the vacant units, housing prices and rents could decline, even leading to a potential uptick in mortgage defaults and foreclosures. Defaults, foreclosures, and lower property values will adversely impact local tax collections and residents' and businesses' overall financial well-being.

The operations workforce will continue to grow until it reaches 250 workers and could absorb 168 of the excess units (i.e., those in Lincoln County (0.67 x 250 = 168)). Maintenance outages at Naughton Power Plant and refueling outages at Kemmerer Unit 1 could occupy some percentage of the vacant units for periods of 35 days or less, 1 or 2 times a year. Naughton outages employ about 300 workers and Kemmerer Unit 1 refueling outages will employ about 500 workers. Outage workers will likely choose temporary accommodations. Other known and yet unknown projects in the area could occupy a percentage of the excess units. Chapter 7, Cumulative Impacts, identifies projects that could reasonably occur in the economic region during the construction and operations phases of the Kemmerer Unit 1 project.

4.4.4.3.3 Conclusion

Across the economic region, there is enough housing to accommodate the construction, operations, and indirect workforces during the construction phase of the Kemmerer Unit 1 project. This conclusion is based on two key assumptions:

- At least 50 percent of the proposed housing in Kemmerer is constructed
- Workers choosing to reside in Green River and Rock Springs will be willing to commute 70-90 or more minutes to the project site

Impacts to housing in Lincoln and Uinta Counties will be LARGE. The increase in the housing stock in Kemmerer and Diamondville and the occupancy of 75 percent of vacant and available housing in Lincoln and Uinta Counties represent large changes in those communities' housing and infrastructure. Current and potential new residents and existing and new businesses will likely experience housing shortages. Increased demand, paired with limited supply, could increase housing prices and rents, and temporary accommodation rates, even with the addition of new units.

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6. If most planned housing construction is realized.

By the end of construction, construction workers will migrate back out of the region, leaving a large number, possibly 1,000 or more, vacant units. Large numbers of vacant housing units could depress overall housing values and rents, potentially increasing mortgage defaults and foreclosures, reducing tax payments to local property taxing bodies, and financially destabilizing some businesses and residents.

In Sweetwater County, the effects of both the worker influx and the worker exodus will be less profound. About 466 housing units are anticipated in the county, representing about 23 percent of the county's vacant and available units. While the effects will be noticeable, they are not expected to initiate land conversion, cause a significant increase in housing prices or rents, or be destabilizing. Impacts in Sweetwater County are expected to be SMALL to MODERATE.

If the key assumptions are not accurate, the construction of the new housing in Kemmerer, Diamondville, and Evanston does not significantly meet worker demand, and workers will not drive 75 to 90 miles (120-145 kilometers) to the site. Housing shortages will be addressed if encountered by its employees using a monitoring and adaptive management approach. The approach is described further below.

4.4.4.3.4 Mitigating Activities

Understanding the issues outlined above, informal communication has been initiated with local and regional governments to disseminate information about project scheduling and workforce sizes. City, county, and regional planning organizations, as well as developers and real estate agencies, are collaborating and evaluating the costs and benefits of project-related housing activities, in relation to local and regional markets (Section 2.4.2.6).

County and city leaders are aware of the potential for an economic boom-bust cycle. The economic region has experienced boom-bust cycles in the past (i.e., the 1970s energy crisis and the 2000s natural gas and fracking boom), and residents are familiar with their effects. In response, county and city leaders as well as economic development organizations, like the South Lincoln County Economic Development Corporation and the Lincoln County Economic Development Board, are leading efforts to attract more business and industry to the area. Successful recruitment of new businesses and industries will serve to enhance market absorption of excess housing developed during the construction period and continue to expand the region's economy.

Housing shortages will be monitored and the affects on workforce. Should workers experience difficulty in locating housing within the economic region,1) ask local realtors and leasing agents to help monitor housing supply vacancy rates and availability, 2) explore busing alternatives, and 3) partner with other projects in the area to establish and share temporary worker housing units if shortages were to become significant. Using this monitoring and adaptive management approach, will help ensure availability of housing for its construction workforces and reduce its impact on housing in the economic region.

4.4.4.4 Public Services

4.4.4.4.1 Water Supply Facilities

In NUREG-1437 (Reference 4.4-7), NRC states impacts on public utility services are considered SMALL if little or no change occurs in the ability to respond to the level of demand and thus there is no need to add to capital facilities. Impacts are considered MODERATE if overtaxing of facilities during peak demand periods occurs. Impacts are considered LARGE if existing service levels (such as the quality of water and sewage treatment) are substantially degraded and additional capacity is needed to meet ongoing demands for services.

The impacts of both construction demand and population increases during the construction phase were considered on local water resources. Impacts are largely based on the population increase resulting from the in-migration of project workers, indirect workers, and associated family members during the peak of construction (Table 4.4-1). The number of in-migrating onsite workers will be 1,630 at peak. The total population increase will be 3,864. Section 2.4.2.7.1 describes the major public water suppliers in the economic region.

<u>Onsite Water Use</u>

Water used by onsite workforces (potable) and onsite construction activities will be obtained from the municipal water supplier in Kemmerer and Diamondville, the Kemmerer-Diamondville Water and Wastewater Joint Powers Board (KDWWJPB). KDWWJPB's water treatment plant currently has an excess production capacity of 3.9 gallons per day (gpd) (15 liters per day [lpd]) (Table 2.4-32). The average person in the United States uses about 82 gpd in their residence (Reference 4.4-6). When multiplied by the number of workers on site at peak, the total increase in potable water use could reach 133,660 gpd (505,960 lpd) (82 gpd [310 lpd] x 1,630 workers). However, some percent of the workers' daily use will occur at their residences, so onsite use will likely be less than 82 gpd (310 lpd) per worker. At 82 gpd (310 lpd) per worker, the workers' use would equate to about 3.4 percent of the excess capacity.

Construction activities requiring the use of water include the concrete batch plant operation, concrete curing, cleanup activities, dust suppression, placement of engineered backfill, and piping hydro tests and flushing operations. As presented in Section 3.3.1.6, the amount of water used by a concrete plant is estimated to be approximately 30,000 gpd (100,000 lpd) at peak. An average of 17,000 gpd (64,000 lpd) (6.3 million gallons [24 million liters] per year) is estimated to be needed overall for construction activities. Of course, not all water uses would occur simultaneously. For instance, backfill operations would not occur at the same time as hydrotests and flushing. The impact to KDWWJPB's water plant supplies are expected to be SMALL.

<u>Offsite Water Use</u>

The largest municipal water suppliers in the economic region have excess capacity: 3.9 million gallons per day (mgd) (15 million liters per day [mld]) in Kemmerer and Diamondville, 1.5 mgd (5.7 mld) in Evanston, and 8 mgd (30 mld) in Green River and Rock Springs (Table 2.4-32). The impact to local water supply systems from construction-related population growth can be estimated by calculating the amount of water required by the in-migrating project-related population. A population increase of 3,864 would increase consumption by 316,848 gpd (1,199,400 lpd) (82 gpd [310 lpd] x 3,864 workers and family members).

Approximately 41 percent of the 3,864 in-migrating workers and family members, 1,580 people, would reside in Lincoln County. These new residents would use 129,560 gpd (490,440 lpd), about 3.3 percent of Kemmerer and Diamondville's excess capacity. Approximately 32 percent of the 3,864 in-migrating workers and family members, 1,218 people, would reside in Uinta County. Those new residents would use 99,876 gpd (378,070 lpd), about 6.7 percent of Evanston's excess capacity. Approximately 28 percent of the 3,864 in-migrating workers and family members, 1,067 people, would reside in Sweetwater County. Those new residents would use 87,494 gpd (331,200 lpd), about 1.1 percent of Green River and Rock Springs' excess capacity.

The impact on economic region municipal water supplies by project-related in-migrating workforces and family members will be SMALL. Water use by these in-migrants would represent less than 3 percent of available capacity in the economic region.

4.4.4.4.2 Wastewater Treatment Facilities

The impacts of both construction demand and population increases during the construction phase were considered on local wastewater treatment facilities. Section 2.4.2.7.2 describes the largest public wastewater treatment systems in the economic region.

The magnitude of the wastewater impacts can be conservatively estimated by assuming 100 percent of the water used by a population would go to a wastewater treatment facility. As stated in Onsite Water Use, the workforces on site during the peak of construction could require 133,660 gpd (505,960 lpd) of drinking water (82 gpd [310 lpd] x 1,630 workers). By extension, 133,660 gpd (505,960 lpd) of additional wastewater treatment capacity would be needed on site. Off site, the construction-related population increase of 3,864 people could require 316,848 gpd (1,199,400 lpd) of drinking water. By extension, 316,848 gpd (1,199,400 lpd) of additional wastewater treatment capacity would be needed.

Onsite Wastewater Treatment

Kemmerer Unit 1 workers will use portable restroom facilities until an onsite wastewater treatment facility is constructed. Waste from the portable facilities will be contracted for disposal, by a portable facility provider or waste hauler, at KDWWJPB's wastewater treatment plant and possibly other offsite wastewater treatment facilities in the region. At the peak of construction, up to 133,660 gpd of wastewater could be disposed of in this manner. Currently, KDWWJPB's wastewater treatment plant has an excess capacity of 0.3 to 0.75 mgd (1 to 2.8 mld) (Table 2.4-34).

In 2023, KDWWJPB's wastewater treatment plant officials procured State and county grants to address the most severe inflow and infiltration (I&I) issues in their system (Section 2.4.2.7.2). They plan to correct enough of these issues to free up about 375,000 gpd (1,420,000 lpd) of existing capacity in time for the peak construction workforce in-migration (Section 2.4.2.7.2). The KDWWJPB also continues to search for funding to address the system-wide repairs, upgrades, and expansions that are still needed.

The onsite workforces could use 45 percent of the lower end of the wastewater treatment plant's current stated excess capacity. Once the I&I issues are addressed, the onsite workforce use will represent only 20 percent of the plant's excess capacity. It should be noted that some percent of the workers' daily use will occur at their residences and most workers (59 percent or more) would reside outside of the Kemmerer and Diamondville area, so actual onsite use would be less than the amounts stated here.

Offsite Wastewater Treatment

The largest municipal wastewater treatment facilities in the economic region have excess production capacity: 0.3 to 0.75 mgd (1 to 2.8 mld) (with potential for 0.38 mgd [1.4 mld] of additional capacity) in Kemmerer and Diamondville, 1.53 mgd (5.79 mld) in Evanston, 0.3 mgd (1 mld) in Green River, and 2.05 mgd (7.76 mld) in Rock Springs (Table 2.4-34). The impact to local wastewater treatment systems from construction-related population growth can be estimated by calculating the amount of wastewater treatment required by the in-migrating project-related population. A construction-related population increase of 3,864 people could increase wastewater treatment production by 316,848 gpd (1,199,400 lpd).

Of the 1,580 workers and family members who will reside in Lincoln County, 791 would be workers (Table 4.4-1). The 791 workers have already been accounted for in the onsite wastewater treatment analysis above. The remaining in-migrants, 789 family members, would generate 64,698 gpd (244,910 lpd) of wastewater and require 21.6 to 8.6 percent of Kemmerer and Diamondville's current excess treatment capacity and 9.6 to 5.8 percent of Kemmerer and Diamondville's future excess treatment capacity (after I&I issues are addressed).

The 1,218 new residents in Uinta County will generate 99,876 gpd (378,070 lpd) of wastewater, using 6.5 percent of Evanston's excess wastewater treatment capacity. The 1,067 new residents in Green River and Rock Springs will generate 87,494 gpd (331,200 lpd) of wastewater, using 3.7 percent of Green River and Rock Springs' combined excess wastewater treatment capacity.

In Lincoln County, the impacts of project-related in-migrating workforces and family members on the KDWWJPB's wastewater treatment plant are expected to be SMALL to MODERATE. Wastewater generated by the in-migrating onsite workforce would use up to 45 percent of the plant's current excess treatment capacity and 20 percent of the plant's excess capacity after I&I issues are addressed. Wastewater generated by offsite in-migrants would use 22 percent of the plant's current excess treatment capacity and 10 percent of the plant's excess capacity after I&I issues are addressed. Combined, increased wastewater generated by the in-migrants could require 67 to 30 percent of the KDWWJPB's wastewater treatment plant's excess capacity.

The impact on the major wastewater treatment facilities in Uinta and Sweetwater Counties will be SMALL. Wastewater treatment requirements by project in-migrants would represent less than 7 percent of available capacity in Evanston's wastewater treatment system and less than 4 percent of available capacity in the systems of Green River and Rock Springs combined.

4.4.4.4.3 Law Enforcement

In NUREG-1437 (Reference 4.4-7), NRC states impacts on public safety are considered SMALL if there is little or no need for additional police or fire personnel. Impacts are considered MODERATE if some permanent additions to the police and fire protection forces or some new capital equipment purchases are needed. Impacts are considered to be LARGE if there is a substantial increase in the permanent manpower of police and fire protection forces and in the need to purchase additional vehicles.

Residents-per-police-officer ratios for the counties and municipalities in the economic region are presented in Table 2.4-36. In 2019, the ratio of residents per police officer was 300 to 1 in the economic region. This ratio includes county and city agency officers. Table 4.4-20 presents the same data, with one exception. Total population includes the following jurisdictions: Kemmerer, Diamondville, Cokeville, LaBarge, Uinta County, Green River, and Rock Springs. The towns of Cokeville and LaBarge have no reported police officers, so they were not included in Table 2.4-36. Their population numbers are included in Table 4.4-20 because they are located within the economic region and will also be served by the police officers reported in Table 2.4-36. The net effect is that the baseline number of residents per police officer is actually 304:1.

As stated in Section 2.4.2.7.3, the national average was 414 residents per police officer. There is no national standard for number of residents per police officer, as there is a great deal of variation between populations of similar sizes. Urban areas tend to employ more law enforcement personnel per resident than rural areas. In Uinta and Sweetwater Counties, all county and city agency ratios exceeded the national ratio. In Lincoln County, the county agency ratio exceeded the national ratio, but Kemmerer and Diamondville ratios did not. Most of the economic region is rural and many of the ratios are higher than the national average.

Kemmerer Unit 1will employ its own security force. Offsite impacts to law enforcement services will be caused by in-migrating workforces. About 3,864 workers and family members will move into the economic region during the construction peak (Table 4.4-1). This new population will temporarily increase the 2019 residents per police officer ratio in the economic region (Kemmerer, Diamondville, Cokeville, LaBarge, Uinta County, Green River, and Rock Springs) by 6.5 percent (Table 4.4-20), creating a SMALL to MODERATE impact. To accommodate the additional population, 13 more police officers (and associated equipment) will be needed in the economic region, during the construction period, to maintain the current residents-per-police-officer ratio.

The municipalities of Kemmerer, Evanston, Green River, and Rock Springs all have ratios that approach or exceed the national ratio. Most of the 13 additional police officers (and associated equipment) will be needed in these municipalities. Impacts to these municipalities could be MODERATE to LARGE.

Moderate and large impacts will be mitigated by the Wyoming's Impact Assistance Tax Program, run by Wyoming Department of Environmental Quality's Industrial Siting division. Section 2.4.2.2.2 describes the program, in detail. The division's ISC oversees the provision of economic impact assistance payments to communities hosting large construction projects in their areas. Payments are used to mitigate construction project impacts to community resources.

Through the Industrial Siting Permit process, affected communities in the economic region will communicate their resource needs to the ISC. The ISC will use that information in determining the sizes of their impact assistance payments. The sum of all payments cannot exceed 2.25 to 2.76 percent of the project's taxable materials costs. The estimates for total taxable materials costs could reach $244 million if none of the costs would be exempt from sales and use taxes. The combined value of all payments could reach $5.5 to $6.7 million.

These funds will be transferred from the State's general fund to the county treasurer, who would distribute the funds to the counties and their municipalities, based on a ratio determined by the ISC. Impacts will be mitigated to SMALL.

Upon construction completion, the additional police personnel and equipment needed to support the population increase during the peak construction period could be considered in excess. However, some personnel and equipment could be used to support Kemmerer Unit 1 operations-related population growth and future non-project-related population growth in the economic region. The additional personnel and equipment could be used to supplement the general provision of law enforcement services in the economic region. These services could be funded by the plant's property taxes and the sales and use tax revenues generated by plant and workforce expenditures in the region.

4.4.4.4.4 Fire Protection Services

Residents-per-active-firefighter ratios for the counties in the economic region are presented in Table 2.4-37. In 2021, the economic region ratio was 287 to 1 (Table 4.4-21). In 2022, the national ratio was 312 residents per active firefighter (Section 2.4.2.7.3).

Onsite fire protection capability and emergency response is the responsibility of Kemmerer Unit 1. Offsite impacts to fire protection services will be caused by the in-migrating project workforces. The addition of 3,864 workers and family members will temporarily increase the 2021 residents-per-active-firefighter ratio in the economic region by 5.3 percent, or 302 to 1 (Table 4.4-21). To accommodate the additional population, 13 more active firefighters (and associated equipment) will be needed in the economic region to maintain the current residents-per-active firefighter ratio. While the ratio will increase by 5.3 percent, the ratio would remain below the national average and be temporary, creating a SMALL to MODERATE impact.

Impacts will be mitigated by Wyoming's Impact Assistance Tax Program. Through the Industrial Siting Permit process, affected communities in the economic region would communicate their resource needs to the ISC. The ISC will use that information in determining the sizes of their impact assistance payments. The sum of all payments cannot exceed 2.25 to 2.76 percent of the project's taxable materials costs. The estimates for total taxable materials costs could reach $244 million if none of the costs would be exempt from sales and use taxes. The combined value of all payments could reach $5.5 to $6.7 million.

These funds will be transferred from the State's general fund to the county treasurer, who would distribute the funds to the counties and municipalities, based on the ratio decided by the ISC. Impacts will be mitigated to SMALL.

Upon construction completion, the additional fire protection personnel and equipment needed to support the population increase during the peak construction period could be considered in excess. However, some personnel and equipment could be used to continue to support the Kemmerer Unit 1 operations-related population growth and future non-project-related population growth in the economic region. The additional personnel and equipment could be used to supplement the general provision of fire suppression services in the economic region. These services could be funded by the plant's property taxes and the sales and use tax revenues generated by plant and workforce expenditures in the region.

4.4.4.4.5 Medical Services

Detailed data concerning the medical services in the economic region are provided in Section 2.4.2.7.3.

Kemmerer Unit 1 will be responsible for onsite medical capabilities and emergency response services. Minor injuries to workers would be assessed and treated by onsite medical personnel. Other injuries would be treated at hospitals in the economic region, depending on the severity of the injury. Agreements will be in place with some local medical providers to support emergencies.

As indicated in Table 2.4-38 and Table 2.4-39, Sweetwater County provides the most opportunities for medical care in the economic region. As indicated in Table 2.4-4, the 2020 population of the economic region was 82,303. According to Table 2.4-38, there were 157 certified hospital beds, with occupancy rates ranging from 9 to 13 percent, in the economic region. Adding an estimated 3,864 residents to the economic region population would increase the population by 4.7 percent. A commensurate 4.7 percent increase in occupancy rates will still be well below the total certified hospital bed capacities in the economic region. The project-related increase in population in the economic region will not exceed medical facility capacities. Therefore, the potential impacts of construction on medical facilities are expected to be SMALL, and mitigation will not be warranted.

In 2021, there were 660 residents per physician in the economic region (Table 2.4-39). As stated in Section 2.4.2.7.3, the U.S. Department of Health Resources and Services Administration maintains lists of areas, populations, and facilities that are experiencing shortages of health care services and personnel. The HPSA list tracks shortages of primary, dental, and mental health care providers. A query of this list, for the economic region, is presented in Table 2.4-40. According to query results, the City of Kemmerer was short 0.4 full-time equivalent primary care providers in 2021. Eastern Uinta County was short 0.2 full-time equivalent primary care providers, and all of Sweetwater County was short 2.7 full-time equivalent primary care providers. With respect to mental health providers, the southwest region of Wyoming is considered a “High Needs Geographic HPSA.” The region was short 2.7 full-time equivalent mental health providers. The addition of 3,864 new residents to the economic region would compound healthcare professional shortages that already exist. Impacts from worsening shortages in all three of the economic region counties could be MODERATE, especially in Kemmerer and Diamondville.

Moderate impacts will be mitigated by the ISC's Impact Assistance Tax Program. Through the Industrial Siting Permit process, affected communities in the economic region would communicate their needs for medical professionals to the ISC. The ISC will use that information in determining the sizes of their impact assistance payments. Impacts should be mitigated to SMALL.

Upon construction completion, the additional medical providers needed to support the population increase during the peak construction period could consider staying in the area to support Kemmerer Unit 1 operations-related population growth and future non-project-related population growth. The additional personnel will be used to supplement the general provision of medical services in the economic region, especially where there are shortages. These services could be funded by the plant's property taxes and sales and use tax revenues generated by plant and workforce expenditures in the region.

4.4.4.4.6 Education

K through 12

In NUREG-1437 (Reference 4.4-7), NRC states SMALL impacts are associated with project-related enrollment increases of 3 percent or less. Impacts are considered small if there is no change in the school systems' abilities to provide educational services and if no additional teaching staff or classroom space is needed. MODERATE impacts generally are associated with 4 to 8 percent increases in enrollment. Impacts are considered moderate if a school system must increase its teaching staff or classroom space even slightly to preserve its pre-project level of service. Any increase in teaching staff, however small (e.g., 0.5 full-time equivalent), that occurs from hiring additional personnel or changing the duties of existing personnel (e.g., a guidance counselor assuming classroom duties) may result in moderate impacts, particularly in small school systems . LARGE impacts are associated with project-related enrollment increases above 8 percent. Education impacts are considered large if current institutions are not adequate to accommodate the influx of students or if the project-related demand can be met only if additional resources (e.g., new teachers and/or classrooms) are acquired.

Section 2.4.2.7.4 presents staff ratio and school capacity data for the school districts in the economic region. It is assumed that each in-migrating worker with a family would have 0.88 school-age children (Table 4.4-1). Therefore, 768 school-age children would accompany an estimated 877 in-migrating workers (Table 4.4-1). This analysis conservatively assumes that all school-age children will attend public schools and reside in one of the 3 counties in the economic region.

The economic region has 42 schools in 8 school districts (Table 2.4-42). As of July 2022, total enrollment in the economic region was 12,698 students, and there was available seating for 6,270 more students. (Table 2.4-42). Student-teacher ratios in all districts were well below the State recommendation of 16:1 (Table 2.4-41). It is estimated that all 768 students associated with the peak of construction would enroll in school districts within the economic region. These students would represent about 12.2 percent of the economic region's excess seating capacity and a 6 percent increase in the economic region's enrollment in 2022.

Individual schools in the economic region were examined for capacity issues (Table 2.4-42). In Evanston, two of four elementary schools were at more than 90 percent of capacity. In Green River, one of four elementary schools was at more than 90 percent of capacity. In Rock Springs, five of seven elementary schools were at more than 90 percent of capacity, and four of the five exceeded capacity. In Rock Springs, both high schools were at more than 90 percent of capacity (Section 2.4.2.7.4). Currently, none of these schools is scheduled for “remedies” to alleviate projected capacity issues (Section 2.4.2.7.4).

Economic region impacts will be MODERATE. Impacts could vary for an individual school or district. The magnitude of the impact to a school or district depends on where the workers would settle and the ages of their children. If an impact to a school or district were moderate or large, it will most likely be mitigated to SMALL by the following:

- Property tax revenues, which will increase due to new housing and commercial building construction and Kemmerer Unit 1 construction
- The State’s education equalization programs, which will ensure that school districts that receive workforce children but do not receive tax payments from the proposed plant, will receive additional funding from the State because of increased enrollments
- Communication with local and regional government officials regarding Kemmerer Unit 1 construction and scheduling, thereby providing time for the school districts to plan for the influx

Therefore, impacts to primary and secondary schools and districts in the economic region will be SMALL, after mitigation through Wyoming’s education equalization programs. Additionally, this conclusion is supported by the fact that the peak construction workforce will not be reached sooner than the end of the second year of construction, giving school districts a couple of years to make accommodations for the additional students. As enrollments grow, schools with capacity issues could install modular classrooms and recruit additional teachers, if needed.

<u>Colleges</u>

There are no colleges, universities, community colleges, or trade schools within a 50-mile radius of the site. The nearest post-secondary institution is the Western Wyoming Community College, located in Rock Springs. Western Wyoming Community College reported an enrollment of 4,316 students for the 2020-2021 academic year (Section 2.4.2.7.4). During the 2016-2018 academic years, the College’s enrollment approached 6,000 students (Section 2.4.2.7.4). There will be plenty of excess capacity to accommodate the college-aged children of the Kemmerer Unit 1 workforces. Therefore, impacts to the college resulting from Kemmerer Unit 1 construction are expected to be SMALL and beneficial and not require mitigation.

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Table 4.4-1 Assumptions for Workforce Migration and Family Composition During Peak Construction Period, Kemmerer Unit 1 (Sheet 1 of 2)

	Construction	Operations	Indirect Workforce	Total (Direct + Indirect)
Workforce characterization				
Peak number of workers on-site during construction peak	1,632	80	N/A	1,712
Workforce migration				
Percent of workforce migrating into Economic Region	95%	100%	100%	
Total number of workers migrating into Economic Region during construction peak	1,550	80	304	1,934
Families				
Percent of workers who bring families	36.8%	80%	80%	
Percent of workers who do not bring families	63.2%	20%	20%	
Number of workers who bring families into Economic Region	571	64	243	877
Number of workers who don't bring families into Economic Region	980	16	61	1,057
Average worker family size (worker, spouse, children)[a]	3.20	3.20	3.20	
Total in-migration - Families and Unaccompanied Workers				
Total number of workers, who bring families, migrating into the Economic Region (= total families)	571	64	243	877
In-migrating workers' family members	1,255	141	534	1,930
Total in-migrating workers accompanied by family, plus family members	1,826	205	777	2,808
Total number of workers not bringing families into the Economic Region	980	16	61	1,057
Total number of workers and family members migrating into the Economic Region (= new population)	**2,806**	**221**	**838**	**3,864**

Table 4.4-1 Assumptions for Workforce Migration and Family Composition During Peak Construction Period, Kemmerer Unit 1 (Sheet 2 of 2)

	Construction	Operations	Indirect Workforce	Total (Direct + Indirect)
School-age children				
Number of school-age children per family[b]	0.88	0.88	0.88	
Number of school-age children	499	56	212	768
Post-construction workforce retention				
Percent of in-migrating construction and indirect workers that leave the Economic Region, post-construction	100%	N/A	0%	N/A
Number of in-migrating construction and indirect workers who leave Economic Region, post-construction	1,550	N/A	0	1,550
Number of in-migrating construction and indirect workers and their families plus in-migrating construction workers without families who leave Economic Region, post-construction	2,806	N/A	0	2,806
Number of school-age children, of in-migrating construction workers, who leave area, post-construction	499	N/A	0	499

a. Reference 4.4-9 (S1101)

b. Reference 4.4-10 (B05009)

Table 4.4-2 Direct and Indirect Employment

Demographic	Kemmerer Unit 1
Construction workforce peak (Table 4.4-1)	1,632
Operations workforce on site during construction peak (Table 4.4-1)	80
Number of construction workers who migrate into Economic Region (95 percent of construction workforce peak) (Table 4.4-1)	1,550
Number of operations workers who migrate into Economic Region (100 percent of operations workforce on site during construction peak) (Table 4.4-1)	80
Employment multiplier for construction workers in Economic Region (indirect portion only)[a]	0.3994
Employment multiplier for operations workers in Economic Region (indirect portion only)[a]	1.9659
Indirect jobs resulting from in-migrating construction workers	619
Indirect jobs resulting from in-migrating operations workers	157
Total number of indirect jobs (includes those resulting from both in-migrating workforces)	777
Estimated number of unemployed adults available to fill indirect jobs (25 percent of 1,892) (Table 2.4-8)	473
Additional indirect jobs that need to be filled by adults currently residing outside of Economic Region	304

a. Reference 4.4-1

Table 4.4-3 Monthly In-migrating Construction Workforce Wages (Sheet 1 of 3)

Month	In-migrating Construction Workforce (95 Percent)	Average Monthly Wage[a]	Total Monthly Wages
Month -16	1	$5,277	$5,013
Month -15	36	$5,277	$188,788
Month -14	43	$5,277	$225,159
Month -13	62	$5,277	$326,699
Month -12	81	$5,277	$427,110
Month -11	117	$5,277	$615,152
Month -10	143	$5,277	$756,140
Month -9	197	$5,277	$1,041,531
Month -8	251	$5,277	$1,326,517
Month -7	300	$5,277	$1,581,509
Month -6	382	$5,277	$2,014,112
Month -5	481	$5,277	$2,540,147
Month -4	525	$5,277	$2,772,244
Month -3	590	$5,277	$3,115,235
Month -2	644	$5,277	$3,400,510
Month -1	733	$5,277	$3,868,001
Month 1	886	$5,277	$4,675,618
Month 2	929	$5,277	$4,900,216
Month 3	1,062	$5,277	$5,601,327
Month 4	1,195	$5,277	$6,307,989
Month 5	1,297	$5,277	$6,844,314
Month 6	1,372	$5,277	$7,241,890
Month 7	1,477	$5,277	$7,796,194
Month 8	1,506	$5,277	$7,947,967
Month 9	1,527	$5,277	$8,058,252
Month 10	1,537	$5,277	$8,112,329
Month 11	1,557	$5,277	$8,218,085
Month 12	1,551	$5,277	$8,183,904
Month 13	1,559	$5,277	$8,225,001
Month 14	1,567	$5,277	$8,267,806
Month 15	1,563	$5,277	$8,248,310
Month 16	1,565	$5,277	$8,258,085
Month 17	1,536	$5,277	$8,105,199
Month 18	1,571	$5,277	$8,287,667
Month 19	1,552	$5,277	$8,190,719
Month 20	1,547	$5,277	$8,162,310

Table 4.4-3 Monthly In-migrating Construction Workforce Wages
(Sheet 2 of 3)

Month	In-migrating Construction Workforce (95 Percent)	Average Monthly Wage[a]	Total Monthly Wages
Month 21	1,569	$5,277	$8,279,918
Month 22	1,550	$5,277	$8,178,515
Month 23	1,550	$5,277	$8,176,693
Month 24	1,553	$5,277	$8,195,789
Month 25	1,553	$5,277	$8,196,535
Month 26	1,550	$5,277	$8,179,517
Month 27	1,519	$5,277	$8,015,846
Month 28	1,465	$5,277	$7,728,286
Month 29	1,400	$5,277	$7,387,125
Month 30	1,299	$5,277	$6,856,007
Month 31	1,164	$5,277	$6,144,625
Month 32	1,110	$5,277	$5,859,235
Month 33	1,020	$5,277	$5,380,858
Month 34	920	$5,277	$4,853,030
Month 35	862	$5,277	$4,550,189
Month 36	750	$5,277	$3,957,031
Month 37	686	$5,277	$3,617,391
Month 38	542	$5,277	$2,859,226
Month 39	440	$5,277	$2,323,869
Month 40	356	$5,277	$1,877,679
Month 41	325	$5,277	$1,717,037
Month 42	252	$5,277	$1,330,796
Month 43	210	$5,277	$1,109,142
Month 44	132	$5,277	$698,008
Month 45	114	$5,277	$600,654
Month 46	110	$5,277	$582,304
Month 47	71	$5,277	$375,972
Month 48	31	$5,277	$165,427
Month 49	20	$5,277	$105,272
Month 50	13	$5,277	$70,181
Month 51	13	$5,277	$70,181

Table 4.4-3 Monthly In-migrating Construction Workforce Wages (Sheet 3 of 3)

Month	In-migrating Construction Workforce (95 Percent)	Average Monthly Wage[a]	Total Monthly Wages
Month 52	13	$5,277	$70,181
Month 53	13	$5,277	$70,181
Total			**$301,419,748**

Source: Table 2.4-11

a. Heavy and Civil Engineering Construction, North American Industry Classification Sector 237 (2021)

Table 4.4-4 Sensitivity Analysis of Impacts to Economic Region Economy from Construction Worker In-Migrant Wages

In-migrating Construction Workforce Total Wages over 69-month Construction Period		**$301,419,748**
Earnings Multiplier for Nonresidential Construction Industry		1.3235
Total Personal Income in Economic Region, 2021		$4,528,826,000
Percent of Total Construction Workforce Wages that could be Spent in Economic Region	Wage Dollars	Total Dollar Impact to Region (earnings multiplier applied)
10	$30,141,975	$39,892,904
20	$60,283,950	$79,785,807
30	$90,425,925	$119,678,711
40	$120,567,899	$159,571,615
50	$150,709,874	$199,464,518
60	$180,851,849	$239,357,422
70	$210,993,824	$279,250,326
80	$241,135,799	$319,143,230
90	$271,277,774	$359,036,133
100	$301,419,748	$398,929,037

Sources: Reference 4.4-1, Reference 4.4-2, and Table 4.4-3

Table 4.4-5 Impacts by Year from Construction In-Migrant Wages to Economic Region Economy during Construction Period

Construction Year	Construction Months	Total Annual Wages	Total Annual Wages Spent in Economic Region (50 percent)[a]	Total Dollar Impact to Region (earnings multiplier applied)[b]	As a Percent of Economic Region Personal Income in 2021 ($4.5 Billion)
1	-16 through -5	$11,047,878	$5,523,939	$7,310,933	0.2
2	-4 through 8	$64,471,504	$32,235,752	$42,664,018	0.9
3	9 through 20	$98,317,667	$49,158,834	$65,061,716	1.4
4	21 through 32	$91,198,089	$45,599,045	$60,350,335	1.3
5	33 through 44	$34,274,256	$17,137,128	$22,680,989	0.5
6 (partial year)	45 through 53	$2,110,354	$1,055,177	$1,396,527	0.03
Total		$301,419,748	$150,709,874	$199,464,518	

a. This impact assessment is based on the conservative assumption that 50 percent of worker wages would be spent in the economic region.

b. Multiplier is 1.3235 (Reference 4.4-1).

Table 4.4-6 Monthly In-migrating Operations Workforce Wages (Sheet 1 of 3)

Month	In-migrating Operations Workforce (100 Percent)	Average Monthly Wage[a]	Total Monthly Wages
Month -16	0	$12,987	$0
Month -15	0	$12,987	$0
Month -14	0	$12,987	$0
Month -13	0	$12,987	$0
Month -12	0	$12,987	$0
Month -11	0	$12,987	$0
Month -10	0	$12,987	$0
Month -9	0	$12,987	$0
Month -8	0	$12,987	$0
Month -7	0	$12,987	$0
Month -6	0	$12,987	$0
Month -5	0	$12,987	$0
Month -4	0	$12,987	$0
Month -3	0	$12,987	$0
Month -2	0	$12,987	$0
Month -1	0	$12,987	$0
Month 1	0	$12,987	$0
Month 2	0	$12,987	$0
Month 3	0	$12,987	$0
Month 4	0	$12,987	$0
Month 5	0	$12,987	$0
Month 6	0	$12,987	$0
Month 7	0	$12,987	$0
Month 8	10	$12,987	$129,867
Month 9	10	$12,987	$129,867
Month 10	10	$12,987	$129,867
Month 11	20	$12,987	$259,733
Month 12	20	$12,987	$259,733
Month 13	20	$12,987	$259,733
Month 14	20	$12,987	$259,733
Month 15	20	$12,987	$259,733
Month 16	20	$12,987	$259,733
Month 17	20	$12,987	$259,733
Month 18	40	$12,987	$519,467
Month 19	40	$12,987	$519,467
Month 20	40	$12,987	$519,467

Table 4.4-6 Monthly In-migrating Operations Workforce Wages (Sheet 2 of 3)

Month	In-migrating Operations Workforce (100 Percent)	Average Monthly Wage[a]	Total Monthly Wages
Month 21	40	$12,987	$519,467
Month 22	60	$12,987	$779,200
Month 23	60	$12,987	$779,200
Month 24	60	$12,987	$779,200
Month 25	60	$12,987	$779,200
Month 26	80	$12,987	$1,038,933
Month 27	80	$12,987	$1,038,933
Month 28	80	$12,987	$1,038,933
Month 29	100	$12,987	$1,298,667
Month 30	100	$12,987	$1,298,667
Month 31	100	$12,987	$1,298,667
Month 32	120	$12,987	$1,558,400
Month 33	120	$12,987	$1,558,400
Month 34	120	$12,987	$1,558,400
Month 35	140	$12,987	$1,818,133
Month 36	140	$12,987	$1,818,133
Month 37	140	$12,987	$1,818,133
Month 38	180	$12,987	$2,337,600
Month 39	180	$12,987	$2,337,600
Month 40	180	$12,987	$2,337,600
Month 41	200	$12,987	$2,597,333
Month 42	200	$12,987	$2,597,333
Month 43	225	$12,987	$2,922,000
Month 44	225	$12,987	$2,922,000
Month 45	250	$12,987	$3,246,667
Month 46	250	$12,987	$3,246,667
Month 47	250	$12,987	$3,246,667
Month 48	250	$12,987	$3,246,667
Month 49	250	$12,987	$3,246,667
Month 50	250	$12,987	$3,246,667
Month 51	250	$12,987	$3,246,667

Table 4.4-6 Monthly In-migrating Operations Workforce Wages
(Sheet 3 of 3)

Month	In-migrating Operations Workforce (100 Percent)	Average Monthly Wage[a]	Total Monthly Wages
Month 52	250	$12,987	$3,246,667
Month 53	250	$12,987	$3,246,667
Total			**$71,816,267**

Source: Table 2.4-12

a. Nuclear Electric Power Generation, North American Industry Classification System 221113 (2021)

Table 4.4-7 Sensitivity Analysis of Impacts to Economic Region Economy from Operations Worker In-Migrant Wages

In-migrating Operations Workforce Total Wages over 69-month Construction Period		**$71,816,267**
Earnings Multiplier for Electric Power Generation, Transmission, and Distribution Industry		1.905
Total Personal Income in Economic Region, 2021		$4,528,826,000
Percent of Total Operations Workforce Wages that could be Spent in Economic Region	**Wage Dollars**	**Total Dollar Impact to Region (earnings multiplier applied)**
10	$7,181,627	$13,680,999
20	$14,363,253	$27,361,998
30	$21,544,880	$41,042,996
40	$28,726,507	$54,723,995
50	$35,908,133	$68,404,994
60	$43,089,760	$82,085,993
70	$50,271,387	$95,766,992
80	$57,453,013	$109,447,990
90	$64,634,640	$123,128,989
100	$71,816,267	$136,809,988

Sources: Reference 4.4-1, Reference 4.4-2, and Table 4.4-6

Table 4.4-8 Impacts by Year from Operations In-Migrant Wages to Economic Region Economy during Construction Period

Construction Year	Construction Months	Total Annual Wages	Total Annual Wages Spent in Economic Region (50 Percent)[a]	Total Dollar Impact to Region (earnings multiplier applied)[b]	As a Percent of Economic Region Personal Income in 2021 ($4.5 Billion)
1	-16 through -5	$0	$0	$0	0.0
2	-4 through 8	$129,867	$64,933	$123,698	0.003
3	9 through 20	$3,636,267	$1,818,133	$3,463,544	0.1
4	21 through 32	$12,207,467	$6,103,733	$11,627,612	0.3
5	33 through 44	$26,622,667	$13,311,333	$25,358,090	0.6
6 (partial year)	45 through 53	$29,220,000	$14,610,000	$27,832,050	0.6
Total		**$71,816,267**	**$35,908,133**	**$68,404,994**	

a. This impact assessment is based on the conservative assumption that 50 percent of worker wages would be spent in the economic region.

b. Multiplier is 1.9050 (Reference 4.4-1).

Table 4.4-9 Sensitivity Analysis of Impacts to Economic Region Economy from All Worker In-Migrant Wages

In-migrating Workforce Total Wages over 69-month Construction Period		**$373,236,015**
Total Personal Income in Economic Region, 2021		$4,528,826,000
Percent of Total Workforce Wages that could be Spent in Economic Region	**Wage Dollars**	**Total Dollar Impact to Region (earnings multipliers applied)[a]**
10	$37,323,602	$53,573,902
20	$74,647,203	$107,147,805
30	$111,970,805	$160,721,707
40	$149,294,406	$214,295,610
50	$186,618,008	$267,869,512
60	$223,941,609	$321,443,415
70	$261,265,211	$375,017,317
80	$298,588,812	$428,591,220
90	$335,912,414	$482,165,122
100	$373,236,015	$535,739,025

Sources: Table 4.4-4 and Table 4.4-7

a. This column is the sum of construction wages with Nonresidential Construction Industry multiplier (1.3235) applied (see Table 4.4-4), plus operations wages with Electric Power Generation, Transmission, and Distribution Industry multiplier (1.9050) applied (see Table 4.4-7).

Table 4.4-10 Impacts by Year from All In-Migrant Wages to Economic Region Economy during Construction Period

Construction Year	Construction Months	Total Annual Wages	Total Annual Wages Spent in Economic Region (50 Pecent)[a]	Total Dollar Impact to Region (earnings multiplier applied)[b]	As a Percent of Economic Region Personal Income in 2021 ($4.5 Billion)
1	-16 through -5	$11,047,878	$5,523,939	$7,310,933	0.2
2	-4 through 8	$64,601,371	$32,300,685	$42,787,716	0.9
3	9 through 20	$101,953,934	$50,976,967	$68,525,260	1.5
4	21 through 32	$103,405,556	$51,702,778	$71,977,947	1.6
5	33 through 44	$60,896,923	$30,448,461	$48,039,079	1.1
6 (partial year)	45 through 53	$31,330,354	$15,665,177	$29,228,577	0.6
Total		$373,236,015	$186,618,008	$267,869,512	

a. This calculation is based on the conservative assumption that 50 percent of worker wages would be spent in the economic region.

b. This column is the sum of construction wages with Nonresidential Construction Industry multiplier (1.3235) applied (see Table 4.4-5, plus operations wages with Electric Power Generation, Transmission, and Distribution Industry multiplier (1.9050) applied (see Table 4.4-8)

Table 4.4-11 Total Sales and Use Tax Collection Projections in the Economic Region and State, Fiscal Year 2021-2030

	2021	2022	2023	2024	2025
County	**Total Taxes (Actual)**	**Total Taxes (Projection)**	**Total Taxes (Projection)**	**Total Taxes** (Projection)	**Total Taxes (Projection)**
Lincoln	$26,355,168	$26,888,751	$27,433,138	$27,988,546	$28,555,199
Sweetwater	$68,456,666	$66,459,391	$64,520,388	$62,637,957	$60,810,447
Uinta	$22,474,796	$22,633,799	$22,793,927	$22,955,187	$23,117,589
Wyoming	$978,476,265	$991,928,784	$1,005,566,253	$1,019,391,216	$1,033,406,251
	2026	**2027**	**2028**	**2029**	**2030**
County	**Total Taxes (Projection)**	**Total Taxes (Projection)**	**Total Taxes (Projection)**	**Total Taxes (Projection)**	**Total Taxes (Projection)**
Lincoln	$29,133,324	$29,723,154	$30,324,925	$30,938,880	$31,565,265
Sweetwater	$59,036,256	$57,313,829	$55,641,654	$54,018,267	$52,442,243
Uinta	$23,281,139	$23,445,846	$23,611,719	$23,778,765	$23,946,993
Wyoming	$1,047,613,971	$1,062,017,024	$1,076,618,097	$1,091,419,912	$1,106,425,229

Source: Table 2.4-18 Total Sales and Use Tax Collections in the Economic Region and State, Fiscal Year 2011-2021

These growth rates are based on the change in sales and use tax revenues between 2011 and 2021 (Table 2.4-18, Lincoln County). Note that the projected values do not include the proposed construction and operation of Kemmerer Unit 1 and may not reflect any increased rates of population change, major changes in the amount or type of goods and services available for purchase in this jurisdiction, or unforeseen changes in consumer and business spending due to other factors.

Table 4.4-12 Kemmerer Unit 1-Generated Sales and Use Tax Payments, by Construction Year

Sales Tax Breakout by Year	2025	2026	2027	2028	2029	2030	TOTAL
Sales Tax	$1,179,767	$1,905,876	$4,237,054	$2,940,616	$1,609,469	$347,415	$12,220,196
Percent of Total	9.7	15.6	34.7	24.1	13.2	2.8	100

Table 4.4-13 Total Property Tax Levies, by Jurisdiction Type, Tax Years 2011, 2021, and 2029

Tax Jurisdiction	2011	2021	Average Annual Percent Change, 2011-2021	Final Year - 2029 (Projection)
Lincoln County				
County	$10,588,451	$8,726,261	-1.9	$7,475,234
Municipal	$649,444	$870,521	2.9	$1,100,447
Special District	$4,822,020	$5,013,971	0.4	$5,173,019
Total Education[a]	$43,342,687	$32,579,974	-2.9	$25,928,575
Total	$59,402,602	$47,190,727	-2.3	$39,255,239
Uinta County				
County	$6,961,457	$3,854,575	-5.9	$2,402,136
Municipal	$823,052	$1,003,446	2.0	$1,175,838
Special District	$2,012,652	$1,149,451	-5.6	$734,290
Total Education[a]	$27,486,125	$14,855,587	-6.2	$9,080,523
Total	$37,283,286	$20,863,059	-5.8	$13,112,003
Sweetwater County				
County	$30,518,648	$23,705,139	-2.5	$19,367,086
Municipal	$2,524,555	$2,735,934	0.8	$2,917,711
Special District	$8,798,690	$9,840,406	1.1	$10,761,902
Total Education[a]	$128,830,777	$99,100,981	-2.6	$80,338,666
Total	$170,672,670	$135,382,460	-2.3	$112,481,510

Source: Table 2.4-20

a. Includes all school district levies (including the State levy for the School Foundation Program (12 mill cap)) and bond/interest revenue.

Table 4.4-14 Estimated Property Tax Liabilities (Payments), by Construction Year

Year	Estimate
2023	$3,901
2024	$1,180,751
2025	$3,073,031
2026	$7,288,215
2027	$10,207,065
2028	$11,842,250
2029	$12,195,298

Table 4.4-15 Kemmerer Unit 1 Estimated Property Tax Payment, Final Year of Construction

Taxing Authority	Levies (Mills)	Property Tax Distribution (Percent)	Estimated Property Tax Payment – Final Construction Year
Lincoln County School #1	46.4	71.25	$8,689,150
Lincoln County	12	18.43	$2,247,593
South Lincoln Hospital	4	6.14	$748,791
South Lincoln Spec. Cemetery	0.967	1.48	$180,490
Weed and Pest	0.905	1.39	$169,515
South Lincoln Fire	0.555	0.85	$103,660
Kemmerer Senior Center	0.3	0.46	$56,098
Lincoln Conservation	0	0.00	$0
TOTAL	65.13	100.00	$12,195,298

Table 4.4-16 Kemmerer Unit 1 Property Tax Payment Comparison, Final Year of Construction

	Lincoln County Property Tax Levies				Kemmerer Unit 1 Property Tax Payment		
Tax Jurisdiction	**2011**	**2021**	**Average Annual Percent Change, 2011-2021**	**Final Construction Year - 2029 (Projection)**	**Kemmerer Unit 1 Property Tax Payment, Final Construction Year**	**Kemmerer Unit 1 Property Tax Payment as Percent of 2029 County Levy Projection**	**Impact Significance**
County	$10,588,451	$8,726,261	-1.9	$7,475,234	$2,247,593	30.1	Large
Municipal	$649,444	$870,521	2.9	$1,100,447	$0	0.0	None
Special District	$4,822,020	$5,013,971	0.4	$5,173,019	$1,258,555	24.3	Large
Total Education[a]	$43,342,687	$32,579,974	-2.9	$25,928,575	$8,689,150	33.5	Small[b]
Total	$59,402,602	$47,190,727	-2.3	$39,255,239	$12,195,298	31.1	Large

Source: Table 2.4-20

a. Includes all school district levies (including the levy for the School Foundation Program (12 mill cap)) and bond/interest revenue.

b. Because Wyoming employs an education equalization program (School Foundation Program), the State redirects money from school districts with excess local property tax revenues to school districts with insufficient local property tax revenues. While United States Sodium Fast Reactor Owner, LLC tax payment would appear to have a Large impact on the district by providing revenues beyond the district's guarantee, those excess revenues would be recaptured by State and applied elsewhere.

Table 4.4-17 Construction Commuters

	Traveling South on US 189		Traveling North on US 189
Counties	Lincoln County commuters	Sweetwater County commuters	Uinta County commuters
Total vehicles	672	459	524
Total vehicles by approach direction	1,131 (68 Percent)		524 (32 Percent)

All numbers rounded whole numbers and based on the peak 12-month average of construction workers

Table 4.4-18 Total Units Required for Kemmerer Unit 1 Workforces during Construction Peak

Construction (95 percent in-migration)[a]	**1,550**
Operations (100 percent in-migration)[a]	80
Indirect workforce	304
Total	1,934
Construction workers with no family (63.2 percent)[a]	980
Construction workers who share (50 percent of those with no families)	490
Estimated number of units construction workers would occupy (2 workers/unit)	245
Construction workers who don't share (50 percent of those with no families)	490
Construction workers with families (36.8 percent)[a]	571
Operations workers (will not share)	80
Indirect workers (will not share)	304
Total units required	**1,689**

a. Table 4.4-1 and Table 4.4-2

Table 4.4-19 Construction Workforce Distribution

Total Housing by County[a]	**Lincoln County (Kemmerer, Cokeville, Diamondville, LaBarge)**	**Uinta County**	**Sweetwater County (Green River and Rock Springs)**
For Sale (vacant)	58	79	140
For Rent (vacant)	38	132	1,463
Hotels/Motels (32.7 percent avail)	102	339	641
RV parks (32.7 percent avail)	69	65	501
New housing (1,497 units total; 50 percent constructed)[b]	654	95	NA
Total units (100 percent)	921	710	2,745
Total units available to project (75 percent)	**690**	**532**	**2,059**
Kemmerer Unit 1 workforce housing unit distribution	690	532	466
Housing unit distribution percent[c]	**41%**	**32%**	**28%**
Total in-migrating construction workforce	1,630	1,630	1,630
Total in-migrating indirect workforce	304	304	304
Construction and indirect workforce distribution	**791**	**610**	**534**

a. From Section 2.4.2.6 Housing

b. Does not include Canyon Road Development's RV park and hotels

c. Total appears to equate to 101 percent due to rounding.

Table 4.4-20 Law Enforcement in the Economic Region, Adjusted for the Construction Workforce and Associated Population

Location	Total Population in 2020*	Additional Population due to New Plant Construction	Total Population	Sworn Police Officers (2019)	Construction Workforce-Adjusted Persons-per-Police Officer Ratio	Pre-Construction Persons-per-Police Officer Ratio	Percent Increase from Pre-Construction Persons-per-Police Officer Ratio	Additional Police Officers Required during Peak Construction Period
Economic Region	59,632	3,864	63,496	196	324	304	6.5%	13

Source: Table 2.4-36

* Total Population includes the following jurisdictions: Kemmerer, Diamondville, Cokeville, LaBarge, Uinta County, Green River, and Rock Springs. Cokeville and LaBarge have reported no police officers, so they were not included in Table 2.4-36. They are included here because they are located within the economic region and would be served by the police officers reported in this table. The net effect of this change is that the Pre-Construction Persons-per-Police Officer Ratio is actually 304:1.

Table 4.4-21 Fire Protection in the Economic Region, Adjusted for the Construction Workforce and Associated Population

Location	Service Population	Additional Population due to New Plant Construction	Total Population	Active Firefighters (full-time, part-time, and volunteer) (2021)	Construction Workforce-Adjusted Persons-per-Firefighter Ratio	Pre-Construction Persons-per-Firefighter Ratio	Percent Increase from Pre-Construction Persons-per-Firefighter Ratio	Additional Firefighters Required during Peak Construction Period
Economic Region	73,515	3,864	77,379	256	302	287	5.3%	13

Source: Table 2.4-37

4.5 Environmental Justice

Environmental justice refers to a Federal policy under which each Federal agency identifies and addresses disproportionately high and adverse human health, environmental, or socioeconomic effects of its programs, policies, and activities on minority or low-income populations. United States Census Bureau American Community Survey 5-Year Summary data was relied on for 2016-2020, at the block group level, to identify concentrations of minority and of low-income populations. Section 2.5.1 describes the evaluation process used to identify minority and low-income populations living within the region that meet the conditions associated with the United States Nuclear Regulatory Commission guidance.

There are 35 census block groups located at least partially within 50 miles (80 kilometers) of Kemmerer Unit 1. One census block group in Summit County, Utah, (Block Group 1, Census Tract 9642.03) falls within this 50-mile (80-kilometer) radius and was identified as containing a significant Black or African American population (Table 2.5-1 and Figure 2.5-1). As discussed in Section 2.5.2, this block group likely does not contain this population; therefore, it was not considered for potential impacts. One block group in Summit County, Utah, and one block group in Sweetwater County, Wyoming, have significant Hispanic, Latino, or Spanish Origin ethnicity populations (Table 2.5-1 and Figure 2.5-2). The block group in Summit County, Utah, is approximately 40 miles (64 kilometers) southwest of the site. The block group in Sweetwater County, Wyoming, is approximately 27 miles (43 kilometers) east of the site, near the towns of Green River and Rock Springs. No low-income populations were identified within the 50-mile (80 kilometer) radius.

While health and environmental effects of the project will be experienced in the 50-mile (80-kilometer) region, socioeconomic effects will be experienced in the economic region. The three-county economic region for construction impacts includes portions of Lincoln and Sweetwater Counties and all of Uinta County. Green River and Rock Springs are located outside of the 50-mile (80 kilometer) radius in Sweetwater County. It is assumed that 28 percent of the in-migrating construction workforce will reside in Green River and Rock Springs (Section 4.4.4.3.1). There are a total of 31 census block groups that surround Green River and Rock Springs (outside of the 50-mile radius) (Table 2.5-3). Four of those block groups have significant Hispanic, Latino, or Spanish Origin ethnicity populations (Figure 2.5-3). Three block groups have significant aggregate minority populations (Figure 2.5-4). Two block groups have significant low-income populations (Figure 2.5-5). Some block groups contain more than one of the aforementioned populations, so the actual number of block groups in Green River and Rock Springs totals five.

Three types of impacts were evaluated: health and environmental impacts, socioeconomic impacts, and impacts experienced by minority and low-income populations with special conditions, unique characteristics, or subsistence-living practices that make them more vulnerable than the general population. Section 4.5.1 through Section 4.5.3 summarize the site’s impacts and discusses whether minority and low-income populations will experience, disproportionately, those impacts that are high and adverse.

The Environmental Justice analysis was conducted under the premise that if the impacts to the general population were found to be SMALL to MODERATE and there were no resource dependencies, preexisting health conditions, or location-dependent reasons that will affect the level of significance of the impact to minority or low-income populations, there will be no disproportionately high and adverse impact on low-income or minority populations.

4.5.1 Health and Environmental Impacts

Impacts from construction of a nuclear power plant are similar to impacts from other large construction projects. There are three primary pathways for health and environmental impacts: soil, water, and air. Construction activities will involve moving large quantities of soil, but the effects will be localized and not extend off site. Construction activities will not impact populations because of their distance from the site. The closest minority or low-income population block group is located approximately 27 miles (43 kilometers) east of the site. Water-related health and environmental impacts include sedimentation and, less likely, spills of petroleum products. However, any land-disturbing activities that affect water quality will be of relatively short duration and will be guided by a stormwater pollution prevention plan. Further, any spills will be mitigated according to a construction phase spill prevention, control, and countermeasures plan. Impacts to surface water quality of North Fork Little Muddy Creek and its tributaries are expected to be SMALL (Section 4.2.3.1).

Construction activities could cause temporary and localized physical impacts such as noise, odors, vehicle exhaust, and fugitive dust emissions (Section 4.4.1). The exclusion area boundary is greater than 0.25 miles in all directions from the reactor. No major roads, public buildings, or residences are in the exclusion area (Section 2.1). Exhaust emissions from construction equipment and dust will cause minor, localized adverse impacts to air quality; however, a mitigation plan would minimize impacts to local ambient air quality and the public in proximity to the project. Impacts to air quality from construction are expected to be SMALL and temporary (Section 4.7). Likewise, noise impacts from construction will be SMALL and temporary (Section 4.4.1.2).

As indicated in Section 4.9, there are no radiation sources at the site, so there will be no radiological exposure to members of the public.

Health and environmental impacts to the general population from construction, via the three pathways, will be SMALL. The closest significant minority population is located approximately 27 miles (43 kilometers) from the site; effects of soil disturbance, noise, vehicle exhausts, and fugitive dust emissions will not reach that minority population. Impacts to groundwater and surface water quality will be SMALL. Therefore, there will be no disproportionately high and adverse impacts to minority or low-income populations within 50 miles (80 kilometers) of the Kemmerer Unit 1 Site via soil, water, or air pathways that affect the health and environment of populations studied in this Environmental Justice analysis.

4.5.2 Socioeconomic Impacts

As discussed in Section 2.5, six block groups in Sweetwater County, Wyoming, and one block group in Summit County, Utah, have significant minority and low-income populations. The block group in Summit County falls outside of the economic region; therefore, it will not experience significant socioeconomic impacts caused by construction. The remaining discussion addresses impacts to the minority and low-income populations in Sweetwater County.

As discussed in Section 4.4, impacts caused by project employment and spending in the economic region will be SMALL to MODERATE and beneficial during the construction period. The in-migration of 1,632 construction and operations workers will create 777 indirect jobs in the region, potentially employing 473 unemployed workers and creating upward pressure on local wages. Conversely, beneficial impacts experienced during construction could lead to adverse impacts when construction is complete. Most of the construction worker in-migrants are estimated to leave the economic region. The gain and loss of construction jobs, population, and wage income will cause SMALL to MODERATE adverse impacts. Whether beneficial or adverse, economic impacts to minority and low-income populations in the economic region, and specifically Sweetwater County, will not be high.

As discussed in Section 4.4, the in-migrating workforces could constrain housing resources in the economic region. Housing impacts were determined to be LARGE in Lincoln and Uinta counties and SMALL to MODERATE in Sweetwater County. Housing impacts in Sweetwater County will be SMALL to MODERATE because they are not expected to cause the conversion of any land from some other use, cause a significant increase in housing stock, prices, and rents, or be destabilizing. Therefore, no disproportionately high and adverse impacts are expected for the minority and low-income populations in Sweetwater County.

Offsite land use impacts would be concentrated in Lincoln County where no significant minority or low-income populations were identified. Thus, there will not be disproportionately high and adverse impacts to minority or low-income populations due to offsite land use impacts.

Impacts of increased traffic as a result of building activities along US 189 are discussed in Section 4.4.4.1. US 189 is the only access road to the site and will experience the greatest traffic impacts with the impacts reducing with distance from the site. There are Hispanic ethnicity and aggregate minority populations and low-income households along the I-80 corridor in Sweetwater County. The block group in Sweetwater County is approximately 27 miles (43 kilometers) east of the site, near the towns of Green River and Rock Springs. Given the distance from the site, there will be no traffic impacts in Sweetwater County and no disproportionate impacts to minority or low-income populations.

As discussed in Sections 4.4.4.4.1 and 4.4.4.4.2, there is excess capacity in the water and wastewater systems in Sweetwater County. Project workers and their family members who will reside in Sweetwater County would not constrain supplies and processing capacities there. Project impacts to water and wastewater will be SMALL for all residents in the County.

With regard to police, fire, and medical capabilities in Sweetwater County (Section 4.4.4.4.3 through Section 4.4.4.4.5), any shortages created or exacerbated by the project would be mitigated by the State's Impact Assistance Payment Program. Affected communities in the economic region will communicate their resource shortages and needs to the Wyoming Industrial Siting Council, and the Industrial Siting Council will distribute impact assistance funds to those communities. Project-related impacts to police, fire, and medical services in Sweetwater County during construction will be mitigated to SMALL.

As discussed in Section 4.4.4.4.6, student-teacher ratios and the physical capacities of schools and school districts in the economic region was assessed (Table 2.4-41). Student-teacher ratios in the economic region are not likely to be impacted by project-related increases in enrollments. Student seating capacities could be impacted, however. In Green River, one of four elementary schools has exceeded 90 percent capacity. In Rock Springs, five of seven elementary schools have exceeded 90 percent capacity, and four of the five have surpassed capacity. In Rock Springs, both high schools were at more than 90 percent capacity (Section 2.4.2.7.2). Currently, none of these schools are scheduled for “remedies” to alleviate projected capacity issues (Section 2.4.2.7.4).

Project-related impacts to these schools will vary, depending on where workers will choose to reside in Green River and Rock Springs. However, the State offers a complete and uniform education to all students through its equalization programs. If a project-related increase in enrollment will adversely impact any Sweetwater County school, the State’s education equalization programs will ensure that school districts have sufficient staff and facilities to accommodate the new students. Any adverse impacts will be mitigated to SMALL.

In conclusion, no construction-related impacts were identified that will have disproportionately high and adverse effects on the human health, environment, and socioeconomics of minority or low-income populations in the demographic and economic regions.

4.5.3 Subsistence, Special Conditions, and Unique Characteristics

As presented in Section 2.5.5, there are no known minority or low-income populations with special conditions, unique characteristics, or subsistence-living practices in the demographic and economic regions. Therefore, there will be no impacts from construction to minority and low-income populations, based on the absence of these conditions, characteristics, or subsistence practices.

4.6 Historic and Cultural Resources

Potential impacts of construction of Kemmerer Unit 1 and ancillary facilities, transmission lines, and water supply line on historic and cultural resources is assessed in this section. Section 2.6 includes information on the cultural context of the project area and describes identified cultural resources and historic properties. Per Regulatory Guide 4.2, “Revision 3, “Preparation of Environmental Reports for Nuclear Power Stations,” Section 4.6, the primary perspective of this analysis is that of Section 106 of the National Historic Preservation Act (54 United States Code § 306108) and its enabling regulations, 36 Code of Federal Regulations Part 800.

As of February 2024, the Department of Energy has begun, but not completed, Section 106 consultations for development of the Sodium Test and Fill Facility and for the site’s preconstruction activities. The Department of Energy is engaged in Section 106 consultations as the lead Federal agency to address obligations that arose because the Office of Clean Energy Demonstrations is partially funding the Natrium Demonstration Project (see Section 3.3). The analysis assumes the recommendations of the Class III cultural resource inventory report (Reference 4.6-1) regarding which inventoried cultural resources are eligible for the National Register of Historic Places (NRHP) and are accepted by all parties, including the Wyoming State Historic Preservation Office (SHPO).

The analysis considered various potential direct and indirect effects on cultural and historic resources from the proposed project, including ground disturbance, physical, visual, auditory, and atmospheric such as fugitive dust, light, and traffic. The principal identified forms of project effects are ground disturbances in the direct area of potential effects (APE) and possible visual intrusions in the indirect APE. Impacts from other potential sources of project effects, such as construction traffic and noise, are anticipated to be negligible due to the nature of the cultural and historic resources in the area. The only resources on the site and in the vicinity are surface archaeological sites with limited subsurface deposits for which setting is generally of minor importance.

4.6.1 Onsite Impacts

The proposed reactor and supporting facilities will be located within the Kemmerer Unit 1 Site (Figure 3.3-1, Site Utilization Plan). The 290-acre (120-hectare) site comprises a portion of the project’s overall direct effects area of potential effects (APE, 36 Code of Federal Regulations § 800.16(d)) (Figure 2.6-1). Approximately 218 acres (88.2 hectares) of the site will be disturbed by preconstruction and construction activities in building Kemmerer Unit 1, and it is anticipated that the majority of ground disturbance will occur during the preconstruction phase of work. Earthwork activities will include clearing, grubbing, and grading. The entirety of the approximately 218 acres (88.2 hectares) that will be disturbed by construction will be cleared, grubbed, and graded by cutting and filling (Section 4.1.1). These earthwork activities will result in disturbance to or destruction of identified archaeological sites and isolated resources.

The 218-acre (88.2-hectare) area of ground disturbances contains two cultural resources that have been determined eligible for the NRHP by the Wyoming SHPO (Reference 4.6-1, Section 2.6.2.2):

- Site 48LN740 is a multi-component prehistoric and historic archaeological site with evidence of multiple prehistoric occupations and indications of intact subsurface deposits. It is eligible under Criterion D of the NRHP for its potential to yield important information about prehistoric period subsistence and settlement patterns in southwestern Wyoming. The historic component is a low-density scatter of historic cans and other debris and is non-contributing to the site's NRHP eligibility.
- Resource 48LN2697 is the 15.45-mile (24.86-kilometer) Cumberland Branch of the Union Pacific Railroad (formerly Oregon Short Line Railroad), extending from Moyer Junction on the railroad mainline near Kemmerer to the former coal camp or town of Cumberland. It is eligible under Criterion A of the NRHP for its association with historically significant coal mining in southern Lincoln County. However, the resource segment crossing the site area, Site 48LN2697_4, an abandoned portion of the rail line, is non-contributing to the overall historic resource because of a lack of integrity. Site 48LN2697_4 is discussed in Section 4.6.2.1.

In brief, the site area contains a single historic property (i.e., a district, site, building, structure, or object included on, or eligible for inclusion on, the NRHP (54 United States Code § 300308)) that could be adversely affected by the project, Site 48LN740. Due to construction of a temporary parking lot to support the building activities of Kemmerer Unit 1 within the area of Site 48LN740, involving vegetation removal, grubbing, cutting, and filling, the project will result in an adverse effect to a historic property. For purposes of this analysis, it is assumed that (a) the impacts to the site cannot be avoided; and (b) that consequently a Memorandum of Agreement (MOA) or a Programmatic Agreement (PA) will be developed in consultation with the Wyoming SHPO and participating American Indian tribes to address and mitigate the anticipated adverse effects to Site 48LN740.

In addition to the MOA or PA that will address impacts to Site 48LN740, best management practices for cultural resources provide for an Unanticipated Discoveries Plan to be developed and included as part of the construction documentation for the project. The Unanticipated Discoveries Plan will provide a protocol to be followed if an unanticipated cultural resource, including but not limited to human remains or funerary objects, is encountered during preconstruction or construction activities.

Aside from historic properties, field investigations and outreach to American Indian tribes have not identified any cultural resources that are not historic properties but may be considered important in the context of the National Environmental Policy Act, such as sacred sites, cemeteries, or local gathering areas. Assuming that a PA or MOA provides mitigation measures that address the adverse effects of ground disturbances to Site 48LN740 and that the agreement includes measures to address unanticipated discoveries, which are appropriately implemented in practice, the onsite direct impacts to cultural and historic resources are anticipated to be SMALL.

4.6.2 Offsite Impacts

4.6.2.1 Direct APE

Offsite areas comprising the direct APE for the project include ancillary facilities related to the construction and operation of the site. These offsite areas comprise the approximately 511-acre (207-hectare) macro-corridor within which the water supply line from the Naughton Power Plant and the two transmission lines to the switchyard at the Naughton Power Plant will be located.

The 511-acre (207-hectare) macro-corridor represents the area within which the transmission lines and the water line will be located. The actual impacts from these project elements will take only a fraction of the full macro-corridor. Within the macro-corridor, ground disturbances will comprise a continuous corridor approximately 50 feet (15 meters) wide for the water line, which will be installed in a trench or by horizontal directional drilling. There will also be a sequence of discontinuous disturbances consisting of transmission structure foundation pads and work areas needed to install the transmission lines, ending at an area designated for the expansion of the existing switchyard to feed electricity generated by the site into the regional grid. Ground disturbances in these areas likely will include vegetation clearing and grubbing, with some grading. Such activities will result in the disturbance to any archaeological sites or isolated resources present in the work areas.

The Class III cultural resources inventory (Reference 4.6-1) identified three resources that are potentially eligible for listing on the NRHP (Section 2.6):

- Resource 48LN2697 is the 15.45-mile (24.86-kilometer) Cumberland Branch of the Union Pacific Railroad (formerly Oregon Short Line Railroad) that extends from Moyer Junction on the railroad mainline to the former coal camp or town of Cumberland. It is recommended as eligible under Criterion A of the NRHP for its association with historically significant coal mining in southern Lincoln County. The resource segment crossing the macro-corridor, 48LN2697_3, is an active section of the rail line in the vicinity of Glencoe Junction. It was upgraded in 1970, and the Class III cultural resource inventory suggests that it is non-contributing to the overall eligibility of the resource (Reference 4.6-1:38). As noted above, it is assumed that the Wyoming SHPO concurs with this recommendation.
- Site 48LN8940 is a multi-component prehistoric and historic archaeological site with indications of intact subsurface deposits, which is recommended as eligible under Criterion D of the NRHP for its potential to yield important information about prehistoric period subsistence and settlement patterns in southwestern Wyoming. The historic component is a low-density scatter of historic cans and other debris and is non-contributing to the site's NRHP eligibility.
- Site 48LN8978 is the abandoned 2.2-mile (3.5-kilometer) Glencoe Spur of the Union Pacific Railroad (formerly Oregon Short Line Railroad) that extends from the vicinity of Glencoe Junction on the Cumberland Branch of the Union Pacific to the abandoned coal camp or town of Glencoe. It is recommended as eligible under Criterion A of the NRHP for its association with historically significant coal mining in southern Lincoln County.

However, the resource segment crossing the macro-corridor, 48LN8978_1, an abandoned segment of rail line, is non-contributing to the overall historic resource because of a lack of integrity.

In brief, the macro-corridor contains a single historic property that could be adversely affected by the project, Site 48LN8940. The site lies across most of the macro-corridor, and while the design of the water line and transmission lines has not yet been developed, it will appear to be difficult for the alignments of the two utility lines not to cross the site. Therefore, avoidance and possibly mitigation measures will be needed, and an MOA or PA will likely need to be developed to formalize those measures. For the water line, it may be possible to avoid impacts to the site through horizontal directional drilling, which will allow the water line to pass beneath the suspected intact subsurface deposits without disturbing near-surface soils by trenching. If horizontal directional drilling is not feasible, then a program of data recovery may be necessary within the alignment of the trench and adjacent work zone. For the transmission lines, it may be possible to avoid impacts to the site by erecting transmission structures on either side of the site and spanning it aerially. Such an avoidance strategy needs to take into consideration whether a temporary or permanent access road along the transmission line is necessary and whether installing transmission cables entails ground disturbance within the site. If ground disturbances will occur within the site as a result of erecting the transmission lines, then data recovery may be necessary.

Aside from historic properties in the macro-corridor, field investigations and outreach to American Indian tribes have not identified any cultural resources that are not historic properties but may be considered important in the context of National Environmental Policy Act, such as sacred sites, cemeteries, or local gathering areas.

Assuming that a PA or MOA provides mitigation measures that address the adverse effects of ground disturbances to Site 48LN8940 and that the agreement includes measures to address unanticipated discoveries, which are appropriately implemented in practice, the onsite direct impacts to cultural and historic resources are anticipated to be SMALL.

4.6.2.2 Indirect APE

As described in Section 2.6.2.3, the indirect APE for assessing potential visual effects from the construction of the site and ancillary project elements such as the transmission lines and water supply line is delineated by a 5-mile (8-kilometer) buffer around the direct APE (Figure 2.6-3). The buffer distance was selected based on several factors, including the gently sloping, open terrain of Cumberland Flats, the maximum anticipated height of site buildings and evaporation plume, and the study areas for natural resources (maximum 5 miles [8 kilometers]). Five miles (eight kilometers) is a conservative estimate of the maximum distance over which various elements of the project might be visible to an extent that might potentially be visually intrusive.

An assessment of visual effects on cultural resources within the proposed indirect effects APE was completed. For the identification stage of the visually sensitive cultural resource impact analysis, a geographic information system-based analysis was utilized with the current Wyoming SHPO database layers with the locations of 310 known cultural resources that fall within the indirect APE and a 33-foot (10-meter) grid resolution digital elevation model. The digital elevation model elevations were augmented by a vegetation layer. The local sagebrush steppe vegetation community added around 3.3 feet (1-meter) to the digital elevation model's bare earth elevations. For the study area elements, the maximum height of proposed structures at the site was assumed to be approximately 150 feet (45.7 meters), which is the assumed height of the tallest building, the steam generator building); the transmission structures' maximum height was assumed to be 90 feet (27 meters); and the buried water line's maximum height was set at bare earth elevation. The resulting line-of-sight analysis categorized the indirect APE into "more visible," "partially visible," and "not visible" areas from the onsite structures. The known cultural resource layers labeled Linear Sites, Provisional Linear Sites, Site Points, Provisional Site Points, and Site Polygons obtained from the Wyoming SHPO database were then overlain with the results to determine which resources were visible or partially visible in the indirect APE. Of the known cultural resources that were identified as more visible or partially visible from the project, 10 archaeological historic properties that meet Wyoming SHPO's definition of visually sensitive cultural resource were identified (Table 2.6-6). Such resources are those that are recommended as, determined eligible for, or listed on the NRHP and whose significance is identified as including the resource's setting. The 10 visually sensitive cultural resources were assessed as potentially visually affected by construction of the site.

Based on this desktop analysis, field data was then collected from nine of the ten archaeological sites that were identified as visually sensitive. One site, 48LN317, was not visited because no access could be obtained, and no photosimulation could be developed. At the remaining nine sites, panoramic photographs were taken, and a visual contrast rating form was completed. The rating form implements Bureau of Land Management Manual 8431, Visual Resource Contrast Rating, which was the assessment methodology employed (Bureau of Land Management 1986). The panoramic photographs were used to create photo simulations illustrating the appearance of the completed facility from various key observation points associated with the archaeological sites (Figure 4.6-1 to Figure 4.6-10).

Results of the analysis are shown in Table 4.6-1, and it is concluded that although historic properties are present, the project will have no effect on them. The field visits established that three of archaeological sites identified in the desktop analysis, 48LN773, 48LN1273, and 48LN2327_14, were not intervisible with the project due to intervening terrain and vegetation. Visual impacts at four sites, 48LN2739_1, 48LN2739_2, 48LN4011, and 48LN4026, were rated as weak, and were categorized as having no effect on the resources. At the remaining two sites, 48LN1272 and 48LN4428, the visual impacts were rated as strong; however, at these two sites, as well as at Site 48LN4011, demolition and reclamation activities after their original documentation have removed much of the aboveground archaeological fabric that made the setting a defining element of the properties. Consequently, it was concluded that integrity of setting had been greatly weakened and is therefore no longer a defining characteristic of the sites. This conclusion led to the recommendation that construction of Kemmerer Unit 1 will have no effect on the archaeological historic properties.

In conclusion, potential impacts from the construction of the site and ancillary project elements in the indirect APE will be SMALL.

Reference

4.6-1 (Karpinski and Karpinski 2023). Mark Karpinski and Elizabeth Karpinski. “A Class III Cultural Resource Inventory for TerraPower, LLC's Natrium Demonstration Project.” 2023. Lincoln County, Wyoming. Prepared for TerraPower, LLC, Bellevue, WA. and Bechtel, Reston, VA, by Tetra Tech, Inc., Salt Lake City, UT.

Table 4.6-1 Assessment of Effects of Construction of Kemmerer Unit 1 on Visually Sensitive Archaeological Sites in the Indirect APE[2]

Smithsonian Site Number	Site Description	Visual Impact	Key Observation Point
48LN317	Prehistoric rock art and camp	Undetermined	No access to property
48LN773	Prehistoric and historic rock cairns and artifact scatter	Not intervisible	1
48LN1272	Glencoe Mine	Strong, but property has been altered so it is no longer visually sensitive	9, 10
48LN1273	Lincoln Star Mine	Not intervisible	5
48LN2327_14	Oregon Shortline Railroad	Not intervisible	2
48LN2739_1 and _2	Kemmerer to Cumberland Highway	Weak	3,4
48LN4011[1]	Prehistoric artifact scatter and historic townsite (Glencoe)	Weak, and property has been altered so it is no longer visually sensitive	7
48LN4026	Blazon Railroad Spur	Weak	6
48LN4428[1]	Historic Glencoe townsite	Strong, but property has been altered so it is no longer visually sensitive	8

[1]The contributing portion of 48LN4011 was re-recorded in 2006 as 48LN4428.

[2]Information based on section figures and Karpinski and Karpinski 2023 Section 4.3

Figure 4.6-1 Photo Simulation from Key Observation Point 1

Figure 4.6-2 Photo Simulation from Key Observation Point 2

Figure 4.6-3 Photo Simulation from Key Observation Point 3

Figure 4.6-4 Photo Simulation from Key Observation Point 4

Figure 4.6-5 Photo Simulation from Key Observation Point 5

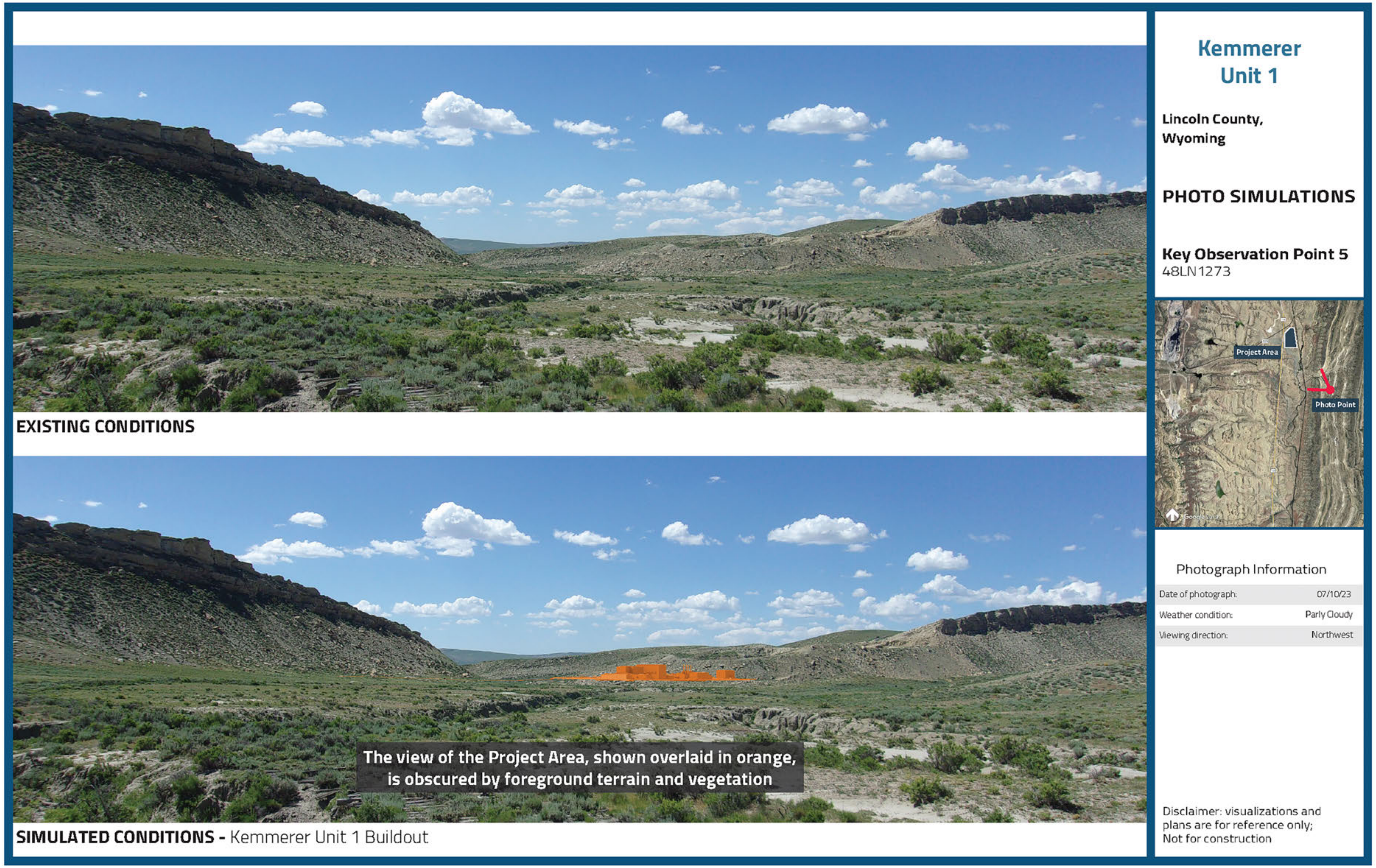


Figure 4.6-6 Photo Simulation from Key Observation Point 6

Figure 4.6-7 Photo Simulation from Key Observation Point 7

Figure 4.6-8 Photo Simulation from Key Observation Point 8

Figure 4.6-9 Photo Simulation from Key Observation Point 9

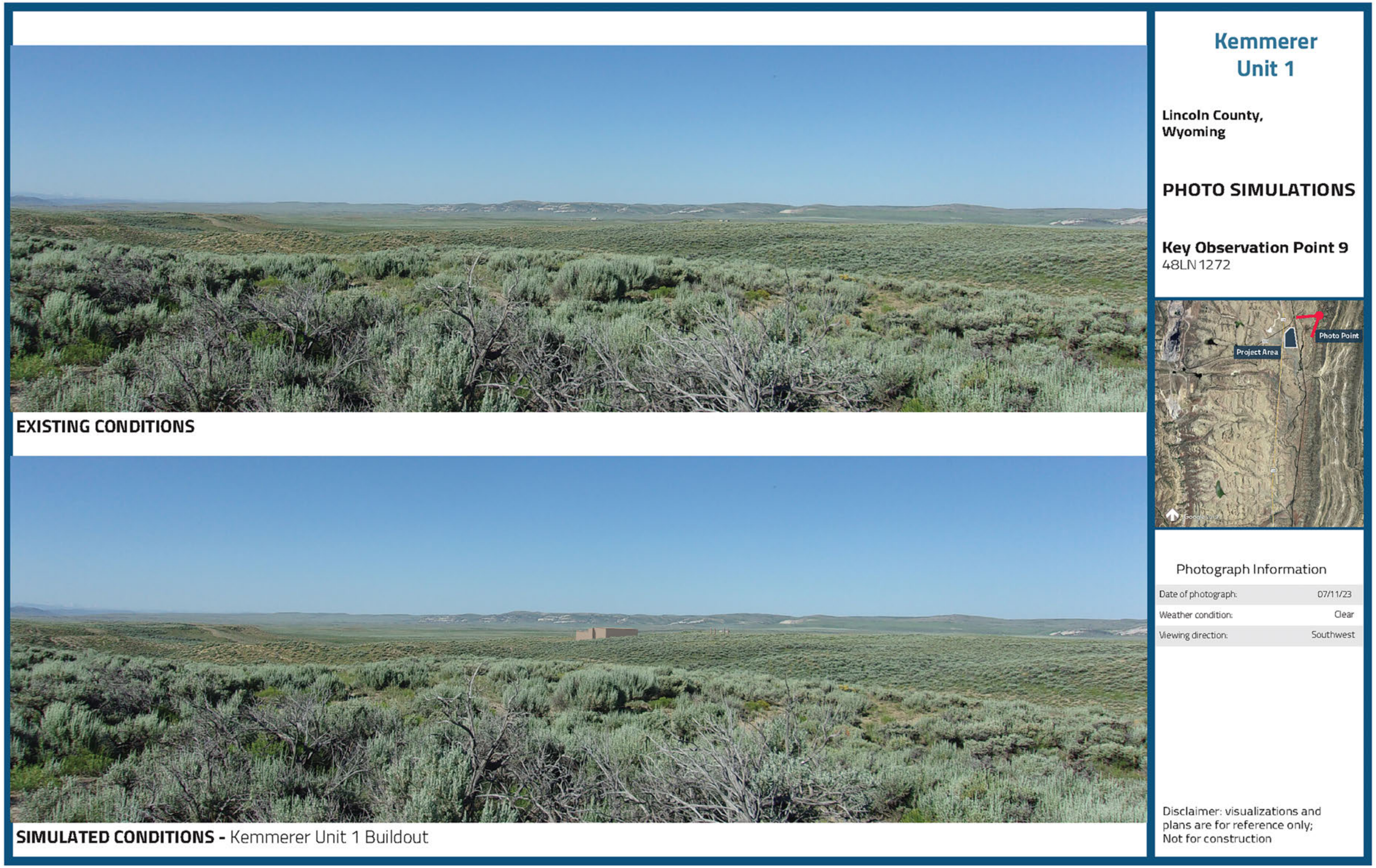


Figure 4.6-10 Photo Simulation from Key Observation Point 10

EXISTING CONDITIONS

SIMULATED CONDITIONS - Kemmerer Unit 1 Buildout

Kemmerer Unit 1

Lincoln County, Wyoming

PHOTO SIMULATIONS

Key Observation Point 10
48LN1272

Photograph Information

Date of photograph:	07/11/23
Weather condition:	Clear
Viewing direction:	Southwest

Disclaimer: visualizations and plans are for reference only; Not for construction

4.7 Air Resources

Temporary and minor impacts to the local ambient air quality could occur as a result of construction activities. Fugitive dust and fine particulate matter emissions will be generated during site preparation, excavation, backfilling, grading and compacting, concrete batching, and vehicular travel over paved and unpaved roads. Construction equipment and offsite vehicles used for hauling debris, soil, construction equipment, and supplies will also produce emissions. Wind erosion over exposed land may also generate fugitive dust and other fine particulate emissions. In addition, commuting vehicles for construction workers and delivery vehicles to the site will add additional emissions during construction. During operations, the majority of emissions will occur from commuter vehicles, delivery vehicles, standby diesel generators, and an auxiliary boiler on site.

4.7.1 Pollutants of Primary Concern

U.S. Environmental Protection Agency (EPA) emission factors were used to calculate the maximum estimated emissions from activities to take place during building activities and operations of Kemmerer Unit 1. Emission contributors of particulate matter of 10 micrometer diameter or less, carbon monoxide, nitrogen oxides, sulfur dioxide, and volatile organic compounds which have been considered are exhaust of construction equipment and diesel engines during building activities, commuter travel, delivery traffic, dust generation from activities on site, construction of the transmission and water lines, and a concrete batch plant. Estimated total emissions for building activities and operations are presented in Table 4.7-1. The estimated maximum annual emissions during building activities are presented in Table 4.7-2, and the estimated maximum annual emissions during operation are presented in Table 4.7-3. The total emissions presented in Table 4.7-1 assume a building period of 5 years and operations for 40 years. Table 4.7-4 summarizes the key inputs used for emission impacts. The Calvert Cliffs Unit 3 construction project was used as a basis for many of the emissions sources (Reference 4.7-1).

Impacts to air quality will be minimized by compliance with Federal, State, and local regulations that govern building activities and emissions such as the Wyoming Air Quality Standards and Regulations and the Clean Air Act, which established the National Ambient Air Quality Standards (NAAQS). These standards include criteria pollutants such as:

- Sulfur dioxide
- Particulate matter of 10 micrometer diameter or less
- Carbon monoxide
- Nitrogen dioxide
- Ozone
- Lead

The portion of Lincoln County where Kemmerer Unit 1 will be located is designated as “attainment” with respect to the NAAQS (40 CFR 81.310). The nearest “nonattainment” area is the Upper Green River Basing Ozone Nonattainment Designation area consisting of all of Sublette County and portions of Lincoln and Sweetwater Counties. Currently, for the 2008 Ozone

NAAQS, the EPA had designated the Upper Green River Basin as nonattainment. However, monitored ozone in the Upper Green River Basin was in attainment for the 2008 Ozone NAAQS by the attainment date of July 2015. The Wyoming Department of Environmental Quality is assessing a pathway for submitting a request to the EPA to redesignate the Upper Green River Basin to attainment for the 2008 Ozone NAAQS.

A construction air permit from the Wyoming Department of Environmental Quality will be required to construct Kemmerer Unit 1, according to Wyoming Air Quality Regulations, Chapter 6. Air emission-producing equipment such as diesel generators, propane heaters, and a concrete batch plant, will be permitted under the Air Quality Division New Source Review regulations. Federal emissions regulations for engines include 40 CFR Part 63; 40 CFR Part 60, Subpart JJJJ; and 40 CFR Part 60, Subpart IIII.

Aside from the six common criteria pollutants, EPA has set NAAQS for, heat-trapping greenhouse gasses (GHG), such as methane, nitrous oxide, and halocarbons will be produced during construction. The GHG of primary concern is carbon dioxide (CO_2). The total carbon footprint, which is the total set of GHG emissions caused by an organization, event, or product, is estimated for a 1,000 megawatt electric nuclear power plant, which bounds Kemmerer Unit 1, to be 82,000 metric tons from building activities. The building activities are conservatively assumed to last for 7 years. These emissions were based on the conservative estimates from NRC staff guidance on GHG and climate change impacts from new environmental impacts (Reference 4.7-3). Construction equipment CO_2 emissions account for approximately 47.6 percent of the total, or approximately 39,000 metric tons.

Emission factors for CO_2 were used and total CO_2 emissions were calculated for the commuting and delivery vehicles, standby diesel generators, and auxiliary boiler. The emissions are included in the results provided in Table 4.7-1 through Table 4.7-3.

Based on GHG life-cycle emissions generated for a nuclear plant, 13 grams of CO_2 equivalent per kilowatt-hour, compared to a natural gas plant's life-cycle GHG emissions, 486 grams of CO_2 equivalent per kilowatt-hour, the atmospheric impacts of GHGs from plant building activities and operation are anticipated to be SMALL (Reference 4.7-4).

Specific mitigation measures to control fugitive dust will be identified in an Storm Water Pollution Prevention Plan. The mitigation measures could include:

- Stabilizing construction roads and unsuitable soils piles
- Limiting speeds on unpaved construction roads
- Using water for dust suppression
- Performing housekeeping, such as removing dirt spilled onto paved roads
- Covering haul trucks when loaded or unloaded
- Minimizing material handling, such as limiting drop heights and double handling
- Ceasing grading and excavating activities during high winds
- Phasing grading to minimize the area of disturbed soils
- Revegetating road medians and slopes

While emissions from construction activities and equipment will be unavoidable, the Storm Water Pollution Prevention Plan will minimize impacts to local ambient air quality and the nuisance impacts to the public close to the project. The mitigation measures could include:

- Phasing construction to minimize daily emissions
- Performing proper maintenance of construction vehicles to maximize efficiency and minimize emissions

Therefore, air quality impacts from construction are anticipated to be SMALL and mitigation does not appear warranted.

4.7.2 Air Emissions Impacts

Air emissions from the facility are estimated to be above the 100 tons per year EPA requirement for major Title V sources for applicable criteria pollutants (particulate matter of 10 micrometer diameter or less, carbon monoxide, and nitrogen oxides) during the 5-year construction period of the project. These values were determined by using conservative values for emissions factors and conservatively assuming no carpooling for the commuting vehicles, a distrubance area of 511 acres (207 hectares) for transmission and water lines, and Tier 2 diesel construction engines. The results are conservative and can be refined in the future. Air emissions are estimated to be below the 100 tons per year EPA requirement for major Title V sources for sulfur dioxide and volatile organic compounds. During the 40-year operational period, air emissions from the facility are estimated to be below the 100 tons per year EPA requirement for major Title V sources for all criteria pollutants. Chemical exposures through air emissions are anticipated to be even lower during operations. Emissions not exceeding 100 tons per year is considered to be minor and waives requirements for dispersion modeling (Reference 4.7-2).

As the estimated offsite emissions will be insignificant from all phases of the project, direct and indirect human health impacts beyond the site boundary during building activities are anticipated to be MODERATE during building activities and are anticipated to be SMALL during operations.

References

4.7-1 (ENSR 2008). ENSR International Corporation. “Enclosure 2: Report of the Construction Activities and Air Impacts from the Proposed Unit 3 at Calvert Cliffs Nuclear Power Plant.” 2008. pp 10, 16, 43-52. August 2008.

4.7-2 (EPA 2023). U.S. Environmental Protection Agency. “Who Has to Obtain a Title V Permit?” *Title V Operating Permits*. May 4, 2023. https://www.epa.gov/title-v-operating-permits/who-has-obtain-title-v-permit. Accessed February 2, 2024.

4.7-3 (NRC 2014). Nuclear Regulatory Commission. “Staff Guidance for Greenhouse Gas and Climate Change Impacts for New Reactor Environmental Impact Statements.” September 2014. COL/ESP-ISG-026, Attachment 1. Accession No. ML14100A157.

4.7-4 (NREL 2024). NREL Life Cycle Green House Gas Emissions from Electricity Generation. Accessed February 21, 2024.

Table 4.7-1 Total Emissions from Construction and Operations

Activity	PM_{10} (tons per year)	CO (tons per year)	NOx (tons per year)	CO_2 (tons per year)	SO_2 (tons per year)	Reactive Organic Compound (Volatile Organic Compound) (tons per year)
Construction	243.5	149.4	125.6	22,454	3.89	12.69
Operations	4.62	17.71	27.71	8,733	0.07	0.72

Table 4.7-2 Maximum Annual Emissions During Construction

Emissions Source	PM_{10} (tons per year)	CO (tons per year)	NOx (tons per year)	CO_2 (tons per year)	SO_2 (tons per year)	Reactive Organic Compound (Volatile Organic Compound) (tons per year)
Site Preparation	42.23	-	-	-	-	-
Aggregate Handling	2.29	-	-	-	-	-
Wind Erosion	7.09	-	-	-	-	-
Concrete Batch Plant	0.50	-	-	-	-	-
Unpaved Roads	133.7	-	-	-	-	-
Paved Roads	28.58	-	-	-	-	-
Transmission/Water Line Construction	20.79	4.79	8.84	-	0.36	0.77
On-Site Combustion	5.56	44.67	82.48	-	3.32	7.18
On-Road Commuting	1.64	88.10	7.79	15,838	0.15	2.26
On-Road Delivering	1.17	11.81	26.46	6,616	0.06	2.49
Total	243.5	149.4	125.6	22,454	3.89	12.69

Table 4.7-3 Maximum Annual Emissions During Operations

Emissions Source	PM_{10} (tons per year)	CO (tons per year)	NOx (tons per year)	CO_2 (tons per year)	SO_2 (tons per year)	Reactive Organic Compound (Volatile Organic Compound) (tons per year)
On-Road Commuting	0.20	10.58	0.94	1,902	0.02	0.27
On-Road Delivering	0.21	2.07	4.64	1,161	0.01	0.44
Paved Roads	3.53	-	-	-	-	-
Standby Diesel Generators	0.62	4.87	21.23	1,026	0.01	-
Auxiliary Diesel Boiler	0.08	0.19	0.90	836	0.03	0.01
Maintenance During Operations[1]	-	-	-	4,987	-	-
Total	4.62	17.71	27.71	8,733	0.07	0.72

1 Used Reference 4.7-3 as source for operational CO_2 equivalent emissions as the values were more conservative than those calculated.

Table 4.7-4 Inputs to Construction and Operational Emissions

Input Parameter Source	Basis	Emission Sources Impacted
Air Emissions from Calvert Cliffs 3 Construction	As the emissions basis to factor to the site emissions based upon disturbed areas	Site Preparation Travel of Unpaved Roads Wind Erosion
Fuel Volume Used at Kemmerer Unit 1	Used as a basis for all of the construction equipment emissions calculations	Standby generators and auxiliary boiler
Occupational and Construction Traffic	Used as a basis for all commuter and delivery vehicular combustion emissions	Commuter Vehicles Delivery Vehicles
Land Disturbance Activities and Area Disturbed	Used as a basis to factor emissions	Site Preparation Travel of Unpaved Roads Wind Erosion
Soil Density and Moisture	Used as a basis to factor emissions	Aggregate Handling
Construction Equipment Combustion Emissions	Based on emissions factors	Construction Equipment
Construction and Operations for Commuting Vehicles	Number of miles traveled annually by vehicle type and Emissions Factor Development	Commuter and Delivery Vehicles During Construction and Operations
Commuting Vehicle Emission Rate Factors by Pollutant	Number of miles traveled annually by vehicle type and Emissions Factor Development	Commuter and Delivery Vehicles During Operations
Standby Diesel Generator Emissions	Emissions factors for various pollutants were generated from the fuel use and emissions factors	Standby Diesel Generator
Auxiliary Boiler Emissions	Emissions factors for various pollutants were generated from the fuel use and emissions factors	Auxiliary Boiler

4.8 Public and Occupational Health

4.8.1 Public and Occupational Health

As presented in Section 4.4.1, people working or living near the Kemmerer Unit 1 Site will not experience physical impacts from the preconstruction and construction physical effects of noise, fugitive dust, and gaseous emissions greater than those that would be considered an annoyance or nuisance. Therefore, the impacts to public health are anticipated to be SMALL.

Construction of the power plant and associated transmission lines and water pipeline will involve risk to workers from accidents and occupational illnesses. These risks could result from construction accidents (e.g., falls and burns), exposure to toxic or oxygen-replacing gases, and other causes. Construction workers and onsite personnel will receive training and personal protective equipment to minimize the risk of potentially harmful exposures. Emergency first-aid care will be available at the onsite and offsite construction locations. Regular health and safety monitoring will be conducted during preconstruction and construction activities as required. During these activities, access to the Kemmerer Unit 1 Site will be controlled and limited to authorized workers and visitors.

There will also be procedures in place for spill prevention, control, and countermeasures that include the control of potential petroleum leaks from construction equipment and actions in the event of a leak or spill. As presented in Section 3.2.2.8, there will be a stormwater system to manage stormwater runoff from the construction site. Construction contractors will also obtain necessary air permit(s) for construction equipment such as the concrete batch plant and install emissions control equipment as required. Given the dry and windy nature of the area, fugitive dust control measures will be put in place to mitigate the effects of ground disturbance and travel on unpaved surfaces. Fugitive dust control measures that could be employed include watering of roads, covering truck loads and material stockpiles, minimizing material handling, revegetating or otherwise covering soils (e.g., geotextile and gravel) as soon as possible following disturbance, and limiting vehicle speeds.

As presented in Section 2.8.1, the United States (U.S.) Bureau of Labor Statistics collects information from U.S. companies on occupational illnesses, injuries, and fatalities. The incidence rate for nonfatal occupational injuries and illnesses for the heavy and civil engineering construction industry was 2.1 per 100 full-time workers (Reference 4.8-1). The U.S. Bureau of Labor Statistics also publishes occupational fatality rates. The rate of fatal work injuries for the construction industry for 2021 was 9.4 per 100,000 full-time equivalent workers (Reference 4.8-2).

The incidence of nonfatal injuries and illnesses for the project has been calculated as the incidence rate times the number of workers. Using monthly employment numbers (Table 3.3-8) and the national rate, the average annual nonfatal occupational injuries and illnesses for the duration of preconstruction and construction activities and the peak number of injuries and illnesses for a 12-month, peak employment period (months 13 through 24) have been estimated. These estimates are presented in Table 4.8-1. Recordable illnesses and injuries of all types based on the national rate published by the U.S. Bureau of Labor Statistics are estimated at an average of approximately 20 annually and an annual peak of approximately 34.

The construction of Kemmerer Unit 1 is not anticipated to result in more potential construction fatalities, based on statistical analysis, than other similarly sized power plant or other heavy construction projects.

4.8.2 Noise

Some level of noise is expected from operation of construction equipment, including earthmoving equipment, trucks, portable generators, pneumatic equipment, and hand tools. Table 3.3-5 lists the construction equipment anticipated for the project with peak noise levels in A-weighted decibles (dBAs). Construction activities will be conducted in compliance with Occupational Safety and Health Administration regulations for occupational noise exposure and hearing protection (29 Code of Federal Regulations 1926.52 and 1926.101). Noise and vibration mitigation measures such as noise control equipment on vehicles and equipment (e.g., dampeners) and staggering construction activities could be used as needed to ensure noise levels remain within Occupational Safety and Health Administration exposure standards which limits time of exposure to noise levels of 90 dBA and higher. As stated in Section 2.8.2, there are no noise restrictions or limits associated with the industrial zoning districts in Lincoln County.

Construction activities will involve operation of pile drivers, excavators, bulldozers, backhoes, graders, front-end loaders, dump trucks, compressors, generators, and similar equipment and machinery over the temporary duration of construction. Table 3.3-5 lists common types of construction equipment and typical sound levels at a distance of 50 feet issued by the Federal Highway Administration for roadway construction modeling. Among the loudest construction activity will be pile driving at 95 dBA. The noise levels from construction activities will fluctuate depending on the number and type of vehicles and equipment in use at a given time.

Construction-related sound levels experienced by a noise sensitive receptor near construction activity is a function of distance, other noise sources, and the presence and extent of vegetation, structures, and intervening topography between the noise source and receptor. Construction activities are scheduled for daylight hours. Sound levels from construction activities will attenuate with distance as the sound waves spread from the source. Generally, at distances greater than half the height of the cooling tower, the noise level will dissipate roughly 6 dBA with each doubling of distance (Reference 4.8-3). The nearest residence is approximately 2.8 miles (4.5 kilometers) away from the site and 1.5 miles (2.4 kilometers) away from the macro-corridor. With attenuation due to distance, a sound level of 95 dBA onsite will decrease to approximately 47 dBA at the nearest residence. Construction within the macro-corridor will use much of the same equipment listed in Table 3.3-5, but perhaps not the impact pile driver, which is identified as the loudest type of equipment. Nevertheless, again using a sound level of 95 dBA, the sound level would attenuate to approximately 53 dBA before reaching the nearest residence. Construction within the macro-corridor would be for a much shorter duration than at the site, and the sound level will fluctuate as the construction progresses along the macro-corridor.

The U.S. Environmental Protection Agency identified 70 dBA as the yearly average equivalent sound level for an outdoor industrial setting to protect the public health and welfare. The Department of Housing and Urban Development (24 Code of Federal Regulations 51.101(a)(8)) uses day-night average sound levels recommended by the U.S. Environmental Protection Agency as guidelines or goals for outdoors in residential areas. Noise levels are acceptable if the day-night average sound level at the site boundary or at any noise sensitive human receptor is less than 65 dBA (Regulatory Guide 4.2, Revision 3, “Preparation of Environmental Reports for Nuclear Power Stations,” Section 4.8.2). Noise levels at the site boundary are likely to exceed 65 dBA, at least intermittently, during daylight depending on the distance to the site boundary and type and number of equipment being operated concurrently. As presented in Section 2.1, the area immediately surrounding the site is undeveloped other than US 189 and the Pacific Union rail. As described in Section 2.4.2, the immediate area could on occasion be traversed by sheepherders, and hunters could occasionally be hunting on the nearby public land. As presented in Section 4.4.1, the closest buildings to the site are small industrial sites approximately 1.8 miles (2.9 kilometers) from the site. Thus, there are no noise-sensitive receptors in the immediate area surrounding the site. The closest noise-sensitive receptor will be the nearest resident who will experience noise levels of less than 65 dBA.

The public and occupational health impacts from sound levels of preconstruction and construction activities are anticipated to be SMALL and mitigation does not appear to be warranted.

4.8.3 Transportation of Construction Materials and Personnel

Heavy vehicle traffic is expected to access the site during most of the construction period. Normal heavy-duty truck traffic will include trucks delivering equipment and materials used for construction of the facilities, dump trucks to move soil and rock from excavations or deliver fill material from offsite sources, fuel tankers, and water tankers to supply water for dust control and other water demands prior to construction of the water supply pipeline. Truck shipments are projected at 95 shipments per working day. Truck shipments will originate from various directions depending on the material being supplied. Deliveries are assumed to originate 50 miles (80 kilometers) from the construction site. The annual truck mileage is estimated at approximately 3.0 million miles (4.83 million killometers). Routes will be similar to the commuting routes identified in Table 2.4-22.

Certain reactor components and equipment exceed Federal and State weight and dimension limits for normal transit on roadways and will need to be transported to the site as heavy-haul or oversize cargo. Heavy-haul or oversize loads will be planned in advance with specific routes. These shipments could require road closures and temporary utility disconnections to allow for passage. Route surveys are being undertaken to plan routes and logistics for heavy-haul or oversize cargo.

The distance driven for commuting could increase the potential number of vehicle accidents involving injuries and fatalities. The commuters during the peak construction period will include the construction workers as well as any operations workers already reporting to the site. Section 3.3.3 discusses both workforces. The average total workforce (construction and operations workers) during the peak 12-month construction period, 1,675 workers, was used to estimate the total annual commuting mileage for the peak year.

Construction workers were assumed to commute 312 days a year and operations workers 260 days a year. Round trip distance for construction workers residing in Lincoln County was assumed to be 20 miles (32 kilometers), the approximate round-trip distance between the site and midpoint of Kemmerer. The distance for Sweetwater County residents was assumed to be 180 miles (290 kilometers), the approximate round-trip distance between the site and mid-way between Green River and Rock Spring via I-80 to US 30. The distance for Uinta County residents was assumed to be 98 miles (158 kilometers), the approximate round-trip distance between the site and the I-80 interchange in Evanston. Consistent with the traffic impact analysis in Section 4.4.4.1, carpooling was not assumed. The operations workers onsite during the 12-month peak construction period were also considered consistent with the traffic impact analysis discussed in Section 5.8.6. The annual commuting distance during the peak construction period is approximately 46.5 million miles (74.8 million kilometers).

Average vehicle crash rates were calculated from Wyoming Department of Transportation state-level data for crashes, injuries, and fatalities for 2018 to 2022 and distance driven. Wyoming Department of Transportation county-level data is available; however, state-level data was used because it reflects urban and rural characteristics similar to the projected population increase impact for Lincoln County. Wyoming Department of Transportation data on truck-involved crashes and distance traveled by trucks were also used to calculate a truck-involved crash rate

Table 4.8-2 presents the estimated number of accidents, injuries, and fatalities for workers commuting to and from the site and truck shipments. Table 4.8-2 also presents the 2018 to 2022 averages for Wyoming and for Kemmerer, Evanston, Green River, and Rock Springs combined for comparison.

References

4.8-1 (BLS 2022a) U.S. Bureau of Labor Statistics. Table 1, "Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Industry and Case Types." 2021. https://www.bls.gov/web/osh/table-1-industry-rates-national.htm. Accessed July 17, 2023.

4.8-2 (BLS 2022c) U.S. Bureau of Labor Statistics. "Number and Rate of Fatal Work Injuries, by Private Industry Sector." 2021. https://www.bls.gov/charts/census-of-fatal-occupational-injuries/number-and-rate-of-fatal-work-injuries-by-industry.htm. Accessed July 17, 2023.

4.8-3 (Tetra Tech 2010) Tetra Tech. Cooling Tower Noise, Plume and Drift Abatement Costs. https://www3.epa.gov/region1/npdes/schillerstation/pdfs/AR-330.pdf#:~:text=For%20plants%20close%20to%20residential%20areas%2C%20local%20noise,expected%20at%20adistance%20of%20500%20ft%20%28SPX%202010a%29. Accessed July 23, 2023.

4.8-4 (WYDOT 2019) Wyoming Department of Transportation. "Wyoming Report on Traffic Crashes 2018." 2019. https://www.dot.state.wy.us/home/dot_safety/crash-data/publications.html. Accessed July 24, 2023.

4.8-5 (WYDOT 2020) Wyoming Department of Transportation. "Wyoming Report on Traffic Crashes 2019." 2020. https://www.dot.state.wy.us/home/dot_safety/crash-data/publications.html. Accessed July 24, 2023.

4.8-6 (WYDOT 2021b) Wyoming Department of Transportation. “Wyoming Report on Traffic Crashes 2020.” 2021. https://www.dot.state.wy.us/home/dot_safety/crash-data/publications.html. Accessed July 24, 2023.

4.8-7 (WYDOT 2022c) Wyoming Department of Transportation. “Wyoming Report on Traffic Crashes 2021.” 2022. https://www.dot.state.wy.us/files/live/sites/wydot/files/shared/Highway_Safety/_Crash%20Data/Publications/Report%20on%20Traffic%20Crashes/Report%20on%20Traffic%20Crashes%202021.pdf. Accessed July 18, 2023.

4.8-8 (WYDOT 2023b) Wyoming Department of Transportation. “Wyoming Report on Traffic Crashes 2022.” 2023. https://www.dot.state.wy.us/home/dot_safety/crash-data/publications.html. Accessed July 18, 2023

Table 4.8-1 Occupational Illnesses, Injuries, and Fatalities

	Construction average	Construction 12-month peak
Workers	953	1639
Illnesses and Injuries	20	34
Fatalities	0.090	0.15

Based on Bureau of Labor Statistics 2021 incidence rates for the heavy construction industry. (Reference 4.8-1, Reference 4.8-2)

Table 4.8-2 Projected Average Annual Vehicle Crashes, Injuries, and Fatalities

	Crashes Per Year	Injuries Per Year	Fatalities Per Year
Commuters and Truck Deliveries During Peak 12-month Construction Period	99	24	0.9
Wyoming	13,900	3,300	126
Kemmerer, Evanston, Green River, and Rock Springs	201	49	0.85

Based on average of 2018-2022 incidence rates calculated using data from Reference 4.8-4, Reference 4.8-5, Reference 4.8-6, Reference 4.8-7, and Reference 4.8-8

4.9 Radiological Health

Potential radiological impacts on construction workers during the construction of Kemmerer Unit 1 are identified in this section. The layout for the plant is shown in Figure 3.1-3. During construction, there will be no onsite or adjacent existing operating nuclear facilities or permanently shut down facilities (Reference 4.9-1). The only radiation sources present are background sources. Therefore, construction workers are considered members of the public and not radiation workers.

4.9.1 Direct Radiation Exposure

There will be no sources of direct exposures from other nuclear facilities at the Kemmerer Unit 1 Site during construction, including independent spent fuel storage facilities, radioactive waste handling facilities, low-level waste storage facilities, condensate storage tanks, skyshine, or operating or permanently shut down nuclear facilities co-located at or near the site. Therefore, there will be no dose to construction workers due to direct radiation exposure from nuclear facilities.

During preconstruction, construction, and operation, radioactive materials in the form of sealed sources will be brought onsite to support activities such as compaction testing and radiography. These radioactive materials are used and maintained by trained and qualified vendors under their own radioactive material licenses in accordance with procedures. Once radioactive material licenses and authorizations are issued in accordance with 10 CFR 30, 10 CFR 40, and 10 CFR 70, Kemmerer Unit 1 will maintain sources and worker exposures as low as reasonably achievable in accordance with 10 CFR 20 and relevant processes and procedures. There are currently no existing sources of direct radiation on the Kemmerer Unit 1 site, and radiological sources brought on site during construction will be a negligible source of direct radiation exposure to construction workers.

4.9.2 Radiation Exposure from Gaseous Effluents

There will be no operating, co-located, or permanently shut down nuclear units at or near the Kemmerer Unit 1 Site during construction and thus no gaseous effluents. Therefore, there will be no dose to construction workers from gaseous effluents.

4.9.3 Radiation Exposure from Liquid Effluents

There will be no operating, co-located, or permanently shut down nuclear units at or near the Kemmerer Unit 1 Site during construction and thus no liquid effluents. Therefore, there will be no dose to construction workers from liquid effluents.

4.9.4 Total Dose to Construction Workers

During construction, there will be no onsite or adjacent existing operating nuclear facilities or permanently shut down facilities. Therefore, there will be no exposures from direct radiation or gaseous or liquid effluents and annual dose to construction workers will be that from background sources and less than the limits specified in 10 CFR Part 20.1301 for members of the public. Impacts on workers from radiation sources during construction are therefore anticipated to be SMALL and mitigation does not appear to be warranted.

References

4.9-1 (NRC 2021) Nuclear Regulatory Commission. “Wyoming.” March 9, 2021. https://www.nrc.gov/info-finder/region-state/wyoming.html. Accessed September 21, 2023.

4.10 Nonradioactive Waste Management

Environmental impacts that could result from the generation, handling, and disposal of nonradioactive waste on land, water, and air during building activities include cleared vegetation, building material debris, municipal waste, spoils, stormwater runoff, sanitary waste, dust, other air emissions, used oils and lubricants from heavy equipment maintenance, and other hazardous chemicals. The assessment of potential impacts resulting from these types of waste is presented in the following sections.

Site supervision and subcontractors will periodically inspect onsite facilities during building activities and ensure maintenance and waste disposal adhere to State and local regulatory requirements.

4.10.1 Impacts to Land

Land impacts associated with site-preparation activities and construction of the Kemmerer Unit 1 Site include construction impacts and mitigation of earthworks, general waste storage, copper waste, and metal waste to be generated and managed within the site and vicinity. Land-use impacts from building activities are presented in Section 4.1.

Impacts to nonradiological health from preconstruction and construction activities are anticipated to be SMALL and will be mitigated by compliance with site permits and implementation of best management practices. A description of the onsite waste expected to be generated is presented in this section.

4.10.1.1 Earthworks and Other Wastes

Clearing and grubbing will occur within the footprint of the site (see Section 3.3.1.1). During clearing and grubbing activities, vegetation will be stripped from the land and stockpiled onsite and separated to the maximum extent possible on the southern portion of the site plan (see Figure 3.1-3). The area will be protected to avoid runoff to unprotected streams as described in Section 3.3. Where practicable, the solid waste will be recycled based on the capacity of local facilities. There will be soil and rock stockpiled at various locations on the site. Section 3.3 provides approximate earthwork quantities in Table 3.3-4.

Woody debris will be piled or chipped and used to create sediment barriers or hauled offsite to a licensed facility. Any excavated material not suitable for fill will be disposed of in accordance with Federal, State, and local regulatory requirements.

4.10.1.2 General Waste Storage

Construction waste will include several main categories. General construction waste will include paper, wood, shipping materials, and miscellaneous waste. General waste will be collected locally at the work fronts throughout the extent of the jobsite. Localized areas such as the laydown yards, office complexes, and craft professional lunch areas will have approved receptacles for trash. Separate receptacles for recyclables (paper and plastic) will be used to segregate trash at these locations. The jobsite will have a centralized repository for larger dumpsters to collect waste from the work fronts and the areas listed previously. This centralized location will be on a maintained gravel pad with access for equipment. The project expects to generate three 40-yard dumpsters for general trash per week, on average, for the duration of the project. The project will also have two 40-yard dumpsters for wood and paper recycling. The project estimates that these dumpsters will be exchanged, on average, weekly for the duration of the project.

4.10.1.3 Metal Waste

Kemmerer Unit 1 building activities will generate metal waste from multiple sources. These sources include, but are not limited to: steel from structural steel installation, pipe of different alloys (e.g., carbon steel, stainless steel), rigid steel conduit, instrument tubing, steel support materials (Unistrut, angle iron, tube steel), metal hardware and miscellaneous fasteners, metal shipping material, and building materials such as purlins and siding. The site will have two metal dumpsters on the site, and it is estimated that the dumpsters will be cycled, on average, two times per week for the duration of building activities.

Materials will be recycled to the maximum extent possible to minimize impact to local municipal solid waste landfills and facilities. Coordination with suppliers will occur to maximize material per container, or delivery, and minimize packing material to the extent practical to allow for protection of the equipment.

4.10.1.4 Equipment Waste

Equipment waste will be generated from onsite construction vehicles. Routine maintenance will be performed at an onsite mechanic shop. It is expected that volumes of equipment wastes would be similar to other construction projects of similar size. Used oils and grease will be stored at a designated location in accordance with applicable regulatory requirements. Used hazardous materials will be transferred to a licensed disposal unit and removed from site for recycling and disposal. Onsite fueling will occur at a centralized location and locally at the equipment location. Drip pans and other containment systems will be used to contain any spillage. This waste will be disposed of in accordance with permitting conditions and regulatory requirements. Efforts to manage impacts from equipment waste will be addressed by construction best management practices to minimize generated waste from onsite construction vehicles to the greatest extent possible.

4.10.1.5 Impacts to Land Summary

Solid waste generation will be minimized based on proposed practices mentioned, with a waste minimization plan provided in the Operator License Application. Additionally, management of solid wastes will comply with all applicable Federal, State, and local requirements and standards. Therefore, the impacts on land from nonradioactive solid wastes generated during building activities is anticipated to be SMALL, and mitigation does not appear to be warranted.

4.10.2 Impacts to Water

Information regarding impacts from liquid waste generated during building activities and the plans for onsite or offsite treatment are described in this section. The project will generate several types of liquid waste during the building activities. Major sources will include ground water from de-watering activities, stormwater, sanitary waste, vehicle oil and grease, and various water treatment chemicals. A description of the onsite liquid waste expected to be generated and the potential impacts to water is presented.

4.10.2.1 Groundwater and Stormwater

Groundwater will be present in deep excavations. Discharges will be in accordance with the Wyoming Pollutant Discharge Elimination System permit and Federal, State, and local requirements. Where possible, groundwater may be used for Kemmerer Unit 1 building activities such as dust suppression or backfill operations for compaction.

Stormwater and snow melt removal will occur throughout the building activities for Kemmerer Unit 1. Water from excavations will be pumped and filtered through inline filtering or through the established silt fence boundary. Stormwater ponds during the construction sequence, along with a series of catch basins, will be constructed to collect run off during construction and final operations. Collected stormwater will be managed in accordance with the Wyoming Pollutant Discharge Elimination System permit.

4.10.2.2 Sanitary Waste

There is no city or municipal infrastructure nearby the site to discharge sanitary waste generated. Portable toilets and portable toilet trailers will be provided. Waste generated from the portable toilets will be disposed through an approved and licensed subcontractor. It is estimated that approximately 80 portable toilets at peak will be required onsite, with cleanout estimated to be every other working day. Restroom trailers will be available for use by personnel. These trailers will have self-contained septic tanks. Disposal of waste will be in compliance with all Federal, State, and local requirements.

4.10.2.3 Construction and Commissioning Water

Waste water will be generated during construction and commissioning testing. To the maximum extent possible, this water will be reused to support hydrostatic and other flushing requirements. When disposal is required, the water will be either transferred to one of the onsite storm water retention ponds, reused for other construction requirements, or treated. Disposal of waste water will be in compliance with all Federal, State, and local requirements.

4.10.2.4 Impacts to Water Summary

Building activities at the site will require a Temporary Dewatering Permit and Large Construction General Permit for dewatering and stormwater activities. Impacts to water resources from preconstruction and construction activities is anticipated to be SMALL, as best management practices, the Stormwater Pollution Prevention Plan, and other requirements from the Large Construction General Permit will be followed.

4.10.3 Impacts to Air

Information on the building activities that would generate impacts to air quality are discussed in this section. This section also discusses equipment and activities that would generate dust or emissions and the plan to mitigate associated impacts. A description of the emissions expected to be generated and the potential impacts to air is presented. Impacts to air resources during construction and operation are further discussed in Sections 4.7 and 5.7.

4.10.3.1 Air Quality Impacts

To facilitate the construction and operation, numerous temporary road improvements will be made and maintained which could impact air quality. It will be necessary to grade and clear paths to build the main access and onsite roads. The project will employ various equipment which will discharge exhaust into the air.

Table 4.10-1 lists major equipment that will be used during construction. Construction equipment has been selected to support activities anticipated to be performed. Initial equipment will be concentrated on excavation activities coupled with forklifts and cranes for offloading material. As the project progresses, an increase in cranes, aerial work platforms, truck trailers, and forklifts will occur. A complete list of equipment and durations is contained in the Project Construction Equipment Schedule.

To alleviate the potential impact to air quality, the project will employ water trucks for dust suppression. Areas with stockpiles of earth will be covered to prevent dust. Storage areas for the water trucks will be at the onsite batch plant. The onsite batch plant will be installed in the area southwest of the Energy Island.

Building activities will comply with Wyoming Air Quality Standards and Regulations General Air Permit (WAQSR Chapter 6, Section 2(a)(I)) for the concrete batch plant, diesel generators, and other minor sources of emissions. Therefore, building activities are anticipated to result in SMALL air quality impacts.

Table 4.10-1 Major Equipment

Equipment Class
Class 02 Trucks - Light Duty
Class 03 Trucks - Heavy Duty
Class 04 Trailers
Class 05 Rebar Shop
Class 06 Personnel Carriers
Class 11 Earthmoving
Class 12 Pipelaying and Trenching Equipment
Class 13 Compaction
Class 14 Cranes
Class 15 Forklift
Class 16 Concrete and Aggregate
Class 17 Air Compressors
Class 18 Crane Accessories
Class 22 Rigging Equipment
Class 23 Gantry Equipment
Class 25 Cable Laying and Pulling Equipment
Class 28 Containers
Class 29 Site Services
Class 51 Winches and Tuggers
Class 52 Welding Equipment
Class 53 Generation Equipment
Class 54 Manlifts and Scissorlifts
Class 55,56 Small Capital Equipment

4.11 Measures and Controls to Limit Adverse Impacts during Construction

Section 4.1 through Section 4.10 describe potential environmental impacts that could result from construction of Kemmerer Unit 1. Adverse environmental impacts will be reduced or eliminated through implementation of mitigation measures and controls. Many of these measures and controls, including monitoring, will be incorporated directly into construction plans and activities. Requirements of construction permits such as construction best management practices will be implemented through site procedures. Durations of monitoring activities will be in compliance with permit requirements. The following Construction-Related Measures and Controls (CMC) will limit adverse environmental impacts:

CMC1. Extent of disturbance will be controlled. Heavy equipment will be restricted to designated areas.

CMC2. Upon completion of construction activities, temporarily disturbed land will be stabilized and revegetated as soon as practicable, in accordance with Wyoming Pollutant Discharge Elimination System requirements.

CMC3. Impacts to wetlands and streams will be minimized through avoidance, maintenance of vegetative cover where possible, and installation of erosion controls during construction activities. Construction activities in streams or wetland areas, including the installation and maintenance of erosion and sedimentation control practices and best management practices, will be conducted in accordance with the requirements of the U.S. Army Corps of Engineers permit and the associated Wyoming Department of Environmental Quality Section 401 Water Quality Certification. Impacts to Federally jurisdictional waters will be mitigated in coordination with the U.S. Army Corps of Engineers.

CMC4. Stockpiles of soils and excavated material will be restricted to designated areas.

CMC5. A Wyoming Pollutant Discharge Elimination System Large Construction General Permit will be obtained that requires implementation of a Storm Water Pollution Prevention Plan to minimize erosion and protect down-gradient wetlands and surface waters.

CMC6. An Spill Prevention Controls and Countermeasures Plan will be prepared to address management of fuel, lubricants, and hydraulic fluid and minimize impacts of any accidental spills. Fueling and equipment maintenance will be restricted to designated areas well removed from wetlands and waterbodies. Areas where bulk amounts of fuel and lubricants are stored will be provided with secondary containment or equipped with spill control equipment.

CMC7. Topsoil from excavations or trenches will be segregated, protected from elements, and placed at surface over subsoil when the excavation or trench is refilled.

CMC8. Location and design of facility fences will be selected in consultation with the Wyoming Department of Transportation and Wyoming Game and Fish Department to reduce impacts on livestock and wildlife.

CMC9. Noise from internal combustion engines (earth-moving equipment, portable generators, and air compressors) will be mitigated with noise dampeners or mufflers; vibration impacts will be mitigated by staggering ground-impacting activities such as blasting and pile-driving.

CMC10. Vehicles and construction equipment will be cleaned prior to movement to a new location to minimize the potential for transporting seeds of invasive plants, in accordance with Wyoming Game and Fish Department recommendations.

CMC11. Re-vegetated areas will be monitored to ensure that plantings of native species are successful and that invasive species do not become established.

CMC12. Dust suppression techniques will be used and equipment maintenance employed to reduce airborne emissions from construction activities. Construction activities will be phased to the extent practical to minimize peak emissions.

CMC13. The water supply pipeline will be installed at wetlands and waterbodies using horizontal directional drilling techniques to minimize direct impacts to wetlands and waterbodies.

CMC14. Transmission towers will be sited so that wetlands and streams are spanned, avoiding direct impacts to these sensitive resources.

CMC15. Right of way construction will be carried out when ground is dry, if practicable, to prevent soil churning, rutting, and displacement.

CMC16. Right of way construction will be carried out in winter, if practicable, when most native plants are dormant.

CMC17. Construction will be carried out outside of the avian nesting season, if possible. Where required, nest clearing surveys for migratory birds will be conducted during the 72-hour period prior to ground disturbance, as recommended by the Wyoming Game and Fish Department.

CMC18. Culverts will be installed at stream crossings to maintain natural water courses and minimize the increase in the flood level upstream. The removal of streamside vegetation will be limited, and areas disturbed will be revegetated when construction is completed.

CMC19. Detention ponds will be used to reduce the turbidity of storm water runoff from disturbed areas of the site.

CMC20. Provisions or devices will be implemented for preventing avian collisions consistent with industry guidelines or as determined by regulatory agencies. Conductors and static ground wires could be marked with bird diverters and similar devices.

CMC21. A Memorandum of Agreement or Programmatic Agreement will be developed between SHPO and the responsible Federal agency that establishes measures that will be taken to avoid, minimize, or mitigate adverse effects to archaeological or historic resources.

CMC22. An Unanticipated Discoveries Plan will be developed that contains a protocol to be followed if cultural resources or artifacts are unearthed unexpectedly during construction. Actions, such as stopping work and contacting State Historic Preservation Office, will be taken following an unexpected discovery of potential historic or archaeological resources.

CMC23. Drainage crossings and the amount of disrupted land adjacent to existing, settled areas will be minimized. To the extent possible, natural drainage patterns will be maintained.

CMC24. Lights will be shielded when possible, and turned off at night, unless essential for safety.

CMC25. To the extent possible, streamside construction work will be conducted during dry periods to minimize soil loss and sedimentation.

CMC26. Construction workers will have adequate training and personal protective equipment to minimize the risk of potentially harmful noise exposures.

CMC27. First-aid capabilities will be provided at the construction site, and construction contractors will be required to comply with safety regulations.

CMC28. A worker health and safety monitoring program will be implemented at the construction site.

CMC29. Communication with local government, planning officials, and media will be maintained so that adequate time is given to plan for significant workforce changes.

CMC30. Construction worker arrival and departure times will be staggered. The intersection of the site entrance road with US 189 will be constructed to minimize congestion and impediments to smooth traffic flow.

CMC31. Routes will be scheduled in advance and traffic controls coordinated with Department of Transportation agencies for construction material deliveries.

CMC32. Localized receptacles for trash will be present. Dumpsters for general trash and for wood and paper recycling will be exchanged, on average, weekly for the duration of the project.

CMC33. The site will have metal dumpsters and is expected to be exchanged, on average, multiple times per week for the duration of building activities. Materials will be recycled to the maximum extent possible.

CMC34. Coordination with suppliers will maximize material per container.

CMC35. Equipment waste will be maintained at an onsite mechanic shop. Used oils and grease will be stored at a designated location in accordance with applicable regulatory requirements. Used hazardous materials will be transferred to a licensed disposal unit and removed from site for recycling and disposal. Onsite fueling will occur at a centralized location and locally at the equipment location. Drip pans and other containment systems will be used to contain any spillage. This waste will be disposed of in accordance with permitting conditions and regulatory requirements.

CMC36. Waste generated from portable toilets will be discharged through an approved and licensed subcontractor. Disposal of waste will be in compliance with all Federal, State, and local requirements.

CMC37. Wastewater generated from construction and commission testing will be reused to support hydrostatic and other flushing requirements to the maximum extent possible.

CMC38. Best management practices, the Storm Water Pollution Prevention Plan, and other requirements from the Large Construction General Permit will be followed.

CMC39. Impacts to air quality will be minimized by compliance with Federal State, and local regulations that govern construction activities and emissions, such as the Wyoming Air Quality Standards and Regulations and the National Ambient Air Quality Standards.

CMC40. Potential electric shocks from the transmission system at Kemmerer Unit 1 will be controlled and minimized by conformance with National Electrical Safety Code criteria and adherence to the standards for transmission systems.

Table 4.11-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 1 of 8)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
4.1 Land Use Impacts		
4.1.1 Onsite Impacts	Clearing and grubbing of vegetation will occur.	CMC1, CMC2, CMC3, CMC5, CMC7. CMC11
	Excavating, backfilling, and stockpiling soils will occur.	CMC1, CMC2, CMC4, CMC7, CMC11
	Temporary buildings, support facilities, and impervious surfaces will be constructed.	CMC1, CMC2, CMC5
4.1.2 Offsite Impacts	Temporary impacts from ground-disturbing activities could occur during installation of the underground pipeline for water supply.	CMC1, CMC2, CMC3, CMC4, CMC7, CMC11, CMC15, CMC16
	Temporary impacts from ground-disturbing activities could occur during installation of transmission lines.	CMC1, CMC2, CMC3, CMC4, CMC11, CMC15, CMC16
4.2 Water Resources Impacts		
	Temporary impacts from ground-disturbing activities during construction require erosion and sediment controls to protect regulated water resources such as waters of the U.S. Erosion control devices such as silt fencing and sediment traps will capture and divert stormwater that would ordinarily contribute to base flow into water resources.	CMC3, CMC5, CMC12
	Building the entrance road could result in alteration to waterbodies and impact flood level upstream	CMC18
4.3 Ecological Impacts		
4.3.1 Terrestrial and Wetland Impacts		
Site	Clearing of 218 acres of sagebrush shrubland and greasewood habitat will occur.	CMC1, CMC2
Offsite	Construction of an underground pipeline and transmission lines will disturb soils and native plants. Invasive plants could colonize bare ground after construction has removed native vegetation.	CMC2, CMC10, CMC11, CMC15, CMC16
Wetlands - Onsite	Construction could impact downgradient streams and wetlands.	CMC3, CMC4, CMC5

Table 4.11-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 2 of 8)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
Wetlands - Offsite	Wetlands and streams could be impacted by pipeline construction.	CMC1, CMC2, CMC3, CMC4, CMC11, CMC13, CMC15, CMC16
	Wetlands and streams could be impacted by transmission line construction.	CMC1, CMC2, CMC3, CMC11, CMC14, CMC15, CMC16
Wildlife - Onsite	Construction noise will disturb wildlife.	CMC9
	Birds could be harmed by collisions with construction equipment (cranes).	CMC20
	Birds could be harmed by collisions with fences; large mammals could be harmed by entanglement with fences.	CMC8
	Bright construction lighting could disorient wildlife.	CMC24
	Fugitive dust on wildlife could create direct or indirect impacts.	CMC12
Wildlife - Offsite	Noise and activity could displace wildlife.	CMC9
Important Species	Erosion and sedimentation from construction could impact Ute Ladies'-tresses, if present.	CMC1, CMC3, CMC5, CMC25
Migratory Birds	Construction could disturb nests of bald eagles, golden eagles, hawks, or burrowing owls.	CMC1, CMC9, CMC17
	Construction could disturb nests of birds protected under the Migratory Bird Treaty Act.	CMC1, CMC9, CMC17
Big Game	Noise and activity of site construction could stress pronghorn, elk, and mule deer and disrupt normal behavior patterns.	CMC1, CMC9
	The potential exists for animal-vehicle collisions.	CMC8
	The potential exists for entanglement with fences.	CMC8

Table 4.11-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 3 of 8)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
4.3.2 Aquatic Ecology		
4.3.2.1 Kemmerer Unit 1 Site Construction	Building the discharge structure could result in erosion and sedimentation and impact aquatic biota.	CMC1, CMC2, CMC3, CMC5, CMC11
	Clearing and grading for the South Construction Laydown Area could result in erosion and sedimentation and potentially impact aquatic biota.	CMC1, CMC2, CMC3, CMC5, CMC11, CMC19, CMC23, CMC25
	Establishing a spoils stockpile in the South Construction Laydown Area could result in spoil material being washed into North Fork Little Muddy Creek with storm water and impact aquatic biota.	CMC1, CMC2, CMC3,CMC4, CMC5, CMC7, CMC11, CMC19, CMC23, CMC 25
	Building the entrance road and culvert could result in erosion and sedimentation and impact aquatic biota.	CMC1, CMC2, CMC3, CMC5, CMC11, CMC23, CMC25
	Accidental spills of fuel, lubricants, or hydraulic fluid could adversely impact surface waters and aquatic biota.	CMC6
4.3.2.2 Offsite Construction	Pipeline construction could impact small, downgradient streams and their aquatic biota.	CMC1, CMC2, CMC3, CMC4, CMC5, CMC7, CMC11, CMC13, CMC15, CMC16, CMC23, CMC25
	Transmission line construction could impact small, down-gradient streams and their aquatic biota.	CMC1, CMC2, CMC3, CMC4, CMC5, CMC7, CMC11, CMC14, CMC15, CMC16, CMC23, CMC25

Table 4.11-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 4 of 8)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
4.4 Socioeconomic Impacts		
4.4.1 Physical Impacts	Workers and transient populations could be exposed to temporary elevated noise levels from construction activities.	CMC9, CMC26, CMC28
	Construction-related noise exposures to the public could occur.	CMC9
	Potential exposure of construction workers to fugitive dust and exhaust emissions could occur.	CMC12, CMC28
	Delivery of large components could require road closures and utility disconnections.	CMC31
4.4.2 Demographic Impacts	A moderate, temporary increase in population could occur in the three-county economic region due to in-migration of construction and indirect workers and families.	CMC29
4.4.2 Social and Economic Impacts	A moderate, temporary increase in population in the three-county economic region is expected due to in-migration of construction and indirect workers and families.	CMC29
	As construction is completed, a loss of construction jobs, population, wage income, and indirect jobs and income is expected due to the out-migrating of the construction workforce as construction is completed.	CMC29
	Loss of sales tax collections is expected due to out-migrating of the construction workforce as construction is completed.	CMC29
	Loss of sales tax collections is expected due to lack of expenditures for construction-related materials and services as construction is completed.	CMC29
	A decline in the residential property tax base is expected due to the departure of worker families from the economic region as construction is completed.	CMC29
	Increased traffic is expected as a result of construction on the roads in the vicinity of Kemmerer Unit 1.	CMC29, CMC30

Table 4.11-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 5 of 8)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
4.4.2 Social and Economic Impacts (cont.)	Potentially, construction noises and vibrations will adversely impact hunting on nearby properties by startling the prey, driving them to a new location, and thus altering the use of the land.	CMC9
	Greater use of recreational facilities within a 10-mile radius could occur.	CMC29
	A potential shortage in housing could occur due to the in-migrating population leading to rising prices and rental rates due to the project--related housing demand.	CMC29
	Additional water demand due to in-migrating workers would slightly reduce the excess capacity in public water supply of the two water planning regions in the Region of Interest.	CMC29
	Additional wastewater requiring treatment due to in-migrating workers' water usage will reduce excess treatment capacity across the economic region by a small amount.	CMC29
	An increase in the residents-per-police officer and residents-per-firefighter ratios could occur in the economic region.	CMC29
	An increased student enrollment could occur in school districts in the economic region that is within the cumulative capacity of the region's schools.	CMC29
	Increased demand for medical services, although not beyond capacity, could occur.	CMC29

Table 4.11-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 6 of 8)

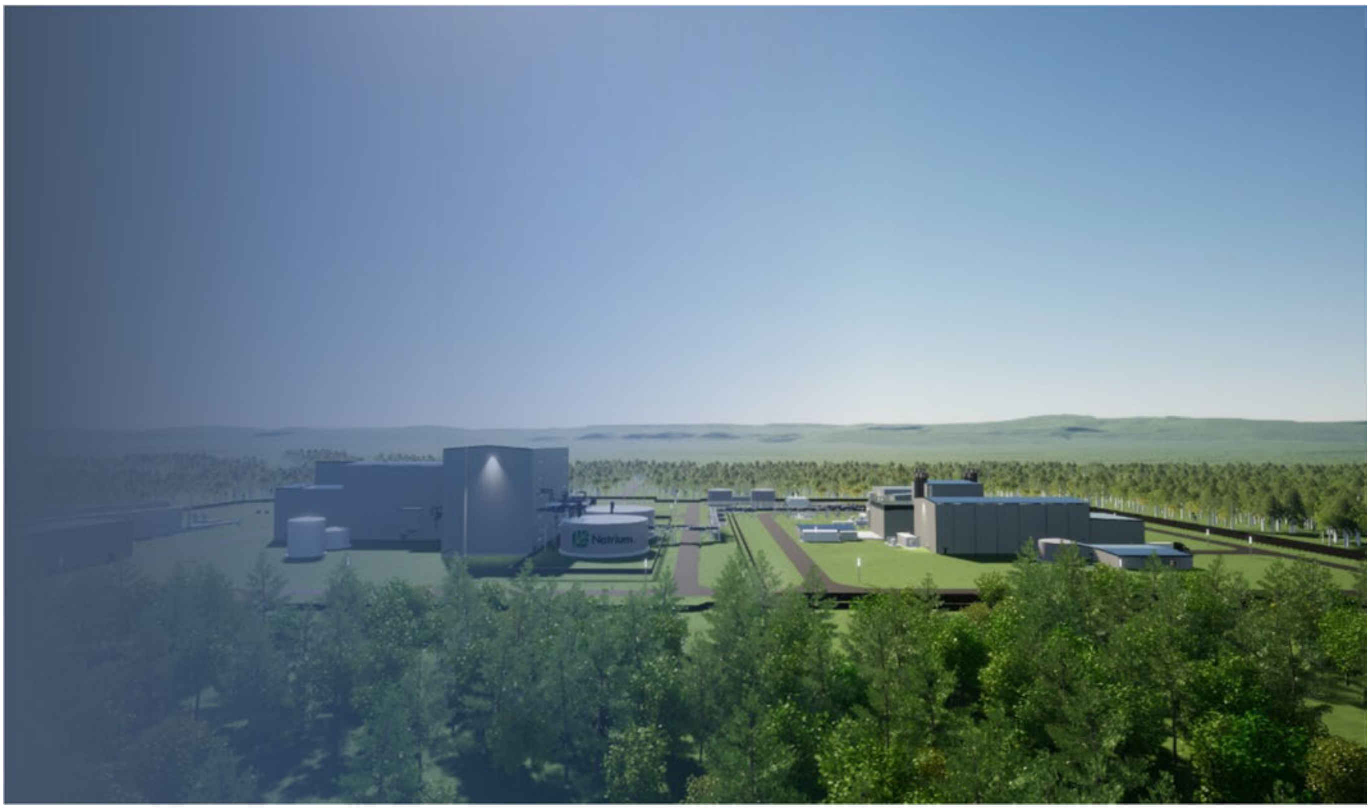
Impact	Adverse Impact Description or Activity	Specific Measures and Controls
4.4.3 Economic Impacts to the Community	As construction is completed, a loss of construction jobs, population, wage income, and indirect jobs and income is expected due to the out-migrating of the construction workforce.	CMC29
	Loss of sales tax collections is expected due to the out-migrating construction workforce as construction is completed.	CMC29
	Loss of sales tax collections is expected due to lack of expenditures for construction-related materials and services as construction is completed.	CMC29
	A decline in the residential property tax base is expected due to the departure of worker families from the economic region as construction is completed.	CMC29
4.4.4 Community Infrastructure Impacts	Traffic congestion along US 189 could occur during peak commuting hours.	CMC30
4.5 Environmental Justice		
	No disproportionately high and adverse impacts are expected to low-income and minority populations in the economic region.	N/A
4.6 Historic and Cultural Resources		
	Clearing, grubbing, and grading will result in disturbance to, or destruction of, identified archaeological sites and isolated resources.	CMC1, CMC21
	Ground disturbance could result in the disturbance of archaeological sites or isolated resources.	CMC1, CMC22
	Unavoidable adverse effects to the historic property are expected.	CMC1, CMC21, CMC22
4.7 Air Resources		
4.7.1 Pollutants of Primary Concern	Fugitive dust from construction activities will temporarily impact air quality.	CMC12

Table 4.11-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction
(Sheet 7 of 8)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
4.8 Nonradiological Health		
	Temporary exposure to noise, odors, exhaust emissions, fugitive dust, and fine particulate matter emissions could occur for construction workers, people living or working adjacent to the construction area, and transient persons.	CMC9, CMC12, CMC26, CMC28
	The potential for occupational injuries and illnesses exists.	CMC26, CMC27, CMC28
	Workers will be exposed to construction-related noise.	CMC9, CMC26, CMC28
	Potential exposure of construction workers to fugitive dust exists.	CMC12
	Delivery of construction materials to the site and workers commuting to the site will pose the risk of vehicle accidents involving injuries and fatalities.	CMC30
	Risk of electric shock and impacts from EMF associated with work on and near electric transmission systems.	CMC40
4.9 Radiological Health		
	No dose to construction workers from direct radiation exposure, gaseous effluents and liquid effluents are anticipated. Impacts on workers from radiation sources during construction would not require mitigation.	N/A
4.10 Nonradiological Waste Management		
4.10.1.1 Earthworks and Other Wastes	Erosion risk from clearing and grubbing of vegetation will exists.	CMC3, CMC4, CMC5
4.10.1.2 General Waste Storage	Impacts to local municipal solid waste landfills and facilities from municipal waste storage and recycling will occur.	CMC32
4.10.1.3 Metal Waste	Metal waste will be produced and storage and recycling will occur.	CMC33, CMC34
4.10.1.4 Equipment Waste	Equipment waste would be generated and there will be a risk spillage.	CMC6, CMC35
4.10.2.1 Groundwater/ Stormwater	Runoff risks associated with stormwater and snow melt removal will exist.	CMC5

Table 4.11-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 8 of 8)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
4.10.2.2 Sanitary Waste	Risk of environmental contamination associated with sanitary waste disposal will exist.	CMC36
	Risk to water resources including sanitary waste, wastewater, and dewatering will exist	CMC37, CMC38
4.10.3.1 Air Quality Impacts	Emissions impacts on local air quality will occur.	CMC39



Kemmerer Power Station Unit 1
ER, Chapter 5

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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Chapter 5 Environmental Impacts from Operation of the Proposed Plant

5.0 Environmental Impacts from Operation of the Proposed Plant

The potential environmental impacts resulting from the operation of Kemmerer Unit 1, as required in 10 Code of Federal Regulations (CFR) Part 51.45(c), including offsite facilities that support operation of the plant, such as transmission lines and pipelines are described in this chapter. Measures and controls that would be used to mitigate and limit adverse environmental impacts are identified for each impact category or impact to a resource.

This chapter is divided into the following sections:

- Land Use- Section 5.1
- Water Resources (Surface Water and Groundwater)- Section 5.2
- Ecological Resources- Section 5.3
- Socioeconomics- Section 5.4
- Environmental Justice- Section 5.5
- Historic and Cultural Resources- Section 5.6
- Air Resources- Section 5.7
- Nonradiological Health- Section 5.8
- Radiological Health during Normal Operation and Radioactive Waste Management - Section 5.9
- Nonradioactive Waste Management- Section 5.10
- Environmental Impacts of Postulated Accidents- Section 5.11
- Measures and Controls to Limit Adverse Impacts during Operation- Section 5.12

These sections present the potential environmental impacts resulting from the site operations. Impacts are analyzed and a significance level of potential impact to each resource is assigned. In addition, this section presents ways to avoid, minimize, or mitigate adverse impacts from site operations.

Environmental impacts are analyzed, and a significance level of potential impact to each resource (i.e., SMALL, MODERATE, or LARGE) is assigned consistent with the criteria that the U.S. Nuclear Regulatory Commission established in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Footnote 3, as follows:

- SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, NRC has concluded that those impacts that do not exceed permissible levels in the NRC’s regulations are considered small.
- MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource.
- LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

Unless the impact is identified as beneficial, the impact is adverse. In the case of “SMALL,” the impact may be negligible. The definitions of significance are as defined in Section 1.0.

5.1 Land Use

5.1.1 Onsite Impacts

Land use impacts from construction are described in Section 4.1. As described in Section 4.1, 218 acres (88.2 hectares) proposed for development of the Kemmerer Unit 1 Site will be disturbed during the operational life of the facility. Construction support areas can be repurposed for operational needs. These areas will provide space for additional structures that could be needed to support operations such as outage workforce parking and staging areas, additional operations buildings, and waste storage. Therefore, the land available within the site is expected to be adequate for operations, and additional land use conversion is not anticipated.

An Independent Spent Fuel Storage Installation (ISFSI) meeting NRC design requirements will be constructed on the Kemmerer Unit 1 Site at a currently undetermined location. The need date for the ISFSI is approximately 2040. The ISFSI is projected to occupy approximately 55,000 square feet (5,110 square meters) in a previously disturbed area of the site. In order to construct an ISFSI, a general license for an ISFSI is issued in accordance with Subpart K of 10 CFR Part 72.210. This general license authorizes storage of spent fuel in casks approved by the NRC.

Construction and maintenance activities on the site that require ground disturbance will be conducted in accordance with site procedures and any required State or local permits.

The other potential impact to land use from operations will be the effects of salt deposition and shadowing from the mechanical draft cooling tower. The impacts of the heat dissipation system, including deposition and shadowing from the cooling tower, are described in Sections 5.3 and Section 5.7. Salt deposition onsite and shadowing of onsite areas will not impact the industrial land use of the site.

Fencing around the Kemmerer Unit 1 facilities will prohibit open range grazing. However, the site is a small fraction of the open rangeland in the vicinity and surrounding region. As land that is zoned as industrial, the civic purpose of the land is for industrial development rather than agricultural use. Potential impacts to water resource access are discussed in Section 5.2. Potential impacts from operations on wetlands and terrestrial communities are discussed in Section 5.3.

In summary, the impact to onsite land use from Kemmerer Unit 1 operations are anticipated to be SMALL.

5.1.2 Offsite Impacts

Operation of the cooling tower has the potential to impact offsite land use from salt deposition and shadowing. The impacts of salt deposition and shadowing from the cooling tower are described in Sections 5.3 and 5.7. As described in Section 5.3.1, the predicted salt deposition is below the concentrations that could damage sensitive vegetation, and shadowing from the plume will not significantly affect offsite areas. As shown in Figure 2.1-6, the area surrounding the site is shrub/scrub, a category of rangeland rather than land cover classified as agricultural, forest, and wetlands. The site and the surrounding land are a small fraction of the shrub/scrub rangeland in the vicinity and surrounding region. The surrounding land is zoned as industrial, rural, or public. No land use conversion will result from operation of the cooling tower. Therefore, offsite impact of operation of the cooling tower on land use are anticipated to be SMALL.

5.1.2.1 Transmission Corridor

Land proposed to be used for the transmission corridor is described in Section 2.1.2. The related operations disturbance represents a very small share of the land available for livestock grazing in the region and is unlikely to noticeably affect overall agricultural production and employment in the area. The easement acquisition process will provide fair compensation to the landowner for the right to use the property for transmission line construction and operation.

Rocky Mountain Power will own and operate the offsite transmission lines and establish right-of-way (ROW) management and line maintenance procedures for the proposed lines or incorporate the new lines under existing procedural plans. Rocky Mountain Power will ensure that land use in the corridor and beneath the high-voltage lines is compatible with the reliable transmission of electricity. Maintaining the ROW is not expected to impact land uses in adjacent areas. As an open range state, livestock will be expected to occasionally graze in the corridor.

Access to transmission corridors is typically via public roads or through private property access agreements in place with the landowner. The land available within the corridors and the established access points are expected to be adequate for operations, and additional land use conversion within the transmission corridor is not anticipated.

Construction and maintenance activities at the corridors that require ground disturbance will be conducted in accordance with industry practices, environmental best management practices, and any required state or local permits.

The operational impacts to land use in transmission corridors during operations are anticipated to be SMALL.

5.1.2.2 Water Supply Corridor

Land proposed to be used for the water supply corridor is described in Section 2.1.2. The pipeline will be buried and thus pose little, if any, operations disturbance. As an open range state, livestock will be expected to occasionally graze in the corridor. Operations and maintenance staff will access the ROW during operations for any maintenance by using public roads or through access agreements with adjacent landowners.

Impacts to land use due to operation of the water supply piping structures are anticipated to SMALL.

5.1.2.3 Waste Disposal

Kemmerer Unit 1 will generate low-level radioactive wastes that will require disposal in licensed radioactive waste disposal facilities (Section 3.4.2) and nonradioactive wastes that will require disposal in permitted landfills. Both types of waste are commonly generated, and permitted treatment and disposal facilities are located throughout the United States. As described in

Section 5.10, there is adequate capacity in the region to meet the projected demand for hazardous and nonhazardous waste disposal. New construction of disposal facilities will not be required. The impacts to offsite land use due to disposal of wastes generated at Kemmerer Unit 1 are anticipated to be SMALL.

5.2 Water Resources (Surface Water and Groundwater)

Surface water and groundwater hydrology that could affect, or be affected by, the operation of Kemmerer Unit 1, as well as the resulting impacts on consumptive and non-consumptive water uses and water quality, are described in this section. Also discussed are the effects of foreseeable changes in the hydrologic environment (climate, land use, and water use) for the resource impact area over the duration of the license. All elevations presented in this section are provided in the NAVD 88 vertical datum, unless otherwise specified.

5.2.1 Hydrologic Alterations

An analysis of hydrological alterations on surface water and groundwater hydrology resulting from the operation of Kemmerer Unit 1 is provided in this section.

5.2.1.1 Surface Water Hydrologic Alterations During Plant Operations

5.2.1.1.1 Intake Structure

No change or resulting impacts to the existing 316(b) approved cooling water intake structure at Naughton Power Plant are proposed; therefore, no action is required under 40 CFR 125.83. As described in Section 2.2, water usage and infrastructure impacts for the project begin at Naughton Power Plant Raw Water Settling Basin.

5.2.1.1.2 Flood Alterations

Encroachment to the 100-year floodplain by the Kemmerer Unit 1 Site will be avoided to the greatest extent possible. The development of Kemmerer Unit 1, including the Nuclear Island (NI) and Energy Island (EI), is outside the Federal Emergency Management Agency (FEMA) 100-year floodplains (Zone A), with the exception of three plant roads, and two stormwater and plant effluent outfalls. Two of the plant roads, one permanent and one temporary for construction, will provide access to the site from US 189 and will cross the Zone A floodplain southwest of the site. A short section of US 189 will be expanded to accommodate a new deceleration lane for the plant access road. The existing drainage culvert and animal crossing underneath US 189 will also need to be extended accordingly. The third road is a construction road for access to a laydown yard and will temporarily encroach onto the Zone A floodplain south of the site. All three roads will cross an ephemeral stream. Road culverts will be installed at the stream crossings. The layout of the roads and culvert crossings will be designed to minimize wetland and floodplain impacts.

For development in floodplains, Lincoln County, Wyoming requires that there will be no damage or back up water to roadways during a 25-year, 1-hour storm event. In addition, Lincoln County Land Use Regulations Appendix C Flood Overlay Provisions stipulate minimum compliant requirements for proposed developments within special hazard flood zones identified by Federal Emergency Management Agency. However, no requirements apply to new developments in Zone A with no base flood elevation established.

A flooding assessment was conducted and estimated that the proposed project will cause the peak water level to increase by about 0.3 feet on both sides of US 189 upstream of the permanent plant access road during a 100-year storm. During a 25-year storm, no overtopping or damage of US 189 and the Union Pacific railroad north of the site is expected as a result of the construction of the permanent or the temporary road that provides access to the site from US 189. An existing unpaved low profile road in the BLM property south of the site would be flooded during a 25-year storm with or without the proposed project development. It is not anticipated that access to the Kemmerer Unit 1 Site will be impeded by a 25-year or 100-year storm.

The flooding impact of the construction laydown yard access road south of the site has not been evaluated in detail, but it is temporary and is expected to be SMALL, and mitigation does not appear to be warranted. The two outfalls, for stormwater and plant effluent discharges, would potentially be located within the Zone A floodplain to the east of the main plant but any encroachment would be very limited. The flooding impact evaluation will be performed at a later time and will comply with the Lincoln County Floodplain Development Permit requirements.

5.2.1.1.3 Flood Protection

Kemmerer Unit 1 NI and EI are outside the FEMA Zone A floodplain as described in Section 5.2.1.1.2 and are not expected to be subject to flooding during a 100-year storm event. For nuclear safety considerations, the NI site grade is raised to a minimum of 6,756 feet from the natural terrain to be above the design basis flood level of 6,755.4 feet. The external flood hazard evaluation for Kemmerer Unit 1 is described in PSAR Section 2.5.1.1 and indicates that the worst case flood event postulated for the site that produces the design basis flood is a result of overtopping failure of the Lake Arambel with a concurrent Probable Maximum Precipitation event.

PSAR Section 2.5.1.1 describes the flooding hazard assessment resulting from Local Intense Precipitation events on the NI. It indicates that the maximum Local Intense Precipitation flood level would be below the NI design plant grade because Kemmerer Unit 1 plant layout and grading would be designed to facilitate positive drainage and direct stormwater away from NI structures. Stormwater generated onsite will flow towards North Fork Little Muddy Creek on the east side and to a drainage ditch on the west side.

The culvert crossing of the permanent plant road is designed to pass the 100-year flood discharge with the top of the road above the estimated 100-year flood level. The EI will also be raised from the natural terrain to be above the flood level from a 500-year storm event. The minimum site grade of the EI is at 6,753 feet.

5.2.1.1.4 Plant Discharge

As shown on Figure 3.1-4, effluent from the Kemmerer Unit 1 site will discharge to North Fork Little Muddy Creek via an outfall structure at a maximum discharge flow rate of 1,118 gallons per minute (which corresponds to the maximum power output) and average discharge flow rate of 787 gallons per minute. Hydrologic alterations to surface wetlands and waterways are anticipated from plant discharge into North Fork Little Muddy Creek from the discharge outfall structure. The outfall design and riprap apron will reduce erosion impacts to these resources to the greatest extent practicable. Section 5.3 provides more information about the outfall and protective measures around the outfall to minimize impacts to North Fork Little Muddy Creek. An analysis on the effect the plant discharge has on North Fork Little Muddy Creek will be performed at a later time in accordance with Wyoming Department of Environmental Quality surface water quality requirements.

Changes to the discharge volume from Naughton Power Plant are not considered an alteration to the hydrology onsite as a result of Kemmerer Unit 1 plant operations.

5.2.1.1.5 Summary

Impacts as a result of stormwater discharges to North Fork Little Muddy Creek, adjacent wetlands, and 100-year floodplains are anticipated to be SMALL, and mitigation does not appear to be warranted.

5.2.1.2 Groundwater Hydrologic Alterations During Plant Operations

No alterations to groundwater resources are expected during plant operations.

5.2.2 Water-Use Impacts

Water use and water users identified in Section 2.2 with regard to regional water availability are discussed in this section. Also discussed are the proposed water source to support plant operations and anticipated consumptive water use impacts from plant operations on surface water and groundwater resources.

5.2.2.1 Surface Water-Use Impacts During Plant Operations

Surface water use at the site will be similar to the water use at Naughton Power Plant. Efforts to limit water use at the site have been evaluated in a Cooling Water Study and is described in Section 9.4.

Average water consumption of Kemmerer Unit 1 is dependent upon the design of the power cycle and constituents that make up the raw water quality. These aspects of design are preliminary. Depending on changes to the final design, small variations to average consumption may occur.

As stated in Section 2.2, confirmation of water availability for appropriated uses of surface water at Kemmerer Unit 1 will be obtained from the State Engineer's Office prior to the issuance of the industrial siting permit.

Future outlook of water usage and water availability was examined. Based on currently available information, no other future users are expected to consume water from the Viva Naughton Reservoir (Schroder 2010). Table 5.2-1 presents proposed water use for Kemmerer Unit 1 for full power parameters under normal conditions. The full power operation of the plant is the operational mode that uses the maximum amount of cooling water. Water use for other operational modes, such as shutdown or outage conditions are significantly less than the full power water needs. Water consumption during outages is being examined and will be provided at a later time.

The annual average precipitation in the region is expected to increase in the future due to climate change (Reference 5.2-1). This will likely improve the average long-term flow discharge in Hams Fork River.

5.2.2.2 Groundwater-Use Impacts During Plant Operations

Groundwater availability for the region is described in the Green River Basin Plan (Reference 5.2-2).

Confirmation of water availability for appropriated uses of groundwater for dust suppression during building activities will be obtained from the State Engineer's Office prior to the issuance of the industrial siting permit.

No impacts to groundwater resources are expected during plant operations. Contingency plans for unexpected impacts to groundwater resources will be in place in compliance with Wyoming State water quality standards and follow best management practices per Wyoming Pollutant Discharge Elimination System (WYPDES) permit requirements to best protect groundwater resources.

5.2.3 Water-Quality Impacts

Negligible long-term impacts to water quality as a result of site operations are anticipated. Anticipated impacts are described below.

5.2.3.1 Surface Water-Quality Impacts During Plant Operations

Anticipated wastewater and stormwater discharges leaving Kemmerer Unit 1 to surface water resources will comply with both State water quality standards and Federal permitting requirements. Water quality in North Fork Little Muddy Creek would be maintained with the added discharge from the site due to the discharge being in compliance with WYPDES permit requirements.

5.2.3.2 Groundwater-Quality Impacts During Plant Operations

The site does not use groundwater for safety-related purposes, as a source of cooling or potable water, or for other plant needs. Therefore, no impacts to groundwater resources are expected during plant operations. Makeup water for the closed-cycle cooling system and potable water will be sourced from Naughton Raw Water Settling Basin. Contingency plans for unexpected impacts to groundwater resources will be in place and in compliance with Wyoming State water quality standards. Best management practices, per WYPDES permit requirements, will also be used to protect groundwater resources.

The site does not rely upon a permanent dewatering system to maintain groundwater levels at or below the design basis groundwater level during plant operation.

Information regarding non-radiological waste impacts to water resources during plant operations is described in Section 5.10.2.

5.2.4 Water Monitoring

The hydrological monitoring required during operation of Kemmerer Unit 1 is discussed in this section. Discussions related to historical and proposed water use and baseline environmental water quality at the site are provided in Section 2.2. Water use at the site is discussed in Section 3.3. Potential discharges from the site are discussed in Section 3.4. Water monitoring to take place during construction is described in Section 4.2.4.

Effluent discharges to navigable water bodies are governed by several regulations, including the Clean Water Act, 40 CFR 122, 40 CFR 423, and Wyoming Department of Environmental Quality water quality standards through the WYPDES permit. In order to discharge effluents to navigable streams, a National Pollutant Discharge Elimination System (known as a WYPDES permit in the State of Wyoming) pursuant to Section 402 of the Clean Water Act is required. Prerequisites for obtaining a WYPDES permit include collecting adequate baseline monitoring samples and providing a plan for collection of operational monitoring samples. The proposed hydrological monitoring for the site is divided into four phases as outlined below:

1. Site preparation and preapplication monitoring on a seasonal basis to verify the existing hydrologic conditions, validation of the design assumptions for hydrologic impacts, and validation of the baseline hydrologic descriptions presented in Section 2.2
2. Construction monitoring to assess anticipated impacts from construction activities and to identify unexpected impacts
3. Preoperational monitoring to establish a post-construction baseline as a point of comparison in order to identify hydrologic impacts that may result from operation of Kemmerer Unit 1
4. Operational monitoring to assess impacts to water quality resulting from operation of Kemmerer Unit 1

5.2.4.1 Surface Water Monitoring During Plant Operations

Anticipated wastewater and stormwater discharges leaving the site to surface water resources will comply with both State and Federal water quality standards. Surface water monitoring will be enforced via the WYPDES permit issued for the site. Wyoming Department of Environmental Quality will determine the monitoring requirements and frequency based on constituents of concern for the site.

References

5.2-1 (IPCC 2021). Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.). "Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change." *Intergovernmental Panel on Climate Change*. 2021. Cambridge University Press. Page 615.

5.2-2 (Schroeder 2010). Schroeder, Murray T. "Green River Basin Plan." December 2010. Report prepared for Wyoming Water Development Commission (WWDC) Basin Planning Program. WWC Engineering, AECOM, and ERO Resources Corp. https://waterplan.state.wy.us/plan/green/2010/finalrept/finalrept-GRB.html. Pages 1 -189.

Table 5.2-1 Water Usage Needs for Kemmerer Unit 1

Facility Name	Average Demand (gpm)	Average Demand (cfs)	Average Demand (acre-feet/year)	Notes
Kemmerer Unit1	3,689	8.22	5,950	345 MWe average power output

5.3 Ecological Resources

The impacts to ecological resources that could result from operation of Kemmerer Unit 1 and associated linear facilities are described in this section.

5.3.1 Terrestrial and Wetland Impacts

A detailed description of the terrestrial and wetland communities of the site and vicinity, including those of the utility corridors is described in Section 2.3.1. Section 2.3.1 provides the ecological baseline against which the potential impacts of operations activities are measured.

5.3.1.1 Site

Most vegetation at the site will be removed during construction. Some disturbed areas will be covered with geotextiles and gravel; other areas will be re-planted with perennial grasses and forbs to minimize erosion, as specified in the Wyoming Pollutant Discharge Elimination System (WYPDES) construction general permit. The goal will be to stabilize soils and prevent erosion, not create wildlife habitat. Once construction parking areas and laydown yards are stabilized and vegetation has become re-established, small mammals and ground-foraging birds (e.g., ground squirrels and killdeer) that tolerate relatively high levels of human disturbance will likely re-appear.

An ISFSI meeting NRC requirements under 10 CFR 72 will be constructed on the Kemmerer Unit 1 Site at a currently undetermined location. The need date for the ISFSI is approximately 2040. The ISFSI is projected to occupy approximately 55,000 square feet (5,110 square meters) in a previously disturbed area of the site.

Most operational impacts to terrestrial ecological resources and wetlands at nuclear plants are associated with landscaping and facility maintenance, operations noise, and collisions with vehicles, fences, and tall structures. Each of these is discussed in the sections that follow. Absent major new construction projects in developed parts of sites or new construction in previously undeveloped parts of sites, none of these potential sources of impacts has been a serious issue at operating nuclear plants. No direct impacts to wetlands are anticipated.

The Kemmerer Unit 1 Site will contain areas that are planted with perennial grasses and forbs for erosion control and are maintained by mowing. There could be some limited use of approved herbicides in these areas to control invasive plants. Some disturbance-tolerant wildlife species are expected to use these landscaped areas. However, generally high levels of human activity and noise during facility operations will limit the number of animals and species using these areas and make them unsuitable for sensitive or protected species.

Noise and general human disturbance are stressors that can disrupt an animal’s normal feeding, resting, and breeding activities. At low noise levels or farther distances, animals initially could be startled but will likely habituate to the low background noise levels. At louder noise levels and closer range, animals will likely be startled to the point of fleeing from the area. Fleeing animals will expend energy needlessly and will forgo the foraging, resting, or breeding opportunities that the area may have otherwise provided. Potential sources of noise from Kemmerer Unit 1 operations will include the mechanical draft cooling towers, transformers, emergency diesel generator(s), and the public address system. Noise generated from cooling tower operations will be approximately 60 decibels adjusted at 500 feet (152 meters) from the tower (Reference 5.3-21). Cooling tower noise levels will be less than 60 decibels adjusted at the site boundary, well below the 80 to 85 decibels adjusted level known to startle or frighten many birds and small mammals (Reference 5.3-11). Thus, it is unlikely that noise from the cooling tower will disturb wildlife at distances greater than 500 feet (152 meters) from the tower and no wildlife outside the site boundary will be affected. Noise from nuclear plant operations has not been a significant occupational or public (i.e., sensitive receptors) human health issue (Reference 5.3-15). State and Federal Occupational Safety and Health Administration regulations intended to protect human health (hearing) are assumed to be protective of wildlife as well. Operations noise impacts to wildlife are anticipated be negligible and mitigation does not appear to be warranted.

Although it is possible that wildlife could be harmed by vehicles traveling roads in the site vicinity, the condition of onsite roads and traffic make harm to wildlife onsite unlikely. Most of the roads in and around the site are unimproved dirt roads that require motorists to drive slowly, making vehicle-animal collisions unlikely. Further, the low vegetation and relatively flat terrain mean that large animals such as deer and pronghorns near roadways are easily seen and easily avoided by motorists, at least in daytime. Smaller animals, such as ground squirrels and prairie dogs, are more likely to be harmed by vehicles traveling site area roads, but even this is expected to be an infrequent occurrence. Wildlife, whether large ungulates, songbirds, raptors, or reptiles, are much more likely to be harmed by vehicles traveling along US 189, a two-lane highway adjacent to the site, than vehicles traveling onsite.

Wildlife could be harmed by collision or entanglement with fences. In its April 27, 2023, letter (Appendix A), Wyoming Game and Fish Department (WGFD) recommended installing wildlife-friendly fencing where possible. Given that security is a paramount concern at nuclear facilities, some of the wildlife friendly designs recommended by the Wyoming Wildlife Foundation (Reference 5.3-23) will not be feasible. For example, the Wyoming Wildlife Foundation recommends that fences be no more than 42 inches (1.1 meters) high, inappropriate for a nuclear facility. However, increasing the visibility of fencing is one of the keys to reducing entanglement, snagging and injuries to wildlife. Increasing visibility with larger top rails, painted top rails (white would be preferred), fence wire enclosed in Polyvinyl Chloride pipe, high visibility poly wire, colorful weather resistant flagging, shiny metallic tags, and other markers (including bird diverters) would reduce entanglements and collisions. WGFD provided recommendations relating to light pollution from Kemmerer Unit 1 facilities. They recommended using only fully shielded, dark-sky-friendly light fixtures, so that light is directed toward the ground. They recommended installing timers, motion sensors, and dimmer switches to minimize the duration and intensity of artificial lighting. They recommended using warmer-colored lights (<2,200 Kelvin) versus cooler-colored lights on the white-blue end of the spectrum, particularly during peak migration periods. They suggested reducing lighting intensity and amount of time lights are in use during periods of bird and bat migration. Security plan requirements will be adhered to and developed at the operating license stage.

WGFD also offered recommendations on placement and design of any industrial ponds that could be necessary for Kemmerer Unit 1 operation, noting that these ponds are especially attractive to wildlife in Wyoming’s arid environment. They recommended that industrial ponds be constructed in areas of high human use or high levels of disturbance so the ponds are less attractive to wildlife. They also recommended that lined ponds and ponds with steep sides be equipped with escape ramps to prevent wildlife from drowning. WGFD also recommended that operations personnel monitor industrial ponds, recording any wildlife drownings, and have a contingency plan for rescuing trapped wildlife and reporting any wildlife die-offs (e.g., waterfowl). If industrial ponds are built (none are currently planned), WGFD recommendations will be followed to the extent practicable.

The mechanical draft cooling tower, described in Section 5.7.1.1 will be located a short distance southeast of the Turbine Building (Figure 3.1-3). Because wet cooling towers rely on direct contact between cooling water and air passing through the tower, some of the water could be entrained in the air stream and carried out of the tower as tiny droplets, referred to as “drift.” These drift droplets settle out of the tower exhaust air stream and are deposited in the vicinity of the tower. Because the drift droplets contain the same chemical constituents as the water circulating through the tower (e.g., mineral salts, water treatment chemicals), they can, under some circumstances, damage equipment or vegetation. Most modern cooling towers, including the one proposed for Kemmerer Unit 1, are equipped with drift eliminators, which remove as many droplets as practicable from the air stream before it leaves the tower. Because the drift droplets contain salts and other impurities, drift eliminators also reduce the rate of salt deposition.

Salt deposition rates between 1 and 2 kg/ha/month typically cause no harm to plants, while deposition rates higher than 10 kg/ha/month during the growing season cause leaf damage in many species (Reference 5.3-14). Some species, such as flowering dogwood (*Cornus florida*) and American ash (*Fraxinus americana*), are more sensitive to leaf damage (Reference 5.3-13), but none of the species identified as sensitive by NRC is native to southwest Wyoming.

Based on Seasonal-Annual Cooling Tower Impact modeling (Reference 5.3-20) using 2020 and 2021 meteorological data, the maximum expected salt deposition rate in any season is 0.25 kg/ha/month (Table 5.7-4), which is well below the rate (1 to 2 kg/ha/month) known to cause harm to sensitive plants and a small fraction of the rate (10 kg/ha/month) that causes leaf damage to most species. The area of highest deposition is anticipated to be approximately 1,500 meters (4,900 feet) south of the cooling tower. Given the predicted rates of deposition, impacts to vegetation are not expected in any area, during any season and annually in any compass direction.

Cooling tower operations can also result in vapor plumes, icing, local precipitation changes, noise, and avian and bat collisions with structures. Cooling tower plumes generally travel farther from taller natural-draft cooling towers than from mechanical draft towers, such as the one proposed for Kemmerer Unit 1. Fogging occurs when the visible plume from the cooling tower intersects with the ground, appearing like fog to an observer; collisions with structures are most probable in fog, mist, or low clouds during the bird and bat migration seasons. Icing may occur if ambient temperatures are below freezing. Based on the predicted plume height and length, and limited time the plume is anticipated to extend beyond the site boundary, impacts to vegetation and wildlife are expected to be SMALL. Icing is anticipated to vary seasonally and be localized, extending beyond the site boundary less than 3 hours per year (Section 5.7.1.1.6). Vapor from cooling towers can form clouds or contribute to existing clouds, increasing precipitation locally, creating a shadowing effect, or both. However, as described in Section 5.7.1.1.5, the annual increase in precipitation due to the cooling tower is anticipated to be small, approximately 3 percent compared to the mean annual precipitation for Kemmerer of 9.41 inches (see Table 2.7-4 in Section 2.7). The amount of time shadowing may occur represents a small percentage of the total daylight hours of each season (13 percent) and per year (6.4 percent) at the fenceline and beyond 400 meters from the cooling tower. Clouds and a small increase in precipitation in the site vicinity from the cooling tower are not expected to have a noticeable effect on local plants and animals.

The Kemmerer Unit 1 mechanical draft cooling tower will rise approximately 12 meters (39 feet) above grade (Table 5.7-1). Tall, natural-draft cooling towers (at least 330 feet tall) have been associated with bird kills, but the much-shorter (typically less than 100 feet tall) mechanical draft cooling towers pose little risk to birds and cause minimal mortality (Reference 5.3-15). Mortality studies at operating nuclear plants have concluded that most birds that suffer collisions are migrating songbirds. While lighting has been assumed to attract birds and therefore increase collisions with communication towers, low-intensity light sources (1.0 ft-candle or less) on cooling towers have been found to successfully reduce collision mortality (Reference 5.3-16). Vapor plumes and operational noise may also divert and reduce the risk of collision. The available data on cooling tower collisions suggest that deaths from collisions with cooling towers at nuclear power plants represent only a small fraction of the total annual bird collision mortality from all sources (i.e., vehicles, buildings, windows, power lines, communication towers, wind generation facilities). Thus, impacts to birds from collisions with the Kemmerer Unit 1 mechanical draft cooling tower are expected to be SMALL and will not warrant mitigation.

Radionuclides may be released from nuclear power plants into the environment via several pathways. Releases into terrestrial environments often result from deposition of small amounts of radioactive particulates released from power plant vents during normal operations. Terrestrial biota may be exposed to ionizing radiation from radionuclides through direct contact with media, inhalation, or ingestion of food or soil. The U.S. Department of Energy guideline for radiation dose rates from environmental media recommends limiting the radiation dose to riparian and terrestrial mammals to less than 0.1 rad per day (0.001 Gy per day) and limiting the dose to terrestrial plants to less than 1.0 rad per day (0.01 Gy per day) (Reference 5.3-7). These guidelines were developed on the basis of experimental evidence that negative effects would not occur at these doses. Potential impacts to wildlife from radiation exposure (less than 0.00194 mrad per day [Table 5.9-9]) caused by the small discharges of radioactive gases from the operation of Kemmerer Unit 1 are expected to be SMALL. Due to the lack of liquid effluents release, no dose from liquid pathways was evaluated.

5.3.1.2 Offsite Areas

Offsite activities with greatest potential to cause terrestrial and wetlands impacts during operations are anticipated to be those associated with transmission system maintenance and ROW vegetation management. Transmission system maintenance will include routine inspections of tower foundations, towers, and conductors. Vegetation management will focus on the establishment and maintenance of low-growing native plants that do not represent a fire risk or grow to heights that could interfere with transmission system operation. Vegetation management will take place on a cycle determined by the rate of vegetation growth and PacifiCorp’s experience in the region.

Because the pipeline and transmission lines cross mostly shrubland with low-growing vegetation, little vegetation management should be necessary. The grasses and forbs that will be planted in ROWs after construction do not grow to heights that interfere with transmission lines. Should vegetation management be necessary, it will presumably involve mostly low-impact methods, such as hand tools, mowers, and bush-hogs. The specific methods will depend on site-specific factors including access, slope, density of vegetation, and presence or absence of sensitive resources such as wetlands. Should it be necessary to use heavy equipment for repairs or maintenance of transmission facilities, every effort will be made to work when soils are dry (or frozen).

Vegetation management activities and transmission system maintenance occasionally result in the erosion of exposed soils where vegetation has been removed or where soils are disturbed by equipment. Management activities that result in the disturbance, compaction, or exposure of soils may promote the establishment of invasive species. Erosion of upland soils may result in sedimentation or increased turbidity in wetlands within the watershed. Herbicides used to manage undesirable species may drift onto nontarget species or affect wetland communities through runoff from treated areas. Herbicides are generally not harmful to wildlife when they are applied sparingly and according to label instructions for ROW management. Best management practices described in the City of Casper (Reference 5.3-5) Erosion and Sediment Control Best Management Practices for the City of Casper, Wyoming, recommended by Wyoming Department of Environmental Quality (WYDEQ), will be followed in disturbed areas that could potentially cause runoff. The management of ROW vegetation is not expected to have significant adverse impacts on wildlife populations, and can provide valuable wildlife habitat. Overall, vegetation management along the ROWs are expected to cause negligible to SMALL impacts to native vegetation, wetlands, and wildlife populations, and will not warrant additional mitigation.

Birds have been identified as a group at risk because of collisions with power lines (Reference 5.3-12; Reference 5.3-6; Reference 5.3-4). Some bird collisions could be considered a “take” if the bird species are protected under the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.), the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668–668d), or the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. § 703 et seq.) Larger-bodied species (e.g., raptors) are known to use utility structures as perch locations and nest sites more often than smaller-bodied, migrating songbirds and as a result are more likely to be harmed by transmission lines. Migrant passerines (e.g., songbirds) may be impacted by collisions with transmission line wires and towers. Fatal collisions with transmission structures are expected to have negligible effects on most songbird populations. Utility poles generally pose less of a threat to smaller birds than large raptors or waterbirds whose wing span is large enough that the bird can simultaneously contact two conductors or a conductor and grounded hardware (Reference 5.3-1).

Provisions or devices for preventing avian collisions will be similar on the proposed transmission lines to those in existing lines in the region maintained by PacifiCorp or as determined by regulatory agencies. Conductors and static/ground wires could be marked with bird diverters and similar devices. The transmission lines will be designed following Avian Power Line Interaction Committee guidelines to reduce impacts to avian species (Reference 5.3-2). The Avian Power Line Interaction Committee is a collaborative of electric utilities, resource agencies, and conservation organizations that addresses a variety of avian interactions with power lines including electrocutions, collisions, nests, and avian concerns associated with construction, maintenance, and operation of electric transmission and distribution infrastructure (Reference 5.3-3).

Transmission lines could have some limited beneficial impacts to raptors. Raptors use structures such as transmission towers as nesting substrate; in areas without other tall structures, raptors can also use towers as perches for hunting. However, increased perching and nesting could lead to unsustainable levels of predation on small mammals, with the potential to decrease the raptors' prey base, which is already impacted by transmission lines. Should agency biologists evidence concerns about predation on small mammals, H-frame structures could be equipped with anti-perch devices along the transmission lines.

Birds may experience behavior changes, decreases in reproductive success, inhibited growth, and stresses to the immune system due to exposure to electromagnetic fields by perching or nesting on the transmission line (Reference 5.3-10). These effects are only likely to be experienced by birds that spend extended periods of time within the ROW, for example birds nesting on towers or within the ROW. Although the nature and severity of these effects are uncertain, the potential effects of electromagnetic radiation are not likely to cause population-level impacts to birds because of the small number of individuals potentially impacted.

Electrical discharges, or corona, that cause noise, radio and television interference, energy losses, and ozone and nitrogen oxide production are generally not an issue for transmission lines of 345 kilovolts or less. Because the proposed lines are 230 kilovolts, there would be no adverse impacts to terrestrial resources from ozone formation (Reference 5.3-14).

There are no reports of high collision mortality associated with transmission lines, nor have significant impacts of electromagnetic fields associated with transmission lines, been identified for terrestrial biota associated with nuclear power plants in the United States (Reference 5.3-15). Many animals in this area will likely shift to similar habitats nearby although some mortality of the smaller species incapable of such travel may occur. Overall, impacts to wildlife in offsite areas are expected to be SMALL.

5.3.1.3 Important Species and Habitats

No Federally endangered or threatened species are known to occur within the site or associated utility ROWs. Procedures will be added to the Environmental Protection Plan if endangered or threatened species are found at the site or along the ROWs, including a process for communicating with the U.S. Fish and Wildlife Services (USFWS). No areas designated as critical habitat for endangered or threatened species by the USFWS occur on or adjacent to the proposed facility or corridors, nor do the site or corridors cross Federal or State parks, wildlife refuges, wildlife management areas, or recreation areas. The site and utility corridors do lie within an area designated crucial winter, year-long range for the pronghorn as discussed in Section 2.3.1.4.

As stated in Section 4.3.1.4, only two locations with perennial flow were deemed marginally suitable habitat for the Ute Ladies'-tresses and no orchids were observed in a 2022 survey. These areas were re-surveyed during the July 20 to August 31 blooming period in 2023 (none were found) and will be re-surveyed again in 2024 (Reference 5.3-22). Should Ute Ladies'-tresses be discovered, Necessary measures will be taken to protect the population in consultation with the USFWS.

Impacts to special-status birds from the operation of Kemmerer Unit 1 and associated linear facilities are expected to be SMALL, provided the mitigation measures described in this section are implemented. Additional mitigation does not appear to be warranted.

Transmission line structures and access roads are not expected to affect the movement or distribution of big game species; big game will readily cross a double-track road or pass under a transmission line. Operational impacts to big game species is therefore anticipated to be SMALL.

5.3.2 Aquatic Impacts

5.3.2.1 Intake Systems

Steam-electric power plants that use closed-cycle, recirculating cooling systems (cooling towers) withdraw significantly less water for condenser cooling than open-cycle (once-through) units. Depending on the type of cooling tower used and the quality of makeup water, power plants with closed-cycle, recirculating cooling towers withdraw only 5 to 10 percent as much water as plants of the same size with once-through cooling systems. Kemmerer Unit 1 will use a closed-cycle, recirculating cooling system, with waste heat rejected at a mechanical-draft cooling tower of conventional design.

Kemmerer Unit 1 will require makeup water to replace water lost to evaporation and drift at the mechanical draft cooling tower. Smaller amounts of water will also be required for service water, demineralized water, fire protection, potable water, and other domestic uses, as discussed in Section 3.2.2. Kemmerer Unit 1 will obtain cooling tower makeup from the existing Naughton Power Plant Raw Water Settling Basin which currently supplies makeup to two coal-fired and one natural gas powered plants. All three units at Naughton Power Plant are currently scheduled for retirement in 2036 (Reference 5.3-19).

5.3.2.1.1 Hydrodynamic Description and Physical Impacts

Makeup for the Kemmerer Unit 1 cooling tower will be withdrawn from the Naughton Power Plant Raw Water Settling Basin. The Raw Water Settling Basin receives water via a cooling water intake structure (CWIS) on the west bank of Hams Fork River (see Figure 3.2-3) that has serviced the units at Naughton Power Plant since the 1960s. From the CWIS, water is pumped 7 miles (11 kilometers) to Naughton Power Plant via two underground pipelines that discharge at the Raw Water Settling Basin. The basin holds several days' supply of makeup water. When Kemmerer Unit 1 is operational, water will be pumped from the Naughton Power Plant Raw Water Settling Basin to the Kemmerer Unit 1 cooling tower basin via an approximately 6-mile (10-kilometer) long water supply pipeline.

The Naughton Power Plant CWIS consists of two intake bays, one designed to provide raw water for Naughton Power Plant Units 1 and 2, and one designed to supply water to Naughton Power Plant Unit 3. Each of the intake bays is associated with a dedicated pipeline that extends to Naughton Power Plant. Both pipelines discharge to the Naughton Power Plant Raw Water

Settling Basin. The Unit 1 and 2 intake bay is a reinforced concrete structure containing three raw water pumps. Each of the three pumps has a rated design capacity of 2,500 gallons per minute, giving the Unit 1 and 2 intake bay a total design intake flow of 7,500 gallons per minute (Reference 5.3-18). The Unit 3 intake bay contains two pumps, each with a rated design capacity of 6,000 gallons per minute, and a total design intake flow of 12,000 gallons per minute (Reference 5.3-18). Therefore, the total design intake flow for the Naughton Power Plant CWIS is 19,500 gallons per minute, or 28 million gallons per day.

The intake openings are 2 ft by 4 ft 2 inches (Units 1 and 2 intake bay) and 7 ft by 4 ft 2 inches (Unit 3 intake bay) (Reference 5.3-18). Both intake bays are equipped with angled trash racks and vertical traveling screens with 3/8-inch-mesh openings. Screenwash is drawn from the discharge header of the raw water pumps rather than the intake.

In compliance with U.S. Environmental Protection Agency's (EPA) Clean Water Act Section 316(b) regulations at 40 CFR 122.21(r) and 40 CFR 125.90-99, PacifiCorp submitted a “National Pollutant Discharge Elimination System (NPDES) Pretreatment Annual Report” document to WYDEQ in 2018 for Naughton Power Plant that addressed pertinent sections of the CWIS regulation. The permit application requirements for Naughton Power Plant contains data on both design intake flow rates and actual intake flow rates. For the period June 2016 to June 2017, actual intake flow for Units 1 and 2 averaged 3,230 gallons per minute while actual intake flow for Unit 3 averaged 3,594 gallons per minute (Reference 5.3-18). Actual intake flow for all three units (5 pumps) over the period of interest averaged 6,824 gallons per minute, or 9.8 million gallons per day. The raw water pumps are operated manually, based on demand, which varies during the year. Intake flows (river water withdrawals) in 2016 to 2017 were greatest over the June to September period, which is the typical pattern (Reference 5.3-18).

As part of the 2018 Clean Water Act 316(b) assessment, PacifiCorp examined the Hydraulic Zone of Influence for the Naughton Power Plant CWIS. The Hydraulic Zone of Influence was determined by comparing CWIS intake velocities to Hams Fork River stream velocities, operating under the assumption(s) that (1) if river velocity is greater than intake velocity, then the Hydraulic Zone of Influence does not extend beyond the intake opening and (2) if intake velocity is greater than river velocity, then the limits of the Hydraulic Zone of Influence extend radially from the CWIS to the point of constant velocity.

The average river velocity for the study period was determined to be 0.66 feet per second (Reference 5.3-18). The through-opening velocity of the Units 1 and 2 intake bay (the larger opening at the face of the CWIS) was determined to be 0.46 feet per second. Because the intake velocity was lower than the river velocity, PacifiCorp concluded that the Hydraulic Zone of Influence did not extend into the river beyond the face of the CWIS and impingement impacts on fish were therefore “minimal.” The Unit 3 through-opening velocity was considerably lower than that for Units 1 and 2, suggesting that its impingement impacts are even less significant.

The Electric Power Research Institute (Reference 5.3-9) conducted a study of approach velocities and impingement and recommended that an approach velocity of 0.5 feet per second be used by agencies as a national screening value indicative of low potential adverse environmental impact at a CWIS “unless the presence of especially vulnerable species or life stages or subsequent operational monitoring indicates particular problems.” Especially vulnerable include “fragile” species, such as shads and herrings that are weak swimmers and have low impingement survival rates (79 FR 48432). There are no “especially vulnerable” species in Hams Fork River in the CWIS vicinity. This provides additional support for the argument that the approach velocities at the two Naughton Power Plant intake bays are below those known to create significant impingement impacts for adult and juvenile fish.

5.3.2.1.2 Aquatic Ecosystem

Water for Kemmerer Unit 1 cooling tower makeup will be withdrawn from the Raw Water Settling Basin located at the Naughton Power Plant. The existing Naughton Power Plant CWIS on the Hams Fork supplies water to the Raw Water Settling Basin. Stream flow and depth at the CWIS are controlled by two radial gates that span the river. These radial gates impound a short reach of river when flows are low, ensuring that water levels are adequate to provide makeup to Naughton Power Plant’s cooling towers. Section 2.3.2 contains a description of aquatic communities in the vicinity of the Naughton Power Plant CWIS and two upstream reference locations based on surveys conducted in October 2022 and June 2023. Hams Fork River fish collections in 2022 and 2023 were dominated by minnows (five species) and catostomids (two species), with smaller numbers of salmonids (three species). Representatives of 2 hardy, non-native species, redside shiner (*Richardsonius balteatus*) and white sucker (*Catostomus commersoni*), made up 88 percent of all fish collected in October 2022 and June 2023.

EPA published its Final Rule (79 FR 48300) establishing requirements for Cooling Water Intake Structures at Existing Facilities in 2014. The Rule gave existing power-generating and industrial facilities designed to withdraw more than 2 million gallons of cooling water per day and 7 options for meeting Best Technology Available requirements for reducing impingement mortality. PacifiCorp chose Option 1 (operation of a closed-cycle, recirculating cooling system) to demonstrate Naughton Power Plant’s compliance with the Rule when its WYPDES permit came up for renewal in 2018. Closed-cycle cooling can reduce water withdrawals by 95 percent or more compared to once-through cooling (79 FR 48303). The Naughton Power Plant was not subject to the entrainment reduction part of the Rule because its withdrawal rates are well below the threshold of 125 million gallons per day.

Naughton Power Plant’s CWIS was deemed Best Available Technology by WYDEQ when the WYPDES permit was renewed in 2018 on the basis of its closed-cycle, recirculating design and the modest amount of water it withdraws for cooling tower makeup. The “Statement of Basis” for the WYPDES Permit Renewal, dated February 27, 2018, from WYDEQ noted that the facility submitted all the necessary information with its permit application and that:

> “*…the facility utilizes an acceptable impingement BAT…a closed-cycle recirculating system, as defined in 40 CFR 125.92. This is an essentially pre-approved technology requiring no demonstration or only a minimal demonstration that the flow reduction and control measures are functioning as envisioned. This facility is in compliance with the 316(b) requirements.*”

In accordance with the regulation at 40 CFR 122.2(r), PacifiCorp submitted detailed information on the hydrology of the source water body (Hams Fork River), cooling water intake structure design and operation, source water biological communities, cooling water system operation, chosen method of compliance, and operational status (age and condition of power plants) in 2018 along with its WYPDES permit renewal application.

PacifiCorp also consulted with USFWS regarding the possible presence of any Federally-listed species, in compliance with 40 CFR 125.95(f). The Final CWIS Rule requires applicants for NPDES permits to identify all Federally listed species and designated critical habitat “that are or may be present” in the action area, which is the area in the vicinity of the CWIS. The Rule also requires (79 FR 48381) that all NPDES permit applications be transmitted to the USFWS for review and notes that it is the responsibility of the Service to correct any information in the application regarding Federally-listed species and to provide recommendations regarding the protection of these species. Based on an IPaC query, PacifiCorp reported in the 316(b) submittal that 8 Federally-listed species (4 fish) possibly occur in the area (Lincoln County) but the probability of any occurring in the vicinity of the CWIS was low.

Because the Naughton Power Plant’s closed-cycle cooling system was deemed an acceptable best available technology for reducing impingement mortality, no studies or surveys of aquatic communities in the intake area were required by WYDEQ. Information in the 316(b) submittal on the Hams Fork River fish community was provided by WGFD. PacifiCorp used the agency’s information to characterize the fish community of Hams Fork River. The Final CWIS Rule notes at 79 FR 48344 that there are no biological compliance monitoring requirements for any of the three compliance paths based on pre-approved technologies. One of these pre-approved technologies is the closed-cycle, recirculating cooling system that will be used at Kemmerer Unit 1.

<u>Summary</u>

Under typical circumstances, impingement and entrainment at a power plant intake are proportional to intake flow. If a facility reduces its intake flow by 50 percent, it reduces the number of organisms potentially impinged and entrained by 50 percent. Facilities at freshwater sites with closed-cycle, recirculating cooling systems can, depending on the quality of makeup water, reduce water use by up to 97.5 percent from the amount that would be use if they had once-through cooling systems (Reference 5.3-8). Closed-cycle cooling systems are as effective in reducing impingement and entrainment mortality as the other commonly employed control technologies, modified Ristroph traveling screens and variable speed intake pumps (Reference 5.3-8, Exhibit 9-1).

The CWIS Final Rule notes that there are circumstances when even closed-cycle recirculating cooling systems may not be sufficiently protective of aquatic communities, such as when threatened or endangered species are present. More stringent controls would be required when threatened or endangered species are potentially impacted.

NRC guidance directs applicants to consider impacts of cooling water intakes on “important” species, which includes Federally-listed species, candidates for Federal listing, State-listed species, and commercially or recreationally important species. PacifiCorp consulted with USFWS (IPAC) in 2017 and concluded that no Federally-listed species would be affected by operation of the Naughton CWIS. Based on a 2022 Information for Planning and Consultation review and sampling conducted by project biologists, it has been concluded (see Section 2.3.2) that no protected aquatic species occur in Hams Fork River in the vicinity of the CWIS. Several Species of Greatest Conservation Need have been recorded from the middle section of Hams Fork River (below Lake Viva Naughton and above Kemmerer), but none were collected from this section in 2004, when WGFD did a basin-wide survey, and none were collected by project biologists in 2022 or 2023.

Hams Fork River is a popular trout stream, and supports populations of brown trout, rainbow trout, and mountain whitefish. Brown trout and mountain whitefish populations appear to be self-sustaining. Rainbow trout populations have historically been maintained by periodic stockings. The impounded section of Hams Fork River from which Kemmerer Unit 1 will withdraw cooling tower makeup is too deep and too silty for trout spawning. Brown trout and rainbow trout spawn in riffles and runs over gravel substrates. Shallow upstream reaches of Hams Fork River with rocky substrates offer better spawning habitat than the intake area. However, three small (77-91 mm TL) brown trout were collected (and released) by project biologists in the vicinity of the CWIS in October 2022. These were presumed to be young-of-the-year fish that had been spawned the previous winter upstream of the CWIS and subsequently moved or were carried to the river reach adjacent to the CWIS. Based on studies of swimming ability of juvenile trout (Reference 5.3-9; Reference 5.3-17), these juvenile trout will have no difficulty avoiding impingement at the CWIS.

Based on the fact that (1) the closed-cycle, recirculating cooling system that will be used for condenser cooling at Kemmerer Unit 1 has been accepted by State and Federal resource agencies as an effective way to reduce impingement and entrainment at power plant intakes, (2) the actual system that will be used was evaluated by WYDEQ as part of the Naughton Power Plant WYPDES renewal in 2018 and deemed Best Available Technology for reducing impacts to Hams Fork River aquatic communities, (3) there are no indications that fish populations in Hams Fork River have been harmed by decades of Naughton Power Plant operation, (4) all of the fish species known to occur in the CWIS vicinity are common-to-ubiquitous species found across western Wyoming, (5) no “fragile” species are present that are especially vulnerable to impingement, (6) recreationally important fish species, including brown and rainbow trout, found in the impounded section of Hams Fork River adjacent to the CWIS are strong swimmers and do not appear to be vulnerable to impingement, and (7) no Federally-listed fish or mussel species will be directly or indirectly affected by the CWIS operation, impacts are anticipated to be SMALL and no additional mitigation measures beyond those already in place (flow reduction from closed-cycle operation) appear to be warranted.

5.3.2.2 Discharge System

This section describes the physical impacts of the proposed Kemmerer Unit 1 discharge on the receiving waters (North Fork Little Muddy Creek) and the potential impacts on the stream’s aquatic communities. Kemmerer Unit 1 will use a closed-cycle, recirculating cooling system (cooling towers) that has been deemed Best Available Technology for minimizing adverse impacts of CWIS operation on aquatic communities. The closed-cycle cooling system will also reduce heat loading to the receiving stream and therefore thermal impacts to its aquatic communities.

5.3.2.2.1 Discharge System Description and Impacts

Section 3.2 contains a description of the proposed Kemmerer Unit 1 cooling system, including the discharge. Plant effluent will be discharged directly into North Fork Little Muddy Creek via a discharge line that extends from the southeast corner of the Energy Island to the edge of North Fork Little Muddy Creek. The operation of the Kemmerer Unit 1 cooling system is discussed in Section 3.2. Section 3.4.1.1.3 provides information on waste water flows and the discharge to North Fork Little Muddy Creek.

The Kemmerer Unit 1 discharge is expected to be mostly cooling tower blowdown, with smaller amounts of sanitary wastes and water treatment wastes. Cooling tower blowdown will be discharged to North Fork Little Muddy Creek via new discharge structure that will be built a short distance from the stream. Cooling tower operation under full power at Kemmerer Unit 1 will likely involve five cycles of concentration (Figure 3.2-2). Discharge flow is expected to range from 236 to 1,118 gallons per minute, and average 787 gallons per minute.

Applicable State Water Quality Standards (Thermal)

WYDEQ has designated North Fork Little Muddy Creek a Class 3B stream. Class 3B waters are intermittent or ephemeral tributary streams that normally have enough flow to support and sustain aquatic communities including invertebrates, amphibians, “or other flora and fauna which inhabit waters of the State at some stage of their life cycles.” Class 3B streams are often associated with linear wetlands within or adjacent to stream channels. According to the water quality standards, Class 3 waters “do not support or have the potential to support fish populations or spawning.” Designated uses for Class 3 waters are aquatic life other than fish, recreation, wildlife, industry, agriculture, and scenic value. Class 3 waters are generally not suitable for (or protected for) drinking water, game fish, non-game fish, or fish consumption.

Wyoming has no numeric temperature (surface water quality) standard for Class 3 streams. The narrative standard (Section 25) states: “For Class 1, 2, and 3 waters, pollution attributable to the activities of man shall not change ambient water temperatures to levels which would result in harmful acute or chronic effects to aquatic life, or which would not fully support existing and designated uses.”

However, this standard is predicated on the assumption that Class 3 waterbodies do not support fish populations. North Fork Little Muddy Creek contains a surprisingly diverse assemblage of fish (seven species were collected in baseline surveys), including one Species of Greatest Conservation Need, the roundtail chub (*Gila robusta*). Given the presence of at least seven species of fish in North Fork Little Muddy Creek, “aquatic life” in this instance includes fish. Based on the Class 3 standard, thermal discharges will not be allowed to raise ambient water temperatures to levels that would have harmful acute or chronic effects on invertebrates, amphibians, or fish.

5.3.2.2.2 Aquatic Ecosystems

Thermal Impacts

Power plants with closed-cycle cooling and cooling towers reject most waste heat from their condensers to the atmosphere rather than receiving waters. The potential for thermal discharge impacts to aquatic biota are greatest at plants with once-through cooling systems, primarily because of their higher discharge temperatures and larger thermal plume area compared to plants with cooling towers. However, in NUREG-1437 (Reference 5.3-13), the NRC noted that impacts of thermal discharges on aquatic biota were small at nuclear plants with cooling towers. In the revised NUREG-1437 (Reference 5.3-15), NRC re-evaluated the issue after reviewing dozens of plant-specific Supplemental Environmental Impact Statements for license renewals and determined that no new information had emerged to alter these conclusions. On the basis of this review, the NRC concluded that the direct impacts of thermal discharges on aquatic communities at operating nuclear plants with cooling towers seeking license renewal would be SMALL.

In addition to potential impacts to the established aquatic communities of North Fork Little Muddy Creek, the thermal discharge (cooling tower blowdown) from Kemmerer Unit 1 could stimulate the growth of nuisance organisms or provide an advantage to an invasive species that is able to tolerate higher-than-normal water temperatures.

As discussed in the previous section, the Wyoming Surface Water Quality Standards prohibit activities that raise water temperatures to levels that would have harmful effects on aquatic life or that would not support existing and designated uses. The Wyoming Surface Water Quality Standards also contain a provision (Section 28) that specifically prohibits discharges that stimulate nuisance aquatic organisms. It states that “All Wyoming surface waters shall be free from substances and conditions or combinations thereof which are attributable to or influenced by the activities of man, in concentrations which produce undesirable aquatic life.” Because Kemmerer Unit 1 discharges will be required to meet this state water quality standard, they are not expected to stimulate the growth of any nuisance or invasive species.

Given that the Kemmerer Unit 1 thermal discharge will have only minor direct impacts on aquatic communities and should not promote growth of any undesirable aquatic species, thermal impacts on aquatic communities of North Fork Little Muddy Creek are anticipated to be SMALL.

Chemical Impacts

Because cooling towers concentrate solids (minerals and salts) and organics that are transported into the system with makeup water, they are normally treated with anti-scaling and corrosion-inhibiting compounds. They are also treated with chemicals to prevent the growth of bio-fouling bacteria and algae. Cooling tower blowdown at Kemmerer Unit 1 will be directed to a wastewater retention basin, as will sanitary wastes, water treatment wastes, and wastes from floor and equipment drains. Following any necessary treatment in the wastewater retention basin, the plant effluent will be discharged to North Fork Little Muddy Creek. Approximately 92 percent of the effluent by volume entering North Fork Little Muddy Creek will be cooling tower blowdown (Table 3.2-1).

Discharge concentrations of cooling tower chemicals, sanitary wastes, and miscellaneous wastes will be limited by the WYPDES permit issued by WYDEQ. These permit limits are intended to protect the designated uses of the receiving waterbody. Wyoming state surface water quality standards specifically prohibit "…substances, whether from point-source discharges or non-point source activities which will adversely alter the structure and function of indigenous or intentionally introduced aquatic communities." Because Kemmerer Unit 1 discharges will meet applicable State water quality standards that are protective of aquatic communities, impacts from these operations on aquatic biota are expected to be SMALL.

Physical Impacts

Scouring of stream banks and bottoms is generally more of a problem at plants with once-through cooling systems than plants with cooling tower-based systems. But even at plants with once-through cooling systems, scouring has not been a significant problem and typically only occurs in the immediate vicinity of the discharge structure (Reference 5.3-15). The Kemmerer Unit 1 discharge will be routed through a velocity dissipation structure (discussed in more detail in Section 4.3) composed of concrete and riprap before entering North Fork Little Muddy Creek. This discharge configuration should prevent scouring of the adjacent stream bank and stream bottom. Based on the proposed design of the discharge structure and operating experience of nuclear plants discharging to a wide range of waterways across the U.S., physical impacts from discharge flow on North Fork Little Muddy Creek are expected to be SMALL.

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5.4 Socioeconomics

5.4.1 Physical Impacts

The potential physical impacts from operation of Kemmerer Unit 1 on the nearby communities or residences include the effects of noise, exhausts from diesel-driven equipment, cooling tower emissions, and visual intrusion.

5.4.1.1 Noise

As discussed in Section 2.1, activities in the vicinity includes surface mining and power plant operations, both of which result in high noise levels at times. Therefore, loud noise and vibration levels are typical in the vicinity. The closest residence is approximately 2.8 miles from the site, and closest neighborhoods are further away in Diamondville. Noise will be attenuated through distance over large areas of rangeland between Kemmerer Unit 1 and the residences. There are no noise restrictions or limits associated with the industrial zoning districts in Lincoln County.

Kemmerer Unit 1 will produce noise from the operation of pumps, cooling towers, transformers, turbine, standby diesel generators, switchyard equipment, and loudspeakers. Most equipment will be located inside structures, thereby reducing the outdoor noise level. The highest levels of noise will be associated with the operation of the cooling towers. Distance to the nearest receptor is an important factor, as the noise dissipates as the distance increases. For a conventional mechanical draft cooling tower, sound levels of about 60 decibels adjusted can be expected at a distance of 500 feet and 50 decibels adjusted at 1,600 feet (Reference 5.4-10). Noise from the site cooling towers will attenuate to ambient levels prior to reaching the nearest resident at 2.8 miles away.

High-voltage transmission lines can emit noise when the electric field strength surrounding the lines is greater than the breakdown threshold of the encapsulating air, creating an energy discharge. This discharge is known as corona discharge and is affected by circumstances such as wind, precipitation, air density, humidity, and energized surface irregularities. Corona discharge may result in audible noise, radio, and television interference, energy losses, and the production of ozone and oxides of nitrogen. The noise from corona discharge can be heard underneath transmission lines. Noise from corona discharge along a transmission line is low (well below the 65 decibels adjusted threshold) and does not pose a health risk to the surrounding community (NUREG-1437, Rev. 1).

As reported in Section 5.3.4 of NUREG-1555, noise levels below 65 decibels adjusted outside of residences is acceptable (Reference 5.4-8). Impacts from the noise of operations activities will be SMALL and do not require mitigation.

5.4.1.2 Air Quality

The National Ambient Air Quality Standards (NAAQS) define ambient concentration criteria for criteria pollutants. Areas of the United States having air quality as good as or better than the NAAQS are designated by the U.S. Environmental Protection Agency (EPA) as attainment areas. Areas with air quality that is worse than the NAAQS criteria are designated by the EPA as non-attainment areas. The site and vicinity are located in an area classified as attainment areas under the NAAQS (Reference 5.4-5 and Reference 5.4-6). A discussion of current and projected regional air quality conditions is contained in Section 2.7.2.

Kemmerer Unit 1 will have standby diesel generators and other auxiliary diesel-driven equipment. This equipment will emit criteria pollutants, but standby and auxiliary equipment would be operated on an intermittent basis rather than continuously. Project-specific air emissions and their impacts on air quality are discussed in Section 5.7. All equipment will be operated in compliance with Wyoming Department of Environmental Quality permits, if applicable, and Wyoming Department of Environmental Quality regulations. Operations exhaust emissions could also result in odors. However, as indicated for construction activities, odors resulting from exhaust emissions should dissipate due to distance prior to reaching offsite workplaces or residences.

Given that the air emission sources are for standby and auxiliary equipment which would be operated intermittently and in compliance with applicable permits and regulations, the impact of operation of Kemmerer Unit 1 on air quality will be SMALL and do not warrant mitigation.

5.4.1.3 Aesthetics

As discussed in Section 2.4.2.5.1, Kemmerer Unit 1 will be visible from other areas within the Cumberland Flats including other industry, public roadways, and public lands used by small numbers of campers, birdwatchers, and hunters. The closest residence is approximately 2.8 miles away and few people will be present in the vicinity to observe plant operations. Kemmerer Unit 1 facilities, including nighttime lighting, would be visually intrusive but no more so than other industrial facilities in the area, such as Naughton Power Plant.

Section 5.7.1 describes the predicted amount of pluming from the mechanical draft cooling tower. Operation of the cooling tower would result in median plume heights ranging from 138 feet (42 meters) in summer to 440 feet (134 meters) in winter (Section 5.7.1.1.1 and Table 5.7-2). The plume will be visible from public roadways and lands in the vicinity. The degree of visibility would depend on the season and resulting height of the plume. It will also depend on the weather, because even a partly cloudy sky would reduce the visibility of a plume. Overall, visibility of the plume will be intermittent during an average year.

Given that Kemmerer Unit 1 site is in close proximity to existing industrial facilities, is almost 3 miles from the closest residence, and is surrounded by lightly used public and private land, the visual aesthetic impacts from site operations will be SMALL and do not warrant mitigation.

5.4.1.4 Traffic

Operations and outage workers commuting to and from the site will take US 189 to gain access to the site. The project-related increased traffic on US 189 could result in some accelerated deterioration. Other area roadways could experience some as well, but the effects would be dispersed, and deterioration would not be easily attributable to project-related traffic. As discussed in Section 4.4.1.4, any necessary acceleration of the routine maintenance schedule for US 189 contributed to by project-related traffic would have a SMALL impact to highway maintenance in Wyoming.

US 189 and other roads in the vicinity will experience an increase in traffic. The miles driven for commuting will increase the risk of vehicle accidents involving injuries and fatalities. The impact of the operations and outage workers' vehicles on traffic in Lincoln County (and US 189 in particular) is described in Section 5.4.4.1.

5.4.1.5 Other Impacts

The operation of the Kemmerer Unit 1 cooling towers will produce visible plumes, fogging, icing, and result in salt deposition.

Plumes, fogging, and salt deposition have the potential to affect offsite land use and nearby structures. As presented in Section 2.1, the site and surrounding land is predominantly rangeland and occasionally grazed by livestock, primarily sheep. The land in the vicinity is zoned public (BLM undeveloped land), rural, and industrial. The site is bordered by US 189 and the Union Pacific rail line. The closest buildings to the site are small industrial sites (e.g., HilCorp Energy Company, Ovintiv Service Inc.) located near CR 325 (Skull Point Road) approximately 1.8 miles from the site. NRC considered the impact of cooling water tower use in the license renewal Generic Environmental Impact Statement, NUREG-1437, Revision 1 (Reference 5.4-9) both those using freshwater or seawater source water. Drift emissions from cooling tower systems using seawater are over seven times greater than those from systems supplied with freshwater makeup feeds (Reference 5.4-9). NRC concluded that impacts to vegetation from cooling water plumes, drift, and salt disposition would be small for all nuclear power plants using cooling waters (Reference 5.4-9). Impacts to vegetation and soils will be expected to bound impacts to structures.

Plumes from operation of the cooling towers may prevent sunlight from reaching the ground, and this shadowing may be important for agricultural areas. Fogging and icing can have localized effects on nearby roads. As shown on Figure 5.7-2 annual fogging at US 189 will be less than 1 hour and no fogging at the nearby rail. As indicated in Section 5.7.1.1.6, no icing on US 189 was predicted.

Impacts from the operation of the cooling system will be SMALL and do not warrant mitigation.

5.4.2 Demographic Impacts

The socioeconomic analysis of Kemmerer Unit 1 operations is presented below. The evaluation assesses the impacts of operations activities and of demands placed on the region by the operations workforce. Operation of Kemmerer Unit 1 will continue for at least 40 years, with an expected licensing renewal of 20 years, resulting in an anticipated operational life of 60 years. The facility will require approximately 250 operations employees (Table 3.3-6). The projected start of commercial operations is described in Section 3.3. Assumptions regarding workforce characteristics, migration, and family characteristics are presented in Table 5.4-1 and Table 5.4-2.

Refueling outages for Type 1 fuel will occur at 1-year intervals, last approximately 18 days, and require approximately 500 temporary workers. Refueling outages for Type 1B fuel will occur in 2-year intervals, last approximately 12 days, and require the same number of temporary workers.

For assessing operations impacts, 100 percent of the operations workers are conservatively assumed to migrate into the area. The economic region is based on the residential distribution of Naughton Power Plant workforce. As of July 2022, Naughton Power Plant employees were distributed, as follows: Lincoln County (67 percent), Uinta County (21 percent), and Sweetwater County (4 percent). Because the majority (88 percent) of Naughton Power Plant workers reside in Lincoln and Uinta Counties, they are the counties that form the economic region for Section 5.4. Therefore, the analysis assumes that 88 percent of the 250 in-migrating operations workers (220 individuals) will reside in Lincoln and Uinta Counties.

The 2020 population within the 50-mile radius of Kemmerer Unit 1 was 30,950 and is projected to grow to 38,035 by 2090 (Table 2.4-1). The 2020 population in the two-county economic region was approximately 40,031 and is projected to grow to 50,050 by 2090 (Table 2.4-4).

The in-migration of operations workers would create additional indirect jobs in the area because of the “multiplier” effect, as explained in Section 4.4.2. The U.S. Department of Commerce’s Bureau of Economic Analysis (BEA) provides multipliers for industry jobs and earnings (Reference 5.4-1). The BEA economic model, Regional Input-Output Modeling System (RIMS) II, incorporates buying and selling linkages among regional industries and provides multipliers by industry to estimate the impacts of changes in that industry to a regional economy. Type II multipliers were used because they account for both the interindustry and household-spending of final-demand industry changes. Multipliers for the electric power generation, transmission, and distribution final demand industry in the economic region were used to estimate the number of indirect jobs and earnings in the economic region, generated by the influx of the Kemmerer Unit 1 workforces.

Table 5.4-2 provides direct and indirect employment data for the economic region. The employment multiplier predicts, for every in-migrating operations worker, 1.8559 indirect jobs would be created. Spending by the 220 directly employed operations workers during this period will support 408 indirect jobs in the economic region, for a total of 628 jobs (both direct and indirect).

This analysis assumes 220 in-migrating workers will settle in the economic region; therefore, the indirect jobs created by the 220 in-migrants would also be in the economic region. Most of the 408 indirect jobs will be service-related, not highly specialized, and filled by the existing labor force within the economic region. In 2021, there were 803 unemployed adults in the economic region (Table 2.4-8). It is assumed 25 percent of these unemployed adults, 201 individuals, could fill some of the project’s indirect jobs during operations. Also, the 304 workers that migrated into the economic region to fill indirect jobs during construction could remain in the area to fill the indirect jobs created by the operations workforce. In fact, many of the indirect jobs supported by the operations workforce will be the same jobs that were supported by the construction workforce. Therefore, all indirect jobs are estimated to be filled by unemployed workers and indirect workers already residing in the economic region and no in-migration of indirect workers would occur.

Regarding the family characteristics of the operations workforce, the following is assumed:

- 100 percent of operations workers would bring families (conservative assumption)
- Average worker family size is 3.2 (including the worker) (Reference 5.4-12)
- Average number of children under 18, per worker family, is 0.88 (Reference 5.4-13)

Therefore, 220 in-migrating operations workers will bring a total of 484 family members, 194 of which will be children under 18 years old (Table 5.4-1).

The two-county economic region population will increase by a total of 704 Kemmerer Unit 1 workers and family members (Table 5.4-1). Approximately 536 of the workers and family members would reside in Lincoln County. This number represents a 14 percent increase in the combined 2020 populations of Kemmerer, Diamondville, Cokeville, and LaBarge (3,831) (Table 2.4-3). The remaining 168 workers and family members will reside in Uinta County. This number represents a less than 1 percent increase in the 2020 population (20,450) of Uinta County (Table 2.4-4).

5.4.3 Economic Impacts to the Community

The operations impacts to the economic region will be payment of wages and benefits that are spent in the region, purchase of goods and services from local businesses, and payment of Federal, State, and local taxes. The employment of 250 operations workers for a 60-year period would have economic impacts throughout the region. Lincoln County would be the most affected because 67 percent of the total operations workforce would reside there, spend their wages, pay taxes, buy and rent homes, and use public services and utilities. Also, project expenditures will benefit local businesses and generate tax revenues for the county, Lincoln County School District (LCSD) #1, and other taxing entities in the county.

In addition to the operations workforce of 250, 500 temporary workers will periodically support refueling outages.

5.4.3.1 Economy

5.4.3.1.1 Employment Impacts from Operations Workers

As stated in Section 5.4.2, for every Kemmerer Unit 1 operations job, an estimated additional 1.8559 (Reference 5.4-1) indirect jobs would be created, which means that the 220 direct jobs would provide an additional 408 indirect jobs, for a total of 628 jobs in the economic region (Table 5.4-2). This additional job estimate assumes that 88 percent of the operations workforce would migrate into the economic region. If less than 88 percent of the workers migrate into the economic region, then proportionally fewer indirect jobs would result.

In 2021, the economic region had 17,543 employed workers (Table 2.4-8). Therefore, 628 additional workers would represent a 3.6 percent increase over 2021 employment. This increase will have a SMALL, beneficial impact on the overall economic region economy. In Lincoln County, the county most affected, this will equate to 479 workers. These workers would represent a 5.2 percent increase in the County’s 2021 employment of 9,154 (Table 2.4-8), creating a SMALL to MODERATE beneficial impact.

In 2021, the economic region had 803 unemployed workers (Table 2.4-8). Therefore, 408 indirect jobs would reduce the region's unemployment rate by 51 percent, to 2.2 percent. This increase will have a LARGE, beneficial impact on the overall economic region economy.

Sixty-seven percent of the total operations workforce of 250 is expected to reside in Lincoln County, creating 310 indirect jobs there. The 310 indirect jobs would reduce Lincoln County's, unemployment rate to less than 1 percent. This increase in indirect jobs will have a LARGE, beneficial impact on the level of unemployment in Lincoln County. Labor markets are dynamic, however, and it's also possible the level of unemployment in the region will be significantly different from the level stated here.

Twenty-one percent of the total operations workforce of 250 is expected to reside in Uinta County, creating 98 indirect jobs there. In 2021, Uinta County had 443 unemployed workers (Table 2.4-8). The 98 indirect jobs will reduce the County's unemployment rate to 3.9 percent, a MODERATE, beneficial impact.

The operations workforce will reach full staffing by the last year of Kemmerer Unit 1 construction (Table 3.3-7). In 2021, the unemployment rate in Lincoln County was 3.8 percent, representing 360 people, a decline from 8.3 percent during the previous decade (Table 2.4-8). The 2021 unemployment rate in Uinta County was 5.0 percent, representing 443 people, a decline from 6.6 percent during the previous decade. Even if the numbers of unemployed people in the two counties continue to decline, it is likely that there would be an adequate labor force to fill most of the indirect jobs created by the in-migrating operations workers. The remaining indirect jobs are assumed to not be filled by the region's unemployed workers and will be filled by the indirect workers that migrated in during the construction period.

To summarize, impacts to employment would range from SMALL to MODERATE and be beneficial. The indirect jobs will have a LARGE beneficial impact on the economic region economy by reducing unemployment by about 51 percent, to 2.2 percent. The indirect jobs will have a LARGE beneficial impact on Lincoln County by reducing that county's unemployment rate to less than 1 percent. In Uinta County, the indirect jobs will have a MODERATE, beneficial impact, reducing its unemployment rate to 3.9 percent.

5.4.3.1.2 Earnings Impacts from Operations Workers

The operations workforce will purchase goods and services, creating a multiplier effect that would result in an increase in regional business activity, particularly in the retail and service industries. The BEA RIMS II program, described in Section 4.4.2, also calculates earnings multipliers. This analysis uses the detailed earnings multipliers for the electric power generation, transmission, and distribution industry sector to estimate the impacts to the economic region from expenditures by in-migrating operations workers. Each dollar spent by an operations in-migrant would result in the circulation of an additional 0.8755 dollars in the economic region economy (Reference 5.4-1).

The U.S. Bureau of Labor Statistics (BLS) collects employment and wage data by occupational category. To assess impacts to the economic region economy from the operations in-migrants, national wage data was obtained for North American Industry Classification System

Sector 221113, Nuclear Electric Power Generation from the BLS's Quarterly Census of Employment and Wages. The average annual wage for this category was $155,840 in the U.S. (Table 2.4-12). There are no wage data in this category for Wyoming.

The methodology for predicting operations in-migrant impacts is the same as that used for predicting construction in-migrant impacts in Section 4.4. The estimated average annual wage of $155,840 was multiplied by the number of operations in-migrants residing in Lincoln and Uinta Counties and then summed to calculate total dollars earned by the in-migrants annually. Table 5.4-3 provides these calculations and shows that operations worker wages will total $34,284,800 annually.

The impact of these wages on the economic region depends on the proportion of the wages spent in the economic region. Table 5.4-3 presents a sensitivity analysis of impacts from workers spending between 10 percent and 100 percent of their wages within the economic region. The earnings multiplier for electric power generation, transmission, and distribution industry workers (1.8755) was also applied (Reference 5.4-1). The results indicate that impacts to the economic region economy from operations worker wages would range from $6,430,114 to $64,301,142, annually, depending on the percentage spent (Table 5.4-3). The total estimated impact (wages with the multiplier applied) represents an increase of 0.3 percent to 3 percent in the economic region's 2021 total personal income, which will be a SMALL and beneficial impact. However, as described in Section 4.4.3.1.2, these impacts could be overstated, as total personal income in the economic region is likely to grow independently of Kemmerer Unit 1. In that case, operations wages will represent a smaller proportion of total personal income and impacts will remain SMALL and beneficial.

In the economic region, Lincoln County will likely receive 76 percent of the benefits generated by the 220 workers residing in Lincoln and Uinta Counties, and Uinta County would receive the rest. In 2021, Lincoln County's total personal income was $1,248,380,000 and Uinta County's was $911,174,000 (Reference 5.4-2).

5.4.3.1.3 Impacts from Outage Workers

Refueling outages are expected to last 2-3 weeks and require about 500 workers. For this analysis, all temporary workers are assumed to come from outside the economic region. To estimate the economic impacts of each outage, the average annual wage of a nuclear technician, $103,910, was divided by 250 work days per year to obtain an average daily wage of approximately $416 (Reference 5.4-3). Wages for 500 outage workers working 18 days would total about $3,744,000. When the earnings multiplier (1.8755) is applied, impacts to the economic region would be $7,021,872, representing an increase of less than 1 percent in Lincoln County's 2021 total personal income of $1,248,380,000 (Reference 5.4-2). Wage impacts from outage workers will be SMALL and beneficial.

During outages, the influx of 500 workers will be noticeable in Kemmerer, Diamondville, and Evanston, but not destabilizing. The municipalities have prior experience with the maintenance outage workforces from Naughton Power Plant and any adverse impacts from the increase in employment would be very temporary. Further, there could be temporary and short-term job opportunities for lodging and restaurant workers to serve the outage workforce, along with beneficial impacts to motels, restaurants, retailers, and other businesses patronized by the outage workers. Impacts caused by the outage workforces will be SMALL and beneficial in Kemmerer, Diamondville, and Evanston.

5.4.3.2 Taxes

Kemmerer Unit 1 is estimated to begin operation in 2031 and will generate several types of taxes. Sales taxes, property taxes, and several other types of taxes and fees will be paid based on the value of, and power generated by, Kemmerer Unit 1 and on operating expenditures. Operations workers and their families will also contribute sales and property tax revenues to the area.

Section 4.4.3.2 provides a detailed description of the significance categories applicable to tax impacts, which are derived from the refurbishment impacts analysis in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (Reference 5.4-7). This Generic Environmental Impact Statement methodology was reviewed and determined that the significance levels are appropriate to apply to an assessment of tax impacts resulting from Kemmerer Unit 1 operations. In summary, significance levels are considered small if new tax payments are less than 10 percent of the taxing jurisdiction's revenue, moderate if payments are 10 percent to 20 percent, and large if payments represent more than 20 percent of total revenue.

5.4.3.2.1 Personal Income and Corporate Taxes

As noted in Section 2.4.2.2.2, Wyoming has no personal or corporate income tax so there will be no income tax-related impacts to state or local revenues during operations.

5.4.3.2.2 Sales and Use Taxes

Wyoming and the local governments in the economic region are expected to experience an increase in sales and use tax collections. Sales and use taxes would be generated by operations expenditures for Kemmerer Unit 1 and by retail purchases by the operations workforce.

<u>Expenditures by Workforce During Operations</u>

The workforce at the Kemmerer Unit 1 site is estimated to consist of 250 operations workers, 88 percent of which will relocate to the economic region. It is estimated that many indirect workers already reside in the economic region. As an indirect impact, the multiplier effect of the new jobs in the area would also result in higher personal income for current residents in the region, more disposable income, and greater expenditures by individuals and families for items subject to sales or use taxes, yielding further increases in sales tax revenues in the economic region (Section 5.4.2).

Retail expenditures spurred by new residents and higher incomes would yield an increase in sales and use tax revenues. As noted in Section 2.4.2.2.2, taxable goods or services purchased anywhere in Wyoming are subject to the state sales tax of 4 percent, 69 percent, of which is directed to the state general fund, and the remainder is returned to the counties of origin. The state received $493,101,908 in sales and use tax revenues in fiscal year 2021 (Table 2.4-14). Direct and indirect taxable purchases associated with the operations workforce would yield a relatively small but beneficial impact to the state.

The share of the state sales and use tax (31 percent) that is returned to the counties of origin is distributed between the counties and their municipalities using a population-based formula. The revenues are used to fund local government operations, infrastructure, and other services. Purchases made in the economic region counties are also subject to each county’s 1 percent general purpose option tax (Table 2.4-17). Lincoln County’s general purpose option sales tax revenues (also distributed by Lincoln County to its municipalities, using the same population-based formula) are used to fund county and municipal government operations, infrastructure construction and maintenance, and other services (Table 2.4-15 and Table 2.4-16).

The magnitude of the impact depends on the availability of goods and services in the economic region and size of the counties’ tax bases. The projected Lincoln and Uinta counties’ sales and use tax collections in 2030 using average annual growth rates is based on county sales and use tax revenues from 2011 to 2021 (Table 2.4-17). The projections are shown in Table 4.4-11. In 2030, Lincoln and Uinta Counties’ projected total sales and use tax collections would reach about $32 million and $24 million. In 2030, the wages for 220 operations workers would total about $34.3 million. If 100 percent of those wages were spent within the 2-county economic region, they would generate about $1.7 million in sales taxes, at a 5 percent sales tax rate. The county and municipality portion of the total sales tax rate of 5 percent is 2.24 percent. Applying the 2.24 percent sales tax rate to $34.3 million equates to about $768,000 in taxes. The remaining $946,000 in taxes would go to the state. A $768,000 increase in the projected 2030 sales and use tax revenues of the economic region counties would represent a 1.4 percent increase in those counties’ sales and use tax revenues. Based on these figures, direct and indirect taxable purchases associated with the operations workforce will be SMALL, beneficial impacts to the economic region counties and their municipalities.

Revenues from purchases with workers’ wages and current residents’ increased incomes, will provide SMALL, beneficial impacts to the jurisdictions in the economic region.

<u>Expenditures for Operations Goods and Services</u>

In addition to sales taxes paid by operations workers and families, the region would also experience an increase in the sales and use taxes collected from project-related expenditures for operations taxable materials, supplies, and services. Many of the goods and services needed to operate Kemmerer Unit 1 could be obtained from the local economy, defined as the economic region.

As explained in Section 4.4.3.2.2, Wyoming statues allow for sales and use tax exemptions which may apply to the production of electric power and exempt a percentage of the materials and services used to operate Kemmerer Unit 1. The remaining operations costs would be subject to sales and use taxes, 4 percent to the state of Wyoming and 1 percent to the counties and municipalities where project purchases would be made and used.

The impact of expenditures in the economic region would depend on the amount of the taxable expenditure and the size of a jurisdiction's baseline collections: the smaller the jurisdiction's baseline collections, the greater the positive impact from the operations expenditure.

To demonstrate the potential significance of operations-related sales and use tax payments to Lincoln County (the county with the greatest potential to be impacted), estimated project-generated sales and use tax payments was compared from the first year of operations with Lincoln County's total sales and use tax collections (projected) for the same year.

Project expenditures result in about $1 million in sales and use tax payments annually. These payments would increase total 2030 sales and use tax collections in Lincoln County by 3.2 percent, resulting in a SMALL impact to the county and its municipalities. An examination of the shares of payments that would be returned to Lincoln County and its municipalities, as distributions, reveals similar percentage increases: 3.9 percent in Lincoln County and 3.1 percent in Kemmerer and Diamondville combined. Not all taxable operations expenditures will occur in Lincoln County; however, these impacts are likely overstated to the extent that some expenditures would occur elsewhere in the economic region or outside of the economic region. The sales and use taxes on those items would be collected by the jurisdictions in which the purchases were made.

The portion of the one million dollars in annual sales and use tax payments that would go to the state would represent a very small percentage of the projected $1.1 billion in sales and use tax collections by the state annually (Table 4.4-11), resulting in a very small, positive impact to the state.

5.4.3.2.3 Other Sales- and Use-Related Taxes

<u>Lodging Tax</u>

As presented in Section 2.4.2.2.2, the counties and cities of the economic region can levy a lodging tax on the cost of sleeping accommodations, in addition to the 3 percent lodging tax imposed by the state. In addition to hotels and motels, the tax extends to tents, campers, trailers, mobile homes and other mobile accommodations. Table 2.4-17 presents the economic region's lodging tax rates. Table 2.4-19 presents economic region lodging tax collections for fiscal year 2021. Eighty to ninety percent of state and local lodging tax proceeds must be used to promote tourism.

Visitors to Kemmerer Unit 1 as well as temporary workers employed for outage activities would use local hotels and motels and pay the lodging tax that is imposed by the state of Wyoming (currently 3 percent) and the cities and counties (2 to 4 percent) (Table 2.4-17). Depending on visitor and outage worker choices for hotel accommodations, the impacts of this tax on the county tourism will likely be MODERATE in Lincoln County and SMALL to MODERATE in Uinta County and be beneficial. The magnitude of impact would depend on the number of visitors and workers to each jurisdiction and the size of each jurisdiction's existing lodging tax base. Impacts to lodging tax collections by the state of Wyoming will be SMALL and beneficial.

5.4.3.2.4 Property Tax

Lincoln County and Special Districts

Property tax impacts would be experienced in two ways: through property taxes paid on behalf of the plant itself and through property taxes paid by the in-migrating operations workforce.

As described in Section 2.4.2.2.2, Wyoming property tax assessments are made by county tax assessors and the Wyoming Department of Revenue. Appraisals are based on consideration of cost, income, or market value. All taxing jurisdictions (state, county, cities, schools, and special districts) apply their individual mill levies to the assessed (or taxable) value of properties within their boundaries to determine the taxes owed.

As stated in Section 4.4.3.2.4, the taxing jurisdictions of the proposed Kemmerer Unit 1 property are presented, along with their 2021 millage rates, below:

- Lincoln County School District #1: 46.4
- Lincoln County: 12
- South Lincoln Hospital: 4
- South Lincoln Special Cemetery District: 0.967
- Weed and Pest: 0.905
- South Lincoln Fire: 0.555
- Kemmerer Senior Center: 0.3
- Lincoln Conservation: 0

During the operation of Kemmerer Unit 1, property tax valuation will be determined in accordance with state law and appraisal formulas or some mutually agreed-upon valuation.

The parcel containing the site has historically been assessed as agricultural land. The previous landowner’s 2021 property tax payment to Lincoln County for the 334-acre Kemmerer Unit 1 portion of the parcel is estimated to be approximately $200 (Section 2.4.2.2.2). The assessment ratio for the 334 acres is expected to change to 11.5 percent (industrial) due to planned site development. Property taxes will be paid to Lincoln County and the other taxing jurisdictions listed above.

Potential property tax impacts were estimated in the following manner.

First, the economic region counties’ historical property tax levies for the 10-year period between 2011 and 2021 were examined. Both, growth and decline were experienced across the various taxing jurisdictions. Table 4.4-13 presents these data, along with calculated average annual growth rates. The growth rates were applied to actual 2021 levies to project levies for the first year of operations.

It is estimated the total property tax during operation will be approximately $7.5 million. Notably, these estimates do not reflect negotiated tax arrangements, such as payments-in-lieu of taxes or other plant valuation agreements and the plant’s taxing jurisdictions. At this time, no such arrangements have been made.

Next, The percentages, based on millage rates (Table 4.4-15) were determined, of the plant's estimated total property tax payment that will be earmarked for each of the plant's taxing jurisdictions in the first year of operation.

Last, the plant's property tax payments were compared to the total property tax levies of the major property tax jurisdiction categories in Lincoln County (Table 2.4-20). Results are presented in Table 5.4-4.

Results indicate an 18.9 percent increase in projected Lincoln County property tax levies and a 14.9 percent increase in projected county-wide special district levies in the first year of operation. Based on NRC impact definitions provided at the outset of this section, property tax payments will be of MODERATE significance and beneficial. The impact to LCSD #1 will result from a 21.2 percent increase in projected education levies. However, this increase will not be a large impact because the state employs two education equalization programs. Consequently, property tax impacts to LCSD #1 will be SMALL and beneficial. More information on property taxes and the state's education equalization programs is presented in School Districts below and Section 5.4.4.4.4.

The second source of economic region property tax revenues is from increased property tax collections on housing for the in-migrating operations workforce. Property values would increase when undeveloped land is converted to residential and commercial uses and currently developed properties are rented or sold to in-migrating workers. In anticipation of increased demand for housing, developers are planning to construct new housing, which would be added to the local property tax base.

As stated in Section 4.4.3.2.4, the housing market analysis found inadequate temporary housing stock to support the in-migrating construction workforces at construction peak. New housing construction is planned and is in various stages of development. During the construction phase, increased demand for existing and new housing would likely drive housing prices up and increase the tax base, thus increasing values, assessments, and property taxes levied and collected. The change in tax revenues is not known at this time, but most of the 1,000 or more permanent units proposed for construction would be in the Kemmerer and Diamondville area. One thousand permanent housing units would represent a 53 percent increase in the total housing stock of the two municipalities (Section 4.4.3.2.4). The increased housing stock spurred by construction could have LARGE and beneficial impacts on the property tax revenues of Lincoln County. Impacts on Uinta County are expected to be SMALL to MODERATE and beneficial.

During operations, after the out-migration of the construction workforce, the housing supply in Kemmerer and Diamondville could be significantly greater than demand. However, the housing would be subject to property tax regardless of its occupancy status. State and local property tax collections would be a continuation of those experienced during construction.

School Districts

School district revenues in the economic region could be affected by the operation of Kemmerer Unit 1 in two ways:

- Increased property tax revenues from property within LCSD #1 boundaries
- Increased enrollments that trigger increased state equalization funding for affected school districts

Property tax revenue increases would come from Kemmerer Unit 1 and from a larger residential tax base. Section 2.4.2.7.4 addresses enrollment and capacity issues in schools, while Figure 2.4-5 shows a map of the school districts in the economic region.

As noted in Section 2.4.2.7.4, LCSD #1 and Uinta County School District (UCSD) #1 are the two school districts expected to be most financially impacted by the Kemmerer Unit 1 project. The boundaries of LCSD #1 contain Kemmerer and Diamondville and the Kemmerer Unit 1 site, so LCSD #1 would host most of the operations workers' children, be a recipient of Kemmerer Unit 1 property taxes, and collect property taxes generated by newly constructed housing. Most operations workers not finding available housing in Kemmerer and Diamondville would be expected to reside in Evanston (Uinta County). UCSD #1 boundaries contain the city of Evanston.

The previous owner of the proposed site paid less than $200 in property taxes to education tax jurisdictions (local and state) (Section 2.4.2.2.2). The payment represented a small percentage of Lincoln County's education levies in 2021. Because the appraised valuation of the Kemmerer Unit 1 site would increase, tax payments to the education taxing jurisdictions would increase.

The Kemmerer Unit 1 property tax payments to jurisdictions levying an education tax would be $5,343,750, annually (Table 5.4-4). This payment would represent a 37.9 percent increase in LCSD #1's 2020-2021 operating revenues of $14,115,177 (Table 2.4-21 School District Revenue by Source).

As discussed in Section 2.4.2.7.4, Wyoming's School Foundation Program enables the state to redirect money from school districts with excess local revenues to school districts with insufficient local revenues using a calculation that incorporates the school finance system's funding model and the characteristics of each school district's schools, staff, and students. Through the School Foundation Program, the state guarantees that school districts are appropriately funded to meet their operational and instructional obligations each year ("guarantee"). While the tax payment would appear to have a large impact on LCSD #1 by potentially providing revenues beyond LCSD #1's guarantee, those excess revenues would be recaptured and redirected by the state to less wealthy school districts. LCSD #1 would likely continue to be a district that is no longer dependent on the state to meet its annual guarantee. Therefore, the impacts of education-related property tax payments on behalf of Kemmerer Unit 1 will be SMALL and beneficial for LCSD #1 and other school districts in the state.

In the economic region, the influx of workers and families would lead to larger enrollments, the largest of which would be in LCSD #1 and UCSD #1. Kemmerer Unit 1 workers' school age children are expected to increase school district enrollments by 148 in Lincoln County and 46 in

Uinta County. The fiscal impacts of greater enrollment would be determined by a district's current physical capacity for additional students and any requirement to add teachers or facilities (Section 2.4.2.7.4).

In Lincoln County, there are only 66 available classroom seats in its only elementary school (Table 2.4-41). In Evanston, 2 of 4 elementary schools are over 90 percent of capacity. Operations workforce children could stress resources at these elementary schools. However, increased enrollments would likely increase the school districts' guarantees through the School Foundation Program, offsetting the added expenses of higher enrollment. Also, the schools' School Capitalization Construction program calculations would change, potentially generating funding to expand school facilities. The fiscal impacts of greater enrollment are likely to be SMALL in both counties' schools because the state's education equalization programs would provide the funding to mitigate any adverse impacts.

5.4.3.2.5 Other Relevant Taxes and Fees

Business (or Corporate) License Tax

W.S. 17-16-1630 authorizes the Wyoming Secretary of State to collect an annual tax from all business entities organized within Wyoming or that have obtained the right to transact business there. The tax is based on the assessed valuation of capital, property, and assets located and employed in the state. The tax is $60.00 or 0.02 percent of the total assessed valuation, whichever is greater. For Kemmerer Unit 1, plant owners would pay 0.02 percent of the estimated assessed value of the plant. At the beginning of operations, it is estimated that the plant's assessed value would reach about $115 million dollars. Applying the fee rate of 0.02 percent to the assessed value of $115 million dollars yields an annual fee of about $23,000. Business license revenues go to the State General Fund (Section 2.4.2.2.2). In fiscal year 2021, State General Fund and Budget Reserve Account revenues totaled $1.69 billion (Table 2.4-14). The U.S. SFR Owner, LLC (USO) Corporate License Tax payment will create a small increase in the state's general fund revenues and, therefore, a SMALL, beneficial impact.

Public Utilities Assessment

To fund Wyoming Public Service Commission operations, the Wyoming Department of Revenue collects from public utilities a tax based on their annual intrastate gross operating revenues (Section 2.4.2.2.2). The tax, capped at 0.3 percent, is applied to individual utility revenues for the preceding calendar year. USO is not a public utility; therefore, the plant would not be subject to this tax. Should USO ever be sold to a public utility, this tax would likely be applicable and the impacts would be beneficial.

Production of Electricity from Nuclear Reactors Tax (Excise Tax)

W.S. 39-23-101 through 39-23-111 authorize the Wyoming Department of Revenue to impose taxes on the sale of electricity from nuclear reactors. The tax rate is $5 per megawatt hour and is paid by the entity that sells the electricity. An exemption is extended to advanced nuclear reactors that are operated in accordance with W.S. 35-11-2101. Beginning in 2035, advanced nuclear reactors such as Kemmerer Unit 1 will be required to produce electricity using uranium sourced from mines in the U.S. (at least 80 percent on a monthly basis) to continue to qualify for the exemption. Payments would be deposited into the state's general fund. In fiscal year 2021, State's General Fund and Budget Reserve Account revenues totaled $1.69 billion dollars (Table 2.4-14). Electricity production tax revenues generated by Kemmerer Unit 1, if any, will likely have a SMALL, beneficial impact on Wyoming's general fund and budget reserve account revenues.

5.4.4 Community Infrastructure Impacts

5.4.4.1 Traffic

The impacts to traffic and transportation from operation of Kemmerer Unit 1 would be greatest on the roads in Lincoln County, particularly US 189, the two-lane highway that provides the only access to the site. Impacts to traffic are determined by four elements: (1) the number of operations workers and their vehicles on the roads, (2) the number of shift changes for the operations workforce, (3) the projected population growth rate in Lincoln County, and (4) the capacity of the roads.

As discussed in Section 5.4.2, operations workers onsite are projected to be 250 and the temporary outage workforce would be 500. The residential distribution of this workforce is discussed in detail in Section 5.4.4.3 and is assumed to mirror that of the existing Naughton Power Plant, with 67, 21, 4, and 8 percent of workers in Lincoln, Uinta, Sweetwater, and other counties. The workers residing in Lincoln County would travel south along US 189 to reach the site. Workers residing in Sweetwater County are assumed to reach US 189 via US 30 and travel south to the site. Workers traveling from Uinta County would reach the site traveling north on US 189. Equal numbers of workers residing outside of the three counties were assumed to reach the site from the north and south. While carpooling could occur, none was assumed. As shown in Table 5.4-5, an estimated 188 commuting vehicles would travel to the site from the north and 63 would travel from the south.

The Annual Average Daily Traffic (AADT) counts for roadways near the site are presented in Table 2.8-2. The average daily traffic volume along US 189 is characterized as 1,041 north of the site (2021 AADT for US 189 at US 30 junction south to CR 304 West to Elkol) and 1,636 south of the site (2021 AADT for US 189 south of CR 304 to junction with WY 412). As shown in Figure 2.8-1 AADT on US 189 near Kemmerer Unit 1 is projected to increase approximately 1.2 percent annually to approximately 2,028 vehicles per day in 2042.

Accounting for round trip commuting would add 375 vehicles to the average daily count north of the site, a 36 percent increase in average daily traffic compared to the 2021 AADT which is slightly higher than the 2022 AADT. Accounting for round trip commuting would add 125 vehicles to the average daily count south of the site, an 8 percent increase in average daily traffic compared to the 2021 AADT. The increased traffic along US 189 could be noticeable during peak commuting hours, particularly north of the site. Kemmerer Unit 1 would operate 24 hours per day 7 days per week, so the total operations workforce of 250 workers would be assigned to shifts with the majority (190) assigned to the weekday day shift. Different shifts would result in slightly staggered arrivals and departures reducing directional traffic congestion at and near the site. The traffic study conducted for the project analyzed operations traffic for Kemmerer Unit 1 plus the Sodium Test and Fill Facility operations traffic for 2043. Traffic on US 189 was estimated at 254 and 348 vehicles for the a.m. and p.m. peak hours. The Sodium Test and Fill Facility operations were estimated to add 22 vehicles to peak hour traffic. The results for US 189 traffic impacts were up to Level-of-Service C for north of the site and up to Level-of-Service B south of the site.

Outages for Type 1 fuel will occur annually for approximately 18 days and for Type 1B fuel outages would occur approximately 12 days every 2 years. During outages the number of vehicles traveling to and from the site would increase by 500 per day for 12 to 18 days. Operations and outage workforce shifts could be staggered as needed to mitigate traffic congestion. Some level of carpooling may occur within the outage workforce.

Given the relatively low volume of existing traffic and the US 189 improvements shown in Figure 3.3-1 to facilitate traffic flow, and operations and outage workforces distributed among staggered shifts, operations-related traffic will have a SMALL to MODERATE impact on traffic flows during peak commuting hours and impacts would be SMALL at non-peak hours. Section 5.8.6 discusses accident-related consequences of additional traffic from operations and outage workers.

5.4.4.2 Recreation

Section 2.4.2.5 presents location and utilization information on recreation areas, venues, and tourism sites in the 10-mile vicinity about Kemmerer Unit 1.

5.4.4.2.1 Aesthetics Impacts to Recreation

As discussed in Section 2.4.2.5.2, the recreational opportunities within the 10-mile vicinity are mostly in Kemmerer and thus site facilities and transmission corridor structures located on the Cumberland Flats would not be visible from most recreation and entertainment venues. The distance and topography would also allow noise from the operations to attenuate to levels not noticeable above ambient.

Within the Cumberland Flats are public lands and one hunter management area that offer limited recreational opportunities. Thus, the facility’s structures and lighting could be visible or partially visible to small numbers of campers, birdwatchers, and hunters using these lands. As discussed in Section 5.4.1.1 and Section 5.4.1.3, Kemmerer Unit 1 would have mechanical draft cooling towers that emit noise and have visible plumes. The noise level from the cooling towers would attenuate with distance and not be discernible above the baseline noise level which includes other industrial activities and highway and railroad noise. The water vapor plumes from Kemmerer Unit 1 would appear cloudlike, particularly as distance from the cooling towers increases.

The transmission lines and water supply corridor would be inspected periodically and maintenance activities conducted. Vegetation in the corridors is expected to be mostly low-growing native grasses and forbs that require very little management. Therefore, visitors camping, birding, or hunting on public lands in the vicinity would not be subject to the noise and disturbance associated with typical ROW vegetation management (periodic mowing, brush-hogging, and tree removal).

Kemmerer Unit 1 facilities would be visible to some area visitors engaged in camping, birdwatching, and hunting on nearby public lands. But a coal mine and coal-fired power plant have operated in the vicinity for decades, and the area is crossed by a major highway, transmission lines, and a railroad line. The nighttime lighting and noise are not expected to be noticeably more intrusive than the existing industrial lighting and noise in the vicinity. Therefore, aesthetic impacts to recreational opportunities resulting from operation of Kemmerer Unit 1 and the associated offsite infrastructure will be SMALL and do not warrant mitigation.

5.4.4.2.2 Use Impacts to Recreation

As described in Section 2.4.2.5.2, public and private recreational facilities and outdoor activities are located in the 10-mile vicinity of the Kemmerer Unit 1 site. Workers and family members who relocate to the area are expected to use recreational areas and facilities in the same manner as that of the permanent population. During operations, 67 percent of the 800 in-migrating workers and family members (Table 5.4-1), 536 workers and family members, would represent a 14 percent increase in the combined 2020 populations of Kemmerer, Diamondville, Cokeville, and LaBarge (3,831, Table 2.4-3). Recreational areas, facilities, and venues used by local residents would be expected to increase by a similar percentage. With the exception of the golf club, there are no stated maximum capacities for recreators at the facilities and venues in the 10-mile radius. Impacts to those facilities will be SMALL. The Fossil Island Golf Club has a maximum daily capacity of about 200 golfers. During its busiest days in the summer (usually weekends), the club can approach maximum capacity. A 14 percent increase in customers could exceed the capacity during periods of high use. Impacts to baseline golf course customers are expected to be SMALL to MODERATE. Local parks generally provide facilities and specialty land uses (ball fields, fishing ponds, picnic tables) that cannot readily accommodate increased usage. At the time of the peak operations workforce, the region would have experienced a recent decrease in population due to the departure of the construction workforce. Therefore, it is possible that local parks would have adjusted to meet the needs of the larger construction workforce at the time the economic region would experience the influx of operations workers.

5.4.4.3 Housing

Impacts on housing from Kemmerer Unit 1 operations depend on the number of operations workers that would relocate from outside the economic region and the type and location of housing those workers would desire. Although operations jobs would be expected to be filled by in-migrating workers, as described previously, indirect workers are expected to already reside in the area, so no indirect workers would require housing. The counties and municipalities most likely to house the Kemmerer Unit 1 workforces would be Kemmerer, Diamondville, Cokeville, and LaBarge, in Lincoln County and all of Uinta County.

It is assumed 88 percent of the in-migrating operations workforce would be split between the economic region counties in the following manner: Lincoln County (67 percent) and Uinta County (21 percent).

Operations workers would choose permanent housing units that are for sale or rent: single family homes, multifamily units (i.e., townhomes, apartments, and condominiums), and mobile homes. Table 4.4-19 summarizes the vacant/available housing data presented in Section 2.4.2.6.

County-level data are provided for Uinta County, while municipality-level data are provided for Lincoln County. Most new housing construction would be located in Kemmerer and Diamondville. Half of the new permanent and temporary units is conservatively assumed to be constructed and available to the project (Section 4.4.4.3.1). Of the total number of existing and new permanent units in the economic region, 750 permanent units would be located in the Lincoln County municipalities, and 306 permanent units would be in Uinta County (Table 4.4-19 and Section 2.4.2.6).

The 168 operations workers (67 percent of 250) would migrate into the Lincoln County municipalities and 53 operations workers (21 percent of 250) would find housing in Uinta County. There will be ample vacant housing for the operations workforce.

Operations demand will not cause rental rates and new and existing housing prices to increase. Most housing price and rental rate increases would have already taken place during construction. Out-migration of the construction workforce, at the end of construction, would likely leave a significant number of vacant units, for which there might not be enough demand. Kemmerer Unit 1 operations workers could occupy up to 168 units (67 percent of 250) in Lincoln County, mitigating some impacts, but it is possible there would be many more vacant units still unoccupied. Unless other new businesses enter the region and create additional housing demand, the excess housing would cause prices and rents to decrease. Decreased prices and rents would adversely impact homeowners and landlords, but benefit disadvantaged populations, especially low-income families. Local taxing bodies (school districts, special districts, municipalities, and counties) would be adversely affected by decreasing real property values which could result in decreased property tax revenues. This is especially true in Kemmerer and Diamondville, where most of the new housing would have been constructed.

Across the economic region, there will be ample housing to accommodate the operations workforce. Most workers would find housing in Lincoln County. Impacts will be SMALL in both counties. The operations workforce will serve to mitigate some of the impacts created by the out-migrating construction workforce in Lincoln County.

5.4.4.4 Public Services

5.4.4.4.1 Water Supply Facilities

The impacts of both operations activity demand and project-related population demand were considered during the operations phase on local water resources. Impacts are largely based on the population increase resulting from the in-migration of project workers and associated family members during operations. An estimated 220 operations workers and 484 associated family members would migrate into the economic region (Table 5.4-1). Section 2.4.2.7.1 describes the major public water suppliers in the economic region.

Onsite Water Use

All water used in the plant, including potable water, will be sourced from the Hams Fork river via water supply pipeline to Naughton Power Plant raw water storage pond and to the site via a water supply pipeline. Therefore, municipal sources will not be impacted.

Offsite Water Use

The largest municipal water suppliers in the economic region have excess capacity: 3.9 million gallons per day in Kemmerer and Diamondville and 1.5 million gallons per day in Evanston (Table 2.4-32). As stated in Section 4.4.4.1, the average person in the U.S. uses about 82 gallons per day. The impact to local water supply systems from operations-related population growth can be estimated by calculating the amount of water required by the in-migrating project-related population. A population increase of 704 would increase water consumption by approximately 57,700 gallons per day.

Sixty-seven percent of the 800 in-migrating workers and family members, 536 people, would reside in Lincoln County. These new residents would use approximately 44,000 gallons per day, about 1.1 percent of Kemmerer and Diamondville's excess capacity. Twenty-one percent of the 800 in-migrating workers and family members, 168 people, would reside in Uinta County. Those new residents would use approximately 13,800 gallons per day, less than 1 percent of Evanston's excess capacity.

The impact on economic region municipal water supplies by project-related in-migrating workforces and family members will be SMALL. Water use by these in-migrants will represent less than 2 percent of available capacity in the economic region.

5.4.4.4.2 Wastewater Treatment Facilities

The impacts of both operations activity demand and project-related population demand during the operations phase were considered on local wastewater treatment facilities. Section 2.4.2.7.2 describes the public wastewater treatment systems in the economic region.

Onsite Wastewater Treatment

As described in Section 3.2, Kemmerer Unit 1 will have onsite sanitary wastewater treatment. Therefore, municipal wastewater treatment facilities would not be impacted.

Offsite Wastewater Treatment

As presented in Table 2.4-34 municipal wastewater treatment facilities in the economic region have excess production capacity. There would be ample capacity for the operations workforce and their family members throughout the economic region.

The largest impacts would occur in the Kemmerer-Diamondville Water & Wastewater Joint Powers Board system. The 536 workers and family members who would reside in Lincoln County would generate approximately 44,000 gallons per day of wastewater, consuming up to 14.7 percent of the Board's current minimum excess treatment capacity of 300,000 gallons per day. In 2023, the Board's wastewater treatment plant officials procured State and county grants to address the most severe inflow and infiltration issues in their system (Section 2.4.2.7.2). The planned repairs would free up about 375,000 gallons per day of existing capacity (Section 2.4.2.7.2), reducing the consumption of the excess capacity to 6.5 percent.

The 168 new residents in Uinta County would generate approximately 13,800 gallons per day of wastewater, using less than 1 percent of Evanston's excess wastewater treatment capacity. The impact on the major wastewater treatment facilities in Lincoln and Uinta Counties by project-related in-migrating workforces and family members would be SMALL.

5.4.4.4.3 Law Enforcement, Fire, and Medical Services

Law Enforcement

Residents-per-police officer ratios for the counties and municipalities in the economic region are presented in Table 2.4-36. In 2019, the ratio of residents per police officer was 261 to 1 in the two-county economic region. This ratio includes both county and city agency officers. Table 5.4-6 presents the same data, with one exception. Total Population includes the following jurisdictions: Kemmerer, Diamondville, Cokeville, LaBarge, and Uinta County. The towns of Cokeville and LaBarge have no reported police officers, so they were not included in Table 2.4-36. Their population numbers are included in Table 5.4-6 because they are located within the economic region and would also be served by the police officers reported in Table 2.4-36. The net effect is that the baseline number of residents-per-police officer would be 261 to 1.

As stated in Section 2.4.2.7.3, the national average was 414 residents per police officer. There is no national standard for residents-per-police-officer ratios, as there is a great deal of variability between populations of similar sizes. Urban areas tend to employ more law enforcement officers per resident than rural areas. In Uinta County, the county and city agency ratios exceeded the national ratio. In Lincoln County, the county agency ratio exceeded the national ratio, but the Kemmerer and Diamondville ratios did not. Most of the economic region is rural. Hence, ratios can be higher than the national average.

Kemmerer Unit 1 will employ its own security force. Offsite impacts to law enforcement services would be caused by in-migrating workforces. During operations, 704 workers and family members will move into the economic region (Table 5.4-1). This new population would increase the 2019 residents per police officer ratio in the economic region (Kemmerer, Diamondville, Cokeville, LaBarge, and Uinta County) by 2.9 percent (Table 5.4-6), creating a SMALL impact. To accommodate the additional population, 3 more police officers (and associated equipment) would be needed in the economic region to maintain the current residents-per-police officer ratio.

During the peak construction period, to maintain pre-project ratios, 13 additional law enforcement officers are estimated to be required in the economic region. The operations workforce would reach full staff in month 26 of construction (Figure 3.3-4). During operations, a maximum of three additional officers and associated equipment would be required in the economic region (Table 5.4-6) to maintain pre-project ratios. Therefore, assuming 13 additional police officers were hired in the economic region during the peak construction period, only 3 of those officers would be required to serve the operations-related population increase. This could cause an overstaffing of 10 officers. The number of officers could be reduced to pre-project levels. Alternatively, officers could be retained to supplement the general provision of law enforcement services in the economic region. Kemmerer Unit 1 related tax payments, including both property taxes and sales and use taxes paid by USO and its employees, could continue to assist in funding these services.

Fire Protection Services

Residents-per-active-firefighter ratios for the counties in the economic region are presented in Table 2.4-37. In 2021, the economic region ratio was 186 to 1. In 2022, the national ratio was 312 residents per active firefighter (Section 2.4.2.7.3).

Kemmerer Unit 1 is responsible for onsite fire protection capability and emergency response. Offsite impacts to fire protection services would be caused by the in-migrating project workforces. The addition of 704 workers and family members would increase the 2021 residents-per-active-firefighter ratio in the economic region by 3 percent (Table 5.4-7), creating a SMALL impact. To accommodate the additional population, four more active firefighters (and associated equipment) will be needed in the economic region to maintain the current residents-per-active firefighter ratio.

During the peak construction period, in order to maintain pre-project ratios, 13 additional active firefighters are estimated to be required in the economic region. The operations workforce would reach full staff in month 26 of construction (Figure 3.3-4). During operations, a maximum of four additional firefighters and associated equipment would be required in the economic region (Table 5.4-7) to maintain pre-project ratios. Therefore, assuming 13 additional active firefighters were hired in the economic region during the peak construction period, only four of those officers would be required to serve the operations-related population increase. This could cause an overstaffing of nine firefighters. The number of firefighters could be reduced to pre-project levels. Alternatively, firefighters could be retained to supplement the general provision of fire protection services in the economic region. Kemmerer Unit 1 related tax payments, including both property taxes and sales and use taxes, could continue to assist in funding these services.

Medical Services

Detailed data concerning the medical services in the economic region are provided in Section 2.4.2.7.3.

Kemmerer Unit 1 is responsible for onsite medical capabilities and emergency response services. Minor injuries to operations workers will be assessed and treated by onsite medical personnel. Other injuries will be treated at hospitals in the economic region, depending on the severity of the injury. Agreements would be in place with some local medical providers to support emergencies.

As indicated in Table 2.4-4, the 2020 population of the two-county economic region was 40,031. According to Table 2.4-38, there were 58 certified hospital beds, with occupancy rates ranging from 5 to 9 percent, in the economic region. Adding an estimated 704 residents to the economic region population would increase the population by 1.8 percent. A 1.8 percent increase in occupancy rates would still be well below the total certified hospital bed capacities in the economic region. The project-related increase in population in the economic region would not exceed medical facility capacities. Therefore, the potential impacts of operations on medical facilities will be SMALL and mitigation is not warranted.

In 2020, there were 629 residents per physician in the economic region (Table 2.4-39). As stated in Section 2.4.2.7.3, the U.S. Department of Health Resources and Services Administration maintains lists of areas, populations, and facilities that are experiencing shortages of health care services and personnel. The Health Professional Shortage Area list tracks shortages of primary, dental, and mental health care providers. A query of this list for the economic region is presented in Table 2.4-40. According to query results, the City of Kemmerer was short 0.4 full-time equivalent primary care providers in 2021. Eastern Uinta County was short 0.2 full-time equivalent primary care providers. With respect to mental health providers, the southwest region of Wyoming is considered a “High Needs Geographic Health Professional Shortage Area”. The region was short 2.7 full-time equivalent mental health providers. The addition of 704 new residents to the economic region would compound healthcare professional shortages that already exist. However, the project-related population increase of 1.8 percent would make a negligible contribution to the overall shortages. Therefore, project-related contributions to existing healthcare provider shortages will be SMALL.

5.4.4.4.4 Education

Section 2.4.2.7.4 presents staff ratio and school capacity data for the school districts in the economic region. Each in-migrating worker with a family is assumed to have 0.88 school-age children (Table 5.4-1). Therefore, 194 school-age children would accompany an estimated 220 in-migrating workers (Table 5.4-1). This analysis conservatively assumes that all school-age children will attend public schools and reside in one of the two counties in the economic region.

The economic region has 22 schools in 6 school districts (Table 2.4-42) including the two Lincoln County school districts, the three Uinta County school districts, and the Sublette County school district (#9) that serves Lincoln County children. The total enrollment reported in July 2022 for the economic region was 5,512 students, and there was available seating for 4,578 more students (Table 2.4-42). Student-teacher ratios in all districts were well below the State recommendation of 16:1 (Table 2.4-41). It is estimated that all 194 students associated with operations workers would enroll in school districts within the economic region. These students will represent about 4 percent of the economic region’s excess seating capacity and a 3.5 percent increase in the economic region’s enrollment in 2022.

Individual schools in the economic region were examined for capacity issues. The influx of workers and families would lead to larger enrollments, the largest of which, would be in LCSD #1 and UCSD #1. Kemmerer Unit 1 workers’ school-age children are expected to increase school district enrollments by 148 in Lincoln County and 46 in Uinta County. As reported in July 2022, there were only 66 available classroom seats in Lincoln County’s only elementary school (Table 2.4-42). In Evanston, two of four elementary schools were over 90 percent of capacity.

Though the impacts to the economic region will likely be SMALL, the impacts could vary for an individual school or district. The magnitude of the impact to a school or district depends on where the workers would settle and the ages of their children. If an impact to a school were moderate or large, it would most likely be mitigated by the following:

- Property tax revenues, which would increase during Kemmerer Unit 1 operations

- The State's education equalization programs, which would ensure that school districts that receive workforce children but do not receive tax payments from the proposed plant, would receive additional funding from the State because of increased enrollments
- Communication with local and regional government officials regarding Kemmerer Unit 1 operations and scheduling, thereby providing time for the school districts to plan for the influx

Therefore, impacts to primary and secondary schools and districts in the economic region will be SMALL, after mitigation through Wyoming's education equalization programs. Additionally, this conclusion is supported by the fact that the peak operations workforce would not be reached sooner than the final construction year, giving school districts a couple of years to make accommodations for the additional students. As enrollments would grow, schools with capacity issues could install modular classrooms and recruit additional teachers.

There are no colleges, universities, community colleges, or trade schools within a 50-mile radius of the site. The nearest post-secondary institution is the Western Wyoming Community College, located in Rock Springs. Western Wyoming Community College reported an enrollment of 4,316 students for the 2020-2021 academic year (Section 2.4.2.7.4). During the 2016-2018 academic years, the College's enrollment approached 6,000 students (Section 2.4.2.7.4). There would be plenty of capacity to accommodate the college-aged children of the operations workforce. Therefore, impacts to the college, resulting from Kemmerer Unit 1 operations, will be SMALL and beneficial.

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Table 5.4-1 Assumptions for Work Force Migration and Family Composition during Kemmerer Unit 1 Operations

Workforce characterization	Operations
Number of operations workers on site	250
Average worker family size (worker, spouse, children)[a]	3.20
Total in-migrating workers plus family members (= population increase)	800
Workforce migration	
Percent of workforce migrating into Economic Region	88%
Number of workers migrating into Economic Region	220
Families	
Percent of workers who bring families into Economic Region	100%
Number of workers who bring families into Economic Region	220
Average worker family size (worker, spouse, children)[a]	3.20
Total in-migrating workers plus family members into Economic Region (=population increase)	704
School-age children	
Number of school-age children per family[b]	0.88
Total number of school-age children (0.88 X 220 families) into Economic Region	194

a. Reference 5.4-12 (Table S1101)

b. Reference 5.4-13 (Table B05009)

Table 5.4-2 Direct and Indirect Employment during Kemmerer Unit 1 Operations

Employment / Demographic Characteristic	
Direct jobs-operations workforce (88 percent migrating into Economic Region)	220
Employment multiplier for Electric Power Generation, Transmission, and Distribution Industry in the economic region (indirect portion only)[a]	1.8559
Indirect jobs-resulting from in-migration of operations workers (220 x 1.8559)	408
Total number of jobs (Direct plus Indirect)	628
Estimated number of indirect workers that migrated into the Economic Region during construction	304
Estimated number of unemployed adults available to fill indirect jobs (25 percent of 803 unemployed workers in Economic Region) (Table 2.4-8)	201

a. Reference 5.4-1

Table 5.4-3 Sensitivity Analysis of Impacts to Economic Region Economy from Operations Worker In-Migrant Wages

Average Annual Wage - Nuclear Electric Power Generation, North American Industry Classification System 221113 (2021)			$155,840
Number of In-Migrating Operations Workers (to Economic Region)			220
Estimated Total Annual Payroll			$34,284,800
Earnings Multiplier for Electric Power Generation, Transmission, and Distribution Industry			1.8755
Total Personal Income in Economic Region, 2021			$2,159,554,000
Percent of Total Operations Workforce Wages that could be Spent in Economic Region	**Wage Dollars**	**Total Dollar Impact to Region (earnings multiplier applied)**	**Multiplied Wages as Percent of 2021 Total Personal Income in Economic Region**
10	$3,428,480	$6,430,114	0.3
20	$6,856,960	$12,860,228	0.6
30	$10,285,440	$19,290,343	0.9
40	$13,713,920	$25,720,457	1.2
50	$17,142,400	$32,150,571	1.5
60	$20,570,880	$38,580,685	1.8
70	$23,999,360	$45,010,800	2.1
80	$27,427,840	$51,440,914	2.4
90	$30,856,320	$57,871,028	2.7
100	$34,284,800	$64,301,142	3.0

Sources: Reference 5.4-4, Reference 5.4-1, Reference 5.4-2

Table 5.4-4 Kemmerer Unit 1 Property Tax Payment Comparison, First Year of Operations

	Lincoln County Property Tax Levies[a]				Property Tax Payment		
Tax Jurisdiction	**2011**	**2021**	**Average Annual Percent Change, 2011-2021**	**First Year of Operations - 2030 (Projection)**	**Property Tax Payment (First Year of Operations)**	**Property Tax Payment as Percent of 2030 Projection**	**Impact Significance**
County	$10,588,451	$8,726,261	-1.9	$7,332,033	$1,382,250	18.9	Moderate
Municipal	$649,444	$870,521	2.9	$1,133,165	0	0.0	None
Special District	$4,822,020	$5,013,971	0.4	$5,193,251	$774,000	14.9	Moderate
Total Education	$43,342,687	$32,579,974	-2.9	$25,198,933	$5,343,750	21.2	Small[b]
Total	$59,402,602	$47,190,727	-2.3	$38,362,133	$7,500,000	19.6	Moderate to Large

Source: Reference 5.4-14 and Reference 5.4-15

Notes:

a. Includes all school district levies (including the State levy for the School Foundation Program (12 mill cap)) and bond and interest revenue.

b. Because Wyoming employs an education equalization program (School Foundation Program), the State redirects money from school districts with excess local property tax revenues to school districts with insufficient local property tax revenues. Therefore, a direct comparison of property tax payments to Lincoln County School District #1 cannot be made. However, it is useful to note the size of the payment, in reference to the school district's revenues.

Table 5.4-5 Operations Commuters

	Traveling South on US 189			Traveling North on US 189	
	Lincoln County commuters	Sweetwater County commuters	Other Counties	Uinta County commuters	Other Counties
Total vehicles	168	10	10	53	10
Total vehicles by approach direction	188 (75 Percent)			63 (25 Percent)	

Note: All numbers rounded to the next whole number.

Table 5.4-6 Law Enforcement in the Economic Region, Adjusted for the Operations Workforce and Associated Population

Location	Total Population in 2020[a]	Additional Population due to New Plant Operations	Total Population	Sworn Police Officers (2019)[b]	Operations Workforce-Adjusted Persons-per-Police Officer Ratio	Pre-Operations Persons-per-Police Officer Ratio	Percent Increase from Pre-Operations Persons-per-Police Officer Ratio	Additional Police Officers Required during Operations
Economic Region	24,281	704	24,985	93	269	261	2.9	3

Sources: Table 2.4-36 and Reference 5.4-11

a. Total Population includes the following jurisdictions: Kemmerer, Diamondville, Cokeville, LaBarge, Uinta County, Green River, and Rock Springs. Cokeville and LaBarge have reported no police officers, so they were not included in Table 2.4-36. They are included here because they are within the economic region and would be served by the police officers reported in this table.

b. Includes officers from, both, city and county agencies.

Table 5.4-7 Fire Protection in the Economic Region, Adjusted for the Operations Workforce and Associated Population

Location	Service Population	Additional Population due to New Plant Operations	Total Population	Active Firefighters (full-time, part-time, and volunteer) (2021)	Operations Workforce-Adjusted Persons-per-Firefighter Ratio	Pre-Operations Persons-per-Firefighter Ratio	Percent Increase from Pre-Operations Persons-per-Firefighter Ratio	Additional Firefighters Required during Peak Operations Period
Economic Region	23,850	704	24,554	128	192	186	3.0	4

Source: Table 2.4-37

5.5 Environmental Justice

Environmental justice refers to a Federal policy under which each Federal agency identifies and addresses disproportionately high and adverse human health, environmental, or socioeconomic effects of its programs, policies, and activities on minority or low-income populations. The U.S. Census Bureau American Community Survey 5-Year Summary data for 2016–2020 data was used at the block group level to identify concentrations of minority and of low-income populations. Section 2.5.1 describes the evaluation process used to identify minority and low-income populations living within the region that meet the conditions associated with the NRC guidance.

There are 35 census block groups located at least partially within 50 miles (80 kilometers) of the Kemmerer Unit 1 Site. One census block group in Summit County, Utah, (Block Group 1, Census Tract 9642.03) falls within this 50-mile (80-kilometer) radius and was identified as containing a significant Black or African American population (Table 2.5-1 and Figure 2.5-1). As discussed in Section 2.5.2, this block group likely does not contain this population; therefore, it is not considered for potential impacts. One block group in Summit County, Utah, and one block group in Sweetwater County, Wyoming, have significant Hispanic, Latino, or Spanish Origin ethnicity populations (Table 2.5-1 and Figure 2.5-2). The block group in Summit County, Utah, is approximately 40 miles (64 kilometers) southwest of the site. The block group in Sweetwater County, Wyoming, is approximately 27 miles (43 kilometers) east of the site. No low-income populations were identified within the 50-mile (80-kilometer) radius.

While the health and environmental effects of the project will be experienced in the 50-mile (80-kilometer) region, socioeconomic effects will be experienced in the economic region. The two-county economic region for operations impacts includes the southern portion of Lincoln County and all of Uinta County. It is assumed that 88 percent of the in-migrating operations workforce will settle in the economic region (see Section 5.4.2). The two-county economic region is contained within the 50-mile (80-kilomenter) region.

For its analysis, three types of impacts were evaluated: health and environmental impacts, socioeconomic impacts, and impacts experienced by minority and low-income populations with special conditions, unique characteristics, or subsistence-living practices that make them more vulnerable than the general population. The following analysis summarizes the site's impacts and discusses whether minority and low-income populations will experience, disproportionately, those that are high and adverse.

The Environmental Justice analysis was conducted under the premise that if the impacts to the general population were found to be SMALL to MODERATE and there were no resource dependencies, preexisting health conditions, or location-dependent reasons that will affect the level of significance of the impact to minority or low-income populations, there will be no disproportionately high and adverse impact on low-income or minority populations.

5.5.1 Health and Environmental Impacts

There are three primary pathways for health and environmental impacts: soil, water, and air. Operations activities will have minimal impacts to soils at the site and in the vicinity surrounding it. Radiological doses to nearby residents via soil or through ingestion of vegetables will be below

10 CFR 50, Appendix I criteria (Section 5.9). Therefore, impacts to the general population and any minority or low-income populations is anticipated to be SMALL. Low-level radioactive waste, as well as non-radioactive waste, will be generated onsite, but these will be disposed in permitted facilities. Impacts to soils from the site is anticipated to be SMALL and will not require mitigation.

The closest minority population is located in Sweetwater County and as indicated in Section 2.4.2.7.1, draws drinking water from the Green River. Kemmerer Unit 1's water usage will not impact this minority population. Blowdown and other process wastewater and sanitary wastewater discharges to North Fork Little Muddy Creek will meet all requirements established in the Wyoming Pollutant Discharge Elimination System permit (Section 5.2.3). Given that Kemmerer Unit 1's wastewater discharges will be governed by the Wyoming Pollutant Discharge Elimination System permit and the plant's water usage will not impact the closest minority population, there will be no operations-related environmental effects that need to be mitigated; therefore, there will be no disproportionately high and adverse impacts to minority and low-income populations.

The total radiological effluent and direct radiation doses from the site will be well within the regulatory limits of 40 CFR 190. Radiological impacts to members of the public are anticipated to be SMALL (Section 5.9.2). Further, the nearest minority population is approximately 27 miles (43 kilometers) from the site. Therefore, there will be no disproportionately high and adverse radiological impacts to minority populations.

The site will produce noise from the operation of equipment such as pumps, cooling tower fans, transformers, the turbine, standby diesel generators, switchyard equipment, and loudspeakers, with the highest level of noise associated with the operation of the cooling towers. Noise generated will be attenuated by distance and is expected to be less than 65 decibels adjusted at the site boundary (Section 5.8.2). No noise impacts will be expected to affect the nearest minority population.

The site will operate under air permits issued by the State of Wyoming and in compliance with Wyoming Department of Environmental Quality regulations. Offsite air quality impacts for the cooling tower are discussed in Section 5.7. The impact of these emissions on air quality will not extend to the closest minority population, located approximately 27 miles (43 kilometers) from the site, thus, there will be no disproportionately high and adverse impacts to minority or low-income populations from air quality impacts.

Health and Environmental impacts to the general population from operations via the three pathways is anticipated to be SMALL; therefore, there will be no disproportionately high and adverse impacts to minority or low-income populations within a 50-mile (80-kilometer) radius of the site via soil, water, or air pathways that will affect the health and environment of populations studied in this Environmental Justice analysis.

5.5.2 Socioeconomic Impacts

As discussed in Section 5.4.3.1.1, impacts created by project employment and spending in the economic region is anticipated to be SMALL to LARGE and beneficial. The in-migration of approximately 250 operations workers will create 408 indirect jobs and provide employment opportunities for unemployed residents, including unemployed minority and low-income workers. This increase in employment opportunities will benefit minority and low-income populations.

There is ample housing within the economic region (Section 5.4.4.3) to accommodate the in-migrating operations workforce. Therefore, impacts to the region's housing market is anticipated to be SMALL. Also, because the in-migrating operations workforce would be significantly smaller than the departing construction workforce, it will be insufficient to occupy all of the housing units vacated by the construction workforce. The excess housing will likely result in downward pressure on housing prices and rents, creating more affordable housing options for low-income populations.

US 189 is the only access road to the site and will experience the greatest traffic impacts. The additional passenger vehicles will have a small impact on US 189 and US 30 and will not exceed the roads' capacities (Section 5.4.4.1). Increased traffic as a result of operations will have a SMALL impact on the roads in the vicinity of the site. There will be no disproportionate transportation impacts to minority or low-income populations.

Potential impacts from operations on public services in the economic region were also assessed (Section 5.4.4.4). Impacts to water supply and wastewater treatment facilities in the overall economic region are anticipated to be SMALL. Impacts to law enforcement, fire protection services, and medical facilities are anticipated to be SMALL. Impacts to education facilities and services will also be SMALL. There will be no disproportionately high and adverse impacts to minority or low-income populations.

There were not any location-dependent, disproportionately high and adverse impacts affecting minority and low-income populations identified. In summary, there were no operations-related impacts identified that will have disproportionately high and adverse effects on the human health, environment, or socioeconomic resources of minority or low-income populations in the 50-mile region.

5.5.3 Subsistence, Special Conditions, and Unique Characteristics

As presented in Section 2.5.5, there are no known minority or low-income populations with special conditions, unique characteristics, or subsistence-living practices in the demographic and economic regions. Therefore, will be no impacts from operations to minority and low-income populations based on the absence of these conditions, characteristics, or subsistence practices.

5.6 Historic and Cultural Resources

Potential impacts of the operation of Kemmerer Unit 1 and ancillary facilities, including the transmission lines and water supply line, on historic and cultural resources are assessed in this section. Section 2.6 discusses the cultural context of the project area and describes identified cultural resources and historic properties. The primary perspective of this analysis is that of Section 106 of the National Historic Preservation Act (54 U.S. Code § 306108) and its enabling regulations, 36 CFR Part 800.

5.6.1 Onsite Impacts

The proposed reactor and supporting facilities will be located within the site area (Figure 3.3-1). This 290-acre (117-hectare) area comprises a portion of the project's overall direct effects area of potential effects (APE) (Figure 2.6-1). Approximately 218 acres (88.2 hectares) of the site area will be disturbed by preconstruction and construction activities in building Kemmerer Unit 1. These ground disturbing activities will result in disturbance to or destruction of archaeological sites and isolated resources within the affected areas.

As described in Section 4.6.1, construction of Kemmerer Unit 1 will result in an adverse effect to one historic property. Operational activities will occur in areas that were previously disturbed during construction of the plant. It is unlikely that these areas will contain any intact historic properties once construction has been completed. No direct effects from traffic or auditory intrusion will occur. No additional direct effects will occur beyond those resulting from construction. Thus, operational activities will have a SMALL effect on these historic properties in the physical disturbance APE and will not require mitigation.

With operational and maintenance activities, there is always the possibility for inadvertent discovery of previously unknown archaeological resources or human remains on the site. The Memorandum of Agreement between NRC, State Historic Preservation Office, and the Advisory Council on Historic Preservation will likely include provisions to deal with these discovery situations, in compliance with the National Historic Preservation Act and the Wyoming burial protection law, Wyoming Statute § 7-4-106. Internal procedures will be developed to implement discovery provisions which could be in the Memorandum of Agreement. A Cultural Resources Protection Plan, including an Unanticipated Discoveries Plan, and protocols related to routine ground disturbing activities will be developed that will ensure any unanticipated discoveries are dealt with promptly and appropriately during operation of the plant.

5.6.2 Offsite Impacts

5.6.2.1 Direct Area of Potential Effects

Offsite areas comprising the direct APE for the project include ancillary facilities related to the operation of the site. These offsite areas currently comprise the approximately 511-acre (207-hectare) macro-corridor within which the water supply line from the Naughton Power Plant and the two transmission lines to the switchyard at the Naughton Power Plant will be located. It is anticipated that the ROW for the water line and transmission lines will be narrower than the current macro-corridors, so the actual operational area of involvement for these offsite utilities will be less than 511 acres (207 hectares).

The corridor for the water supply line and that of the transmission lines are adjacent and occupy a single ROW that also will include an access road. The exception to this arrangement will occur near the northern end of the corridor where it will split into two, one for the water line and one for the transmission lines (Figure 2.6-1). Where the combined utility line will cross Site 48LN8940, a multi-component prehistoric and historic archaeological site with indications of intact subsurface deposits which is recommended as eligible for the National Register of Historic Places, impacts will be avoided by horizontal directional drilling of the water line, spanning the site with the transmission lines, and routing of the access road.

The Class III inventory (Karpinski and Karpinski 2023) indicate that the operation of water and transmission lines will not require mitigation and will have a SMALL effect on any historic property. Likewise, field investigations and outreach to American Indian tribes have not identified any cultural resources that are not historic properties but may be considered important in the context of National Environmental Policy Act, such as sacred sites, cemeteries, or local gathering areas. A Cultural Resources Protection Plan will be developed and protocols related to routine ground disturbing activities within the utility corridor that will ensure that disturbances to Site 48LN8940 do not occur and that any unanticipated discoveries are dealt with promptly and appropriately during operation of these facilities.

5.6.2.2 Indirect Area of Potential Effects

The Project’s proposed indirect APE comprises a 5-mile (8-kilometer) buffer around the proposed direct APE (Figure 2.6-3). Of the known cultural resources in the 5-mile (8-kilometer) buffer, 10 were assessed for potential visual impacts from construction, and it was concluded that construction of the project will have no adverse effect on historic properties in the indirect APE.

Field investigations and consultations with American Indian tribes have not to date identified any cultural resources that are not historic properties but may be considered important in the context of National Environmental Policy Act, such as sacred sites, cemeteries, or local gathering areas in the indirect APE. Overall, the impacts from construction to cultural resources in the indirect APE were evaluated as SMALL (Section 4.6.2.2).

Section 5.7.1 describes the predicted amount of pluming, fogging, icing, and salt deposition from the mechanical draft cooling tower. Operation of the cooling tower will result in median plume heights ranging from 138 feet (42 meters) in summer to 440 feet (134 meters) in winter (Section 5.7.1.1.1 and Table 5.7-2). The plume will be visible from historic properties in the APE. The degree of visibility will depend on the season and resulting height of the plume. It will also depend on the weather, because even a partly cloudy sky reduces the visibility of a plume. Overall, visibility of the plume will be intermittent during an average year. As described in Section 4.6.2.2, construction of the Kemmerer Unit 1 structures themselves will result in no effect to the visually sensitive historic properties in the APE. Changes in traffic and noise as a result of the project will have no effect on historic properties in the indirect APE. While operation of the plant and the resulting plume will introduce a new visual element into the environment, the plume itself will have a SMALL effect on the historic properties and will not require additional mitigation.

References

5.6-1 (Karpinski and Karpinski 2023). Mark Karpinski and Elizabeth Karpinski. "A Class III Cultural Resource Inventory for TerraPower, LLC's Natrium Demonstration Project." 2023. Lincoln County, Wyoming. Prepared for TerraPower, LLC, Bellevue, WA, and Bechtel, Reston, VA, by Tetra Tech, Inc., Salt Lake City, UT.

5.7 Air Resources

The impacts to the atmosphere from cooling system operations, as well as the impacts to air quality from operation of the proposed plant and associated transmission lines, are described in this section. Section 5.7.1 describes cooling system impacts, Section 5.7.2 describes air-quality impacts associated with operations, and Section 5.7.3 describes transmission line impacts.

5.7.1 Cooling-System

The heat discharge system for Kemmerer Unit 1 is a wet cooling system consisting of one mechanical draft cooling tower that removes excess heat from both the circulating water system and the service water system.

5.7.1.1 Cooling Tower Heat Discharge System and Impacts

The heat discharge system’s mechanical draft tower includes crossflow and counterflow designs. Hot water from the condenser is introduced at the top of the tower and flows down through the fill section where it is brought into contact with ambient air flowing across, or counter to, the direction of the falling water flow. Both sensible and latent heat transfer to the air cools the bulk of the water which is then collected in a basin and returned to the condenser. The air leaving the tower is heated and humidified to an essentially saturated plume. There will be appreciable electrical loads for the fans in each of the tower’s cells. In a mechanical draft cooling tower, water usage is due to makeup of losses to blowdown, evaporation, and drift. A relatively small amount of water used in closed cycle systems compared to once-through systems. Mechanical draft cooling towers are often the cooling tower design for power applications, and this type of tower is in widespread use in industry.

Cooling towers evaporate water to dissipate heat to the atmosphere. Evaporation is followed by partial recondensation, which, with the right atmospheric conditions, creates a visible mist or plume. The plume creates the potential for shadowing, fogging, icing, and localized increases in humidity. In addition, small water droplets are blown out of the tops of the cooling towers. These water droplets are referred to as drift and could be deposited, along with any dissolved salts, on vegetation and surfaces surrounding the cooling towers.

Kemmerer Unit 1 impacts from fogging, icing, shadowing, and drift deposition were modeled using the Electric Power Research Institute Seasonal-Annual Cooling Tower Impacts (SACTI) prediction code (Reference 5.7-2). This code incorporates the modeling concepts presented by Policastro et al. (Reference 5.7-4), which are endorsed by the NRC in NUREG-1555. The model provides predictions of seasonal and annual cooling tower impacts from mechanical or natural draft cooling towers. It predicts average plume length, rise, drift deposition, fogging, icing, and shadowing, providing results that have been validated with experimental data. Engineering data for Kemmerer Unit 1 were used to develop input to the SACTI model for normal operations. The SACTI code simulated one linear mechanical draft cooling tower (LMDCT) for Kemmerer Unit 1. The LMDCT for Kemmerer Unit 1 has a maximum heat rejection rate of 708.2 megawatts and a maximum water flow of 220,000 gallons per minute (830,000 liters per minute).

The LMDCT has 10 ports with a diameter of 30.0 feet (9.14 meters), and the tower is 39.4 feet (12 meters) high. Meteorological data were acquired from the National Weather Service meteorological stations located at Kemmerer, Wyoming for the surface data and the Riverton Regional Airport for the upper air mixing height data for the years 2020–2021. Mixing height data are required in air dispersion modeling. Due to mixing height data not being recorded at the Kemmerer station, mixing height data were used from the nearest and most representative station at Riverton Regional Airport in Riverton, Wyoming. Relevant physical and performance characteristics of the mechanical draft cooling towers are presented in Table 5.7-1.

5.7.1.1.1 Length and Height of Elevated Plumes

The analysis of cooling tower plume behavior for the 2-year simulation period (2020–2021) indicated that the predicted plumes will remain primarily on site. The maximum of the median plume lengths and plume heights across the 2020–2021 SACTI modeling period are provided in Table 5.7-2.

Using maximum values across the 2020–2021 SACTI modeling period, the median plume length ranged from approximately 640 feet (195 meters) in the summer to 1,624 feet (495 meters) in the winter. The annual prediction for the median plume length is 1,398 feet (426 meters) from the cooling tower. Plume lengths will cross over the fenceline often during the winter months towards the east but rarely, less than 3 percent of the time, towards the west across the highway, as shown in Figure 5.7-1, for the worst-case spring season for impacts to the west. Plumes will have minimal impact on the highway.

Using maximum values across the 2020–2021 SACTI modeling period, the median plume height ranged from approximately 138 feet (42 meters) in the summer to 440 feet (134 meters) in the winter. The annual prediction for the median plume height is 354 feet (108 meters) from the cooling tower. Plume heights will be visible from the surrounding region but will have minimal impacts.

The impacts attributable to plume heights and plume lengths as a result of the operation of the Kemmerer Unit 1 cooling tower are anticipated to be SMALL, and mitigation does not appear to be warranted.

5.7.1.1.2 Ground-Level Fogging

Fogging from the LMDCT occurs when the visible plume intersects with the ground, appearing like fog to an observer. Table 5.7-3 provides the maximum overall and 1,312 feet (400 meters) maximum fenceline fogging hours per season based upon the 2020–2021 SACTI modeling period. The code predicted a total maximum of 156 hours of fogging from the operation of the LMDCT during the winter season towards the east. Each of the other seasons are predicted to have less than 27 hours of fogging. The annual prediction for fogging has a maximum of 192 hours per year towards the east. The code predicted at the 1,312 feet (400 meter) fenceline a maximum of 7.1 hours of fogging will occur during the spring season towards the east northeast. Each of the other seasons are predicated have less than 5 hours of fogging per season. The annual prediction for fogging has a maximum of 14.5 hours towards the east northeast. The 1,312 feet (400 meters) fogging hours ranged from 0.0-0.32 percent of the hours during a season. Figure 5.7-2 shows the maximum fogging hours impact to the highway off to the west, for perspective, at a maximum of 0.7 hours or less per season.

The impacts attributable to fogging as a result of the operation of the Kemmerer Unit 1 cooling tower are anticipated to be SMALL and mitigation does not appear to be warranted.

5.7.1.1.3 Salt Deposition

Salt deposition from the LMDCT is presented in Table 5.7-4. Water droplets blown from the LMDCT will have the same concentration of salts as the water in the LMDCT basins. As the water droplets blown from the tower evaporates, salt is deposited on vegetation or equipment. The maximum predicted salt deposition is to the south of the cooling towers, 4,921 feet (1,500 meters) from the center point of the LMDCT. The maximum deposition across the two years of SACTI modeling (2020–2021) occurred in the winter for 2020 and is 0.22 pounds per acre per month (0.25 kilograms per hectare per month or 25.35 kilograms per square kilometer per month). Annually, the maximum salt deposition is 0.13 pounds per acre per month (0.15 kilograms per hectare per month or 14.67 kilograms per square kilometer per month) with the deposition to the south at 4,921 feet (1,500 meters) from the LMDCT. This is lower than the NUREG-1555 significance level for possible visible effects to vegetation, 8.9 pounds per acre per month (10 kilograms per hectare per month).

5.7.1.1.4 Ground-Level Humidity Increase

Increases in the absolute and relative humidity could result from the operation of the mechanical draft cooling towers. The SACTI model does not produce humidity results; however, based upon the wet deposition results from the SACTI modeling, it is unlikely there will be significant increases in atmospheric humidity at offsite locations from the operation of the Kemmerer Unit 1 cooling tower. Ground-level humidity increases are anticipated to be SMALL, and mitigation does not appear to be warranted.

5.7.1.1.5 Cloud Formation, Cloud Shadowing, and Additional Precipitation

Vapor from cooling towers can create clouds or contribute to existing clouds. The SACTI code predicted the precipitation from the LMDCT. The maximum precipitation is anticipated to occur during the winter season, with less than 1 inch (2.5 centimeters) of precipitation 5,249 feet (1,600 meters) southeast of the center point of the towers. The worst-case annual precipitation across the 2020–2021 SACTI modeling is 0.13 inches (0.3 centimeters) of rain monthly. Precipitation from the LMDCT is presented in Table 5.7-5. As shown in Table 2.7-4, the mean annual rainfall for Kemmerer, Wyoming, based on 30-year normals, is 9.41 inches. The annual precipitation from the LMDCT will be less than 7 percent compared to the mean annual rainfall for the region. Impacts from precipitation are anticipated to be SMALL and mitigation does not appear to be warranted.

The formation of clouds could also prevent sunlight from reaching the ground, a phenomenon referred to as cloud shadowing. This is especially important for agricultural areas or other sensitive areas. Shadowing from the LMDCT is presented in Table 5.7-6. Shadowing in the vicinity of the LMDCT was predicted to occur for 262 hours or less per season and 559 hours or less annually. Shadowing in offsite areas (more than 1,313 feet [400 meters] from the cooling tower) was predicted to occur 141 hours or less per season and 279 hours or less annually. The worst-case seasonal impacts of shadowing across the highway to the west are provided in Figure 5.7-3 for the spring season maximum of less than 30 hours of shadowing. These values for shadowing in offsite areas represent a small percentage of the total daylight hours of each season and per year from a low of 2.8 percent of the daylight hours during the summer season to a minimum of 13.6 percent of the daylight hours during the winter season. Impacts from shadowing are anticipated to be SMALL and mitigation does not appear to be warranted.

5.7.1.1.6 Vapor Plumes and Icing

As discussed in Section 5.7.1.1.1, the annual prediction for the median plume length is 1,398 feet (426 meters) from the cooling tower. As discussed in Section 5.7.1.1.2, ground level fogging from the operation of the LMDCT is predicted to occur less than 156 hours per year towards the east. Icing from the mechanical draft cooling towers could be the result of ground-level fogging when ambient temperatures are below freezing. Icing resulting from LMDCT operation is predicted to occur less than 84 hours per year towards the east at the maximum and less than 3 hours per year toward the east northeast at 1,313 feet (400 meters) from the cooling tower as provided in Table 5.7-7. No impacts from icing on the highway to the west of the cooling tower are anticipated based on the SACTI modeling.

The impacts attributable to icing as a result of the operation of the Kemmerer Unit 1 cooling tower are anticipated to be SMALL and mitigation does not appear to be warranted.

5.7.1.1.7 Interaction with Existing Pollution Sources

The closest existing pollution source is the Naughton Power Plant, approximately 3.8 miles (6.1 km) away. The salt deposition concentration maximum occurred approximately 4,921 feet 1,500 meters) from the cooling tower during the winter of 2020 in the SACTI modeling. By 3.8 miles (6.1 kilometers) away from the cooling tower, the salt deposition declined to negligible levels, as shown in Table 5.7-8. Therefore, interactions with other sources of air pollution are anticipated to be SMALL and mitigation does not appear to be warranted.

5.7.2 Air Quality Impacts

Standards, limits, and regulations related to emissions from Kemmerer Unit 1 are described in Section 2.7 and Section 4.7. The site consists of one generating unit with no safety-related alternating current power currently required for safe shutdown. There are two standby diesel generators which supply power to permanent non-safety equipment for investment protection in the event of a loss of offsite power and main generator trip. The U.S. Environmental Protection Agency maintains standards for exhaust emissions from non-road compression ignition engines. In the current configuration, the standby diesel generators conform to the standards. Therefore, mitigation of emissions does not appear to be warranted.

The tons of pollutants, including greenhouse gas emissions discharged, were calculated using the emissions factor, required electrical output from each diesel generator, and maximum annual hours of generator use. Table 3.4-3 shows the calculated annual emissions from the standby diesel generators for criteria pollutants. The emissions are within the applicable limits of the U.S.

Environmental Protection Agency and the applicable Wyoming Department of Environmental Quality permits described in Section 1.4. The ultra-low sulfur diesel fuel used in the standby diesel generators will comply with all applicable U.S. Environmental Policy Act and State guidelines, as described in Section 4.7.1. Emissions of volatile organic compounds have not been determined. Volatile organic compound releases are anticipated to be minimal from the standby diesel generators due to US Environmental Protection Agency emission factors being lower than other pollutants (Reference 5.7-1).

5.7.3 Transmission-Line Impacts

Kemmerer Unit 1 will have two 230 kV transmission lines to transmit electrical power to the electrical infrastructure at Naughton Power Plant. The NRC addresses the impacts of existing transmission lines on air quality in NUREG-1437. Small amounts of ozone and smaller amounts of nitrogen oxides are produced by transmission lines. The production of these gases was found to be insignificant for 745 kV transmission lines (the largest lines in operation) and for a prototype 1,200 kV transmission line.

The air-quality impacts from the transmission lines of Kemmerer Unit 1 are anticipated to be SMALL and mitigation does not appear be warranted.

References

5.7-1 (EPA 1996). AP-42 Compilation of Air Emissions Factors from Stationary Sources, Section 3.4 Large Stationary Diesel and Stationary Dual-Fuel Engines, 10/96. Accessed February 18, 2024.

5.7-2 (EPRI 2004). Electric Power Research Institute. “Comparison of Alternate Cooling Technologies for U.S. Power Plants - Economic, Environmental, and Other Tradeoffs.” Technical Report 1005358. Palo Alto, CA: 2004.

5.7-3 (NOAA 2024). National Oceanic and Atmospheric Administration. U.S. Climate Normals Quick Access for Kemmerer 2N. 2024. https://www.ncei.noaa.gov/access/us-climate-normals/#dataset=normals-monthly&timeframe=30&location=WY&station=USC00485105. Accessed January 4, 2024.

5.7-4 (Policastro et al. 1994). Policastro, A.J., W.E. Dunn, R.A. Carhart. “A Model for Seasonal and Annual Cooling Tower Impacts.” *Atmospheric Environment*. February 1994. Volume 28, Issue 3. Pages 379-395.

Table 5.7-1 Physical and Performance Characteristics of Mechanical Draft Cooling Tower

Parameter	Value
Number of Towers	1
Number of Ports (Cells)	10
Circulating Water Flow Rate (gpm)	220,000
Cycle of Concentrations	5
Exit Port Height (m)	12
Diameter of Port (m)	9.14
Diameter of Tower (m)	160.3
Tower Type	Linear Mechanical Draft
Drift Rate (g/s)	69.11
Total Heat Dissipation Rate (MW)	708.2
Air Flow, per fan (kg/s)	728.9
Total Input Mass Air Flow (kg/s)	7287
Elevation of Cooling Tower (ft)[1]	6,758

1. Based on the elevation of the Nuclear Island.

Table 5.7-2 Estimated Median Plume Lengths and Plume Heights by Season, 2020–2021

	2020					**2021**				
	Winter	**Spring**	**Summer**	**Fall**	**Annual**	**Winter**	**Spring**	**Summer**	**Fall**	**Annual**
Median Plume Length (Meters)	495	452	204	427	426	466	414	195	400	421
Median Plume Height (Meters)	134	123	42	100	105	116	116	44	107	108

Table 5.7-3 Estimated Maximum and 400 m Number of Hours of Fogging by Season, 2020–2021

	2020					2021				
	Winter	**Spring**	**Summer**	**Fall**	**Annual**	**Winter**	**Spring**	**Summer**	**Fall**	**Annual**
Maximum Hours of Plume Fogging	104.4	15.8	0.0	27.2	147.4	155.8	26.7	3.8	5.7	192.0
Direction Fog Headed	E	E	None	E	E	E	E	E	E	E
Hours of Plume Fogging at 400 m From Cooling Tower	2.5	0.5	0.0	1.0	3.5	4.9	7.1	1.5	1.0	14.5
Direction Fog Headed	ENE	ENE	ENE	SW	ENE	ENE	ENE	ENE	ENE	ENE
Percentage of Fogging at 400 m During Season	0.11%	0.02%	N/A	0.05%	0.04%	0.22%	0.32%	0.07%	0.05%	0.17%

Table 5.7-4 Estimated Maximum Salt Deposition by Season, 2020–2021

	2020			2021		
	Concentration (kg/km^2-mon)	Direction Plume Headed	Distance (m)	Concentration (kg/km^2-mon)	Direction Plume Headed	Distance (m)
Winter	25.35	S	1500	20.43	S	1500
Spring	12.06	S	1500	9.31	S	1500
Summer	14.01	NE	200	1.50	S	1500
Fall	18.44	S	1500	5.06	S	1500
Annual	14.67	S	1500	10.49	S	1500

Table 5.7-5 Estimated Maximum Water Deposition by Season, 2020–2021

	2020			2021		
	Water Deposition (in.)	**Direction Plume Headed**	**Distance (m)**	**Water Deposition (in.)**	**Direction Plume Headed**	**Distance (m)**
Winter	0.130	SE	1600	0.076	S	1500
Spring	0.058	S	1600	0.048	E	4300
Summer	0.011	SE	1600	0.005	S	1500
Fall	0.089	S	1600	0.020	E	4300
Annual Total	0.279	S	1600	0.156	E	4300
Annual Regional Precipitation in Kemmerer, WY (in)[1]	9.41	-	-	9.41	-	-
Percentage of Annual Precipitation	2.96%	-	-	1.66%	-	-

Table 5.7-6 Estimated Maximum and 400 m Hours of Shadowing by Season, 2020–2021

	2020					2021				
	Winter	**Spring**	**Summer**	**Fall**	**Annual**	**Winter**	**Spring**	**Summer**	**Fall**	**Annual**
Maximum Hours of Plume Shadowing	232.3	190.2	121.6	158.6	559.0	262.1	140.9	63.9	141.5	508.5
Direction Shadow Headed	NE	ENE	SW	NE	NE	NE	E	SW	ENE	NE
Hours of Plume Shadowing at 400 m From Cooling Tower	121.1	62.5	65.7	54.3	238.8	140.8	66.6	37.2	93.2	278.8
Direction Shadow Headed	ENE	E	SW	ENE	ENE	ENE	ENE	SW	ENE	ENE

Table 5.7-7 Estimated Maximum and 400 m Hours of Icing by Season, 2020–2021

	2020					2021				
	Winter	**Spring**	**Summer**	**Fall**	**Annual**	**Winter**	**Spring**	**Summer**	**Fall**	**Annual**
Maximum Hours of Plume Icing	38.7	3.1	None	8.1	48.6	83.7	5.1	None	1.9	83.7
Direction Icing Headed	E	WSW	N/A	E	E	E	SW	N/A	SE	E
Hours of Plume Icing at 400 m From Cooling Tower	None	None	None	None	None	2.4	None	None	None	2.4
Direction Icing Headed	N/A	N/A	N/A	N/A	N/A	ENE	N/A	N/A	N/A	ENE

Table 5.7-8 Salt Deposition Maximum Concentration to Cooling Tower Impacts of Salt Deposition at Naughton Power Plant

	Value (kg/km^2 per month)	Modeling Season	Location
Maximum Concentration at 1,500 meters from cooling tower	25.35	Winter 2020	South
Maximum NW Concentration at 1,600 meters from cooling tower	2.02	Winter 2020	North West
Concentration at Naughton Power Plant NW of the Site	0.00	Winter 2020	North West

Figure 5.7-1 SACTI2 Plume Length Frequency (%) - 2021 Spring

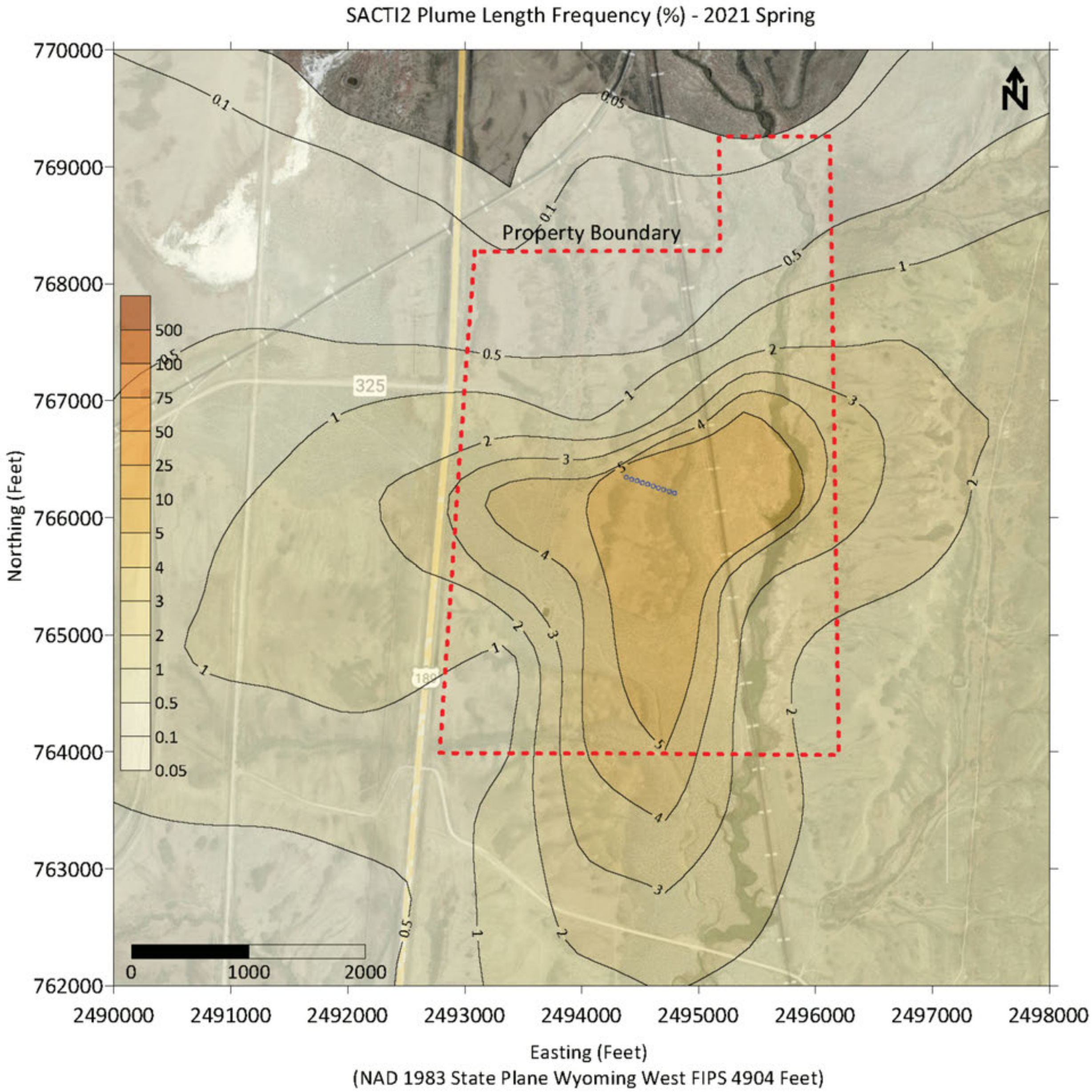


Figure 5.7-2 SACTI2 Maximum Fogging (Hours) - 2020 Fall

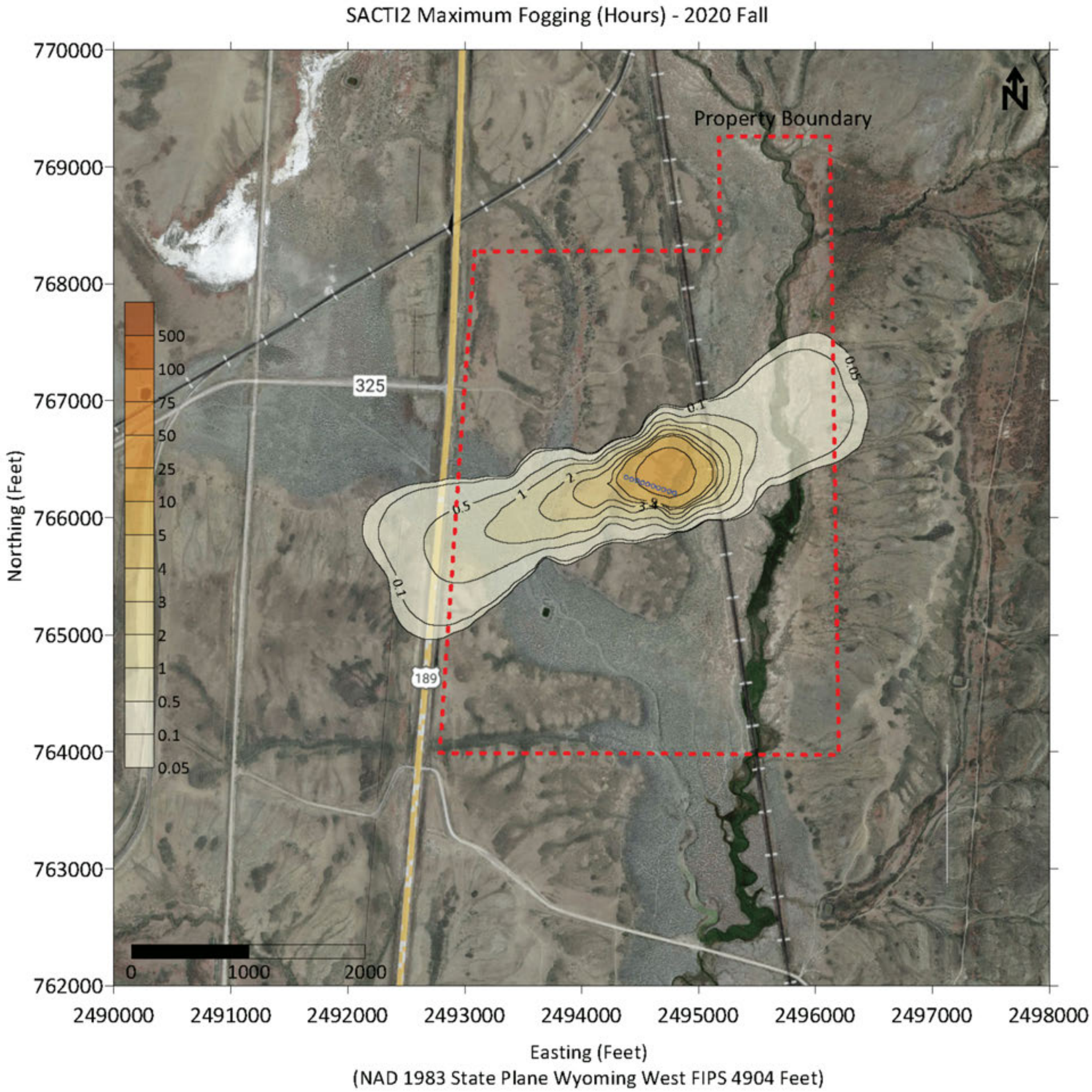
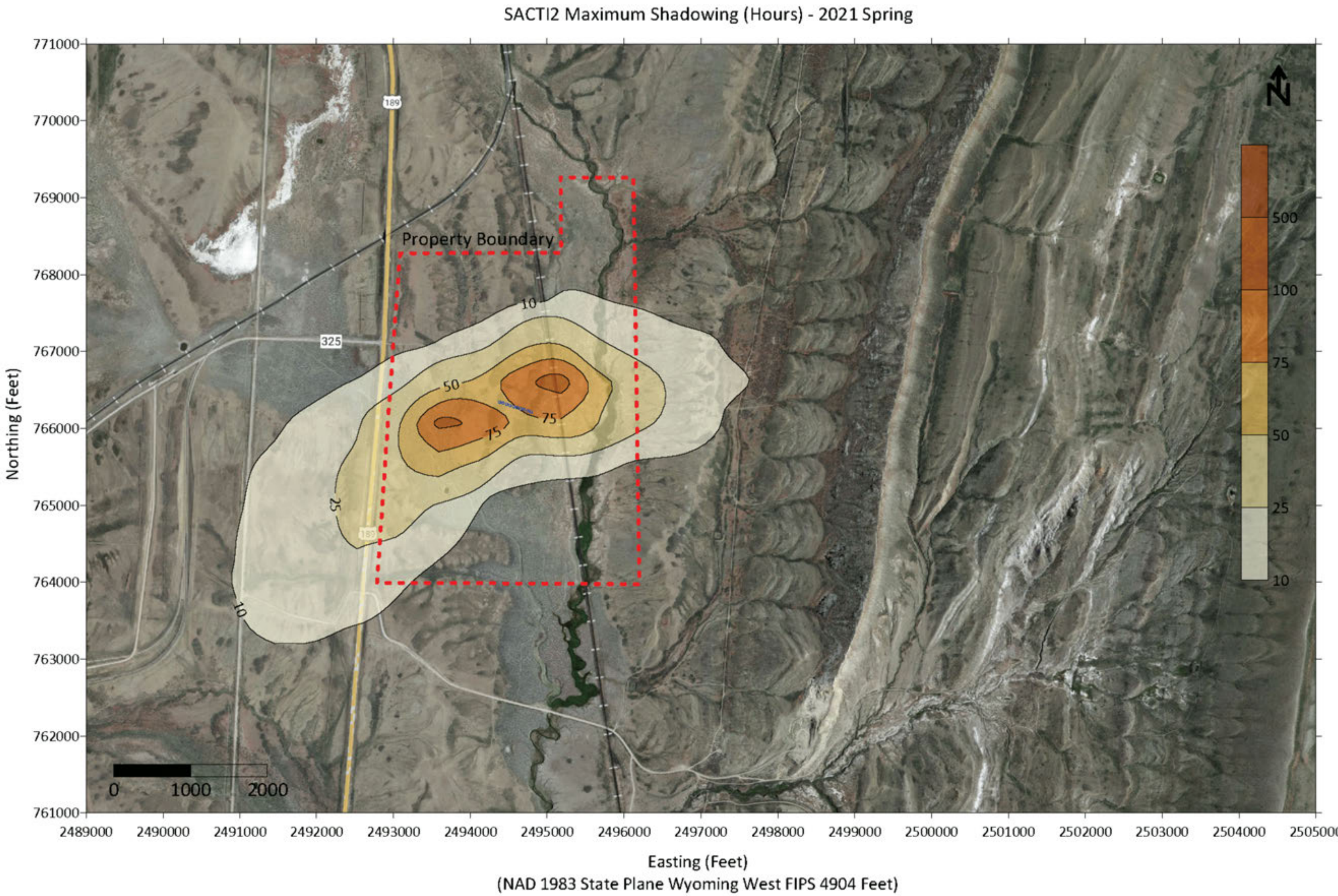


Figure 5.7-3 SACTI2 Maximum Shadowing (Hours) - 2021 Spring



5.8 Nonradiological Health

5.8.1 Etiological Agents and Emerging Contaminants

The Heat Rejection System is described in Section 3.2.2.3. The plant water source is described in Section 2.2.1.1.2, and water quality is characterized in Section 2.2.3.1. The water source is not reclaimed or impaired water. Nonradioactive waste streams that are expected from the operation of Kemmerer Unit 1 are described in Section 3.4.1.1.3.

The etiological agents associated with thermal discharges are thermophilic microorganisms, and their presence and concentration can be increased by the addition of heat. The most serious of which is attributed to *N. fowleri,* a free-living amoeba that occurs worldwide. It is present in soil and practically all natural surface waters such as lakes, ponds, and rivers. *N. fowleri* thrives in warm, fresh water, particularly if the water is stagnant or slow moving. Because a primary food source for the amoeba is coliform bacteria, the presence of significant numbers of coliform bacteria will promote growth of this amoeba (Reference 5.8-4). The onsite sanitary waste water treatment facility, which contains elements of the sanitary waste system and waste water system described in Section 3.2.2.10 and Section 3.2.2.12, will treat and disinfect wastewater prior to discharge to a common wastewater basin. While the temperature increase resulting from the plant's thermal discharge has not been determined at this time, the discharge from the wastewater basin will meet Wyoming Department of Environmental Quality standards and comply with the Wyoming Pollutant Discharge Elimination System permit limits, including any thermal discharge limits. Additional chemical constituents found in the treated sanitary waste water will be included in the Wyoming Pollutant Discharge Elimination System permit as well as requirements for water quality monitoring. As advised by the Wyoming Department of Environmental Quality, downstream property owners will be informed of plans to discharge treated sanitary waste into North Fork Little Muddy Creek. Water quality impacts from the discharge are addressed in Section 5.2.

Etiological agents can also pose an occupational hazard; however, there are no Occupational Safety and Health Administration standards specific to *Legionella* or other non-bloodborne, biological hazards (Reference 5.8-5). Exposure to *Legionella* spp. from power plant operations is a potential concern for a subset of the workforce. Plant personnel most likely to encounter *Legionella* aerosols will be those present during the dislodge of biofilms occurring with the cleaning of the cooling towers (Reference 5.8-6). The water supply for Kemmerer Unit 1 will not include impaired water or reclaimed water. Biocides, scale, and corrosion inhibitors will be added as needed to maintain the cooling water system and comply with the Wyoming Pollutant Discharge Elimination System permit.

Although there are no Occupational Safety and Health Administration standards specific to *Legionella*, several existing requirements may apply to occupational exposure to *Legionella,* such as Occupational Safety and Health Administration standards for personal protective equipment (29 CFR 1910.132), eye and face protection (29 CFR 1910.133), and respiratory protection (29 CFR 1910.134) (Reference 5.8-5). Cooling tower cleaning, maintenance, and repair operations will be conducted under a comprehensive industrial safety program with provisions for hazard identification, personal protective equipment, and other hazard mitigation. The operation of the cooling tower and its impact on air quality are addressed in Section 5.7;

however, the air emissions from the cooling tower are not expected to significantly increase public health risk from etiologic agents because the water source is not reclaimed water which could pose the risk of concentrating etiological agents from multiple cycles of concentration. Further, the human health risk associated with cooling tower operation is primarily from indoor or confined spaces.

The operation of Kemmerer Unit 1 will not significantly increase the public health risk posed by etiological agents. The risk to public health posed by etiological agents associated with the discharge to North Fork Little Muddy Creek is anticipated to be small because the discharge from Kemmerer Unit 1 will be governed by a Wyoming Pollutant Discharge Elimination System permit, and there is a very low incidence of waterborne disease in Wyoming. Further, the Kemmerer Unit 1 cooling towers will not be accessible to the public, and the higher risk of *Legionella* exposure is presented by indoor or confined spaces. The occupational health risk to workers posed by the operation of the Kemmerer Unit 1 cooling towers will be controlled by implementation of an industrial safety program and compliance with applicable Occupational Safety and Health Administration requirements. The risks to public and worker health associated with etiological agents is anticipated to be SMALL and does not appear to warrant mitigation.

5.8.2 Noise

Operational noise can cause impacts to workers and nearby populations. Applicable Federal, State, and local regulations governing noise are discussed in Section 2.8.2. Most equipment will be located inside structures, thereby reducing the outdoor noise level. Noise sources outside of structures will include electrical equipment, such as transformers and the switchyard, which will emit a low level hum, intermittent noise from generators, loudspeakers, and the cooling tower. The highest levels of noise will be associated with the operation of the cooling tower. Distance to the nearest receptor is an important factor, as the noise dissipates as the distance increases.

For a conventional mechanical draft cooling tower, sound levels of about 60 A-weighted decibels (dBA) can be expected at a distance of 500 feet (152 meters) and 50 dBA at 1,600 feet (488 meters) (Reference 5.8-7). Noise levels will be less than 60 dBA at the site boundary and will have attenuated to ambient levels prior to reaching the nearest resident at 2.8 miles (4.5 kilometers) away from Kemmerer Unit 1. The day-night average sound level at the site boundary and closest noise sensitive human receptor will be less than 65 dBA. Therefore, human health impacts from the noise of operations activities are anticipated to be SMALL and mitigation does not appear to be warranted.

5.8.3 Electric Shock Impacts

Potential electric shocks from the transmission system at Kemmerer Unit 1 will be controlled and minimized by conformance with National Electrical Safety Code criteria and adherence to the standards for transmission systems. As presented in Chapter 3, new transmission lines will be required to service new power generation at Kemmerer Unit 1, along with a new switchyard. All new structures will be designed and constructed to comply with all National Electrical Safety Code provisions as well as the safety standards described within Wyoming Statute 37-3-114, which invokes the provisions of the current edition of the National Electrical Safety Code.

The types of potential exposures to transmission lines, such as electric shock from direct contact or induced charge to metal structures, will not be significant, as the new transmission lines will conform to the present National Electrical Safety Code criteria. Electric shock potential is of small significance for transmission lines that are operated in adherence with the National Electrical Safety Code (Reference 5.8-9).

The nearest resident to the macro-corridor for the new transmission system is approximately 1.5 miles (2.4 kilometers) away.

Both electric and magnetic fields induce voltages and currents in the human body. However, even directly beneath a high voltage transmission line, the induced currents will be very small compared to thresholds for producing shock and other electrical effects (Reference 5.8-8).

The impact on the public and operational personnel from potential electric shock effects of electromagnetic fields are anticipated to be SMALL; and mitigation does not appear to be warranted.

5.8.4 Chronic Effects of Electromagnetic Fields

The generation of electromagnetic fields by electrical transmission system operations and scientific research to determine if there are any harmful effects to humans is discussed in Section 2.8.4. Although studies continue to be conducted and additional information is published regarding the effects of exposure to electric and magnetic fields (Reference 5.8-10, Reference 5.8-11, Reference 5.8-12, Reference 5.8-13), there continues to be no conclusive evidence of a link between electric and magnetic fields and possible health impacts, including the development of cancer, reproductive disorders, or other abnormalities in humans.

NUREG-1437 finds that the chronic effects of electromagnetic fields are of uncertain impact (Reference 5.8-14, Section 4.5.4a1.2.3).

The macro-corridor is approximately 1.5 miles (2.4 kilometers) from the closest resident.

Therefore, impacts to members of the public attributable to electric and magnetic field exposure from transmission system operations are anticipated to be SMALL, and mitigation does not appear to be warranted.

5.8.5 Occupational Health

Operations personnel could be involved in industrial accidents such as falls, electric shock, burns, or occupational illnesses because of noise exposure, exposure to toxic or oxygen replacing gases, caustic agents, or other industrial hazards. Kemmerer Unit 1 will have a comprehensive industrial safety program in place. The program will have provisions for training, hazard identification, personal protective equipment, and other hazard mitigation. There will be task-specific procedures in place to implement industry best management practices and Occupational Safety and Health Administration standards for worker safety.

The U.S. Bureau of Labor Statistics collects information from U.S. companies on occupational injuries, illnesses, and fatalities. The incidence rate for nonfatal occupational injuries and illnesses for the nuclear electric power generation industry was 0.2 per 100 full-time workers (Reference 5.8-15). The U.S. Bureau of Labor Statistics also publishes occupational fatality rates. The rate of fatal work injuries for the manufacturing industry for 2021 was 2.6 per 100,000 full-time equivalent workers (Reference 5.8-16).

The calculated number of nonfatal injuries and illnesses for the operation of Kemmerer Unit 1 using the applicable rate and projected workforce is 250. Recordable illnesses and injuries of all types based on the national rate published by the U.S. Bureau of Labor Statistics are estimated at an average annual of approximately 0.50 injuries and illnesses and 0.0065 fatalities.

It is anticipated that the operation of Kemmerer Unit 1 will result in no more potential occupational injuries and fatalities, based on statistical analysis, than other similarly sized power plants.

5.8.6 Human Health Impacts from Transportation

Road improvements discussed in Section 3.3.1.2.1 will be initiated prior to Kemmerer Unit 1 construction to enhance access to the site and improve safety to the public. The distance driven for commuting will increase the risk of vehicle accidents involving injuries and fatalities. The residential distribution of the operations workforce is discussed in Section 5.4.2. Sixty seven percent are assumed to reside in Lincoln County, 21 percent in Uinta County, 4 percent in Sweetwater County, and 8 percent in other areas. Round trip distance for workers residing in Lincoln County was assumed to be 20 miles (32 kilometers), the approximate round-trip distance between the site and mid-Kemmerer. Round trip distance for Uinta County residents was assumed to be 98 miles (158 kilometers), the approximate round-trip distance between the site and the I-80 interchange in Evanston. Round trip distance for Sweetwater County residents was assumed to be 180 miles (290 kilometers), the approximate round-trip distance between the site and mid-way between Green River and Rock Spring via I-80 to US 30. For the workers that live outside of the three counties, a round trip commute of 180 miles (290 kilometers) was assumed. While carpooling could occur, none was assumed. Truck deliveries are assumed at 20 per day with a round trip of 100 miles (161 kilometers). The annual distance is estimated at approximately 5.2 million miles (8.37 million kilometers).

For purposes of estimating commuting distance, an outage workforce of 500, double the size of the operations workforce, is assumed. Outages will occur annually initially and transition to biannually with the transition to Type 1B fuel. The outages will last approximately 18 days for Type 1 fuel, and 12 days for Type 1B fuel. The outage workforce is assumed to occupy temporary housing in Lincoln and Uinta counties, with 50 percent residing in each county. Round trip distance was assumed to be 20 and 98 miles (32 and 158 kilometers) for Lincoln and Uinta counties. No carpooling was assumed. The annual (18 days) commuting distance for 500 outage workers is estimated at approximately 531,000 miles (855,000 kilometers).

Average vehicle incidence rates were calculated from Wyoming Department of Transportation state-wide data for crashes, injuries, and fatalities for 2018 to 2022 and distance driven. Wyoming Department of Transportation county-level data is available; however, state-level data was used because it reflects urban and rural characteristics similar to the projected population increase impact for Lincoln County. Table 5.8-1 presents the estimated number of crashes, injuries, and fatalities for operations and outage workers commuting to and from the site and presents the 2018 to 2022 averages for Wyoming and for Kemmerer and Evanston combined for comparison.

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Table 5.8-1 Projected Average Annual Vehicle Crashes, Injuries, and Fatalities

	Crashes Per Year	Injuries Per Year	Fatalities Per Year
Operations	11	2.6	0.10
18-day Outage at 500 Workers	1.1	0.25	0.0096
Wyoming	13,900	3,300	126
Kemmerer and Evanston	59	18	0.3

Based on average of 2018–2022 incidence rates calculated using data from Reference 5.8-17, Reference 5.8-18, Reference 5.8-19, Reference 5.8-20, and Reference 5.8-21.

5.9 Radiological Health during Normal Operation and Radioactive Waste Management

The radiological impacts to the public, workers, and non-human biota within a 50-mile (80-kilometer) radius of the site from operation of Kemmerer Unit 1 are described in this section.

5.9.1 Exposure Pathways

During normal operation, radioactive gases are discharged to the environment primarily through the plant stack. Other sources of radioactive gas discharge include the Nuclear Island (NI) Heating Ventilation and Air Conditioning System and the Reactor Air Cooling System. The impacts of these releases to the public, workers, and nonhuman biota in proximity to the site is evaluated through consideration of exposure pathways to the biota of interest. Pathways include direct exposure, inhalation, and consumption of meat, dairy, and vegetables produced in proximity to the plant. Gaseous effluent activities are included in Table 5.9-3.

The population within a 50-mile (80-kilometer) radius of the plant was considered based on 10 CFR 50 Appendix I guidance. Doses to the maximally exposed individual (MEI) were considered along with doses to the population within 50 miles (80 kilometers) to ensure adherence to 40 CFR 190 limits. Additionally, doses were compared to the 10 CFR 50 Appendix I limits. The MEI was assumed to reside at the Exclusion Area Boundary (EAB) so that the MEI receives the maximum possible dose to a member of the public. Use of the MEI allows comparison of Federal dose limits to the public dose.

The projected population for 2090 was utilized (see Table 5.9-1). This corresponds to the end of the expected plant life and the projected peak population within the plant lifetime. Plant lifetime is based on a 40-year initial operating license and a 20-year license extension. Production of vegetables, meat, and dairy are considered to be proportional to the population projected for 2090.

5.9.1.1 Liquid Pathways

During normal operation, liquid release is limited to that from trace amounts of tritium migrating to the steam generator, which may migrate into the water of the steam generator and be released through the cooling tower blowdown; however, a release will be indistinguishable from background radiation levels.

5.9.1.2 Gaseous Pathways

Gaseous pathways of exposure include direct radiation, inhalation of iodine and particulates, and ingestion of iodine and particulates through goat milk, cow milk, vegetables, and meat. Agricultural data is included in Table 5.9-2. Radiation from iodine and particulates deposited on the ground is also considered. Skin doses are not provided for consumption and inhalation values per Federal Guidance Report No. 11.

The site contains two release points; the NI release points are concentrated within a 100-meter (328-foot) radius of the centerpoint of the reactor. This 100-meter (328-foot) radius is conservatively treated as a singular NI release point in the analysis. Tritium is released from the

Energy Island (EI) due to migration through the salt. This release is conservatively modeled as being from the cold salt storage tank, which is the highest concentration point in the EI, as tritium will migrate through the entirety of the salt path.

5.9.1.3 Direct Radiation

Sources of direct radiation include the facilities contained within the NI.

5.9.2 Radiation Doses to Members of the Public

The impacts of normal plant operation on members of the public are evaluated in this section by comparing the estimated doses to regulatory acceptance criteria. Using parameters included in Table 5.9-1, Table 5.9-2, Table 5.9-3, and Table 5.9-4, GASPAR II was used to calculate annual doses from gaseous effluents to the MEI, the population, and non-human biota. The Sodium Test and Fill Facility (TFF) is within the EAB, so occupational doses to the TFF workers were also considered.

GASPAR runs were completed for both the NI and the EI using atmospheric dispersion factors and atmospheric deposition factors values specific to the release point's location relative to locations of interest. The GASPAR results for both the NI and EI release locations were summed to calculate total doses at the locations of interest. The maximally exposed adult, teenager, child, and infant were considered at the following locations:

- EAB
- Nearest residence (2.8 miles [4.5 kilometers] from the reactor centerpoint)
- TFF (only adult worker exposure)

Conservatively, the nearest vegetable garden and dairy animal were assumed to be located at the nearest residence and, due to local herding practices, the nearest meat animal was assumed to be located at the EAB. The nearest residence was modeled in each cardinal direction, and the most conservative direction was selected to account for different atmospheric dispersion factors in each direction.

There is no accredited capability to keep biota outside of the EAB, so the biota were modeled at the TFF, a representative location within the EAB.

The contributions to MEI doses at the locations of interest utilized exposure pathways unique to the location as detailed in Table 5.9-5. The MEI at the nearest residence could eat meat produced at the EAB, so the EAB meat value was added. The TFF workers, during their time at the TFF, will be limited to inhalation, ground, and plume doses. A direct radiation dose of 1 millirem per year (mrem/yr) is conservatively applied to members of the public, as direct radiation dose from an sodium fast reactor is expected to be negligible.

The doses for each age group at each location are presented in Table 5.9-5 and it is shown that the maximum dose is experienced by a teen located at the EAB. These doses are compared to Federal regulation.

The MEI has an external total body dose of 0.796 mrem/year, a skin dose of 1.63 mrem/year, and a maximum organ dose from all pathways (conservatively including all isotopes, not just iodines and particulates) of 4.74 mrem/year. These doses are below the 10 CFR 50 Appendix I criteria and are shown in Table 5.9-6.

There is a population dose to the public within 50 miles (80 kilometers) of the site of 0.127 person-rem per year from plant effluents, compared to a background dose of 11,800 person-rem per year, as shown in Table 5.9-11.

The TFF workers are treated as members of the public and have a worker dose found by multiplying the annual dose by the fraction of the year that the workers are expected to be present at the facility. The workers have an external total body dose of 0.102 mrem/year, a skin dose of 0.208 mrem/year, and a maximum organ dose to the lung from iodine and particulates of 0.133 mrem/year, as shown in Table 5.9-10. These doses are below the 10 CFR 50 Appendix I criteria. Doses to workers at the plant, including doses from outage activities, will be determined as the design develops.

5.9.2.1 Liquid Pathway Doses

There is no liquid effluent release from the NI. The liquid effluent release from the EI will be indistinguishable from background. With the assumption that 100 percent of the tritium at the steam generator migrates into the water, there is a maximum annual concentration in the cooling tower blowdown of 38.8 picocuries per liter (pCi/L). The concentration must comply with the U.S. Environmental Protection Agency drinking water limit of 20,000 pCi/L, which corresponds to 4 mrem/year. As a point of comparison, the concentration will need to be below 15,000 pCi/L to meet 10 CFR 50 Appendix I limits, which corresponds to 3 mrem/year. The maximum annual concentration in the cooling tower blowdown, which releases the steam generator blowdown to the environment, is less than both U.S. Environmental Protection Agency and 10 CFR 50 Appendix I limits. The cooling tower blowdown maximum annual concentration of 38.8 pCi/L is comparable to natural concentration rates of tritium in surface waters between 10 and 30 pCi/L and will, therefore, be indistinguishable from the background concentration (Reference 5.9-1, Section 11.2).

5.9.2.2 Gaseous Pathway Doses

Considering a direct dose of 1 mrem/year, the MEI receives a total body dose of 5.73 mrem/year. Direct dose does not apply to organs, giving a thyroid dose of 4.73 mrem/year, and a maximum organ dose of 4.74 mrem/year to the lungs. These doses are in compliance with 40 CFR 190.10 and are shown in Table 5.9-7.

5.9.3 Impacts to Biota Other than Members of the Public

The impact of normal operation to nonhuman biota is examined in this section. This assessment uses surrogate biota to represent dose impacts that could potentially affect broader classes of living organisms beyond the biota analyzed as described in NUREG/CR-4013. Birds, mammals, fish, algae, and invertebrates are represented by the biota analyzed. No unique or specific animals reside near the site that warrant specific evaluation.

Kemmerer Unit 1 does not discharge liquid radioactive waste to the environment. No dose from liquid pathways was evaluated. GASPAR II does not perform dose calculations to biota, so biota were assumed to receive an equivalent dose to the human MEI. Plume dose is independent of receptor, and internal doses are based on a much longer retention period for humans than expected for biota, so this assumption is conservative. Biota are generally closer to the ground than the average human, which corresponds to a higher ground deposition dose. However, most biota are a comparable distance to the ground as a human infant, so the usage of the most conservative ground dose to humans is also considered conservative for biota.

Biota of interest were conservatively considered to receive an equivalent dose to the MEI at the TFF. The bioaccumulation factors used to calculate the biota doses are included in Table 5.9-8. The TFF dose was utilized due to the ability of biota to cross the EAB. The biota considered include water-dwelling biota, which will receive a negligible dose due to the liquid release from the plant being limited to a low concentration of tritium. Land-dwelling biota considered are muskrat, raccoon, heron, and duck, which all receive the same dose of 0.776 mrad per year. This dose is in compliance with International Atomic Energy Agency and National Council on Radiation Protection dose guidelines for biota. Information is shown in Table 5.9-9.

5.9.4 Occupational Radiation Doses

The annual occupational dose to operational workers, including outage activities, will be provided as the design develops. This dose will comply with 10 CFR 20.

5.9.5 Radiological Monitoring

Information pertaining to the Radiological Environmental Monitoring Program is included in Section 2.9.

5.9.6 Solid Waste Management and Onsite Spent Fuel Storage

Plans for minimizing the production and processing of Class A, B, and C low-level radioactive waste onsite will be included as part of the program discussed in PSAR Section 10.2 to maintain doses as low as is reasonably achievable. The amount of onsite storage space for Class A, B, and C low-level radioactive waste is identified in Section 3.4.2. The spent fuel pool is sized to accommodate approximately 10 years of spent fuel; additional information regarding the spent fuel pool is provided in PSAR Section 7.3.1.3. The construction and use of an ISFSI is anticipated; see Section 5.1 for the anticipated need date and projected size. No other onsite temporary storage facilities are planned.

References

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Table 5.9-1 Population Projection for 2090 by Distance

	0 to 1 mi	1 to 2 mi	2 to 3 mi	3 to 4 mi	4 to 5 mi	5 to 10 mi	10 to 20 mi	20 to 30 mi	30 to 40 mi	40 to 50 mi
S	25	25	25	27	27	30	0	34	237	95
SSW	25	25	0	3	2	1	0	0	3,236	436
SW	25	0	0	0	0	0	0	6	9,960	184
WSW	25	0	0	36	0	0	0	49	723	25
W	25	0	0	38	0	0	0	134	1,054	61
WNW	25	0	0	38	0	2	10	94	248	2,617
NW	25	0	0	0	38	68	15	54	1,124	142
NNW	25	25	25	18	51	30	28	35	94	129
N	25	25	25	30	438	6,516	34	76	14	1
NNE	25	0	1	81	541	794	15	22	179	740
NE	25	0	4	40	36	32	0	3	28	0
ENE	25	0	0	0	7	46	143	0	12	1
E	25	0	0	0	0	0	0	22	0	9
ESE	25	0	0	0	0	0	0	3	166	9
SE	25	0	0	0	0	0	0	88	19	0
SSE	25	0	0	0	0	0	0	3,550	2,489	38
									Total People	38,035

Table 5.9-2 Projected Agricultural Data (2090)

County	County Land Within 50 Miles	Beef Cattle in County (head)	Sheep in County (head)	Milk Cows in County (head)	Beef within 50 Miles (kg)	Sheep within 50 Miles (kg)	Total Meat within 50 Miles (kg)	Milk within 50 Miles (l)	Vegetables within 50 Miles (kg)
Bear Lake, ID[3]	50%	23,200	7,600	1,500	6,330,000	259,000	6,580,000	7,670,000	-
Cache, UT[2]	15%	12,500	3,310	22,600	1,020,000	33,800	1,060,000	34,700,000	-
Lincoln, WY[1]	75%	36,800	24,700	749	15,000,000	1,260,000	16,300,000	5,740,000	-
Morgan, UT[2]	8%	5,610	21,900	1,020	244,000	119,000	363,000	837,000	-
Rich, UT[2]	99%	0	9,230	0	0	621,000	621,000	0	-
Sublette, WY[1]	10%	36,000	0	27	1,950,000	0	1,950,000	27,700	-
Summit, UT[2]	5%	11,400	15,500	1,050	311,000	52,700	363,000	536,000	-
Sweetwater, WY[1]	15%	17,700	7,070	12	1,450,000	72,200	1,520,000	18,900	-
Uinta, WY[1]	95%	31,100	39,500	0	16,100,000	2,550,000	18,600,000	0	-
Total		174,000	129,000	27,000	42,400,000	4,970,000	47,400,000	49,500,000	9,130,000

1. Reference 5.9-2.
2. Reference 5.9-3.
3. Reference 5.9-4.

Table 5.9-3 Annual Gaseous Effluent Release Activities

	Radionuclide	Bounding Release (Ci/yr)
Energy Island	H-3	9.03×10^{2}
Nuclear Island	H-3	6.64
	N-16	3.57×10^{-1}
	Ar-41	7.81×10^{1}
	Kr-85	1.40×10^{2}
	Rb-88	6.24×10^{-2}
	Xe-131m	5.96×10^{1}
	Xe-133	9.67
	Cs-137	1.09×10^{-4}
	Ba-137m	1.03×10^{-4}

Table 5.9-4 XOQ and DOQ at Locations of Interest

Location	From NI[1]						From EI[2]					
	Distance (mi)	Distance (m)	Undecayed Undepleted (s/m^3)	Decayed Undepleted (s/m^3)	Decayed Depleted (s/m^3)	Deposited (m^{-2})	Distance (mi)	Distance (m)	Undecayed Undepleted (s/m^3)	Decayed Undepleted (s/m^3)	Decayed Depleted (s/m^3)	Deposited (m^{-2})
EAB	0.19 S	300 S	5.128×10^{-5}	5.126×10^{-5}	4.908×10^{-5}	1.513×10^{-7}	0.12 S	193 S	1.896×10^{-4}	1.895×10^{-4}	1.838×10^{-4}	2.841×10^{-7}
Nearest Residence	2.74 S	4,406 S	1.380×10^{-6}	1.370×10^{-6}	1.105×10^{-6}	2.740×10^{-9}	2.69 S	4,337 S	1.505×10^{-6}	1.495×10^{-6}	1.207×10^{-6}	2.842×10^{-9}
TFF	0.08 N	130 N	2.755×10^{-5}	2.754×10^{-5}	2.69210^{-5}	8.013×10^{-8}	0.24 N	394 N	6.092×10^{-6}	6.085×10^{-6}	5.769×10^{-6}	1.662×10^{-8}

1.The NI release is modeled as a 100-meter circle centered on the reactor.

2.The EI release is modeled as coming from the cold salt storage tank.

**Table 5.9-5 Dose for All Locations of Interest
(Sheet 1 of 2)**

			Dose per Unit (mrem/yr)							
Location	Pathway		Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Site EAB	External	Plume	7.89×10^{-1}	7.89×10^{-1}	7.89×10^{-1}	7.89×10^{-1}	7.89×10^{-1}	7.89×10^{-1}	7.94×10^{-1}	1.62
		Ground	6.82×10^{-3}	6.82×10^{-3}	6.82×10^{-3}	6.82×10^{-3}	6.82×10^{-3}	6.82×10^{-3}	6.82×10^{-3}	7.96×10^{-3}
		Total	7.96×10^{-1}	7.96×10^{-1}	7.96×10^{-1}	7.96×10^{-1}	7.96×10^{-1}	7.96×10^{-1}	8.01×10^{-1}	1.63
	Inhalation	Adult	3.91	3.91	8.11×10^{-5}	3.91	3.91	3.91	3.91	0.00
		Teen	3.94	3.94	1.14×10^{-4}	3.94	3.94	3.94	3.94	0.00
		Child	3.48	3.48	1.54×10^{-4}	3.48	3.48	3.48	3.48	0.00
		Infant	2.00	2.00	9.31×10^{-5}	2.00	2.00	2.00	2.00	0.00
	All	Adult	4.70	4.70	7.96×10^{-1}	4.70	4.70	4.70	4.71	1.63
		Teen	4.73	4.73	7.96×10^{-1}	4.73	4.73	4.73	4.74	1.63
		Child	4.27	4.27	7.96×10^{-1}	4.27	4.27	4.27	4.28	1.63
		Infant	2.80	2.80	7.96×10^{-1}	2.80	2.80	2.80	2.80	1.63
TFF	External	Plume	4.24×10^{-1}	4.24×10^{-1}	4.24×10^{-1}	4.24×10^{-1}	4.24×10^{-1}	4.24×10^{-1}	4.27×10^{-1}	8.71×10^{-1}
		Ground	3.61×10^{-3}	3.61×10^{-3}	3.61×10^{-3}	3.61×10^{-3}	3.61×10^{-3}	3.61×10^{-3}	3.61×10^{-3}	4.21×10^{-3}
		Total	4.28×10^{-1}	4.28×10^{-1}	4.28×10^{-1}	4.28×10^{-1}	4.28×10^{-1}	4.28×10^{-1}	4.31×10^{-1}	8.75×10^{-1}
	Inhalation	Adult	1.29×10^{-1}	1.29×10^{-1}	4.45×10^{-5}	1.29×10^{-1}	1.29×10^{-1}	1.29×10^{-1}	1.29×10^{-1}	0.00
		Teen	1.30×10^{-1}	1.30×10^{-1}	6.24×10^{-5}	1.30×10^{-1}	1.30×10^{-1}	1.30×10^{-1}	1.30×10^{-1}	0.00
		Child	1.16×10^{-1}	1.16×10^{-1}	8.43×10^{-5}	1.16×10^{-1}	1.16×10^{-1}	1.16×10^{-1}	1.16×10^{-1}	0.00
		Infant	6.64×10^{-2}	6.64×10^{-2}	5.11×10^{-5}	6.64×10^{-2}	6.64×10^{-2}	6.63×10^{-2}	6.63×10^{-2}	0.00
	All	Adult	5.57×10^{-1}	5.57×10^{-1}	4.28×10^{-1}	5.57×10^{-1}	5.57×10^{-1}	5.57×10^{-1}	5.60×10^{-1}	8.75×10^{-1}
		Teen	5.58×10^{-1}	5.58×10^{-1}	4.28×10^{-1}	5.58×10^{-1}	5.58×10^{-1}	5.58×10^{-1}	5.61×10^{-1}	8.75×10^{-1}
		Child	5.43×10^{-1}	5.43×10^{-1}	4.28×10^{-1}	5.43×10^{-1}	5.43×10^{-1}	5.43×10^{-1}	5.46×10^{-1}	8.75×10^{-1}
		Infant	4.94×10^{-1}	4.94×10^{-1}	4.28×10^{-1}	4.94×10^{-1}	4.94×10^{-1}	4.94×10^{-1}	4.97×10^{-1}	8.75×10^{-1}

Table 5.9-5 Dose for All Locations of Interest (Sheet 2 of 2)

Location	Pathway		Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
			Dose per Unit (mrem/yr)							
Nearest Property	External	Plume	$1.74x10^{-2}$	$1.74x10^{-2}$	$1.74x10^{-2}$	$1.74x10^{-2}$	$1.74x10^{-2}$	$1.74x10^{-2}$	$1.75x10^{-2}$	$3.74x10^{-2}$
		Ground	$1.23x10^{-4}$	$1.23x10^{-4}$	$1.23x10^{-4}$	$1.23x10^{-4}$	$1.23x10^{-4}$	$1.23x10^{-4}$	$1.23x10^{-4}$	$1.44x10^{-4}$
		Total	$1.75x10^{-2}$	$1.75x10^{-2}$	$1.75x10^{-2}$	$1.75x10^{-2}$	$1.75x10^{-2}$	$1.75x10^{-2}$	$1.76x10^{-2}$	$3.75x10^{-2}$
	Inhalation	Adult	$3.11x10^{-2}$	$3.11x10^{-2}$	$1.83x10^{-6}$	$3.11x10^{-2}$	$3.11x10^{-2}$	$3.11x10^{-2}$	$3.11x10^{-2}$	0.00
		Teen	$3.14x10^{-2}$	$3.14x10^{-2}$	$2.56x10^{-6}$	$3.14x10^{-2}$	$3.14x10^{-2}$	$3.14x10^{-2}$	$3.14x10^{-2}$	0.00
		Child	$2.78x10^{-2}$	$2.78x10^{-2}$	$3.47x10^{-6}$	$2.78x10^{-2}$	$2.78x10^{-2}$	$2.78x10^{-2}$	$2.78x10^{-2}$	0.00
		Infant	$1.60x10^{-2}$	$1.60x10^{-2}$	$2.10x10^{-6}$	$1.60x10^{-2}$	$1.60x10^{-2}$	$1.60x10^{-2}$	$1.60x10^{-2}$	0.00
	Vegetable	Adult	$3.09x10^{-2}$	$3.09x10^{-2}$	$2.96x10^{-5}$	$3.09x10^{-2}$	$3.09x10^{-2}$	$3.09x10^{-2}$	$3.09x10^{-2}$	0.00
		Teen	$3.59x10^{-2}$	$3.58x10^{-2}$	$4.78x10^{-5}$	$3.59x10^{-2}$	$3.59x10^{-2}$	$3.58x10^{-2}$	$3.58x10^{-2}$	0.00
		Child	$5.60x10^{-2}$	$5.60x10^{-2}$	$1.13x10^{-4}$	$5.61x10^{-2}$	$5.60x10^{-2}$	$5.60x10^{-2}$	$5.60x10^{-2}$	0.00
	Dairy	Adult	$6.94x10^{-2}$	$6.92x10^{-2}$	$2.28x10^{-4}$	$6.95x10^{-2}$	$6.93x10^{-2}$	$6.92x10^{-2}$	$6.92x10^{-2}$	0.00
		Teen	$9.02x10^{-2}$	$9.00x10^{-2}$	$4.13x10^{-4}$	$9.06x10^{-2}$	$9.02x10^{-2}$	$9.00x10^{-2}$	$9.01x10^{-2}$	0.00
		Child	$1.43x10^{-1}$	$1.43x10^{-1}$	$9.96x10^{-4}$	$1.44x10^{-1}$	$1.43x10^{-1}$	$1.43x10^{-1}$	$1.43x10^{-1}$	0.00
		Infant	$2.16x10^{-1}$	$2.16x10^{-1}$	$1.59x10^{-3}$	$2.18x10^{-1}$	$2.17x10^{-1}$	$2.16x10^{-1}$	$2.16x10^{-1}$	0.00
	Meat	Adult	1.21	1.21	$3.72x10^{-4}$	1.21	1.21	1.21	1.21	0.00
		Teen	$7.25x10^{-1}$	$7.24x10^{-1}$	$3.09x10^{-4}$	$7.25x10^{-1}$	$7.25x10^{-1}$	$7.24x10^{-1}$	$7.24x10^{-1}$	0.00
		Child	$8.78x10^{-1}$	$8.78x10^{-1}$	$5.69x10^{-4}$	$8.78x10^{-1}$	$8.78x10^{-1}$	$8.78x10^{-1}$	$8.78x10^{-1}$	0.00
	All	Adult	1.36	1.36	$1.82x10^{-2}$	1.36	1.36	1.36	1.36	$3.75x10^{-2}$
		Teen	$9.00x10^{-1}$	$8.99x10^{-1}$	$1.83x10^{-2}$	$9.00x10^{-1}$	$9.00x10^{-1}$	$8.99x10^{-1}$	$8.99x10^{-1}$	$3.75x10^{-2}$
		Child	1.12	1.12	$1.92x10^{-2}$	1.12	1.12	1.12	1.12	$3.75x10^{-2}$
		Infant	$2.50x10^{-1}$	$2.50x10^{-1}$	$1.91x10^{-2}$	$2.52x10^{-1}$	$2.50x10^{-1}$	$2.50x10^{-1}$	$2.50x10^{-1}$	$3.75x10^{-2}$

Table 5.9-6 Comparison of MEI External Doses with 10 CFR 50 Appendix I Criteria

Type of Dose	Annual Dose	
	Site	Limit
Gamma Air (mrad)	1.19	10
Beta Air (mrad)	9.79×10^{-1}	20
Total Body (mrem)	7.96×10^{-1}	5
Skin (mrem)	1.63	15
Maximum Organ from Iodine and Particulates (mrem)	4.74	15

Notes:

1. Annual doses are taken from Table 5.9-5 and occur at the EAB.
2. Limits are from 10 CFR 50, Appendix I.
3. The maximum organ dose conservatively includes all isotopes and pathways and applies to the lungs.
4. Site dose is the sum of the dose from the reactor and the dose from the cold salt storage tank.

Table 5.9-7 Compliance of MEI with 40 CFR 190.10 Criteria

	Dose (mrem/yr)			
	Gaseous	**Direct**	**Total**	**Limit**
Total Body	4.73	1.00	5.73	25
Thyroid	4.73	0.00	4.73	75
Other Organ - Lung	4.74	0.00	4.74	25

Notes:

1. Gaseous doses are from Table 5.9-5.
2. Direct dose is assumed to be 1 mrem/yr.
3. Doses occur at the site boundary.
4. Limits are from 40 CFR 190.10.

Table 5.9-8 Bio accumulation Factors[1]

Element	Plants (pCi/g plant per pCi/g soil)	Meat (pCi/kg per pCi/day intake)	Cow Milk (pCi/L per pCi/day intake)
H	4.8	$1.2x10^{-2}$	$1.0x10^{-2}$
N	7.5	$7.7x10^{-2}$	$2.2x10^{-2}$
Ar	$6.0x10^{-1}$	$2.0x10^{-2}$	$2.0x10^{-2}$
Kr	3.0	$2.0x10^{-2}$	$2.0x10^{-2}$
Rb	$1.3x10^{-1}$	$3.1x10^{-2}$	$3.0x10^{-2}$
Xe	$1.0x10^{1}$	$2.0x10^{-2}$	$2.0x10^{-2}$
Cs	$1.0x10^{-2}$	$4.0x10^{-3}$	$1.2x10^{-2}$
Ba	$5.0x10^{-3}$	$3.2x10^{-3}$	$4.0x10^{-4}$

Note: Bioaccumulation factors are from NUREG/CR 4653.

Table 5.9-9 Doses to Biota

Biota	Dose (mrad/yr) Gaseous	Total Body Dose (mrad/d)	IAEA/NCRP Dose Guidelines for Biota (mrad/d)
Fish	0.00	0.00	1,000
Invertebrates	0.00	0.00	1,000
Algae	0.00	0.00	1,000
Muskrat	$7.76x10^{-1}$	$1.94x10^{-3}$	100
Raccoon	$7.76x10^{-1}$	$1.94x10^{-3}$	100
Heron	$7.76x10^{-1}$	$1.94x10^{-3}$	100
Duck	$7.76x10^{-1}$	$1.94x10^{-3}$	100

Notes:

1. Gaseous doses are from Table 5.9-5. The daily dose is obtained by dividing the annual dose by 365 days.
2. Land dwelling biota are assumed to receive ground, plume, inhalation, and vegetable doses equivalent to the maximum dose at the TFF.
3. Water dwelling biota are assumed to receive no dose due to insignificant release of liquid effluents.

Table 5.9-10 Comparison of TFF Worker Doses with 10 CFR 50 Appendix I Criteria

Type of Dose	Annual Worker Dose	Limit
Gamma Air (mrad)	6.41×10^{-1}	10
Beta Air (mrad)	5.26×10^{-1}	20
Total Body (mrem)	1.02×10^{-1}	5
Skin (mrem)	2.08×10^{-1}	15
Lung from Iodine and Particulates (mrem)	1.33×10^{-1}	15

Notes:

1. Worker doses are calculated by multiplying the annual doses by the hours worked in a year (2,080) and dividing by the hours in a year (8,760).
2. Worker doses will be restricted to background without fuel on site.
3. Doses are adult doses for the TFF from Table 5.9-5.
4. TFF workers are considered members of the public.
5. Organ dose is conservatively from all isotopes.

Table 5.9-11 Population Dose

Population Dose from Reactor (person-rem/year)	Population Dose from Background (person-rem/year)
1.27×10^{-1}	1.18×10^{4}

Notes:

1. The background population dose is the product of the national average background dose of 311 mrem/year and the population of 38,035 (Table 5.9-1).

5.10 Nonradioactive Waste Management

Descriptions of the Kemmerer Unit 1 Site nonradioactivate waste systems and waste stream discharges are presented in Section 3.2. Descriptions of nonradioactive waste streams that are expected from the operation of Kemmerer Unit 1 are presented in Section 3.4.3.

Nonradioactive wastes will be managed in accordance with applicable Federal, State and local laws and regulations and permit requirements as identified in Section 1.4. A Waste Minimization Plan will be implemented to ensure waste reduction, recycling, energy recovery, treatment, and disposal practices are compliant with permit requirements during plant operations.

Management practices will include:

- Recyclable wastes, such as scrap metal, lead acid batteries, and paper collected at the site will be recycled offsite at an approved recycling facility.
- Wastes, such as used oil and rags, will be collected and stored temporarily onsite until recovered at an offsite permitted recycling or recovery facility or disposed of at an offsite licensed commercial waste disposal facility.
- Hazardous waste, such as paint and solvents, will be disposed of in accordance with 40 CFR 261 and 40 CFR 262 at an approved hazardous waste disposal facility. Water discharges from cooling and auxiliary systems from routine plant operations (e.g., cooling tower blowdown, sanitary waste water treatment effluent, and other waste water effluent streams collected in the blowdown sump) will be treated by the wastewater subsystem before discharge to the environment via outfall structure leading to North Fork Little Muddy Creek.
- Stormwater will be managed by the site stormwater drainage system, consisting of catch basins, manholes, storm drainpipe, and three stormwater detention basins.
- Waste sludge generated from the Oil Water Separator and Extended Aeration Skid will be hauled offsite to an approved disposal location.

The assessment of potential impacts resulting from the discharge of nonradioactive wastes is presented in the following sections.

5.10.1 Impacts to Land

Operation of the site will result in the generation of solid wastes, including trash, water treatment resins, and water and sanitary treatment residuals. The Wyoming Department of Environmental Quality's Solid and Hazardous Waste Division requirements will be met regarding the handling, transporting, and disposal of solid wastes offsite (Reference 5.10-1). Wyoming State law requires that all solid waste be disposed of, treated, or recycled at designated facilities approved by both the Solid and Hazardous Waste Division and the local governing body with jurisdiction (county, city, or town) in which the facility is located. Any onsite disposal of uncontaminated sediment and excavated material during operation will be stockpiled in areas with engineering controls to limit runoff to surface water.

As mentioned in Section 3.4.3, the workforce at the site will be approximately 250 onsite operations workers. Therefore, the site will not produce significant annual amounts of nonradioactive, nonhazardous waste requiring disposal in landfills, including spent filters from waste and waste water treatment. Impacts to land from nonradioactive waste generated, handled, stored, and disposed of during operations is anticipated to be SMALL.

5.10.1.1 Waste Sludge

The waste water subsystems described in Section 5.10.2 will generate waste sludge from the Oil Water Separator and the Extended Aeration Skid that will be hauled offsite to an approved disposal location.

5.10.1.2 Hazardous Waste

The types of hazardous waste that nuclear power plants typically generate include waste paints, lab packs, and solvents. The quantities of these wastes generated at individual plants are highly variable but are generally relatively small when compared with the quantities at most other industrial facilities that generate hazardous waste. Most nuclear power plants accumulate their hazardous waste onsite as authorized under the Resource Conservation and Recovery Act (42 U.S. Code 6901 et. seq.) and transport it to a treatment facility where it undergoes treatment. The remaining residues are sent to a permanent disposal facility. There are several treatment and disposal facilities throughout the United States allowed by the Resource Conservation and Recover Act that are used by the owners of nuclear power plants.

Operation of Kemmerer Unit 1 is expected to produce waste in quantities similar to those described in NUREG-2226 (Reference 5.10-3) that will allow classification as a Small Quantity Generator of Hazardous Wastes that will be disposed of by a licensed hazardous-waste management facility. In accordance with hazardous material management regulations in 40 CFR 261 and 40 CFR 265, onsite storage of hazardous and mixed wastes are limited. Hazardous and mixed wastes will be shipped offsite for treatment or disposal after a short accumulation period. No significant emissions or releases of hazardous materials are expected as a result of hazardous or mixed waste management practices. Therefore, environmental impacts of hazardous and mixed waste are expected to be SMALL and mitigation does not appear to be warranted.

5.10.1.3 Mixed Waste

The term mixed waste refers specifically to waste that is regulated as both low-level radioactive waste and hazardous waste. Radioactive materials at nuclear power plants are regulated by the U.S. Nuclear Regulatory Commission under the Atomic Energy Act of 1954 (42 U.S. Code 2011 et seq.). Hazardous wastes are regulated by the State of Wyoming, which is a U.S. Environmental Protection Agency-authorized state (i.e., a State authorized by the U.S. Environmental Protection Agency to regulate those portions of the Federal act) under the Resource Conservation and Recovery Act.

Mixed waste generated from the operation of the site will meet U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, Wyoming Department of Environmental Quality, and Occupational Safety and Health Administration requirements. The radioactive component of mixed waste must satisfy the definition of low-level waste in the Low-Level Radioactive Waste Policy Amendments Act of 1985. The hazardous component must exhibit at least one of the hazardous waste characteristics identified in 40 CFR 261, Subpart C, or be listed as a hazardous waste under 40 CFR 261, Subpart D.

A 1990 survey conducted by the U.S. Nuclear Regulatory Commission identified the following types of mixed low-level waste at reactor facilities (Reference 5.10-2):

- waste oil from pumps and other equipment
- chlorinated fluorocarbons resulting from cleaning, refrigeration, degreasing, and decontamination activities
- organic solvents, reagents, compounds, and associated materials, such as rags and wipes
- metals, such as lead from shielding applications and chromium from solutions and acids
- metal-contaminated organic sludge and other chemicals
- corrosive liquids consisting of organic and inorganic acids

Operation of Kemmerer Unit 1 is expected to produce waste in quantities similar to NUREG-2226 (Reference 5.10-3) that will allow classification as a Small Quantity Generator of Hazardous Wastes that will be disposed of by a licensed hazardous-waste management facility. In accordance with hazardous material management regulations in 40 CFR 261 and 40 CFR 265, onsite storage of hazardous and mixed wastes are limited. Hazardous and mixed wastes will be shipped offsite for treatment or disposal after a short accumulation period. No significant emissions or releases of hazardous materials are expected as a result of hazardous or mixed waste management practices. Therefore, environmental impacts of mixed waste to land, water, and air quality are anticipated to be SMALL.

5.10.2 Impacts to Water

Nonradioactive waste water from routine plant operations will include cooling tower blowdown, plant auxiliary systems, and water treatment, including reverse osmosis reject, and water treatment chemicals. Water use information is presented in Figure 3.2-2.

5.10.2.1 Nuclear Island Water Systems

The Nuclear Island Water System Floor and Equipment Drains Subsystem will be designed such that potentially radioactive or radioactive fluid will be separated from nonradioactive fluids.

5.10.2.2 Energy Island Water Systems

The Energy Island Water System waste water subsystem will collect plant process streams. This subsystem includes facilities and equipment, such as oil and water separators and de-chlorination skids, which will treat plant waste water streams such that they become within acceptable discharge limits. The waste water streams will include sanitary waste, Heat Rejection System cooling tower basin blowdown, water treatment reject, and Oil Water Separator discharge.

The site stormwater drainage system will be comprised of catch basins, manholes, storm drainpipe, and three stormwater detention basins. By way of sheet flow, water will be drained away from buildings and roads then directed into catch basins. From there, stormwater pipes will convey the water into stormwater retention ponds. Emergency spillways will be provided to prevent over topping.

5.10.2.3 Waste water and Stormwater Discharge

Discharges from the waste water basin leaving Kemmerer Unit 1 are projected to have a maximum flow rate of 1,118 gallons per minute (4,232 liters per minute). Stormwater discharge flow rates have not been determined at this time. Section 5.2 describes plant discharge information. Hydrological and hydraulic impacts from plant discharge on North Fork Little Muddy Creek and its adjacent wetlands and floodplain area are anticipated to be negligible.

The anticipated waste water and stormwater discharges leaving the site to surface water resources will comply with both Federal and State water quality standards. Discharge from the site will comply with Wyoming Pollutant Discharge Elimination System permit requirements resulting in water quality in North Fork Little Muddy Creek being maintained.

Since waste water and stormwater discharge will meet end of pipe limitations, and discharge flow rates are similar to Naughton Power Plant, potential impacts from the discharge of nonradioactive liquid waste is anticipated to be SMALL.

5.10.3 Impacts to Air

Operation of the site will result in small amounts of gaseous emissions to the air from equipment associated with plant auxiliary systems (e.g., diesel generators). This equipment will operate infrequently during startup, shutdown, or testing, and the related emissions will be intermittent. Projected emissions from the standby diesel-fueled equipment are provided in Table 3.4-3.

The air emission sources as a result of operation of the site will be regulated under a Wyoming Department of Environmental Quality General Air Permit.

Based on the estimated amount of potential air emissions, the intermittent nature of the potential emissions, and the requirement to adhere to prevention of significant deterioration requirements, impacts to air quality are anticipated to be SMALL.

References

5.10-1 (WYDEQ 2023) “WYDEQ Solid Waste Management.” 2023. https://deq.wyoming.gov/shwd/solid-waste/. Accessed August 30, 2023.

5.10-2 (NRC 2013) U.S. Nuclear Regulatory Commission. “NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants.” 2013. Revision 1. Accession No. ML13106A241.

5.10-3 (NRC 2019) U.S. Nuclear Regulatory Commission. “NUREG-2226, Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site: Final Report.” 2019.

5.11 Environmental Impacts of Postulated Accidents

The radiological consequences to the environment from potential accidents at the Kemmerer Unit 1 Site are evaluated in this section. Site-specific events that could lead to releases substantially greater than permissible limits for normal operations are considered. Design Basis Accidents (DBAs) and severe accidents are evaluated. To determine if there are any procedures, training activities, or plant-design changes that could significantly reduce environmental risks at the site due to severe accidents, Severe Accident Mitigation Alternatives (SAMAs) and Severe Accident Mitigation Design Alternatives (SAMDAs) are also evaluated.

5.11.1 Design-Basis Accidents

DBAs evaluated in PSAR Chapter 3 include a spectrum of events that the plant should be designed specifically to accommodate. DBA analyses have a direct impact on safety-related systems, structures, and components that are designed to ensure adequate protection of the public health and safety. These safety analyses are intentionally performed in a conservative manner to compensate for uncertainties in accident progression. The radiological consequences of DBAs are assessed as part of the safety review to demonstrate that the plant can be sited and operated without undue risk to the health and safety of the public.

Offsite radiological consequences of DBAs are calculated, as described in PSAR Section 3.3.1, except that site-specific 50th percentile atmospheric dispersion factors (X/Qs) are used instead of enveloping values. PSAR Sections 2.1, 2.4, and 2.7 used ARCON to calculate the 50th and 99.5th percentile X/Qs.

The calculated X/Qs within the Environmental Report used PAVAN. PAVAN yields more conservative X/Qs than ARCON.

The resulting doses are compared to the regulatory limits in 10 CFR 50.34:

1. An individual located at any point on the boundary of the exclusion area for any 2-hour period following the onset of the postulated fission product release, would not receive a radiation dose in excess of 25 rem Total Effective Dose Equivalent.

2. An individual located at any point on the outer boundary of the low population zone, who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a radiation dose in excess of 25 rem Total Effective Dose Equivalent.

Table 5.11-1 shows the offsite X/Qs for the Exclusion Area Boundary (EAB) and the Low Population Zone (the EAB and Low Population Zone are the same). For each DBA, Table 5.11-2 provides the source term name and a brief description, as well as the 2-hour activity release period that yields the maximum EAB dose. Table 5.11-3 through Table 5.11-18 show the time-dependent isotopic activities released to the environment. The resulting doses in Table 5.11-19 are within the acceptance criteria in 10 CFR 50.34, indicating the environmental impacts of DBAs are anticipated to be SMALL.

5.11.2 Severe Accidents

This section evaluates the mean environmental risks of severe accidents involving radioactive material within a 50-mile (80-kilometer) radius of the site. Severe accidents involve multiple failures of equipment or function and, therefore, have a lower likelihood of occurrence than DBAs; however, the consequences of such accidents may be higher. The risks of a severe accident type are defined as the products of the estimated consequences and the probability of accident occurrence. Severe accident types (or major release categories), source terms, and associated probabilities are determined by the Probabalistic Risk Assessment (PRA).

The overview of PRA is described in PSAR Section 3.1. The site-specific environmental risks of severe accidents consider all severe accident types from the PRA and apply source terms from those events that result in activity releases to the environment. At the construction permit stage, only those events initiated internally are evaluated. External events will be evaluated at the operating license stage.

The definition of a severe accident is any non-DBA event that exceeds a 30-day dose of 25 rem Total Effective Dose Equivalent at the EAB. Of all the events evaluated, two have source terms that meet the severe accident definition: one involving a reactivity transient (Source Term ID RC-B-CB) and the other leading to local boiling (Source Term ID RCLB-1F). The PRA analysis defines release sequences and assigns them to categories based on the level of fuel damage and the status of primary and secondary confinement barriers. Table 5.11-20 lists the accident categories pertaining to the two severe accident source terms and their associated frequencies.

The MACCS computer code (Reference 5.11-6) is used to estimate site-specific severe accident risks based on regional meteorology, population, and land-use data. Relevant environmental pathways that lead to radiological consequences include air, ground, food, and surface water. Key features of this analysis are as follows:

- Meteorological Data – Three years (2019 to 2021) of meteorological data collected at Naughton Power Plant, which is near the Kemmerer Unit 1 Site, are evaluated and the one that yields the bounding consequences is used to estimate population dose risks from air pathways. Section 2.7.1.4 discusses the applicability of Naughton Power Plant data to Kemmerer Unit 1.
- Emergency Response – The Kemmerer Unit 1 Emergency Planning Zone coincides with the EAB, meaning that no credit is taken for an emergency plan for the site and its associated mitigative impacts due to evacuation, sheltering, and emergency relocation. Not crediting an emergency plan is conservative, as it yields larger doses. However, dose-dependent relocation during the chronic phase is considered by setting dose criteria for direct exposure and food ingestion pathways in MACCS.
- Demographics – Demographic and population data for the 50-mile (80-kilometer) region surrounding the plant is collected using the SecPop computer code (Reference 5.11-10). The population is projected to 2090, the year that operation of the plant is expected to cease.

- Land Use – SecPop is used to produce land-use characterization (e.g., farmland), watershed data, and land and water fractions by radial and angular sectors. This data is used to estimate the risks associated with contaminated land areas, specifically the quantification of land area requiring decontamination.
- Food Pathways – The COMIDA2 module of MACCS is used to evaluate food ingestion doses. MACCS includes a predefined COMIDA file with typical US characteristics for food growth and consumption that can be used in lieu of performing a site-specific evaluation. As site-specific data on crops is not available, the predefined file is utilized for the site. As a mitigative action, dose criteria for the food ingestion pathways are specified in MACCS to trigger interdiction as appropriate.
- Economic Cost – Economic cost risks are estimated using land values from SecPop and costs associated with actions such as long-term relocation and cleanup from NUREG/CR-7270 (Reference 5.11-12).
- Surface Water – Population dose risks from the drinking water pathway are estimated using SecPop data on surface water bodies within 50 miles (80 kilometers). MACCS does not evaluate other water pathways. NUREG-1437 (Reference 5.11-13) indicates the risk associated with aquatic food pathways to be relatively small compared to the risk from the airborne pathways for most sites, excepting the few with large aquatic food harvests, which Kemmerer Unit 1 does not have.
- Individual Risks – Early fatality risk to an individual within 1 mile (1.6 kilometers) of the EAB and latent cancer fatality risk to an individual within 10 miles (16 kilometers) of the EAB are estimated based on population-weighted doses within sectors.
- Other Inputs – Other than source term inputs pertaining to the Natrium design and site-specific data for population, land, and weather, recommended MACCS inputs from NUREG/CR-7009 (Reference 5.11-9) and NUREG/CR-7270 (Reference 5.11-12) are utilized, as applicable. For plume meander, the Ramsdell and Fosmire model is used, with input parameters taken from SAND2021-6924 (Reference 5.11-5).

Radioactivity released during an accident can directly and indirectly enter groundwater that serves as a source of drinking water or irrigation or can move through an aquifer that eventually discharges to surface water. MACCS does not model the groundwater pathway. However, NUREG-1437 (Reference 5.11-13) indicates that groundwater contamination can be caused by reactor basemat melt-through having a very low frequency of occurrence and that the melt-through sequences pose a low severe accident risk due to their long-developing nature. The dose from this pathway is expected to be negligible compared to that from air pathways and from the ingestion of food and surface water.

Table 5.11-21 summarizes the results. It shows that individual risks for early fatality and latent cancer fatality meet the Commission’s Safety Goals (51 FR 30028), as quantified in Regulatory Guide 1.233, “Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors,” Revision 0. The early fatality risk within 1 mile (1.6 kilometers) of the EAB is zero, compared to the goal of 5×10^{-7} per plant-year. The latent cancer fatality risk within 10 miles (16 kilometers) of the EAB is 5.1×10^{-12} per reactor-year, compared to the goal of 2×10^{-6} per plant-year. The population dose risk is

1.5 x 10^{-4} person-rem per reactor-year. While there is no regulatory acceptance criterion for the population dose, the calculated risk is only 0.12 percent of the estimated dose of 0.127 person-rem per year from routine releases, as shown in Table 5.11-11.

As current generation reactors undergoing license renewal are Generation I and II light water reactors, it is more appropriate to compare the Natrium design to newer non-light water reactors. Given the lack of such information on non-light water reactors, the frequencies and population dose risks from the Natrium design cannot be compared to other non-light water reactors. Comparisons with the following large Generation III and newer light water reactors indicate that they bound the Natrium design sited at Kemmerer Unit 1, as shown in Table 5.11-22: AP1000 at Turkey Point 6 & 7 (Reference 5.11-2), ESBWR at Fermi 3 (Reference 5.11-1), US-APWR at Comanche Peak 3 & 4 (Reference 5.11-3), and US EPR at Calvert Cliffs 3 (Reference 5.11-7). Based on the results, the environmental impacts of severe accidents are anticipated to be SMALL.

5.11.3 Severe Accident Mitigation Alternatives

This section evaluates SAMAs that could limit activity releases to the environment, thereby significantly reducing the environmental risks from severe accidents. The methodology outlined in NEI 05-01 (Reference 5.11-4) is utilized to perform the SAMA analysis. Although NEI 05-01 is intended to be used for license renewal applications, the guidance presented therein utilizes the generic methodology from NUREG/BR-0184. The primary parameter pertaining to license renewal in the NEI document is the evaluation period of 20 years, which is extended to 60 years in this application. The methodology involves identifying SAMA and SAMDA candidates that have the potential to reduce plant risk (frequency, consequence,or both, of a severe accident) and evaluating whether the implementation of those candidates is potentially beneficial from a cost-risk reduction perspective.

NEI 05-01 presents the following steps for evaluating SAMAs:

1. Determine Severe Accident Risk – Determine offsite dose and economic impacts of severe accidents using PRA models and analyzing the radiological consequences.

2. Determine Cost of Severe Accident Risk and Maximum Benefit – Calculate the monetary values of severe accident risks due to offsite and onsite exposure cost and offsite and onsite economic costs. The sum of these costs represents the maximum averted cost risk.

3. SAMA and SAMDA Identification – Develop a list of potential SAMAs and SAMDAs by reviewing the dominant plant-specific risk contributors and potentially relevant industry generic SAMAs and SAMDAs.

4. Preliminary Screening (Phase I SAMA and SAMDA Analysis) – Perform screening of the SAMA and SAMDA candidates identified in Step 3 based on their applicability and relevance to the plant's design and their estimated costs compared to the maximum averted cost risk value from Step 2. PRA insights may be used to screen out candidates that do not address significant contributors to risk.

5. Final Screening (Phase II SAMA and SAMDA Analysis) – For those SAMA and SAMDA candidates that are retained from Step 4, calculate the risk reduction from the implementation of the candidates and compare the result to the estimated cost of implementation to identify the net cost-benefit. PRA insights may be used to screen out candidates that do not address significant contributors to the risk.

6. Sensitivity Analysis – Evaluate how changes in the SAMA and SAMDA analysis assumptions and uncertainties might impact the cost-benefit evaluations for the SAMA and SAMDA candidates identified in Step 5.

7. Conclusions and Recommendations – Summarize the results of the analysis and identify potentially cost-beneficial SAMA and SAMDA candidates.

At the construction permit stage, only the first two steps are implemented. The remaining steps will be implemented at the operating license stage. Table 5.11-21 summarizes the offsite dose and economic cost risks from Step 1. The offsite population dose is assigned a monetary value using the NUREG-1530 (Reference 5.11-11) conversion of $5,200 per person-rem in 2014 dollars and then updating to current dollars using the guidance in NUREG-1530, yielding $8,200 per person-rem. The resulting monetary value of dose is added to the economic cost to arrive at the total offsite cost.

As with offsite, onsite costs are based on exposure to plant personnel and economic costs. In accordance with NEI 05-01, onsite exposure costs are broken down into immediate and long-term doses to plant workers following an accident while onsite economic costs are those associated with cleanup, decontamination, and obtaining replacement power. Key features of the analysis are as follows:

- All onsite costs are estimated based on generic values provided in NEI 05-01, as site specific data is not available.
- An evaluation period of 60 years is used instead of 20 years.
- In estimating the replacement power cost, the peak Natrium Reactor Plant electrical power of 500 MWe is used and plant capacity is conservatively assumed to be 100 percent.
- Consistent with the offsite analysis, the conversion of onsite exposure to a monetary cost is performed using the updated guidance in NUREG-1530 in lieu of the outdated conversion rate in NEI 05-01.
- All costs are adjusted to current dollars using the Consumer Price Index Inflation Calculator (Reference 5.11-8).
- A baseline annual discount rate of 7 percent is used, along with a sensitivity discount rate of 3 percent.
- Table 5.11-23 presents the results. Rounded to two significant figures, the maximum averted cost risks are $430 and $1,100 at annual discount rates of 7 and 3 percent. These results suggest no SAMA implementation will be cost-effective. However, a full SAMA analysis will be performed at the operating license stage.

References

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5.11-13 (USNRC 2023) United States Nuclear Regulatory Commission. “General Environmental Impact Statement for License Renewal of Nuclear Plants, Appendices.” NUREG-1437, Volume 2, Revision 2. February 2023.

Table 5.11-1 Atmospheric Dispersion Factors

Receptor	Time (hr)	X/Q (s/m^3)
EAB	0-2	9.03×10^{-4}
LPZ	0-8	5.59×10^{-4}
	8-24	4.40×10^{-4}
	24-96	2.62×10^{-4}
	96-720	1.24×10^{-4}

Table 5.11-2 Design Basis Accident Source Term Descriptions

Source Term Name	Source Term Description	EAB Worst 2-hr Period
LocFault_DBA	Local fault resulting in one failed in-vessel assembly	5.75 - 7.75
FDIV_1assy_DBA	Fuel drop during in-vessel movement resulting in one failed assembly	0 - 2
FDIV_2assy_DBA	Fuel drop during in-vessel movement resulting in two failed assemblies; above-grade reactor building functional containment barrier is failed, but vessel head is intact	0 - 2
SCG_HAA_DBA	Failure of the Sodium Cover Gas (SCG) system resulting in a small ex-vessel leak to the Head Access Area (HAA)	0 - 2
SCG_VTC_DBA	Failure of the SCG system resulting in a small ex-vessel leak to the vapor trap cell	0 - 2
SPS_Sm_DBA	Failure of the Sodium Processing System (SPS) resulting in a small ex-vessel leak	0 - 2
EVHM_DBA	Fuel damage while handling fuel inside of the Ex-Vessel Handling Machine (EVHM) resulting in a failed ex-vessel assembly	2 - 4
EVHM_LTA_DBA	Fuel damage while handling fuel inside of the EVHM resulting in a failed ex-vessel Lead Test Assembly	2 - 4
PIC_DBA	Fuel damage while handling fuel inside of the Pool Immersion Cell (PIC) resulting in a failed ex-vessel assembly	2 - 4
FHA_SFP_DBA	Fuel assembly drop in the spent fuel pool resulting in a failed ex-vessel assembly	0 - 2
ULOHS_IVS_fullcore	Unprotected Loss of Heat Sink resulting in the failure of all assemblies in the core and In-Vessel Storage (IVS)	156 - 158
RWG_DBA	Failure of the Radwaste Gas System resulting in a release of radionuclides from the holdup tank to the environment via the plant stack	0 - 2
SPS_CTR	Failure of the SPS cold trap resulting in the ex-vessel release of tritium	6.25 - 8.25
SCG_Lg_HAA_DBA	Failure in the SCG system resulting in a large ex-vessel leak inside the HAA	0 - 2
SCG_Lg_VTC_DBA	Failure in the SCG system resulting in a large ex-vessel leak outside the HAA, but inside the vapor trap cell	0 - 2

Table 5.11-3 Activity Releases for Source Term LocFault_DBA - Plenum Gas (Sheet 1 of 2)

Isotope	Cumulative Activity Release (Ci)						
	2 hr	5.75 hr	7.75 hr	8 hr	24 hr	96 hr	720 hr
Am-242	0	2.31×10^{-6}	3.27×10^{-6}	3.38×10^{-6}	7.49×10^{-6}	8.93×10^{-6}	8.93×10^{-6}
Br-82	1.33×10^{-4}	9.97×10^{-4}	1.72×10^{-3}	1.82×10^{-3}	1.11×10^{-2}	4.49×10^{-2}	5.72×10^{-2}
Br-84	3.57×10^{-3}	4.79×10^{-3}	4.80×10^{-3}	4.80×10^{-3}	4.81×10^{-3}	4.81×10^{-3}	4.81×10^{-3}
Ce-141	8.09×10^{-6}	9.41×10^{-5}	1.65×10^{-4}	1.75×10^{-4}	7.34×10^{-4}	1.34×10^{-3}	1.37×10^{-3}
Cm-242	0	0	1.47×10^{-6}	1.53×10^{-6}	4.41×10^{-6}	7.34×10^{-6}	7.49×10^{-6}
Cs-134	8.13×10^{-3}	4.31×10^{-2}	6.38×10^{-2}	6.63×10^{-2}	1.91×10^{-1}	3.18×10^{-1}	3.25×10^{-1}
Cs-135	0	1.42×10^{-6}	2.11×10^{-6}	2.19×10^{-6}	6.42×10^{-6}	1.10×10^{-5}	1.12×10^{-5}
Cs-136	1.10×10^{-2}	5.79×10^{-2}	8.55×10^{-2}	8.89×10^{-2}	2.53×10^{-1}	4.09×10^{-1}	4.15×10^{-1}
Cs-137	1.86×10^{-2}	9.85×10^{-2}	1.46×10^{-1}	1.52×10^{-1}	4.37×10^{-1}	7.27×10^{-1}	7.43×10^{-1}
Cs-138	9.78×10^{-1}	1.35	1.36	1.36	1.36	1.36	1.36
Eu-154	3.18×10^{-3}	1.69×10^{-2}	2.50×10^{-2}	2.60×10^{-2}	7.49×10^{-2}	1.24×10^{-1}	1.27×10^{-1}
Eu-155	1.36×10^{-2}	7.19×10^{-2}	1.06×10^{-1}	1.11×10^{-1}	3.19×10^{-1}	5.31×10^{-1}	5.42×10^{-1}
Eu-156	4.65×10^{-2}	2.46×10^{-1}	3.63×10^{-1}	3.77×10^{-1}	1.07	1.74	1.77
Eu-157	2.13×10^{-2}	1.02×10^{-1}	1.45×10^{-1}	1.50×10^{-1}	3.27×10^{-1}	3.86×10^{-1}	3.86×10^{-1}
Eu-158	4.56×10^{-3}	6.97×10^{-3}	7.05×10^{-3}	7.06×10^{-3}	7.07×10^{-3}	7.07×10^{-3}	7.07×10^{-3}
I-129	0	0	0	0	0	1.46×10^{-6}	1.24×10^{-5}
I-130	8.35×10^{-4}	5.73×10^{-3}	9.45×10^{-3}	9.94×10^{-3}	4.36×10^{-2}	8.30×10^{-2}	8.39×10^{-2}
I-131	6.00×10^{-2}	4.67×10^{-1}	8.23×10^{-1}	8.73×10^{-1}	6.20	4.35×10^{1}	1.60×10^{2}
I-132	5.90×10^{-2}	2.38×10^{-1}	3.07×10^{-1}	3.14×10^{-1}	4.30×10^{-1}	4.32×10^{-1}	4.32×10^{-1}
I-133	1.16×10^{-1}	8.44×10^{-1}	1.43	1.51	8.08	2.30×10^{1}	2.48×10^{1}
I-134	5.11×10^{-2}	1.00×10^{-1}	1.05×10^{-1}	1.05×10^{-1}	1.06×10^{-1}	1.06×10^{-1}	1.06×10^{-1}
I-135	9.87×10^{-2}	6.04×10^{-1}	9.39×10^{-1}	9.82×10^{-1}	2.98	3.75	3.75
Kr-83m	4.30×10^{-1}	1.51	1.84	1.87	2.26	2.26	2.26
Kr-85	5.04×10^{-2}	3.96×10^{-1}	7.01×10^{-1}	7.44×10^{-1}	5.48	4.43×10^{1}	3.75×10^{2}
Kr-85m	1.26	6.92	1.02×10^{1}	1.06×10^{1}	2.40×10^{1}	2.62×10^{1}	2.62×10^{1}
Kr-87	1.48	3.96	4.43	4.46	4.75	4.75	4.75
Kr-88	2.85	1.29×10^{1}	1.75×10^{1}	1.80×10^{1}	2.84×10^{1}	2.88×10^{1}	2.88×10^{1}
La-140	8.11×10^{-3}	4.14×10^{-2}	6.02×10^{-2}	6.24×10^{-2}	1.61×10^{-1}	2.24×10^{-1}	2.25×10^{-1}
La-141	6.44×10^{-3}	2.39×10^{-2}	3.01×10^{-2}	3.08×10^{-2}	4.21×10^{-2}	4.25×10^{-2}	4.25×10^{-2}
La-142	4.24×10^{-3}	1.01×10^{-2}	1.10×10^{-2}	1.11×10^{-2}	1.16×10^{-2}	1.16×10^{-2}	1.16×10^{-2}
Mo-99	8.49×10^{-3}	4.40×10^{-2}	6.44×10^{-2}	6.69×10^{-2}	1.80×10^{-1}	2.65×10^{-1}	2.67×10^{-1}
Nb-95	8.49×10^{-3}	4.50×10^{-2}	6.66×10^{-2}	6.93×10^{-2}	2.00×10^{-1}	3.32×10^{-1}	3.39×10^{-1}
Nb-95m	9.29×10^{-5}	4.89×10^{-4}	7.22×10^{-4}	7.50×10^{-4}	2.12×10^{-3}	3.42×10^{-3}	3.48×10^{-3}

Table 5.11-3 Activity Releases for Source Term LocFault_DBA - Plenum Gas (Sheet 2 of 2)

Isotope	Cumulative Activity Release (Ci)						
	2 hr	5.75 hr	7.75 hr	8 hr	24 hr	96 hr	720 hr
Nb-97	8.07×10^{-3}	4.00×10^{-2}	5.71×10^{-2}	5.91×10^{-2}	1.33×10^{-1}	1.60×10^{-1}	1.60×10^{-1}
Nb-97m	8.43×10^{-3}	4.41×10^{-2}	6.35×10^{-2}	6.58×10^{-2}	1.64×10^{-1}	2.03×10^{-1}	2.03×10^{-1}
Nd-147	3.13×10^{-3}	1.65×10^{-2}	2.43×10^{-2}	2.53×10^{-2}	7.16×10^{-2}	1.15×10^{-1}	1.17×10^{-1}
Np-239	8.20×10^{-2}	4.23×10^{-1}	6.18×10^{-1}	6.42×10^{-1}	1.71	2.48	2.49
Pm-147	1.32×10^{-3}	7.01×10^{-3}	1.04×10^{-2}	1.08×10^{-2}	3.11×10^{-2}	5.18×10^{-2}	5.29×10^{-2}
Pr-143	7.57×10^{-3}	3.99×10^{-2}	5.89×10^{-2}	6.13×10^{-2}	1.74×10^{-1}	2.82×10^{-1}	2.87×10^{-1}
Pu-238	2.56×10^{-6}	1.36×10^{-5}	2.01×10^{-5}	2.09×10^{-5}	6.02×10^{-5}	1.00×10^{-4}	1.02×10^{-4}
Pu-239	4.16×10^{-6}	2.21×10^{-5}	3.27×10^{-5}	3.40×10^{-5}	9.80×10^{-5}	1.63×10^{-4}	1.66×10^{-4}
Pu-240	0	3.00×10^{-6}	4.44×10^{-6}	4.62×10^{-6}	1.33×10^{-5}	2.22×10^{-5}	2.26×10^{-5}
Pu-241	6.91×10^{-6}	3.66×10^{-5}	5.42×10^{-5}	5.63×10^{-5}	1.62×10^{-4}	2.70×10^{-4}	2.76×10^{-4}
Rb-86	1.86×10^{-3}	9.82×10^{-3}	1.45×10^{-2}	1.51×10^{-2}	4.31×10^{-2}	7.02×10^{-2}	7.15×10^{-2}
Rb-88	2.74	1.38×10^{1}	1.89×10^{1}	1.95×10^{1}	3.14×10^{1}	3.18×10^{1}	3.18×10^{1}
Rh-105	3.29×10^{-3}	1.72×10^{-2}	2.52×10^{-2}	2.61×10^{-2}	6.85×10^{-2}	9.44×10^{-2}	9.47×10^{-2}
Ru-103	6.09×10^{-3}	3.22×10^{-2}	4.76×10^{-2}	4.95×10^{-2}	1.42×10^{-1}	2.34×10^{-1}	2.39×10^{-1}
Ru-105	2.71×10^{-3}	1.04×10^{-2}	1.34×10^{-2}	1.37×10^{-2}	1.97×10^{-2}	1.99×10^{-2}	1.99×10^{-2}
Ru-106	1.28×10^{-3}	6.79×10^{-3}	1.01×10^{-2}	1.05×10^{-2}	3.01×10^{-2}	5.01×10^{-2}	5.11×10^{-2}
Tc-99	0	0	0	0	1.47×10^{-6}	2.45×10^{-6}	2.50×10^{-6}
Tc-99m	7.62×10^{-3}	4.00×10^{-2}	5.89×10^{-2}	6.13×10^{-2}	1.68×10^{-1}	2.51×10^{-1}	2.53×10^{-1}
U-237	2.71×10^{-3}	1.42×10^{-2}	2.10×10^{-2}	2.18×10^{-2}	6.11×10^{-2}	9.64×10^{-2}	9.77×10^{-2}
Xe-131m	1.31×10^{-1}	1.02	1.80	1.91	1.37×10^{1}	1.01×10^{2}	4.63×10^{2}
Xe-133	9.17	7.11×10^{1}	1.25×10^{2}	1.33×10^{2}	9.25×10^{2}	6.07×10^{3}	1.70×10^{4}
Xe-133m	2.77×10^{-1}	2.11	3.66	3.88	2.51×10^{1}	1.25×10^{2}	1.95×10^{2}
Xe-135	8.38	5.50×10^{1}	8.85×10^{1}	9.29×10^{1}	3.50×10^{2}	5.36×10^{2}	5.37×10^{2}
Xe-135m	1.22×10^{-1}	1.25×10^{-1}	1.25×10^{-1}	1.25×10^{-1}	1.25×10^{-1}	1.25×10^{-1}	1.25×10^{-1}
Xe-138	4.49×10^{-1}	4.57×10^{-1}	4.57×10^{-1}	4.57×10^{-1}	4.57×10^{-1}	4.57×10^{-1}	4.57×10^{-1}
Y-90	3.89×10^{-4}	2.01×10^{-3}	2.94×10^{-3}	3.06×10^{-3}	8.20×10^{-3}	1.21×10^{-2}	1.22×10^{-2}
Y-91	7.09×10^{-3}	3.75×10^{-2}	5.55×10^{-2}	5.77×10^{-2}	1.66×10^{-1}	2.74×10^{-1}	2.80×10^{-1}
Y-92	5.71×10^{-3}	2.04×10^{-2}	2.54×10^{-2}	2.59×10^{-2}	3.41×10^{-2}	3.43×10^{-2}	3.43×10^{-2}
Y-93	7.31×10^{-3}	3.35×10^{-2}	4.63×10^{-2}	4.78×10^{-2}	9.35×10^{-2}	1.03×10^{-1}	1.03×10^{-1}
Zr-95	8.52×10^{-3}	4.51×10^{-2}	6.67×10^{-2}	6.94×10^{-2}	2.00×10^{-1}	3.30×10^{-1}	3.37×10^{-1}
Zr-97	7.77×10^{-3}	3.77×10^{-2}	5.35×10^{-2}	5.53×10^{-2}	1.24×10^{-1}	1.49×10^{-1}	1.49×10^{-1}

Table 5.11-4 Activity Releases for Source Term LocFault_DBA - Other than Plenum Gas (Sheet 1 of 3)

Isotope	Cumulative Activity Release (Ci)						
	2 hr	5.75 hr	7.75 hr	8 hr	24 hr	96 hr	720 hr
Am-242	1.70×10^{-6}	8.28×10^{-6}	1.17×10^{-5}	1.21×10^{-5}	2.69×10^{-5}	3.21×10^{-5}	3.21×10^{-5}
Ba-139	2.75×10^{-1}	6.25×10^{-1}	6.71×10^{-1}	6.75×10^{-1}	6.97×10^{-1}	6.97×10^{-1}	6.97×10^{-1}
Ba-140	4.85×10^{-1}	2.58	3.82	3.97	1.13×10^{1}	1.83×10^{1}	1.86×10^{1}
Br-82	5.74×10^{-4}	2.94×10^{-3}	4.27×10^{-3}	4.44×10^{-3}	1.13×10^{-2}	1.54×10^{-2}	1.54×10^{-2}
Br-84	1.61×10^{-2}	2.02×10^{-2}	2.02×10^{-2}	2.02×10^{-2}	2.02×10^{-2}	2.02×10^{-2}	2.02×10^{-2}
Ce-141	3.20×10^{-2}	1.71×10^{-1}	2.54×10^{-1}	2.64×10^{-1}	7.59×10^{-1}	1.25	1.27
Ce-143	2.90×10^{-2}	1.48×10^{-1}	2.15×10^{-1}	2.23×10^{-1}	5.63×10^{-1}	7.60×10^{-1}	7.62×10^{-1}
Ce-144	2.38×10^{-2}	1.27×10^{-1}	1.89×10^{-1}	1.97×10^{-1}	5.67×10^{-1}	9.43×10^{-1}	9.63×10^{-1}
Cm-242	0	3.56×10^{-6}	5.28×10^{-6}	5.49×10^{-6}	1.59×10^{-5}	2.64×10^{-5}	2.70×10^{-5}
Cs-134	4.09×10^{-2}	2.19×10^{-1}	3.24×10^{-1}	3.37×10^{-1}	9.75×10^{-1}	1.62	1.66
Cs-135	1.34×10^{-6}	7.18×10^{-6}	1.07×10^{-5}	1.11×10^{-5}	3.21×10^{-5}	5.35×10^{-5}	5.46×10^{-5}
Cs-136	5.52×10^{-2}	2.94×10^{-1}	4.35×10^{-1}	4.52×10^{-1}	1.29	2.08	2.12
Cs-137	9.35×10^{-2}	5.00×10^{-1}	7.42×10^{-1}	7.71×10^{-1}	2.23	3.71	3.79
Cs-138	7.27×10^{-1}	9.66×10^{-1}	9.69×10^{-1}	9.69×10^{-1}	9.69×10^{-1}	9.69×10^{-1}	9.69×10^{-1}
I-130	3.60×10^{-3}	1.71×10^{-2}	2.40×10^{-2}	2.48×10^{-2}	5.14×10^{-2}	5.86×10^{-2}	5.86×10^{-2}
I-131	2.58×10^{-1}	1.37	2.03	2.11	5.94	9.46	9.60
I-132	2.65×10^{-1}	8.59×10^{-1}	1.04	1.06	1.56	1.85	1.86
I-133	5.02×10^{-1}	2.50	3.58	3.71	8.70	1.09×10^{1}	1.09×10^{1}
I-134	2.27×10^{-1}	3.80×10^{-1}	3.88×10^{-1}	3.89×10^{-1}	3.90×10^{-1}	3.90×10^{-1}	3.90×10^{-1}
I-135	4.27×10^{-1}	1.83	2.45	2.52	4.23	4.42	4.42
Kr-83m	1.41×10^{-1}	4.99×10^{-1}	6.09×10^{-1}	6.19×10^{-1}	7.49×10^{-1}	7.49×10^{-1}	7.49×10^{-1}
Kr-85	1.65×10^{-2}	1.31×10^{-1}	2.33×10^{-1}	2.47×10^{-1}	1.82	1.48×10^{1}	1.25×10^{2}
Kr-85m	4.14×10^{-1}	2.29	3.38	3.52	7.99	8.70	8.70
Kr-87	4.84×10^{-1}	1.31	1.46	1.47	1.57	1.57	1.57
Kr-88	9.32×10^{-1}	4.27	5.78	5.95	9.44	9.57	9.57
La-140	3.94×10^{-2}	2.98×10^{-1}	5.02×10^{-1}	5.30×10^{-1}	2.58	6.53	6.82
La-141	2.28×10^{-2}	8.55×10^{-2}	1.08×10^{-1}	1.10×10^{-1}	1.51×10^{-1}	1.52×10^{-1}	1.52×10^{-1}
La-142	1.50×10^{-2}	3.60×10^{-2}	3.93×10^{-2}	3.95×10^{-2}	4.13×10^{-2}	4.13×10^{-2}	4.13×10^{-2}
Mo-99	3.01×10^{-2}	1.58×10^{-1}	2.31×10^{-1}	2.40×10^{-1}	6.47×10^{-1}	9.55×10^{-1}	9.63×10^{-1}
Nb-95	3.01×10^{-2}	1.61×10^{-1}	2.39×10^{-1}	2.49×10^{-1}	7.19×10^{-1}	1.20	1.22
Nb-95m	3.29×10^{-4}	1.75×10^{-3}	2.59×10^{-3}	2.69×10^{-3}	7.64×10^{-3}	1.23×10^{-2}	1.25×10^{-2}
Nb-97	2.86×10^{-2}	1.44×10^{-1}	2.05×10^{-1}	2.12×10^{-1}	4.79×10^{-1}	5.77×10^{-1}	5.77×10^{-1}
Nb-97m	2.95×10^{-2}	1.58×10^{-1}	2.27×10^{-1}	2.36×10^{-1}	5.91×10^{-1}	7.29×10^{-1}	7.30×10^{-1}

Table 5.11-4 Activity Releases for Source Term LocFault_DBA - Other than Plenum Gas (Sheet 2 of 3)

Isotope	Cumulative Activity Release (Ci)						
	2 hr	5.75 hr	7.75 hr	8 hr	24 hr	96 hr	720 hr
Nd-147	1.11×10^{-2}	5.90×10^{-2}	8.72×10^{-2}	9.07×10^{-2}	2.57×10^{-1}	4.15×10^{-1}	4.21×10^{-1}
Pm-147	4.69×10^{-3}	2.51×10^{-2}	3.72×10^{-2}	3.87×10^{-2}	1.12×10^{-1}	1.86×10^{-1}	1.90×10^{-1}
Pr-143	2.69×10^{-2}	1.44×10^{-1}	2.14×10^{-1}	2.22×10^{-1}	6.41×10^{-1}	1.06	1.08
Rb-86	9.35×10^{-3}	4.99×10^{-2}	7.38×10^{-2}	7.68×10^{-2}	2.20×10^{-1}	3.58×10^{-1}	3.65×10^{-1}
Rb-88	9.72×10^{-1}	4.66	6.35	6.54	1.05×10^{1}	1.06×10^{1}	1.06×10^{1}
Rh-105	1.17×10^{-2}	6.16×10^{-2}	9.03×10^{-2}	9.38×10^{-2}	2.46×10^{-1}	3.40×10^{-1}	3.41×10^{-1}
Ru-103	2.16×10^{-2}	1.15×10^{-1}	1.71×10^{-1}	1.78×10^{-1}	5.11×10^{-1}	8.43×10^{-1}	8.59×10^{-1}
Ru-105	9.60×10^{-3}	3.74×10^{-2}	4.80×10^{-2}	4.91×10^{-2}	7.06×10^{-2}	7.16×10^{-2}	7.16×10^{-2}
Ru-106	4.55×10^{-3}	2.43×10^{-2}	3.61×10^{-2}	3.75×10^{-2}	1.08×10^{-1}	1.80×10^{-1}	1.84×10^{-1}
Sb-127	1.78×10^{-3}	9.39×10^{-3}	1.38×10^{-2}	1.44×10^{-2}	3.94×10^{-2}	6.01×10^{-2}	6.07×10^{-2}
Sb-129	4.33×10^{-3}	1.68×10^{-2}	2.16×10^{-2}	2.21×10^{-2}	3.16×10^{-2}	3.20×10^{-2}	3.20×10^{-2}
Sr-89	1.05×10^{-1}	5.62×10^{-1}	8.33×10^{-1}	8.66×10^{-1}	2.49	4.12	4.20
Sr-90	7.58×10^{-3}	4.06×10^{-2}	6.01×10^{-2}	6.25×10^{-2}	1.81×10^{-1}	3.01×10^{-1}	3.07×10^{-1}
Sr-91	1.25×10^{-1}	5.77×10^{-1}	7.96×10^{-1}	8.20×10^{-1}	1.58	1.73	1.73
Sr-92	1.04×10^{-1}	3.39×10^{-1}	4.05×10^{-1}	4.12×10^{-1}	4.93×10^{-1}	4.94×10^{-1}	4.94×10^{-1}
Tc-99	0	1.19×10^{-6}	1.76×10^{-6}	1.83×10^{-6}	5.29×10^{-6}	8.81×10^{-6}	8.99×10^{-6}
Tc-99m	2.70×10^{-2}	1.44×10^{-1}	2.12×10^{-1}	2.20×10^{-1}	6.05×10^{-1}	9.02×10^{-1}	9.09×10^{-1}
Te-127	1.78×10^{-3}	9.47×10^{-3}	1.40×10^{-2}	1.46×10^{-2}	4.11×10^{-2}	6.42×10^{-2}	6.50×10^{-2}
Te-127m	2.80×10^{-4}	1.50×10^{-3}	2.22×10^{-3}	2.31×10^{-3}	6.69×10^{-3}	1.11×10^{-2}	1.14×10^{-2}
Te-129	4.31×10^{-3}	1.72×10^{-2}	2.22×10^{-2}	2.27×10^{-2}	3.28×10^{-2}	3.33×10^{-2}	3.33×10^{-2}
Te-129m	8.60×10^{-4}	4.60×10^{-3}	6.82×10^{-3}	7.09×10^{-3}	2.04×10^{-2}	3.36×10^{-2}	3.43×10^{-2}
Te-131m	2.59×10^{-3}	1.32×10^{-2}	1.92×10^{-2}	1.99×10^{-2}	5.03×10^{-2}	6.80×10^{-2}	6.82×10^{-2}
Te-132	2.62×10^{-2}	1.38×10^{-1}	2.02×10^{-1}	2.10×10^{-1}	5.72×10^{-1}	8.57×10^{-1}	8.65×10^{-1}
Xe-131m	4.28×10^{-2}	3.38×10^{-1}	5.97×10^{-1}	6.34×10^{-1}	4.58	3.42×10^{1}	1.72×10^{2}
Xe-133	3.02	2.37×10^{1}	4.18×10^{1}	4.44×10^{1}	3.15×10^{2}	2.15×10^{3}	6.19×10^{3}
Xe-133m	9.13×10^{-2}	7.09×10^{-1}	1.24	1.32	8.82	4.81×10^{1}	7.90×10^{1}
Xe-135	2.82	1.95×10^{1}	3.21×10^{1}	3.38×10^{1}	1.41×10^{2}	2.37×10^{2}	2.37×10^{2}
Xe-135m	3.87×10^{-2}	3.98×10^{-2}	3.98×10^{-2}	3.98×10^{-2}	3.98×10^{-2}	3.98×10^{-2}	3.98×10^{-2}
Xe-138	1.42×10^{-1}	1.45×10^{-1}	1.45×10^{-1}	1.45×10^{-1}	1.45×10^{-1}	1.45×10^{-1}	1.45×10^{-1}
Y-90	1.48×10^{-3}	8.70×10^{-3}	1.34×10^{-2}	1.40×10^{-2}	5.04×10^{-2}	1.09×10^{-1}	1.14×10^{-1}
Y-91	2.52×10^{-2}	1.35×10^{-1}	2.00×10^{-1}	2.08×10^{-1}	6.02×10^{-1}	9.98×10^{-1}	1.02
Y-92	4.64×10^{-2}	2.91×10^{-1}	4.16×10^{-1}	4.30×10^{-1}	7.26×10^{-1}	7.37×10^{-1}	7.37×10^{-1}
Y-93	2.59×10^{-2}	1.20×10^{-1}	1.66×10^{-1}	1.72×10^{-1}	3.36×10^{-1}	3.71×10^{-1}	3.71×10^{-1}

Table 5.11-4 Activity Releases for Source Term LocFault_DBA - Other than Plenum Gas (Sheet 3 of 3)

Isotope	Cumulative Activity Release (Ci)						
	2 hr	**5.75 hr**	**7.75 hr**	**8 hr**	**24 hr**	**96 hr**	**720 hr**
Zr-93	0	0	0	0	0	1.25×10^{-6}	1.28×10^{-6}
Zr-95	3.02×10^{-2}	1.62×10^{-1}	2.40×10^{-1}	2.49×10^{-1}	7.18×10^{-1}	1.19	1.21
Zr-97	2.76×10^{-2}	1.35×10^{-1}	1.92×10^{-1}	1.99×10^{-1}	4.45×10^{-1}	5.35×10^{-1}	5.35×10^{-1}

Table 5.11-5 Activity Releases for Source Term FDIV_1Assy_DBA - Plenum Gas (Sheet 1 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Am-242	0	1.32×10^{-6}	1.36×10^{-6}	1.36×10^{-6}	1.36×10^{-6}
Br-82	1.02×10^{-3}	3.85×10^{-3}	9.92×10^{-3}	2.22×10^{-2}	2.60×10^{-2}
Cm-242	4.09×10^{-6}	7.15×10^{-6}	7.47×10^{-6}	7.47×10^{-6}	7.47×10^{-6}
Cs-134	1.77×10^{-1}	3.11×10^{-1}	3.24×10^{-1}	3.24×10^{-1}	3.24×10^{-1}
Cs-135	5.84×10^{-6}	1.02×10^{-5}	1.07×10^{-5}	1.07×10^{-5}	1.07×10^{-5}
Cs-136	2.11×10^{-1}	3.68×10^{-1}	3.83×10^{-1}	3.83×10^{-1}	3.83×10^{-1}
Cs-137	4.06×10^{-1}	7.11×10^{-1}	7.42×10^{-1}	7.43×10^{-1}	7.43×10^{-1}
Eu-154	6.95×10^{-2}	1.22×10^{-1}	1.27×10^{-1}	1.27×10^{-1}	1.27×10^{-1}
Eu-155	2.97×10^{-1}	5.19×10^{-1}	5.42×10^{-1}	5.42×10^{-1}	5.42×10^{-1}
Eu-156	9.27×10^{-1}	1.62	1.69	1.69	1.69
Eu-157	3.09×10^{-2}	5.12×10^{-2}	5.27×10^{-2}	5.27×10^{-2}	5.27×10^{-2}
I-129	0	0	0	1.93×10^{-6}	1.27×10^{-5}
I-130	7.29×10^{-4}	2.48×10^{-3}	5.06×10^{-3}	6.79×10^{-3}	6.82×10^{-3}
I-131	1.22	4.83	1.40×10^{1}	4.89×10^{1}	1.44×10^{2}
I-132	9.61×10^{-1}	1.93	2.12	2.12	2.12
I-133	4.03×10^{-1}	1.46	3.43	5.94	6.18
I-135	4.50×10^{-3}	1.35×10^{-2}	2.17×10^{-2}	2.36×10^{-2}	2.36×10^{-2}
Kr-83m	1.80×10^{-6}	3.23×10^{-6}	3.39×10^{-6}	3.40×10^{-6}	3.40×10^{-6}
Kr-85	1.24	4.97	1.49×10^{1}	5.85×10^{1}	3.86×10^{2}
Kr-85m	3.09×10^{-3}	8.24×10^{-3}	1.13×10^{-2}	1.16×10^{-2}	1.16×10^{-2}
Kr-88	3.34×10^{-5}	7.42×10^{-5}	8.61×10^{-5}	8.64×10^{-5}	8.64×10^{-5}
La-140	1.69×10^{-1}	2.89×10^{-1}	3.00×10^{-1}	3.00×10^{-1}	3.00×10^{-1}
La-141	4.07×10^{-6}	5.90×10^{-6}	5.96×10^{-6}	5.96×10^{-6}	5.96×10^{-6}
Mo-99	9.93×10^{-2}	1.71×10^{-1}	1.78×10^{-1}	1.78×10^{-1}	1.78×10^{-1}
Nb-95	1.86×10^{-1}	3.25×10^{-1}	3.39×10^{-1}	3.39×10^{-1}	3.39×10^{-1}
Nb-95m	2.01×10^{-3}	3.51×10^{-3}	3.66×10^{-3}	3.66×10^{-3}	3.66×10^{-3}
Nb-97	1.56×10^{-2}	2.59×10^{-2}	2.67×10^{-2}	2.67×10^{-2}	2.67×10^{-2}
Nb-97m	1.59×10^{-2}	2.71×10^{-2}	2.81×10^{-2}	2.81×10^{-2}	2.81×10^{-2}
Nd-147	5.85×10^{-2}	1.02×10^{-1}	1.06×10^{-1}	1.06×10^{-1}	1.06×10^{-1}
Np-239	8.69×10^{-1}	1.50	1.56	1.56	1.56
Pm-147	2.90×10^{-2}	5.07×10^{-2}	5.29×10^{-2}	5.29×10^{-2}	5.29×10^{-2}
Pr-143	1.57×10^{-1}	2.74×10^{-1}	2.86×10^{-1}	2.86×10^{-1}	2.86×10^{-1}
Pu-238	5.63×10^{-5}	9.85×10^{-5}	1.03×10^{-4}	1.03×10^{-4}	1.03×10^{-4}

Table 5.11-5 Activity Releases for Source Term FDIV_1Assy_DBA - Plenum Gas (Sheet 2 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Pu-239	9.13×10^{-5}	1.60×10^{-4}	1.67×10^{-4}	1.67×10^{-4}	1.67×10^{-4}
Pu-240	1.24×10^{-5}	2.17×10^{-5}	2.26×10^{-5}	2.26×10^{-5}	2.26×10^{-5}
Pu-241	1.51×10^{-4}	2.64×10^{-4}	2.76×10^{-4}	2.76×10^{-4}	2.76×10^{-4}
Rb-86	3.71×10^{-2}	6.48×10^{-2}	6.76×10^{-2}	6.76×10^{-2}	6.76×10^{-2}
Rb-88	2.47×10^{-5}	6.34×10^{-5}	7.49×10^{-5}	7.52×10^{-5}	7.52×10^{-5}
Rh-105	2.51×10^{-2}	4.28×10^{-2}	4.44×10^{-2}	4.44×10^{-2}	4.44×10^{-2}
Ru-103	1.27×10^{-1}	2.23×10^{-1}	2.32×10^{-1}	2.32×10^{-1}	2.32×10^{-1}
Ru-105	5.57×10^{-6}	8.23×10^{-6}	8.33×10^{-6}	8.33×10^{-6}	8.33×10^{-6}
Ru-106	2.79×10^{-2}	4.88×10^{-2}	5.10×10^{-2}	5.10×10^{-2}	5.10×10^{-2}
Tc-99	1.37×10^{-6}	2.40×10^{-6}	2.50×10^{-6}	2.50×10^{-6}	2.50×10^{-6}
Tc-99m	9.60×10^{-2}	1.66×10^{-1}	1.72×10^{-1}	1.72×10^{-1}	1.72×10^{-1}
U-237	4.59×10^{-2}	8.00×10^{-2}	8.33×10^{-2}	8.33×10^{-2}	8.33×10^{-2}
Xe-131m	2.93	1.16×10^{1}	3.41×10^{1}	1.24×10^{2}	4.50×10^{2}
Xe-133	1.90×10^{2}	7.48×10^{2}	2.14×10^{3}	7.04×10^{3}	1.61×10^{4}
Xe-133m	4.46	1.71×10^{1}	4.63×10^{1}	1.21×10^{2}	1.66×10^{2}
Xe-135	6.63	2.14×10^{1}	3.94×10^{1}	4.69×10^{1}	4.69×10^{1}
Xe-135m	1.19×10^{-2}	1.20×10^{-2}	1.20×10^{-2}	1.20×10^{-2}	1.20×10^{-2}
Y-90	8.43×10^{-3}	1.46×10^{-2}	1.51×10^{-2}	1.51×10^{-2}	1.51×10^{-2}
Y-91	1.52×10^{-1}	2.65×10^{-1}	2.77×10^{-1}	2.77×10^{-1}	2.77×10^{-1}
Y-92	4.47×10^{-6}	6.38×10^{-6}	6.44×10^{-6}	6.44×10^{-6}	6.44×10^{-6}
Y-93	2.80×10^{-3}	4.51×10^{-3}	4.62×10^{-3}	4.62×10^{-3}	4.62×10^{-3}
Zr-95	1.81×10^{-1}	3.17×10^{-1}	3.31×10^{-1}	3.31×10^{-1}	3.31×10^{-1}
Zr-97	1.44×10^{-2}	2.40×10^{-2}	2.48×10^{-2}	2.48×10^{-2}	2.48×10^{-2}

Table 5.11-6 Activity Releases for Source Term FDIV_1Assy_DBA - Other than Plenum Gas (Sheet 1 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Am-242	2.85×10^{-6}	4.76×10^{-6}	4.91×10^{-6}	4.91×10^{-6}	4.91×10^{-6}
Ba-140	9.35	1.64×10^{1}	1.71×10^{1}	1.71×10^{1}	1.71×10^{1}
Br-82	3.94×10^{-3}	6.75×10^{-3}	7.01×10^{-3}	7.01×10^{-3}	7.01×10^{-3}
Ce-141	6.73×10^{-1}	1.18	1.23	1.23	1.23
Ce-143	1.85×10^{-1}	3.16×10^{-1}	3.28×10^{-1}	3.28×10^{-1}	3.28×10^{-1}
Ce-144	5.22×10^{-1}	9.19×10^{-1}	9.59×10^{-1}	9.59×10^{-1}	9.59×10^{-1}
Cm-242	1.46×10^{-5}	2.57×10^{-5}	2.69×10^{-5}	2.69×10^{-5}	2.69×10^{-5}
Cs-134	9.00×10^{-1}	1.58	1.65	1.65	1.65
Cs-135	2.96×10^{-5}	5.21×10^{-5}	5.44×10^{-5}	5.44×10^{-5}	5.44×10^{-5}
Cs-136	1.07	1.87	1.96	1.96	1.96
Cs-137	2.06	3.63	3.79	3.79	3.79
I-130	2.82×10^{-3}	4.64×10^{-3}	4.76×10^{-3}	4.76×10^{-3}	4.76×10^{-3}
I-131	4.71	8.24	8.59	8.59	8.59
I-132	3.91	5.34	5.38	5.38	5.38
I-133	1.56	2.63	2.71	2.71	2.71
I-135	1.75×10^{-2}	2.73×10^{-2}	2.78×10^{-2}	2.78×10^{-2}	2.78×10^{-2}
Kr-83m	0	1.07×10^{-6}	1.12×10^{-6}	1.12×10^{-6}	1.12×10^{-6}
Kr-85	4.11×10^{-1}	1.65	4.95	1.95×10^{1}	1.29×10^{2}
Kr-85m	1.02×10^{-3}	2.74×10^{-3}	3.76×10^{-3}	3.86×10^{-3}	3.86×10^{-3}
Kr-88	1.10×10^{-5}	2.46×10^{-5}	2.86×10^{-5}	2.87×10^{-5}	2.87×10^{-5}
La-140	7.45×10^{-1}	1.64	1.80	1.80	1.80
La-141	1.45×10^{-5}	2.12×10^{-5}	2.14×10^{-5}	2.14×10^{-5}	2.14×10^{-5}
Mo-99	3.55×10^{-1}	6.17×10^{-1}	6.42×10^{-1}	6.42×10^{-1}	6.42×10^{-1}
Nb-95	6.64×10^{-1}	1.17	1.22	1.22	1.22
Nb-95m	7.20×10^{-3}	1.26×10^{-2}	1.32×10^{-2}	1.32×10^{-2}	1.32×10^{-2}
Nb-97	5.57×10^{-2}	9.31×10^{-2}	9.61×10^{-2}	9.61×10^{-2}	9.61×10^{-2}
Nb-97m	5.70×10^{-2}	9.77×10^{-2}	1.01×10^{-1}	1.01×10^{-1}	1.01×10^{-1}
Nd-147	2.09×10^{-1}	3.67×10^{-1}	3.83×10^{-1}	3.83×10^{-1}	3.83×10^{-1}
Pm-147	1.04×10^{-1}	1.83×10^{-1}	1.91×10^{-1}	1.91×10^{-1}	1.91×10^{-1}
Pr-143	5.62×10^{-1}	9.87×10^{-1}	1.03	1.03	1.03
Rb-86	1.88×10^{-1}	3.30×10^{-1}	3.45×10^{-1}	3.45×10^{-1}	3.45×10^{-1}
Rb-88	1.03×10^{-5}	2.32×10^{-5}	2.71×10^{-5}	2.71×10^{-5}	2.71×10^{-5}
Rh-105	8.98×10^{-2}	1.54×10^{-1}	1.60×10^{-1}	1.60×10^{-1}	1.60×10^{-1}

Table 5.11-6 Activity Releases for Source Term FDIV_1Assy_DBA - Other than Plenum Gas (Sheet 2 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Ru-103	4.56×10^{-1}	8.02×10^{-1}	8.37×10^{-1}	8.37×10^{-1}	8.37×10^{-1}
Ru-105	1.99×10^{-5}	2.96×10^{-5}	2.99×10^{-5}	2.99×10^{-5}	2.99×10^{-5}
Ru-106	9.99×10^{-2}	1.76×10^{-1}	1.83×10^{-1}	1.83×10^{-1}	1.83×10^{-1}
Sb-127	2.55×10^{-2}	4.45×10^{-2}	4.63×10^{-2}	4.63×10^{-2}	4.63×10^{-2}
Sb-129	8.11×10^{-6}	1.20×10^{-5}	1.22×10^{-5}	1.22×10^{-5}	1.22×10^{-5}
Sr-89	2.24	3.94	4.12	4.12	4.12
Sr-90	1.67×10^{-1}	2.94×10^{-1}	3.07×10^{-1}	3.07×10^{-1}	3.07×10^{-1}
Sr-91	3.80×10^{-2}	6.14×10^{-2}	6.29×10^{-2}	6.29×10^{-2}	6.29×10^{-2}
Tc-99	4.90×10^{-6}	8.62×10^{-6}	9.00×10^{-6}	9.00×10^{-6}	9.00×10^{-6}
Tc-99m	3.44×10^{-1}	5.96×10^{-1}	6.20×10^{-1}	6.20×10^{-1}	6.20×10^{-1}
Te-127	2.97×10^{-2}	5.18×10^{-2}	5.39×10^{-2}	5.39×10^{-2}	5.39×10^{-2}
Te-127m	6.17×10^{-3}	1.09×10^{-2}	1.13×10^{-2}	1.13×10^{-2}	1.13×10^{-2}
Te-129	7.16×10^{-3}	8.31×10^{-3}	8.32×10^{-3}	8.32×10^{-3}	8.32×10^{-3}
Te-129m	1.81×10^{-2}	3.18×10^{-2}	3.32×10^{-2}	3.32×10^{-2}	3.32×10^{-2}
Te-131m	1.66×10^{-2}	2.84×10^{-2}	2.94×10^{-2}	2.94×10^{-2}	2.94×10^{-2}
Te-132	3.39×10^{-1}	5.89×10^{-1}	6.13×10^{-1}	6.13×10^{-1}	6.13×10^{-1}
Xe-131m	9.70×10^{-1}	3.88	1.14×10^{1}	4.21×10^{1}	1.66×10^{2}
Xe-133	6.29×10^{1}	2.49×10^{2}	7.18×10^{2}	2.37×10^{3}	5.45×10^{3}
Xe-133m	1.48	5.73	1.56×10^{1}	4.19×10^{1}	5.80×10^{1}
Xe-135	2.19	7.17	1.33×10^{1}	1.59×10^{1}	1.59×10^{1}
Xe-135m	3.80×10^{-3}	3.82×10^{-3}	3.82×10^{-3}	3.82×10^{-3}	3.82×10^{-3}
Y-90	3.18×10^{-2}	5.92×10^{-2}	6.27×10^{-2}	6.27×10^{-2}	6.27×10^{-2}
Y-91	5.43×10^{-1}	9.54×10^{-1}	9.96×10^{-1}	9.96×10^{-1}	9.96×10^{-1}
Y-92	1.61×10^{-5}	2.31×10^{-5}	2.34×10^{-5}	2.34×10^{-5}	2.34×10^{-5}
Y-93	1.00×10^{-2}	1.62×10^{-2}	1.66×10^{-2}	1.66×10^{-2}	1.66×10^{-2}
Zr-93	0	1.22×10^{-6}	1.28×10^{-6}	1.28×10^{-6}	1.28×10^{-6}
Zr-95	6.50×10^{-1}	1.14	1.19	1.19	1.19
Zr-97	5.17×10^{-2}	8.64×10^{-2}	8.91×10^{-2}	8.91×10^{-2}	8.91×10^{-2}

Table 5.11-7 Activity Releases for Source Term FDIV_2Assy_DBA - Plenum Gas (Sheet 1 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Am-242	1.60×10^{-6}	2.65×10^{-6}	2.73×10^{-6}	2.73×10^{-6}	2.73×10^{-6}
Br-82	2.04×10^{-3}	7.70×10^{-3}	1.98×10^{-2}	4.44×10^{-2}	5.20×10^{-2}
Cm-242	8.18×10^{-6}	1.43×10^{-5}	1.49×10^{-5}	1.49×10^{-5}	1.49×10^{-5}
Cs-134	3.55×10^{-1}	6.21×10^{-1}	6.48×10^{-1}	6.48×10^{-1}	6.48×10^{-1}
Cs-135	1.17×10^{-5}	2.05×10^{-5}	2.13×10^{-5}	2.14×10^{-5}	2.14×10^{-5}
Cs-136	4.21×10^{-1}	7.35×10^{-1}	7.67×10^{-1}	7.67×10^{-1}	7.67×10^{-1}
Cs-137	8.13×10^{-1}	1.42	1.48	1.49	1.49
Eu-154	1.39×10^{-1}	2.43×10^{-1}	2.54×10^{-1}	2.54×10^{-1}	2.54×10^{-1}
Eu-155	5.93×10^{-1}	1.04	1.08	1.08	1.08
Eu-156	1.85	3.24	3.38	3.38	3.38
Eu-157	6.19×10^{-2}	1.02×10^{-1}	1.05×10^{-1}	1.05×10^{-1}	1.05×10^{-1}
I-129	0	0	0	3.86×10^{-6}	2.55×10^{-5}
I-130	1.46×10^{-3}	4.96×10^{-3}	1.01×10^{-2}	1.36×10^{-2}	1.36×10^{-2}
I-131	2.44	9.66	2.81×10^{1}	9.78×10^{1}	2.89×10^{2}
I-132	1.92	3.86	4.24	4.24	4.24
I-133	8.06×10^{-1}	2.92	6.86	1.19×10^{1}	1.24×10^{1}
I-135	9.00×10^{-3}	2.69×10^{-2}	4.35×10^{-2}	4.72×10^{-2}	4.72×10^{-2}
Kr-83m	3.61×10^{-6}	6.46×10^{-6}	6.79×10^{-6}	6.79×10^{-6}	6.79×10^{-6}
Kr-85	2.49	9.94	2.97×10^{1}	1.17×10^{2}	7.72×10^{2}
Kr-85m	6.18×10^{-3}	1.65×10^{-2}	2.26×10^{-2}	2.32×10^{-2}	2.32×10^{-2}
Kr-88	6.68×10^{-5}	1.48×10^{-4}	1.72×10^{-4}	1.73×10^{-4}	1.73×10^{-4}
La-140	3.38×10^{-1}	5.79×10^{-1}	6.01×10^{-1}	6.01×10^{-1}	6.01×10^{-1}
La-141	8.13×10^{-6}	1.18×10^{-5}	1.19×10^{-5}	1.19×10^{-5}	1.19×10^{-5}
Mo-99	1.99×10^{-1}	3.43×10^{-1}	3.57×10^{-1}	3.57×10^{-1}	3.57×10^{-1}
Nb-95	3.71×10^{-1}	6.49×10^{-1}	6.78×10^{-1}	6.78×10^{-1}	6.78×10^{-1}
Nb-95m	4.02×10^{-3}	7.02×10^{-3}	7.32×10^{-3}	7.32×10^{-3}	7.32×10^{-3}
Nb-97	3.11×10^{-2}	5.18×10^{-2}	5.34×10^{-2}	5.34×10^{-2}	5.34×10^{-2}
Nb-97m	3.17×10^{-2}	5.42×10^{-2}	5.61×10^{-2}	5.61×10^{-2}	5.61×10^{-2}
Nd-147	1.17×10^{-1}	2.04×10^{-1}	2.13×10^{-1}	2.13×10^{-1}	2.13×10^{-1}
Np-239	1.74	3.00	3.11	3.11	3.11
Pm-147	5.80×10^{-2}	1.01×10^{-1}	1.06×10^{-1}	1.06×10^{-1}	1.06×10^{-1}
Pr-143	3.14×10^{-1}	5.48×10^{-1}	5.71×10^{-1}	5.71×10^{-1}	5.71×10^{-1}
Pu-238	1.13×10^{-4}	1.97×10^{-4}	2.06×10^{-4}	2.06×10^{-4}	2.06×10^{-4}

Table 5.11-7 Activity Releases for Source Term FDIV_2Assy_DBA - Plenum Gas (Sheet 2 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Pu-239	1.83×10^{-4}	3.20×10^{-4}	3.34×10^{-4}	3.34×10^{-4}	3.34×10^{-4}
Pu-240	2.48×10^{-5}	4.34×10^{-5}	4.53×10^{-5}	4.53×10^{-5}	4.53×10^{-5}
Pu-241	3.02×10^{-4}	5.29×10^{-4}	5.52×10^{-4}	5.52×10^{-4}	5.52×10^{-4}
Rb-86	7.42×10^{-2}	1.30×10^{-1}	1.35×10^{-1}	1.35×10^{-1}	1.35×10^{-1}
Rb-88	4.94×10^{-5}	1.27×10^{-4}	1.50×10^{-4}	1.50×10^{-4}	1.50×10^{-4}
Rh-105	5.02×10^{-2}	8.57×10^{-2}	8.89×10^{-2}	8.89×10^{-2}	8.89×10^{-2}
Ru-103	2.55×10^{-1}	4.46×10^{-1}	4.65×10^{-1}	4.65×10^{-1}	4.65×10^{-1}
Ru-105	1.11×10^{-5}	1.65×10^{-5}	1.67×10^{-5}	1.67×10^{-5}	1.67×10^{-5}
Ru-106	5.58×10^{-2}	9.77×10^{-2}	1.02×10^{-1}	1.02×10^{-1}	1.02×10^{-1}
Tc-99	2.74×10^{-6}	4.79×10^{-6}	5.00×10^{-6}	5.00×10^{-6}	5.00×10^{-6}
Tc-99m	1.92×10^{-1}	3.31×10^{-1}	3.45×10^{-1}	3.45×10^{-1}	3.45×10^{-1}
U-237	9.19×10^{-2}	1.60×10^{-1}	1.67×10^{-1}	1.67×10^{-1}	1.67×10^{-1}
Xe-131m	5.87	2.33×10^{1}	6.83×10^{1}	2.47×10^{2}	9.01×10^{2}
Xe-133	3.81×10^{2}	1.50×10^{3}	4.29×10^{3}	1.41×10^{4}	3.22×10^{4}
Xe-133m	8.92	3.43×10^{1}	9.26×10^{1}	2.43×10^{2}	3.33×10^{2}
Xe-135	1.33×10^{1}	4.28×10^{1}	7.88×10^{1}	9.38×10^{1}	9.39×10^{1}
Xe-135m	2.38×10^{-2}	2.40×10^{-2}	2.40×10^{-2}	2.40×10^{-2}	2.40×10^{-2}
Y-90	1.69×10^{-2}	2.91×10^{-2}	3.03×10^{-2}	3.03×10^{-2}	3.03×10^{-2}
Y-91	3.03×10^{-1}	5.30×10^{-1}	5.53×10^{-1}	5.53×10^{-1}	5.53×10^{-1}
Y-92	8.94×10^{-6}	1.28×10^{-5}	1.29×10^{-5}	1.29×10^{-5}	1.29×10^{-5}
Y-93	5.59×10^{-3}	9.02×10^{-3}	9.25×10^{-3}	9.25×10^{-3}	9.25×10^{-3}
Zr-95	3.63×10^{-1}	6.35×10^{-1}	6.62×10^{-1}	6.62×10^{-1}	6.62×10^{-1}
Zr-97	2.89×10^{-2}	4.80×10^{-2}	4.95×10^{-2}	4.95×10^{-2}	4.95×10^{-2}

Table 5.11-8 Activity Releases for Source Term FDIV_2Assy_DBA - Other than Plenum Gas (Sheet 1 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Am-241	0	1.73×10^{-6}	1.81×10^{-6}	1.81×10^{-6}	1.81×10^{-6}
Am-242	5.71×10^{-6}	9.52×10^{-6}	9.81×10^{-6}	9.81×10^{-6}	9.81×10^{-6}
Ba-140	1.87×10^{1}	3.28×10^{1}	3.42×10^{1}	3.42×10^{1}	3.42×10^{1}
Br-82	7.87×10^{-3}	1.35×10^{-2}	1.40×10^{-2}	1.40×10^{-2}	1.40×10^{-2}
Ce-141	1.35	2.37	2.47	2.47	2.47
Ce-143	3.69×10^{-1}	6.32×10^{-1}	6.56×10^{-1}	6.56×10^{-1}	6.56×10^{-1}
Ce-144	1.04	1.84	1.92	1.92	1.92
Cm-242	2.93×10^{-5}	5.15×10^{-5}	5.38×10^{-5}	5.38×10^{-5}	5.38×10^{-5}
Cs-134	1.80	3.17	3.31	3.31	3.31
Cs-135	5.93×10^{-5}	1.04×10^{-4}	1.09×10^{-4}	1.09×10^{-4}	1.09×10^{-4}
Cs-136	2.14	3.75	3.91	3.91	3.91
Cs-137	4.12	7.25	7.57	7.57	7.57
I-130	5.64×10^{-3}	9.27×10^{-3}	9.53×10^{-3}	9.53×10^{-3}	9.53×10^{-3}
I-131	9.41	1.65×10^{1}	1.72×10^{1}	1.72×10^{1}	1.72×10^{1}
I-132	7.81	1.07×10^{1}	1.08×10^{1}	1.08×10^{1}	1.08×10^{1}
I-133	3.11	5.25	5.43	5.43	5.43
I-135	3.51×10^{-2}	5.46×10^{-2}	5.56×10^{-2}	5.56×10^{-2}	5.56×10^{-2}
Kr-83m	1.19×10^{-6}	2.14×10^{-6}	2.25×10^{-6}	2.25×10^{-6}	2.25×10^{-6}
Kr-85	8.22×10^{-1}	3.31	9.90	3.90×10^{1}	2.57×10^{2}
Kr-85m	2.04×10^{-3}	5.48×10^{-3}	7.52×10^{-3}	7.71×10^{-3}	7.71×10^{-3}
Kr-88	2.20×10^{-5}	4.92×10^{-5}	5.72×10^{-5}	5.74×10^{-5}	5.74×10^{-5}
La-140	1.49	3.28	3.59	3.59	3.59
La-141	2.91×10^{-5}	4.23×10^{-5}	4.28×10^{-5}	4.28×10^{-5}	4.28×10^{-5}
Mo-99	7.11×10^{-1}	1.23	1.28	1.28	1.28
Nb-95	1.33	2.34	2.44	2.44	2.44
Nb-95m	1.44×10^{-2}	2.53×10^{-2}	2.63×10^{-2}	2.63×10^{-2}	2.63×10^{-2}
Nb-97	1.11×10^{-1}	1.86×10^{-1}	1.92×10^{-1}	1.92×10^{-1}	1.92×10^{-1}
Nb-97m	1.14×10^{-1}	1.95×10^{-1}	2.02×10^{-1}	2.02×10^{-1}	2.02×10^{-1}
Nd-147	4.19×10^{-1}	7.34×10^{-1}	7.66×10^{-1}	7.66×10^{-1}	7.66×10^{-1}
Pm-147	2.07×10^{-1}	3.65×10^{-1}	3.81×10^{-1}	3.81×10^{-1}	3.81×10^{-1}
Pr-143	1.12	1.97	2.06	2.06	2.06
Rb-86	3.76×10^{-1}	6.60×10^{-1}	6.89×10^{-1}	6.89×10^{-1}	6.89×10^{-1}
Rb-88	2.06×10^{-5}	4.65×10^{-5}	5.41×10^{-5}	5.43×10^{-5}	5.43×10^{-5}
Rh-105	1.80×10^{-1}	3.08×10^{-1}	3.20×10^{-1}	3.20×10^{-1}	3.20×10^{-1}

Table 5.11-8 Activity Releases for Source Term FDIV_2Assy_DBA - Other than Plenum Gas (Sheet 2 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Ru-103	9.12×10^{-1}	1.60	1.67	1.67	1.67
Ru-105	3.98×10^{-5}	5.91×10^{-5}	5.99×10^{-5}	5.99×10^{-5}	5.99×10^{-5}
Ru-106	2.00×10^{-1}	3.51×10^{-1}	3.67×10^{-1}	3.67×10^{-1}	3.67×10^{-1}
Sb-127	5.10×10^{-2}	8.89×10^{-2}	9.26×10^{-2}	9.26×10^{-2}	9.26×10^{-2}
Sb-129	1.62×10^{-5}	2.40×10^{-5}	2.43×10^{-5}	2.43×10^{-5}	2.43×10^{-5}
Sr-89	4.48	7.89	8.23	8.23	8.23
Sr-90	3.34×10^{-1}	5.88×10^{-1}	6.14×10^{-1}	6.14×10^{-1}	6.14×10^{-1}
Sr-91	7.61×10^{-2}	1.23×10^{-1}	1.26×10^{-1}	1.26×10^{-1}	1.26×10^{-1}
Sr-92	1.11×10^{-6}	1.52×10^{-6}	1.53×10^{-6}	1.53×10^{-6}	1.53×10^{-6}
Tc-99	9.80×10^{-6}	1.72×10^{-5}	1.80×10^{-5}	1.80×10^{-5}	1.80×10^{-5}
Tc-99m	6.87×10^{-1}	1.19	1.24	1.24	1.24
Te-127	5.94×10^{-2}	1.04×10^{-1}	1.08×10^{-1}	1.08×10^{-1}	1.08×10^{-1}
Te-127m	1.23×10^{-2}	2.17×10^{-2}	2.27×10^{-2}	2.27×10^{-2}	2.27×10^{-2}
Te-129	1.43×10^{-2}	1.66×10^{-2}	1.66×10^{-2}	1.66×10^{-2}	1.66×10^{-2}
Te-129m	3.62×10^{-2}	6.36×10^{-2}	6.64×10^{-2}	6.64×10^{-2}	6.64×10^{-2}
Te-131m	3.31×10^{-2}	5.68×10^{-2}	5.89×10^{-2}	5.89×10^{-2}	5.89×10^{-2}
Te-132	6.77×10^{-1}	1.18	1.23	1.23	1.23
Xe-131m	1.94	7.76	2.29×10^{1}	8.42×10^{1}	3.31×10^{2}
Xe-133	1.26×10^{2}	4.99×10^{2}	1.44×10^{3}	4.75×10^{3}	1.09×10^{4}
Xe-133m	2.95	1.15×10^{1}	3.13×10^{1}	8.37×10^{1}	1.16×10^{2}
Xe-135	4.39	1.43×10^{1}	2.66×10^{1}	3.18×10^{1}	3.18×10^{1}
Xe-135m	7.60×10^{-3}	7.64×10^{-3}	7.64×10^{-3}	7.64×10^{-3}	7.64×10^{-3}
Y-90	6.35×10^{-2}	1.18×10^{-1}	1.25×10^{-1}	1.25×10^{-1}	1.25×10^{-1}
Y-91	1.09	1.91	1.99	1.99	1.99
Y-92	3.21×10^{-5}	4.63×10^{-5}	4.67×10^{-5}	4.67×10^{-5}	4.67×10^{-5}
Y-93	2.00×10^{-2}	3.24×10^{-2}	3.33×10^{-2}	3.33×10^{-2}	3.33×10^{-2}
Zr-93	1.39×10^{-6}	2.45×10^{-6}	2.56×10^{-6}	2.56×10^{-6}	2.56×10^{-6}
Zr-95	1.30	2.28	2.38	2.38	2.38
Zr-97	1.03×10^{-1}	1.73×10^{-1}	1.78×10^{-1}	1.78×10^{-1}	1.78×10^{-1}

Table 5.11-9 Activity Releases for Source Term SCG_HAA_DBA

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Ar-41	5.89×10^{1}	5.92×10^{1}	5.92×10^{1}	5.92×10^{1}	5.92×10^{1}
Cs-134	5.69×10^{-5}	5.74×10^{-5}	5.74×10^{-5}	5.74×10^{-5}	5.74×10^{-5}
Cs-136	3.73×10^{-5}	3.76×10^{-5}	3.76×10^{-5}	3.76×10^{-5}	3.76×10^{-5}
Cs-137	6.88×10^{-5}	6.95×10^{-5}	6.95×10^{-5}	6.95×10^{-5}	6.95×10^{-5}
Cs-138	1.33	1.34	1.34	1.34	1.34
Kr-83m	1.06	1.06	1.06	1.06	1.06
Kr-85	3.11×10^{-1}	3.14×10^{-1}	3.14×10^{-1}	3.14×10^{-1}	3.14×10^{-1}
Kr-85m	2.48	2.50	2.50	2.50	2.50
Kr-87	3.67	3.68	3.68	3.68	3.68
Kr-88	5.66	5.69	5.69	5.69	5.69
Na-24	7.15×10^{-2}	7.21×10^{-2}	7.21×10^{-2}	7.21×10^{-2}	7.21×10^{-2}
Rb-88	2.72	2.76	2.76	2.76	2.76
Xe-131m	7.16×10^{-1}	7.23×10^{-1}	7.23×10^{-1}	7.23×10^{-1}	7.23×10^{-1}
Xe-133	2.13×10^{1}	2.15×10^{1}	2.15×10^{1}	2.15×10^{1}	2.15×10^{1}
Xe-133m	7.01×10^{-1}	7.08×10^{-1}	7.08×10^{-1}	7.08×10^{-1}	7.08×10^{-1}
Xe-135	2.08×10^{1}	2.10×10^{1}	2.10×10^{1}	2.10×10^{1}	2.10×10^{1}
Xe-135m	1.34	1.34	1.34	1.34	1.34
Xe-138	4.24	4.24	4.24	4.24	4.24

Table 5.11-10 Activity Releases for Source Term SCG_VTC_DBA

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Ar-41	1.97	3.44	3.59	3.59	3.59
Cs-134	2.34×10^{-6}	8.81×10^{-6}	2.26×10^{-5}	4.96×10^{-5}	5.73×10^{-5}
Cs-136	1.53×10^{-6}	5.73×10^{-6}	1.45×10^{-5}	3.04×10^{-5}	3.41×10^{-5}
Cs-137	2.83×10^{-6}	1.07×10^{-5}	2.73×10^{-5}	6.01×10^{-5}	6.95×10^{-5}
Cs-138	5.43×10^{-2}	6.32×10^{-2}	6.32×10^{-2}	6.32×10^{-2}	6.32×10^{-2}
Kr-83m	3.55×10^{-2}	6.19×10^{-2}	6.46×10^{-2}	6.46×10^{-2}	6.46×10^{-2}
Kr-85	1.28×10^{-2}	4.82×10^{-2}	1.24×10^{-1}	2.72×10^{-1}	3.14×10^{-1}
Kr-85m	9.34×10^{-2}	2.38×10^{-1}	3.12×10^{-1}	3.16×10^{-1}	3.16×10^{-1}
Kr-87	1.13×10^{-1}	1.66×10^{-1}	1.67×10^{-1}	1.67×10^{-1}	1.67×10^{-1}
Kr-88	2.03×10^{-1}	4.35×10^{-1}	4.94×10^{-1}	4.95×10^{-1}	4.95×10^{-1}
Na-24	2.86×10^{-3}	9.49×10^{-3}	1.83×10^{-2}	2.29×10^{-2}	2.29×10^{-2}
Rb-88	1.66×10^{-1}	4.30×10^{-1}	4.97×10^{-1}	4.98×10^{-1}	4.98×10^{-1}
Xe-131m	2.94×10^{-2}	1.10×10^{-1}	2.77×10^{-1}	5.79×10^{-1}	6.48×10^{-1}
Xe-133	8.75×10^{-1}	3.25	8.02	1.58×10^{1}	1.72×10^{1}
Xe-133m	2.86×10^{-2}	1.04×10^{-1}	2.44×10^{-1}	4.20×10^{-1}	4.37×10^{-1}
Xe-135	8.20×10^{-1}	2.52	4.22	4.69	4.69
Xe-135m	2.20×10^{-2}	2.20×10^{-2}	2.20×10^{-2}	2.20×10^{-2}	2.20×10^{-2}
Xe-138	6.73×10^{-2}	6.74×10^{-2}	6.74×10^{-2}	6.74×10^{-2}	6.74×10^{-2}

Table 5.11-11 Activity Releases for Source Term SPS_Sm_DBA

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Cs-134	2.47×10^{-4}	9.29×10^{-4}	2.38×10^{-3}	5.23×10^{-3}	6.05×10^{-3}
Cs-137	7.40×10^{-4}	2.79×10^{-3}	7.15×10^{-3}	1.57×10^{-2}	1.82×10^{-2}
Na-22	6.32×10^{-3}	2.38×10^{-2}	6.10×10^{-2}	1.34×10^{-1}	1.55×10^{-1}
Na-24	3.13×10^{1}	1.04×10^{2}	2.00×10^{2}	2.50×10^{2}	2.50×10^{2}

Table 5.11-12 Activity Releases for Source Terms EVHM_DBA and PIC_DBA (Sheet 1 of 2)

Isotope	Cumulative Activity Release (Ci)					
	2 hr	4 hr	8 hr	24 hr	96 hr	720 hr
Am-241	0	0	0	0	1.37×10^{-6}	1.03×10^{-5}
Ba-140	2.06×10^{-6}	4.12×10^{-6}	8.20×10^{-6}	2.42×10^{-5}	8.93×10^{-5}	3.67×10^{-4}
Ce-141	1.05×10^{-3}	2.11×10^{-3}	4.21×10^{-3}	1.26×10^{-2}	4.87×10^{-2}	2.81×10^{-1}
Ce-144	4.12×10^{-2}	8.25×10^{-2}	1.65×10^{-1}	4.95×10^{-1}	1.97	1.43×10^{1}
Cm-242	0	0	0	2.12×10^{-6}	8.41×10^{-6}	5.97×10^{-5}
Cs-134	2.29×10^{-2}	4.58×10^{-2}	9.17×10^{-2}	2.75×10^{-1}	1.10	8.13
Cs-135	0	1.83×10^{-6}	3.65×10^{-6}	1.10×10^{-5}	4.39×10^{-5}	3.29×10^{-4}
Cs-136	0	1.18×10^{-6}	2.34×10^{-6}	6.91×10^{-6}	2.56×10^{-5}	1.07×10^{-4}
Cs-137	6.26×10^{-2}	1.25×10^{-1}	2.51×10^{-1}	7.53×10^{-1}	3.01	2.26×10^{1}
Eu-154	8.30×10^{-4}	1.66×10^{-3}	3.32×10^{-3}	9.97×10^{-3}	3.99×10^{-2}	2.98×10^{-1}
Eu-155	3.41×10^{-3}	6.83×10^{-3}	1.37×10^{-2}	4.10×10^{-2}	1.64×10^{-1}	1.22
Eu-156	0	1.79×10^{-6}	3.56×10^{-6}	1.05×10^{-5}	3.94×10^{-5}	1.76×10^{-4}
I-129	0	0	0	0	0	2.14×10^{-6}
Kr-85	1.15×10^{-2}	2.30×10^{-2}	4.61×10^{-2}	1.38×10^{-1}	5.53×10^{-1}	4.13
La-140	0	0	1.43×10^{-6}	6.75×10^{-6}	5.24×10^{-5}	3.61×10^{-4}
Nb-95	4.04×10^{-3}	8.08×10^{-3}	1.62×10^{-2}	4.83×10^{-2}	1.90×10^{-1}	1.26
Nb-95m	2.28×10^{-5}	4.55×10^{-5}	9.05×10^{-5}	2.65×10^{-4}	9.68×10^{-4}	5.07×10^{-3}
Nd-147	0	0	0	0	0	2.02×10^{-6}
Pm-147	2.66×10^{-3}	5.32×10^{-3}	1.06×10^{-2}	3.19×10^{-2}	1.28×10^{-1}	9.47×10^{-1}
Pr-143	0	0	1.67×10^{-6}	4.94×10^{-6}	1.83×10^{-5}	7.78×10^{-5}
Pu-238	0	1.17×10^{-6}	2.35×10^{-6}	7.05×10^{-6}	2.82×10^{-5}	2.11×10^{-4}
Pu-239	0	1.91×10^{-6}	3.81×10^{-6}	1.14×10^{-5}	4.58×10^{-5}	3.43×10^{-4}
Pu-240	0	0	0	1.55×10^{-6}	6.20×10^{-6}	4.65×10^{-5}
Pu-241	1.53×10^{-6}	3.06×10^{-6}	6.12×10^{-6}	1.84×10^{-5}	7.35×10^{-5}	5.49×10^{-4}
Rb-86	2.57×10^{-6}	5.14×10^{-6}	1.02×10^{-5}	3.04×10^{-5}	1.15×10^{-4}	5.59×10^{-4}
Ru-103	3.40×10^{-4}	6.79×10^{-4}	1.36×10^{-3}	4.05×10^{-3}	1.58×10^{-2}	9.51×10^{-2}
Ru-106	1.97×10^{-3}	3.95×10^{-3}	7.90×10^{-3}	2.37×10^{-2}	9.45×10^{-2}	6.91×10^{-1}
Sr-89	3.41×10^{-3}	6.81×10^{-3}	1.36×10^{-2}	4.07×10^{-2}	1.59×10^{-1}	1.01
Sr-90	4.31×10^{-3}	8.63×10^{-3}	1.73×10^{-2}	5.18×10^{-2}	2.07×10^{-1}	1.55
Tc-99	0	0	0	1.72×10^{-6}	6.87×10^{-6}	5.15×10^{-5}
Te-127	4.33×10^{-5}	8.67×10^{-5}	1.73×10^{-4}	5.19×10^{-4}	2.06×10^{-3}	1.42×10^{-2}
Te-127m	4.42×10^{-5}	8.85×10^{-5}	1.77×10^{-4}	5.30×10^{-4}	2.10×10^{-3}	1.45×10^{-2}
Te-129	2.41×10^{-6}	3.15×10^{-6}	3.44×10^{-6}	3.46×10^{-6}	3.46×10^{-6}	3.46×10^{-6}

Table 5.11-12 Activity Releases for Source Terms EVHM_DBA and PIC_DBA (Sheet 2 of 2)

Isotope	Cumulative Activity Release (Ci)					
	2 hr	4 hr	8 hr	24 hr	96 hr	720 hr
Te-129m	6.55×10^{-6}	1.31×10^{-5}	2.62×10^{-5}	7.79×10^{-5}	3.02×10^{-4}	1.76×10^{-3}
Xe-131m	0	0	1.02×10^{-6}	3.00×10^{-6}	1.10×10^{-5}	4.36×10^{-5}
Y-90	9.00×10^{-4}	1.88×10^{-3}	4.04×10^{-3}	1.53×10^{-2}	1.04×10^{-1}	1.39
Y-91	1.35×10^{-3}	2.70×10^{-3}	5.40×10^{-3}	1.61×10^{-2}	6.35×10^{-2}	4.10×10^{-1}
Zr-93	0	0	0	0	0	7.29×10^{-6}
Zr-95	2.00×10^{-3}	4.00×10^{-3}	7.99×10^{-3}	2.39×10^{-2}	9.41×10^{-2}	6.15×10^{-1}

Table 5.11-13 Activity Releases for Source Term EVHM_LTA_DBA (Sheet 1 of 3)

Isotope	Cumulative Activity Release (Ci)					
	2 hr	4 hr	8 hr	24 hr	96 hr	720 hr
Am-241	0	0	0	0	0	5.18×10^{-6}
Ba-140	1.63×10^{-1}	3.26×10^{-1}	6.49×10^{-1}	1.91	7.06	2.90×10^{1}
Br-82	1.47×10^{-4}	2.88×10^{-4}	5.55×10^{-4}	1.43×10^{-3}	3.24×10^{-3}	3.82×10^{-3}
Ce-141	8.80×10^{-2}	1.76×10^{-1}	3.52×10^{-1}	1.05	4.06	2.35×10^{1}
Ce-143	2.41×10^{-2}	4.72×10^{-2}	9.07×10^{-2}	2.32×10^{-1}	5.09×10^{-1}	5.87×10^{-1}
Ce-144	6.83×10^{-2}	1.37×10^{-1}	2.74×10^{-1}	8.20×10^{-1}	3.27	2.37×10^{1}
Cm-242	0	0	1.70×10^{-6}	5.11×10^{-6}	2.03×10^{-5}	1.44×10^{-4}
Cs-134	2.77×10^{-2}	5.55×10^{-2}	1.11×10^{-1}	3.33×10^{-1}	1.33	9.85
Cs-135	0	1.83×10^{-6}	3.65×10^{-6}	1.10×10^{-5}	4.39×10^{-5}	3.29×10^{-4}
Cs-136	3.29×10^{-2}	6.57×10^{-2}	1.31×10^{-1}	3.86×10^{-1}	1.43	5.97
Cs-137	6.35×10^{-2}	1.27×10^{-1}	2.54×10^{-1}	7.63×10^{-1}	3.05	2.28×10^{1}
Eu-154	8.69×10^{-4}	1.74×10^{-3}	3.48×10^{-3}	1.04×10^{-2}	4.17×10^{-2}	3.12×10^{-1}
Eu-155	3.71×10^{-3}	7.42×10^{-3}	1.48×10^{-2}	4.45×10^{-2}	1.78×10^{-1}	1.33
Eu-156	1.16×10^{-2}	2.31×10^{-2}	4.61×10^{-2}	1.36×10^{-1}	5.10×10^{-1}	2.28
Eu-157	3.84×10^{-4}	7.36×10^{-4}	1.35×10^{-3}	2.94×10^{-3}	4.36×10^{-3}	4.41×10^{-3}
I-129	0	0	0	0	0	2.12×10^{-6}
I-130	1.05×10^{-4}	1.99×10^{-4}	3.58×10^{-4}	7.32×10^{-4}	9.85×10^{-4}	9.90×10^{-4}
I-131	1.76×10^{-1}	3.51×10^{-1}	6.97×10^{-1}	2.03	7.17	2.27×10^{1}
I-132	1.40×10^{-1}	2.21×10^{-1}	3.00×10^{-1}	3.89×10^{-1}	5.87×10^{-1}	8.02×10^{-1}
I-133	5.80×10^{-2}	1.12×10^{-1}	2.11×10^{-1}	4.96×10^{-1}	8.64×10^{-1}	9.01×10^{-1}
I-135	6.47×10^{-4}	1.17×10^{-3}	1.94×10^{-3}	3.14×10^{-3}	3.41×10^{-3}	3.41×10^{-3}
Kr-85	1.19×10^{-2}	2.39×10^{-2}	4.78×10^{-2}	1.43×10^{-1}	5.73×10^{-1}	4.29
Kr-85m	2.96×10^{-5}	5.14×10^{-5}	7.92×10^{-5}	1.09×10^{-4}	1.12×10^{-4}	1.12×10^{-4}
La-140	2.03×10^{-2}	4.55×10^{-2}	1.10×10^{-1}	5.24×10^{-1}	4.13	2.85×10^{1}
La-141	0	0	1.05×10^{-6}	1.37×10^{-6}	1.39×10^{-6}	1.39×10^{-6}
Mo-99	1.03×10^{-2}	2.04×10^{-2}	4.01×10^{-2}	1.11×10^{-1}	3.16×10^{-1}	4.97×10^{-1}
Nb-95	1.93×10^{-2}	3.87×10^{-2}	7.74×10^{-2}	2.32×10^{-1}	9.27×10^{-1}	6.75
Nb-95m	2.09×10^{-4}	4.18×10^{-4}	8.31×10^{-4}	2.44×10^{-3}	8.94×10^{-3}	4.75×10^{-2}
Nb-97	1.61×10^{-3}	3.10×10^{-3}	5.73×10^{-3}	1.28×10^{-2}	2.01×10^{-2}	2.04×10^{-2}
Nb-97m	1.57×10^{-3}	3.17×10^{-3}	6.16×10^{-3}	1.57×10^{-2}	2.59×10^{-2}	2.65×10^{-2}
Nd-147	6.08×10^{-3}	1.21×10^{-2}	2.42×10^{-2}	7.10×10^{-2}	2.59×10^{-1}	9.86×10^{-1}
Np-239	9.04×10^{-3}	1.79×10^{-2}	3.49×10^{-2}	9.53×10^{-2}	2.59×10^{-1}	3.74×10^{-1}
Pm-147	3.02×10^{-3}	6.04×10^{-3}	1.21×10^{-2}	3.63×10^{-2}	1.45×10^{-1}	1.09

Table 5.11-13 Activity Releases for Source Term EVHM_LTA_DBA (Sheet 2 of 3)

Isotope	Cumulative Activity Release (Ci)					
	2 hr	4 hr	8 hr	24 hr	96 hr	720 hr
Pr-143	1.64×10^{-2}	3.28×10^{-2}	6.58×10^{-2}	1.98×10^{-1}	7.75×10^{-1}	3.46
Pu-238	0	1.17×10^{-6}	2.35×10^{-6}	7.04×10^{-6}	2.82×10^{-5}	2.11×10^{-4}
Pu-239	0	1.90×10^{-6}	3.81×10^{-6}	1.14×10^{-5}	4.57×10^{-5}	3.43×10^{-4}
Pu-240	0	0	0	1.55×10^{-6}	6.20×10^{-6}	4.65×10^{-5}
Pu-241	1.57×10^{-6}	3.15×10^{-6}	6.30×10^{-6}	1.89×10^{-5}	7.55×10^{-5}	5.65×10^{-4}
Rb-86	5.79×10^{-3}	1.16×10^{-2}	2.31×10^{-2}	6.84×10^{-2}	2.59×10^{-1}	1.26
Rh-105	2.60×10^{-3}	5.11×10^{-3}	9.85×10^{-3}	2.55×10^{-2}	5.75×10^{-2}	6.79×10^{-2}
Ru-103	1.33×10^{-2}	2.65×10^{-2}	5.30×10^{-2}	1.58×10^{-1}	6.16×10^{-1}	3.71
Ru-105	0	0	1.51×10^{-6}	2.07×10^{-6}	2.12×10^{-6}	2.12×10^{-6}
Ru-106	2.90×10^{-3}	5.81×10^{-3}	1.16×10^{-2}	3.49×10^{-2}	1.39×10^{-1}	1.02
Sb-127	6.67×10^{-4}	1.33×10^{-3}	2.61×10^{-3}	7.40×10^{-3}	2.30×10^{-2}	4.47×10^{-2}
Sr-89	5.87×10^{-2}	1.17×10^{-1}	2.35×10^{-1}	7.01×10^{-1}	2.75	1.73×10^{1}
Sr-90	4.37×10^{-3}	8.75×10^{-3}	1.75×10^{-2}	5.26×10^{-2}	2.10×10^{-1}	1.57
Sr-91	9.86×10^{-4}	1.84×10^{-3}	3.23×10^{-3}	6.06×10^{-3}	7.37×10^{-3}	7.37×10^{-3}
Tc-99	0	0	0	1.71×10^{-6}	6.86×10^{-6}	5.15×10^{-5}
Tc-99m	9.97×10^{-3}	1.98×10^{-2}	3.87×10^{-2}	1.07×10^{-1}	3.05×10^{-1}	4.80×10^{-1}
Te-127	7.76×10^{-4}	1.54×10^{-3}	3.05×10^{-3}	8.72×10^{-3}	2.87×10^{-2}	9.40×10^{-2}
Te-127m	1.61×10^{-4}	3.23×10^{-4}	6.46×10^{-4}	1.94×10^{-3}	7.72×10^{-3}	5.41×10^{-2}
Te-129	1.75×10^{-4}	2.28×10^{-4}	2.49×10^{-4}	2.51×10^{-4}	2.51×10^{-4}	2.51×10^{-4}
Te-129m	4.73×10^{-4}	9.46×10^{-4}	1.89×10^{-3}	5.63×10^{-3}	2.19×10^{-2}	1.27×10^{-1}
Te-131m	4.32×10^{-4}	8.48×10^{-4}	1.63×10^{-3}	4.17×10^{-3}	9.17×10^{-3}	1.06×10^{-2}
Te-132	8.85×10^{-3}	1.76×10^{-2}	3.45×10^{-2}	9.65×10^{-2}	2.87×10^{-1}	4.95×10^{-1}
U-237	4.78×10^{-4}	9.53×10^{-4}	1.89×10^{-3}	5.48×10^{-3}	1.89×10^{-2}	5.36×10^{-2}
Xe-131m	2.81×10^{-2}	5.62×10^{-2}	1.12×10^{-1}	3.30×10^{-1}	1.22	4.96
Xe-133	1.82	3.63	7.20	2.07×10^{1}	6.91×10^{1}	1.66×10^{2}
Xe-133m	4.28×10^{-2}	8.45×10^{-2}	1.65×10^{-1}	4.49×10^{-1}	1.20	1.67
Xe-135	6.36×10^{-2}	1.18×10^{-1}	2.06×10^{-1}	3.81×10^{-1}	4.55×10^{-1}	4.56×10^{-1}
Xe-135m	1.12×10^{-4}	1.13×10^{-4}	1.13×10^{-4}	1.13×10^{-4}	1.13×10^{-4}	1.13×10^{-4}
Y-90	9.24×10^{-4}	1.92×10^{-3}	4.14×10^{-3}	1.57×10^{-2}	1.06×10^{-1}	1.41
Y-91	1.58×10^{-2}	3.16×10^{-2}	6.31×10^{-2}	1.89×10^{-1}	7.41×10^{-1}	4.79
Y-92	0	0	1.13×10^{-6}	1.42×10^{-6}	1.44×10^{-6}	1.44×10^{-6}
Y-93	2.89×10^{-4}	5.41×10^{-4}	9.53×10^{-4}	1.83×10^{-3}	2.27×10^{-3}	2.27×10^{-3}
Zr-93	0	0	0	0	0	7.29×10^{-6}

Table 5.11-13 Activity Releases for Source Term EVHM_LTA_DBA
(Sheet 3 of 3)

Isotope	Cumulative Activity Release (Ci)					
	2 hr	4 hr	8 hr	24 hr	96 hr	720 hr
Zr-95	1.89×10^{-2}	3.78×10^{-2}	7.55×10^{-2}	2.26×10^{-1}	8.89×10^{-1}	5.81
Zr-97	1.49×10^{-3}	2.87×10^{-3}	5.31×10^{-3}	1.19×10^{-2}	1.85×10^{-2}	1.89×10^{-2}

Table 5.11-14 Activity Releases for Source Term FHA_SFP_DBA (Sheet 1 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Am-241	2.92×10^{-6}	2.92×10^{-6}	2.92×10^{-6}	2.92×10^{-6}	2.92×10^{-6}
Ba-140	7.52×10^{-6}	7.52×10^{-6}	7.52×10^{-6}	7.52×10^{-6}	7.52×10^{-6}
Ce-141	2.09×10^{-2}	2.09×10^{-2}	2.09×10^{-2}	2.09×10^{-2}	2.09×10^{-2}
Ce-144	5.40	5.40	5.40	5.40	5.40
Cm-242	9.62×10^{-6}	9.62×10^{-6}	9.62×10^{-6}	9.62×10^{-6}	9.62×10^{-6}
Cs-134	1.60×10^{1}	1.60×10^{1}	1.60×10^{1}	1.60×10^{1}	1.60×10^{1}
Cs-135	6.98×10^{-4}	6.98×10^{-4}	6.98×10^{-4}	6.98×10^{-4}	6.98×10^{-4}
Cs-136	2.33×10^{-6}	2.33×10^{-6}	2.33×10^{-6}	2.33×10^{-6}	2.33×10^{-6}
Cs-137	4.76×10^{1}	4.76×10^{1}	4.76×10^{1}	4.76×10^{1}	4.76×10^{1}
Eu-154	6.21×10^{-1}	6.21×10^{-1}	6.21×10^{-1}	6.21×10^{-1}	6.21×10^{-1}
Eu-155	2.51	2.51	2.51	2.51	2.51
Eu-156	7.15×10^{-6}	7.15×10^{-6}	7.15×10^{-6}	7.15×10^{-6}	7.15×10^{-6}
I-129	9.92×10^{-4}	9.92×10^{-4}	9.92×10^{-4}	9.92×10^{-4}	9.92×10^{-4}
Kr-85	1.89×10^{3}	1.89×10^{3}	1.89×10^{3}	1.89×10^{3}	1.89×10^{3}
Nb-95	1.20×10^{-1}	1.20×10^{-1}	1.20×10^{-1}	1.20×10^{-1}	1.20×10^{-1}
Nb-95m	4.19×10^{-4}	4.19×10^{-4}	4.19×10^{-4}	4.19×10^{-4}	4.19×10^{-4}
Pm-147	2.06×10^{-1}	2.06×10^{-1}	2.06×10^{-1}	2.06×10^{-1}	2.06×10^{-1}
Pu-238	4.88×10^{-4}	4.88×10^{-4}	4.88×10^{-4}	4.88×10^{-4}	4.88×10^{-4}
Pu-239	7.95×10^{-4}	7.95×10^{-4}	7.95×10^{-4}	7.95×10^{-4}	7.95×10^{-4}
Pu-240	1.08×10^{-4}	1.08×10^{-4}	1.08×10^{-4}	1.08×10^{-4}	1.08×10^{-4}
Pu-241	1.26×10^{-3}	1.26×10^{-3}	1.26×10^{-3}	1.26×10^{-3}	1.26×10^{-3}
Rb-86	4.77×10^{-5}	4.77×10^{-5}	4.77×10^{-5}	4.77×10^{-5}	4.77×10^{-5}
Ru-103	4.85×10^{-3}	4.85×10^{-3}	4.85×10^{-3}	4.85×10^{-3}	4.85×10^{-3}
Ru-106	1.37×10^{-1}	1.37×10^{-1}	1.37×10^{-1}	1.37×10^{-1}	1.37×10^{-1}
Sr-89	7.22×10^{-1}	7.22×10^{-1}	7.22×10^{-1}	7.22×10^{-1}	7.22×10^{-1}
Sr-90	3.58	3.58	3.58	3.58	3.58
Tc-99	1.19×10^{-5}	1.19×10^{-5}	1.19×10^{-5}	1.19×10^{-5}	1.19×10^{-5}
Te-127	1.91×10^{-2}	1.91×10^{-2}	1.91×10^{-2}	1.91×10^{-2}	1.91×10^{-2}
Te-127m	1.95×10^{-2}	1.95×10^{-2}	1.95×10^{-2}	1.95×10^{-2}	1.95×10^{-2}
Te-129m	6.95×10^{-4}	6.95×10^{-4}	6.95×10^{-4}	6.95×10^{-4}	6.95×10^{-4}
Xe-131m	1.23×10^{-4}	1.23×10^{-4}	1.23×10^{-4}	1.23×10^{-4}	1.23×10^{-4}
Y-90	7.18×10^{-2}	7.18×10^{-2}	7.18×10^{-2}	7.18×10^{-2}	7.18×10^{-2}
Y-91	3.45×10^{-2}	3.45×10^{-2}	3.45×10^{-2}	3.45×10^{-2}	3.45×10^{-2}

Table 5.11-14 Activity Releases for Source Term FHA_SFP_DBA (Sheet 2 of 2)

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Zr-93	1.69×10^{-6}	1.69×10^{-6}	1.69×10^{-6}	1.69×10^{-6}	1.69×10^{-6}
Zr-95	5.65×10^{-2}	5.65×10^{-2}	5.65×10^{-2}	5.65×10^{-2}	5.65×10^{-2}

Table 5.11-15 Activity Releases for Source Term RWG_DBA

Isotope	Activity Release (Ci) 2 hr
Ar-41	5.84
Ba-137m	1.92×10^{-3}
Cs-135	5.37×10^{-5}
Cs-137	2.00×10^{-3}
Cs-138	1.55
Cs-139	2.57×10^{-3}
H-3	3.79×10^{-2}
Kr-83m	2.52
Kr-85	2.85×10^{-1}
Kr-85m	2.79×10^{1}
Kr-87	5.96
Kr-88	2.02×10^{1}
Kr-89	1.96×10^{-2}
Kr-90	1.84×10^{-4}
Ne-23	1.70×10^{-4}
Rb-88	2.07×10^{1}
Rb-89	5.12×10^{-2}
Rb-90m	1.03×10^{-3}
Xe-131m	2.48×10^{1}
Xe-133	2.35×10^{3}
Xe-133m	7.67×10^{1}
Xe-135	3.75×10^{2}
Xe-135m	2.06×10^{-1}
Xe-137	5.50×10^{-2}
Xe-138	1.08
Xe-139	3.51×10^{-4}

Table 5.11-16 Activity Releases for Source Term SPS_CTR

Isotope	Cumulative Activity Release (Ci)						
	2 hr	6.25 hr	8 hr	8.25 hr	24 hr	96 hr	720 hr
H-3	1.80×10^3	6.80×10^3	8.87×10^3	9.16×10^3	2.77×10^4	2.83×10^4	2.83×10^4

Table 5.11-17 Activity Releases for Source Term SCG_Lg_HAA_DBA

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Ar-41	1.07×10^{4}	1.08×10^{4}	1.08×10^{4}	1.08×10^{4}	1.08×10^{4}
Cs-134	1.04×10^{-2}	1.05×10^{-2}	1.05×10^{-2}	1.05×10^{-2}	1.05×10^{-2}
Cs-136	6.80×10^{-3}	6.86×10^{-3}	6.86×10^{-3}	6.86×10^{-3}	6.86×10^{-3}
Cs-137	1.25×10^{-2}	1.27×10^{-2}	1.27×10^{-2}	1.27×10^{-2}	1.27×10^{-2}
Cs-138	2.43×10^{2}	2.44×10^{2}	2.44×10^{2}	2.44×10^{2}	2.44×10^{2}
Kr-83m	1.93×10^{2}	1.94×10^{2}	1.94×10^{2}	1.94×10^{2}	1.94×10^{2}
Kr-85	5.67×10^{1}	5.73×10^{1}	5.73×10^{1}	5.73×10^{1}	5.73×10^{1}
Kr-85m	4.52×10^{2}	4.55×10^{2}	4.55×10^{2}	4.55×10^{2}	4.55×10^{2}
Kr-87	6.69×10^{2}	6.71×10^{2}	6.71×10^{2}	6.71×10^{2}	6.71×10^{2}
Kr-88	1.03×10^{3}	1.04×10^{3}	1.04×10^{3}	1.04×10^{3}	1.04×10^{3}
Na-24	1.30×10^{1}	1.32×10^{1}	1.32×10^{1}	1.32×10^{1}	1.32×10^{1}
Rb-88	4.96×10^{2}	5.03×10^{2}	5.03×10^{2}	5.03×10^{2}	5.03×10^{2}
Xe-131m	1.31×10^{2}	1.32×10^{2}	1.32×10^{2}	1.32×10^{2}	1.32×10^{2}
Xe-133	3.89×10^{3}	3.93×10^{3}	3.93×10^{3}	3.93×10^{3}	3.93×10^{3}
Xe-133m	1.28×10^{2}	1.29×10^{2}	1.29×10^{2}	1.29×10^{2}	1.29×10^{2}
Xe-135	3.79×10^{3}	3.83×10^{3}	3.83×10^{3}	3.83×10^{3}	3.83×10^{3}
Xe-135m	2.44×10^{2}	2.44×10^{2}	2.44×10^{2}	2.44×10^{2}	2.44×10^{2}
Xe-138	7.74×10^{2}	7.74×10^{2}	7.74×10^{2}	7.74×10^{2}	7.74×10^{2}

Table 5.11-18 Activity Releases for Source Term SCG_Lg_VTC_DBA

Isotope	Cumulative Activity Release (Ci)				
	2 hr	8 hr	24 hr	96 hr	720 hr
Ar-41	3.60×10^{2}	6.27×10^{2}	6.54×10^{2}	6.54×10^{2}	6.54×10^{2}
Cs-134	4.26×10^{-4}	1.61×10^{-3}	4.12×10^{-3}	9.04×10^{-3}	1.05×10^{-2}
Cs-135	0	0	0	1.16×10^{-6}	1.40×10^{-6}
Cs-136	2.79×10^{-4}	1.05×10^{-3}	2.64×10^{-3}	5.53×10^{-3}	6.22×10^{-3}
Cs-137	5.16×10^{-4}	1.94×10^{-3}	4.98×10^{-3}	1.10×10^{-2}	1.27×10^{-2}
Cs-138	9.90	1.15×10^{1}	1.15×10^{1}	1.15×10^{1}	1.15×10^{1}
Kr-83m	6.47	1.13×10^{1}	1.18×10^{1}	1.18×10^{1}	1.18×10^{1}
Kr-85	2.33	8.79	2.25×10^{1}	4.95×10^{1}	5.73×10^{1}
Kr-85m	1.70×10^{1}	4.34×10^{1}	5.68×10^{1}	5.77×10^{1}	5.77×10^{1}
Kr-87	2.07×10^{1}	3.02×10^{1}	3.05×10^{1}	3.05×10^{1}	3.05×10^{1}
Kr-88	3.70×10^{1}	7.94×10^{1}	9.01×10^{1}	9.03×10^{1}	9.03×10^{1}
Na-24	5.22×10^{-1}	1.73	3.34	4.17	4.18
Rb-88	3.03×10^{1}	7.83×10^{1}	9.06×10^{1}	9.08×10^{1}	9.08×10^{1}
Xe-131m	5.36	2.01×10^{1}	5.06×10^{1}	1.05×10^{2}	1.18×10^{2}
Xe-133	1.60×10^{2}	5.92×10^{2}	1.46×10^{3}	2.88×10^{3}	3.13×10^{3}
Xe-133m	5.22	1.89×10^{1}	4.44×10^{1}	7.66×10^{1}	7.96×10^{1}
Xe-135	1.50×10^{2}	4.59×10^{2}	7.70×10^{2}	8.55×10^{2}	8.55×10^{2}
Xe-135m	4.00	4.02	4.02	4.02	4.02
Xe-138	1.23×10^{1}	1.23×10^{1}	1.23×10^{1}	1.23×10^{1}	1.23×10^{1}

Table 5.11-19 Design Basis Accident Doses

Source Term	Dose (rem TEDE)	
	EAB	LPZ
LocFault_DBA	5.68×10^{-2}	5.05×10^{-1}
FDIV_1assy_DBA	3.73×10^{-1}	7.85×10^{-1}
FDIV_2assy_DBA	7.45×10^{-1}	1.57
SCG_HAA_DBA	1.82×10^{-2}	1.83×10^{-2}
SCG_VTC_DBA	6.18×10^{-4}	1.05×10^{-3}
SPS_Sm_DBA	3.48×10^{-2}	1.43×10^{-1}
EVHM_DBA	8.59×10^{-3}	3.29×10^{-1}
EVHM_LTA_DBA	1.60×10^{-2}	5.62×10^{-1}
PIC_DBA	8.59×10^{-3}	3.29×10^{-1}
FHA_SFP_DBA	3.14	3.14
ULOHS_IVS_fullcore	6.44×10^{-2}	2.19
RWG_DBA	4.11×10^{-2}	4.11×10^{-2}
SPS_CTR	5.73×10^{-2}	2.68×10^{-1}
SCG_Lg_HAA_DBA	3.32	3.33
SCG_Lg_VTC_DBA	1.13×10^{-1}	1.92×10^{-1}

Table 5.11-20 Severe Accident Release Categories, Source Terms, and Frequencies

RC#	Release Category	Assemblies with Cladding Damage	Reactor Vessel Head	HAA Functional Containment Barrier	Source Term ID	Accident Frequency (per reactor-yr)
1	RC_B4_4	Peak in Core	Failed	Failed	RC-B-CB	1.13×10^{-8}
2	RC_B4-1_4	All in Core	Failed	Failed	RC-B-CB	8.83×10^{-11}
3	RC_B4-2_4	Peak + 2/3 Core	Failed	Failed	RC-B-CB	3.67×10^{-11}
4	RC_B4-3_4	Peak + 1/3 Core	Failed	Failed	RC-B-CB	3.67×10^{-11}
5	RC_SF-1_4	All in Core + IVS	Intact	Failed	RC-B-CB	6.75×10^{-10}
6	RC_SF-1_4_CB	All in Core + IVS	Intact	Failed	RC-B-CB	1.51×10^{-13}
7	RC_VD_4	All in Core + IVS	Failed	Failed	RC-B-CB	6.49×10^{-11}
8	RC_VD_4_CB	All in Core + IVS	Failed	Failed	RC-B-CB	4.58×10^{-15}
9	RC_LB_1	All in Core	Intact	Intact	RCLB-1F	8.27×10^{-10}
10	RC_LB_1_CB	All in Core	Intact	Intact	RCLB-1F	5.30×10^{-14}
11	RC_LB_2	All in Core	Intact	Failed	RCLB-1F	7.38×10^{-10}
12	RC_LB_3	All in Core	Failed	Intact	RCLB-1F	8.14×10^{-12}
13	RC_LB_4	All in Core	Failed	Failed	RCLB-1F	7.28×10^{-12}
					Total	1.38×10^{-8}

Table 5.11-21 Severe Accident Impacts

RC#	Latent Cancer Fatality Risk ≤ EAB+10-mi (per reactor-yr)	Population Dose Risk (person-rem/reactor-yr)				Economic Cost Risk ($/reactor-yr)	Land Area Decontamination Risk (acre/reactor-yr)
		Air	Water	Food	Total		
1	2.93×10^{-12}	5.34×10^{-5}	1.80×10^{-6}	3.31×10^{-5}	8.83×10^{-5}	2.15×10^{-2}	1.52×10^{-8}
2	2.29×10^{-14}	4.17×10^{-7}	1.40×10^{-8}	2.58×10^{-7}	6.90×10^{-7}	1.68×10^{-4}	1.19×10^{-10}
3	9.51×10^{-15}	1.74×10^{-7}	5.84×10^{-9}	1.07×10^{-7}	2.87×10^{-7}	6.97×10^{-5}	4.94×10^{-11}
4	9.51×10^{-15}	1.74×10^{-7}	5.84×10^{-9}	1.07×10^{-7}	2.87×10^{-7}	6.97×10^{-5}	4.94×10^{-11}
5	1.75×10^{-13}	3.19×10^{-6}	1.07×10^{-7}	1.98×10^{-6}	5.27×10^{-6}	1.28×10^{-3}	9.09×10^{-10}
6	3.91×10^{-17}	7.14×10^{-10}	2.40×10^{-11}	4.42×10^{-10}	1.18×10^{-9}	2.87×10^{-7}	2.03×10^{-13}
7	1.68×10^{-14}	3.07×10^{-7}	1.03×10^{-8}	1.90×10^{-7}	5.07×10^{-7}	1.23×10^{-4}	8.74×10^{-11}
8	1.19×10^{-18}	2.17×10^{-11}	7.28×10^{-13}	1.34×10^{-11}	3.58×10^{-11}	8.70×10^{-9}	6.17×10^{-15}
9	9.92×10^{-13}	1.80×10^{-5}	6.75×10^{-7}	1.18×10^{-5}	3.04×10^{-5}	1.57×10^{-3}	1.11×10^{-9}
10	6.36×10^{-17}	1.15×10^{-9}	4.32×10^{-11}	7.53×10^{-10}	1.95×10^{-9}	1.01×10^{-7}	7.14×10^{-14}
11	8.86×10^{-13}	1.61×10^{-5}	6.02×10^{-7}	1.05×10^{-5}	2.72×10^{-5}	1.40×10^{-3}	9.94×10^{-10}
12	9.77×10^{-15}	1.77×10^{-7}	6.64×10^{-9}	1.16×10^{-7}	3.00×10^{-7}	1.55×10^{-5}	1.10×10^{-11}
13	8.74×10^{-15}	1.58×10^{-7}	5.94×10^{-9}	1.03×10^{-7}	2.68×10^{-7}	1.38×10^{-5}	9.80×10^{-12}
Total	5.06×10^{-12}	9.21×10^{-5}	3.23×10^{-6}	5.82×10^{-5}	1.53×10^{-4}	2.62×10^{-2}	1.86×10^{-8}

Note: Early fatality risk within 1 mi of the EAB is zero for all release categories.

Table 5.11-22 Comparison of the Natrium Design's Severe Accident Impacts to Advanced Large LWRs

Plant	Design	Accident Frequency (per reactor-yr)	Dose Risk (person-rem/reactor-yr)
Kemmerer 1	Natrium	1.4×10^{-8}	1.5×10^{-4}
Turkey Point 6 & 7	AP1000	2.4×10^{-7}	2.7×10^{-1}
Fermi 3	ESBWR	1.7×10^{-8}	3.2×10^{-2}
Comanche Peak 3 & 4	US APWR	1.2×10^{-6}	3.0×10^{-1}
Calvert Cliffs 3	US EPR	5.3×10^{-7}	3.5×10^{-1}

Note: Data from other plants are from the respective combined license applications.

Table 5.11-23 Maximum SAMA Benefit

Location	Cost Type	Cost Risk	
		7% Discount	3% Discount
Offsite	Population Exposure	$17.71	$35.01
	Economic	$0.37	$0.73
	Total Exposure and Economic	$18.08	$35.74
Onsite	Immediate Exposure	$5.25	$10.38
	Long-Term Exposure	$22.87	$54.33
	Total Exposure	$28.12	$64.71
	Cleanup and Decontamination	$209.21	$496.94
	Replacement Power	$174.58	$490.13
	Total Economic	$383.78	$987.07
	Total Exposure and Economic	$411.91	$1,051.78
Total	Maximum Averted Cost Risk	$430	$1,100

5.12 Measures and Controls to Limit Adverse Impacts during Operation

Section 5.1 through Section 5.11 describe potential environmental impacts that could result from the operation of Kemmerer Unit 1. Adverse environmental impacts will be reduced or eliminated through implementation of measures and controls. Frequency of compliance and monitoring activities affecting site-related environmental resources and quality will be determined when programs are further developed. The following Operations-Related Measures and Controls (OMCs) will limit adverse environmental impacts:

OMC1 During low-flow periods, the plant could limit water withdrawals from Hams Fork River. Withdrawals will be limited to stay within existing water rights.

OMC2 Mitigation of potential water quality impacts to North Fork Little Muddy Creek from plant discharges will be accomplished through: (1) design and operation of the discharge system, (2) ensuring compliance with the requirements of the Wyoming Pollutant Discharge Elimination System permit, and (3) monitoring and reporting, conducted in accordance with the Wyoming Pollutant Discharge Elimination System permit requirements to demonstrate continued compliance with the permit and protection of the environment.

OMC3 Minor spills of diesel fuel, hydraulic fluid, or lubricants during operations will be cleaned up quickly in accordance with the site’s Spill Prevention Control and Countermeasure Plan and a response plan to be developed for the facility.

OMC4 Impacts to vegetation and wildlife habitat from transmission system operation, which include corridor maintenance and transmission line use, are expected to be mitigated by the transmission service provider through the use of best management practices for the application and storage of chemicals used in transmission corridor maintenance. Only U.S. Environmental Protection Agency approved chemicals are anticipated to be used.

OMC5 Provisions or devices for preventing avian collisions are anticipated to be implemented by the transmission service provider, consistent with industry standards.

OMC6 The color of the facilities will be selected to be aesthetically compatible with the surrounding environment.

OMC7 First-aid capabilities will be provided at the site and, employees and contractors will be required to comply with safety regulations.

OMC8 An industrial safety program will be implemented, and safety professionals will be employed to oversee the program.

OMC9 A Storm Water Pollution Prevention Plan will be developed to prevent or minimize the discharge of pollutants associated with storm water. The Storm Water Pollution Prevention Plan will include the use of best management practices, such as limiting the storage of petroleum materials to designated areas.

OMC10 Industry-accepted chemical handling techniques, pre-job planning, and compliance with a facility waste minimization plan will ensure only small quantities of mixed wastes will be generated.

OMC11 In order to mitigate potential impacts to aquatic populations from operation and maintenance of transmission lines, practices and procedures are expected to be adopted by the transmission service provider to prevent impacts to surface waters and wetlands from erosion and sedimentation.

OMC12 Radiological protection programs will manage and limit doses to workers who are exposed to radiation emitted during incident-free transportation of radiological materials.

OMC13 Communication with local government, planning officials, and media will be maintained to ensure adequate time is given to plan for significant workforce changes.

OMC14 A Cultural Resources Protection Plan, including an Unanticipated Discoveries Plan, and protocols related to routine ground disturbing activities will be developed that will ensure that any unanticipated discoveries are dealt with promptly and appropriately during operation of the plant.

OMC15 Corridors will be managed to promote the growth of low-growing, native vegetation that provides food and cover for wildlife but does not interfere with transmission system maintenance or operation.

OMC16 Transmission system maintenance is anticipated to be carried out when ground is dry or frozen, to prevent soil churning, displacement, and rutting.

OMC17 Generation of low-level radioactive wastes will require disposal at licensed radioactive waste disposal facilities, and nonradioactive wastes will require disposal in permitted landfills.

OMC18 Stormwater best management practices will be employed to treat storm water resulting from new impervious surfaces and to best protect regulated water resources, in compliance with all Federal, State, and local permits.

OMC19 Operations and outage workers arrival and departure times will be staggered. The intersection of the site entrance road with US 189 will be constructed to minimize congestion and impediments to smooth traffic flow.

OMC20 Onsite Standby Diesel Generators will comply with all applicable U.S. Environmental Protection Agency and State guidelines. The ultra-low sulfur diesel fuel used in these generators will comply with all applicable U.S. Environmental Protection Agency and State guidelines.

OMC21 Potential electric shock from the transmission system at Kemmerer Unit 1 will be controlled and minimized by conformance with National Electrical Safety Code criteria and adherence to the standards for transmission systems.

OMC22 Monitoring for radiological releases will occur, as required by the radiological environmental monitoring program.

OMC23 Barriers will be erected to restrict access to contaminated soil or water.

Table 5.12-1 summarizes the environmental impacts and corresponding measures and controls discussed in previous sections of Chapter 5.

Table 5.12-1 Summary of Measures and Controls to Limit Adverse Impacts during Operation
(Sheet 1 of 4)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
5.1 Land Use Impacts		
5.1.2 Offsite	Operations in offsite corridors will be compatible with grazing, hunting, and existing industrial uses. Vegetation and land use beneath the high-voltage lines will be maintained and monitored for compatibility with reliable transmission of electricity.	OMC4, OMC15
5.2 Water Resources Impacts		
5.2.1 Hydrologic Alterations		
Plant Water Supply	Water withdrawal from Hams Fork River via the Naughton Power Plant Cooling Water Intake Structure will occur in order to replace water lost to evaporation, drift, seepage, and blowdown.	OMC1
Discharge System	Water discharged from the plant adds additional water into North Fork Little Muddy Creek and its adjacent wetlands and 100-year floodplains.	OMC2
5.2.2 Water Use Impacts		
Plant Water Supply	Water withdrawal from Hams Fork River via the Naughton Power Plant Cooling Water Intake Structure will occur in order to replace water lost to evaporation, drift, seepage, and blowdown.	OMC1
5.2.3 Water Quality Impacts		
Discharge System (Cooling System)	Blowdown from the cooling tower will result in thermal, chemical, and physical impacts to North Fork Little Muddy Creek and its aquatic life.	OMC2
Heat-Discharge System (Cooling System)	Potential of a chemical spill from the Heat Rejection System chemical injection system exists.	OCM10
5.3 Ecological Resources Impacts		
5.3.1 Terrestrial Resources	Transmission system operation could impact vegetation and wildlife habitat, which includes corridor maintenance and transmission line use, relative to terrestrial ecosystems.	OMC4, OMC11, OMC15, OMC16
	Avian mortality could occur as a result of collision with transmission lines.	OMC5

Table 5.12-1 Summary of Measures and Controls to Limit Adverse Impacts during Operation (Sheet 2 of 4)

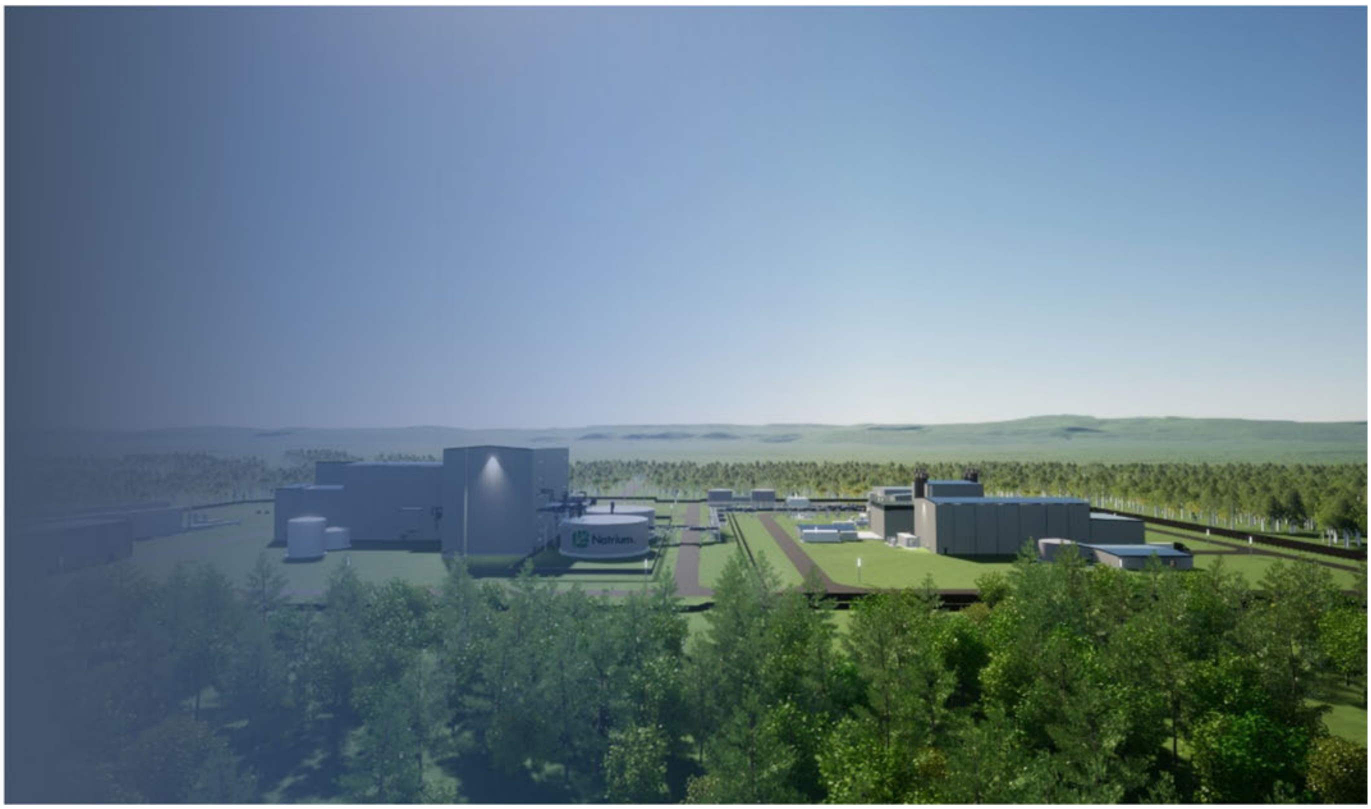
Impact	Adverse Impact Description or Activity	Specific Measures and Controls
5.3.2 Aquatic Resources	Discharges from the wastewater basin could create water quality impacts to North Fork Little Muddy Creek.	OMC2
	Spills of chemicals or petroleum products could create water quality impacts to surface water and groundwater.	OMC3, OMC9, OMC18
	Maintenance of transmission lines that lie at or near water bodies and wetlands could create water quality impacts and subsequent impacts to aquatic populations.	OMC4, OMC11, OMC16
5.4 Socioeconomics Impacts		
5.4.1 Physical Impacts	Visual impacts to landscape from buildings and structures, cooling tower plumes, nighttime lighting, and offsite transmission lines would occur.	OMC6
5.4.2 Demographic Impacts	A small operations-related population increase of the economic region could occur.	OMC13
5.4.4 Community Infrastructure Impacts Services	An impact to the housing market could occur and affect prices and rents.	OMC13
	Additional water demand due to operations-related population will slightly reduce the excess capacity of the public water systems in the economic region.	OMC13
	Impacts to local wastewater treatment systems could occur as the population would increase due to the in-migration of the operations-related workers and their families.	OMC13
	An impact to police and fire department services in the economic region could occur due to small increases in the ratio of persons-to-police and firefighters over preconstruction levels.	OMC13
	Medical services in Lincoln County could be impacted due to medical service needs of operations-related population but within capacity.	OMC13
	Schools will be impacted due to operations workforce increasing the student population.	OMC13
	Commuting operations and outage workforces and truck deliveries will increase traffic on local roads.	OMC19

Table 5.12-1 Summary of Measures and Controls to Limit Adverse Impacts during Operation (Sheet 3 of 4)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
5.5. Environmental Justice Impacts of Station Operation		
	No disproportionately high and adverse impacts to low-income and minority populations will occur due to operations.	N/A
5.6 Historic and Cultural Resources		
	Ground disturbances could occur during operations.	OMC6, OMC14
	Visual impacts to offsite historic resources could occur from the ability to see the structures and cooling tower plumes of Kemmerer Unit 1.	OMC16
5.7 Air Quality		
5.7.2 Air Quality Impacts	Standby Diesel Generator emissions will impact local air quality.	OMC20
5.8 Nonradiological Health Impacts		
5.8.1 Etiological Agents and Emerging Contaminants	Health impacts to members of the public and workers could result from contact with human disease-causing microorganisms in the cooling basin and at North Fork Little Muddy Creek from the blowdown and operation of the cooling tower.	OMC2, OMC8
5.8.3 Electric Shock Impacts	Impacts to members of the public resulting from the operation and maintenance of the transmission system may occur as an electric shock hazard.	OMC21
5.8.5 Occupational Health	Impacts to worker health are anticipated to occur due to occupational injuries and illnesses.	OCM7, OCM8
5.9 Radiological Impacts of Normal Operation		
5.9.1 Exposure Pathways	Release of radionuclides in gaseous effluents and exposure of humans to direct radiation.	OMC12, OMC22
5.9.2 Impacts to Members of the Public	Health impacts to members of the public could occur from exposure to radiological releases. Modeling using the design and operational parameters of Kemmerer Unit 1 results in estimated doses to the public that are within the design objectives of 10 CFR 50 Appendix I and within the regulatory limits of 40 CFR 190.	OMC22, OMC23
5.9.3 Impacts to Biota Other than Members of the Public	Impacts will occur to terrestrial and aquatic ecosystems from chronic radiation exposure of less than 100 millirads per day caused by small discharges of radioactive liquids and gases from the operation of Kemmerer Unit 1.	OMC22

Table 5.12-1 Summary of Measures and Controls to Limit Adverse Impacts during Operation
(Sheet 4 of 4)

Impact	Adverse Impact Description or Activity	Specific Measures and Controls
5.9.4 Occupational Radiation Doses	Health impacts to workers could occur from radiation exposure of the annual maximum collective dose.	OMC22
5.9.6 Solid Waste Management and Onsite Spent Fuel Storage	Generation of low-level radioactive wastes that will require disposal in a licensed radioactive waste disposal facility.	OMC17
5.10 Nonradioactive Waste System Impacts		
5.10.1.3 Mixed Waste	Generation of small amounts of mixed waste will occur.	OMC10
5.10.1 Impacts to Land	Nonradioactive wastes that will require disposal in permitted landfills will be genrated.	OMC17
5.10.2.3 Impacts to Waste Water and Stormwater Discharge	Impacts to the water quality of North Fork Little Muddy Creek could occur due to discharges from the wastewater basin.	OMC2
	Impacts to surface water quality could occur due to an increased volume of storm water resulting from new impervious surfaces.	OMC9, OMC18
5.10.3 Impacts to Air	Impacts to air quality could occur from emissions of auxiliary systems operated on an intermittent basis.	OMC20



Kemmerer Power Station Unit 1
ER, Chapter 6

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

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Chapter 6 Fuel Cycle, Transportation, and Decommissioning Impacts

The environmental impacts of the fuel cycle and the transportation of unirradiated and irradiated fuel and radioactive waste have been evaluated for the construction and operation of Kemmerer Unit 1. This chapter contains the following sections:

- Fuel-Cycle Impacts and Waste Management - Section 6.1
- Transportation of unirradiated and irradiated fuel and radioactive waste - Section 6.2
- Decommissioning - Section 6.3

6.1 Fuel-Cycle Impacts and Waste Management

6.1.1 Background

Table S-3 shall be included in the environmental report (ER) and may be supplemented by a discussion of the environmental significance of the data set forth in the table as weighted in the analysis for the proposed facility, according to 10 Code of Federal Regulations (CFR) 51.51, “Uranium Fuel Cycle Environmental Data-Table S-3.”

6.1.1.1 Natrium Fuel Characteristics

The Natrium reactor is a sodium-cooled fast reactor using High Assay Low-Enriched Uranium (HALEU) metallic fuel. Its initial core will include 162 fuel assemblies containing enriched uranium (U) -235 as fuel. The fuel employs a metal fuel system instead of oxides. As indicated in Table 6.1-1, the enrichment level of the fuel is up to [redacted] weight percent, and the burnup is in the range exhibited by Generation III+ light water reactor (LWR) designs and Power Reactor Innovative Small Module (greater than 33,000 megawatt-days/metric tons of uranium [MTU]). The fuel loading per cycle is provided in Table 6.1-2.

6.1.1.2 Fuel Cycle Phases

Although the enrichment and fuel form of the fuel (metallic) is different than the 10 CFR 51.51 Table S-3 1,000 megawatts-electric (MWe) reference reactor (uranium dioxide), the fissile material used (U-235), the need for enrichment of the fissile material, and the phases of the fuel cycle are essentially the same. Those phases are as follows:

1. Uranium recovery
2. Conversion (also referred to as uranium hexafluoride (UF_6) production)
3. Enrichment
4. Deconversion and metailization
5. Fuel fabrication
6. Reprocessing of irradiated fuel
7. Storage and disposal of wastes
8. Disposal of irradiated fuel

The information in this section supplements the information in 10 CFR 51.51 Table S-3. Table 6.1-1 provides Kemmerer Unit 1 reactor parameters. Table 6.1-2 provides the annual average uranium fuel requirement for the reactor. Table 6.1-4 shows the scaling factor of the Kemmerer Unit 1 against the model reactor addressed in Table S-3.

10 CFR 51.51 states that in developing Table S-3, the Nuclear Regulatory Commission (NRC) considered two fuel cycle options for the treatment of spent fuel removed from a reactor. The "no recycle" option treats all spent fuel as waste to be stored at a Federal waste repository (i.e., an open fuel cycle). WASH-1248, "Environmental Survey of the Uranium Fuel Cycle," addresses both a "no recycle" and a "uranium only recycle" option, which includes reprocessing spent fuel and returning it to the fuel cycle (i.e., a closed fuel cycle for uranium) (Reference 6.1-1). NUREG-0116, "Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," revisited the impacts from the reprocessing and radioactive waste management phases of the fuel cycle (Reference 6.1-15).

WASH-1248 includes technologies for the different phases that were common at the time of writing. These included the following:

- Open pit and underground mining
- Milling from ore using chemical and mechanical processes
- Conversion to UF_6 using hydrofluor and fluorination processes
- Enrichment of U-235 content using gaseous diffusion by which the gas molecules pass through a porous barrier to separate U-235 from U-238
- Fabrication into sintered pellets in Zircaloy or stainless-steel tubes

There have been a number of significant improvements in fuel cycle processes made available since WASH-1248 and NUREG-0116 were written that reduce the environmental impacts associated with the fuel cycle. These include the following:

- Use of in situ leach recovery (ISR) in lieu of strip and deep excavation mining
- Derivation of yellowcake at the ISR site eliminates the need for a separate milling facility
- Use of gaseous centrifuge versus gaseous diffusion as the process for enrichment

(Reference 6.1-27, Reference 6.1-31)

Other phases of the fuel cycle evaluated in WASH-1248 and NUREG-0116 have not undergone as significant changes to processes or assumptions, although some improvements may have been realized (e.g., treatment upgrades to support lower fluoride emissions at the Honeywell conversion plant, as identified in NUREG-2249, "Generic Environmental Impact Statement for Advanced Nuclear Reactors") (Reference 6.1-22, Section 3.14.2.2). These phases are as follows:

- Conversion
- Reprocessing of irradiated fuel
- Transportation of radioactive materials and management of low-level wastes and high-level wastes

Changes to the fuel cycle processes and practices from those identified in WASH-1248 and NUREG-0116 and the differences in the fuel cycles associated with the Natrium technology are considered in addressing the fuel cycle environmental impacts from Kemmerer Unit 1. Information from Draft NUREG-2249 and PNNL-29367, Rev. 1, “Non-LWR Fuel Cycle Environmental Data,” is considered in addressing the environmental impacts (Reference 6.1-6).

6.1.1.3 Methodology

In the recent past, LWR ERs have addressed the environmental impacts of the fuel cycle by scaling the impacts against those for the model reactor in WASH-1248 directly by considering the number of units, the power rating, and the capacity factor of the proposed unit(s). This was because the fuel form and requirements (e.g., enrichment) were very similar to the model reactor. In the case of the Natrium reactor, as previously stated, the fuel is metallic with a significantly higher enrichment and burnup. The latter two considerations lead to differences which affect the environmental impacts associated with enrichment.

The difference in environmental impacts from changes in annual fuel requirements is prominent during the enrichment phase, where it results in the identification of increased UF_6 feed requirements as well as increases in the separative work units (SWUs) (and associated electricity demand) required for the higher enrichment of the Natrium fuel (Reference 6.1-31). The annual fuel requirements (i.e., product in the enrichment phase) and enrichment are used to determine the UF_6 feed requirements (ultimately yellowcake requirements), which can be scaled against those associated with the model reactor to determine impacts. Impacts associated with electricity demands (water, fossil usage, and emissions) resulting from the enrichment process are scaled against the electricity requirements for the model reactor to determine their associated impacts.

As identified above, ISR has replaced strip and deep excavation, and the environmental impacts are significantly different. For the environmental impacts associated with uranium recovery, the guidance is provided in PNNL-29367 and is used to determine environmental impacts.

6.1.1.4 Changes in Fuel Cycle Processes

6.1.1.4.1 Uranium Recovery

Uranium recovery focuses on extracting natural uranium ore and concentrating (milling) that ore. The recovery operations produce “yellowcake,” which is transported to the next phase in the fuel cycle facility (Reference 6.1-27).

In some cases, the fuel cycle begins with mining the uranium; however, in others, the domestic impacts may begin downstream. According to the 2022 Uranium Marketing Annual Report, uranium market conditions resulted in most of the uranium purchased for use in United States (U.S.) commercial reactors being of foreign-origin, and thus, for the immediate future, mining and milling will likely be performed outside of the U.S., resulting in no environmental impacts within the U.S. (Reference 6.1-9).

Alternately, the source of uranium could be pre-existing, such as from a National Laboratory or Federal Agency. In these cases, many of the environmental impacts will have already been evaluated and realized; therefore, further evaluation of environmental impacts would not be required (Reference 6.1-6, 30). While the availability of pre-existing sources is likely, this evaluation includes all fuel cycle phases in evaluating the environmental impacts of the fuel cycle.

WASH-1248 identified deep underground mining and open pit mining as the two methods evaluated with open pit mining being the predominant method used (WASH-1248, A-1). However, since the time of publishing WASH-1248, other methods of mining have become options to conventional mining and milling. In the U.S., there are three methods for the extraction of uranium: conventional mining and milling (open pit or underground mine), heap leaching, and ISR (Reference 6.1-27).

For conventional mining and milling, the ore uranium is mined using deep underground shafts or shallow open pits and is transported to a mill where it is crushed and undergoes a chemical process to remove the uranium. The uranium is concentrated to produce uranium octoxide “yellowcake” (Reference 6.1-27).

Alternatively, uranium may be recovered from the ore using a heap leaching (or ion exchange) process. In this process, the ore is placed on an engineered barrier and sprayed with acid where it dissolves into a solution that is collected in the barrier. The solution undergoes additional processes under which yellowcake is produced (Reference 6.1-27). It is noted that although heap leaching (or ion exchange) processes have been used in the past, those facilities no longer operate and are being decommissioned. Thus, no further evaluation of this type of milling is performed (Reference 6.1-28).

The ISR method involves extracting minerals from the ground by dissolving them in a liquid (referred to as an “lixiviant”) and pumping that liquid to the surface. The uranium-containing solution undergoes additional chemical processing and concentration to produce yellowcake. Currently, ISR is the dominant method used to extract uranium in the United States. (Reference 6.1-27).

As indicated in Section 3.14.2.1 of NUREG-2249, the primary industrial hazards associated with uranium milling are the occupational hazards similarly found in any metal milling operation that uses chemical extraction, as well as the toxicity of uranium. The primary radiological hazard is attributed to the presence of radium in the waste materials (i.e., mill tailings). The use of ISR reduces environmental impacts related to mining and milling in the following ways: (1) it eliminates the impacts associated with the transportation of materials from the mine to the milling facility, (2) there is little surface disturbance, and (3) no mill tails or waste rock are generated in the process (Reference 6.1-30).

6.1.1.4.2 Conversion

After the uranium ore concentrate is mined or milled, the yellowcake is packaged in drums and sent to a uranium conversion plant. There, the yellowcake is processed and is then reacted with fluorine to create UF_6 (which is the form used as feed to the enrichment process). The process to convert uranium ore concentrate (uranium oxide) powder to UF_6 involves a number of volatile and soluble chemicals including fluorine, hydrofluoric acid, and uranyl fluoride. Similar to mining or milling, the primary risks associated with conversion are chemical and not radiological. These chemical forms contribute to risks associated with inhalation if a release occurred. In addition, the conversion process uses hydrogen gas, which is flammable (Reference 6.1-29).

The UF_6 exits the reaction process as a gas, which is then cooled to a liquid. It is then drained into storage and transport cylinders. The UF_6 continues to cool over the course of approximately five days, during which it transitions from a liquid to a solid. The cylinders, with UF_6 now in the solid form, are shipped to an enrichment plant (Reference 6.1-29).

One uranium conversion plant currently exists in the U.S., the Honeywell conversion facility, located in Metropolis, Illinois. The plant is in operational or idle-ready status (Reference 6.1-29). As indicated in the environmental assessment (EA) for the proposed license renewal of the Metropolis Works Uranium Conversion Facility, Honeywell completed upgrades to its facility to facilitate the removal of fluoride from the waste stream and to comply with new fluoride discharge limits (Reference 6.1-21, 2-27 and 2-28).

6.1.1.4.3 Enrichment

Once converted, the UF_6 is transported to a separate facility for uranium enrichment. Uranium found in nature consists largely of two isotopes, U-235 and U-238 (Reference 6.1-31). The Natrium technology uses U-235 for the fission reaction that produces heat delivered to the reactor coolant that is ultimately used to produce steam that drives the turbine generators and in turn produces electricity.

Natural uranium contains approximately 0.7 percent U-235 with the remaining approximately 99.3 percent primarily being U-238, which does not contribute directly to the fission process (For comparison, the Natrium reactor uses a maximum U-235 enrichment of [redacted] weight percent.) The enrichment process uses the slight difference in atomic weights, and thus mass, between U-235 and U-238. Large-scale enrichment schemes employ hundreds of identical stages in a cascading process to produce successively higher concentrations of U-235 until the desired enrichment is reached (Reference 6.1-31).

WASH-1248 evaluated the environmental impacts based on the use of the gaseous diffusion technology; however, three processes for enrichment have been used worldwide (Reference 6.1-24).

In the gaseous diffusion process, UF_6 gas is pumped via plant pipelines through porous membranes that allow the smaller UF_6 molecules containing U-235 to diffuse faster than those containing U-238. Hundreds of membranes in series are required to achieve even the enrichment needed for typical LWR nuclear fuel, such as that used reference reactor in WASH-1248. Once the desired level of enrichment is achieved, UF_6 gas is converted into a liquid and containerized. It is allowed to cool and solidify before it is transported to a fuel fabrication facility (Reference 6.1-24).

Two gaseous diffusion enrichment plants operated in the U.S.; Paducah in Paducah, Kentucky, and Portsmouth in Piketon, Ohio. Both plants were used for enrichment of uranium for commercial purposes but have been shut down and are in the process of decommissioning by U.S. Department of Energy. Therefore, gaseous diffusion is no longer a viable method for enrichment of uranium for use in fuel for Kemmerer Unit 1 (Reference 6.1-24).

In the gas centrifuge process, UF_6 gas is placed in a gas centrifuge cylinder and rotated at a high speed, which creates a strong centrifugal force that causes the heavier gas molecules (UF_6 containing U-238 atoms) to move towards the outside of the cylinder. The lighter gas molecules (containing U-234 and U-235) collect closer to the center. The resulting stream that is slightly enriched in U-235 is fed into the next centrifuge stage for further enrichment. The slightly depleted stream (with a lower concentration of U-235) is recycled back into the next lower stage. Centrifuge machines are interconnected (in series and parallel) to form cascades and trains. Similar to gaseous diffusion, the UF_6 gas is cooled to a liquid and then a solid for transport to a fuel fabrication facility (Reference 6.1-24, Reference 6.1-17). A higher degree of U-235 enrichment may be obtained from a single unit gas centrifuge than from a single unit gaseous diffusion barrier, and the separation factor available from a single centrifuge is about 1.05 to 1.2 as compared to 1.004 for a gaseous diffusion stage. However, the throughput rate of UF_6 that can be processed by a single centrifuge is very small compared to a gaseous diffusion stage (Reference 6.1-17).

Currently, two gas centrifuge commercial production plants are in operation. One is the URENCO USA facility licensed as Louisiana Energy Services, in Eunice, New Mexico (Reference 6.1-24). Centrus Energy received a license amendment in June of 2021 to enrich to up to 20 weight percent U-235 at its Piketon, Ohio, American Centrifuge Plant, and the plant began operations in 2023 (Reference 6.1-8).

In the laser separation process, molecules including U are excited by laser light, increasing the energy in the electrons of a specific isotope, changing its properties, and allowing it to be separated. The process entails using three major systems: the laser system, optical system, and separation module system. The light from these lasers can photo-ionize a specific isotopic species while not affecting others. Because the affected species is chemically changed, it can be separated. The laser separation technology developed by U.S. Department of Energy used a uranium metal alloy as its feed material, while the separation of isotopes by laser excitation method uses UF_6 as the feed material (Reference 6.1-24).

No laser separation uranium enrichment plants are currently operating in the United States. (Reference 6.1-24). The NRC approved a license amendment submitted by General Electric for a test loop of the technology; however, the license was terminated in 2021 (Reference 6.1-26).

Based on the information above, uranium enrichment technology to be used in the foreseeable future is gas centrifuge. As indicated previously, the enrichment technology assumed in WASH-1248 is gaseous diffusion.

The difference between the required weight percent enrichment of U-235 for the reference reactor in WASH-1248 versus Kemmerer Unit 1 does not allow for a direct comparison. Different weight percent enrichment results in differences in SWU required for the mass of product and the mass of feed material required, which influences the environmental impacts.

Per WASH-1248, SWU is a measure of the effort required to separate a quantity of uranium of a given assay (product) into two components, one having a higher percentage of U-235 (product) and one having a lower percentage of U-235 (tails). For all enrichment methods, SWU is the standard measure of the effort required to separate U-235 from U-238 (Reference 6.1-31).

The SWU required increases with the increased enrichment of the product. The following are examples of enrichment percentages and the resulting product amounts for an MTU of feed using the gas centrifuge process:

- 4% enrichment: 130 kilograms (kg) (290 pounds [lb]) of product at 6.25 SWU per kg (2.83 SWU per lb) of product
- 5% enrichment: 120 kg (260 lb) of product at 8.85 SWU per kg (4.01 SWU per lb) of product
- 20% enrichment: 26 kg (57 lb) of product at 45 SWU per kg (20 SWU per lb) of product
- 90% enrichment: 5.6 kg (12 lb) of product at 227 SWU per kg (103 SWU per lb) of product

(Reference 6.1-31)

Per Table S-3A of WASH-1248 and considering the revised environmental impacts identified in Table 2.10 of NUREG-0116, the enrichment step consumes approximately 97 percent of the electrical energy required by the fuel cycle. Electricity is used in the enrichment process, and the amount required is a function of SWU. The gaseous diffusion process consumes approximately 2,500 kilowatt-hours, whereas the gas centrifuge plant technology requires approximately 50 kilowatt-hours per SWU, which is significantly less electricity for the same amount of product (Reference 6.1-31).

6.1.1.4.4 Deconversion and Metallization

Before fabrication of HALEU metallic fuel, the enriched uranium must be converted to a metallic form. The U.S. Department of Energy has issued a draft HALEU Environmental Impact Statement that evaluates the potential environmental impacts from activities associated with DOE's Proposed Action, which is to acquire, through procurement from commercial sources, HALEU enriched to at least [redacted] and less than 20 weight percent uranium-235 over a 10-year period of performance, and to facilitate the establishment of commercial HALEU fuel production (Reference 6.1-32). Once final, an applicability review will be conducted at or before the operating license stage.

Given that the HALEU source for Kemmerer Unit 1 has yet to be confirmed, an approach to determining environmental impacts from HALEU metallic fuel is PNNL-29367, Rev. 1, which assumes that the initial source of uranium for a HALEU metallic fuel fast reactor would be materials from the EBR-II experimental reactor. For Kemmerer Unit 1, it is assumed the same source of uranium would be used. In this representative scenario, the environmental impacts associated with mining and milling, conversion, and enrichment would have already been realized and would not have to be considered (Reference 6.1-6, 30).

Idaho National Laboratory has produced an EA (Reference 6.1-5) for the use of U.S. Department of Energy-owned HALEU stored at Idaho National Laboratory. EA Section 4.1.2 discusses environmental impacts associated with normal operational activities for the facility, primarily focusing on dose and generation of low-level waste (LLW). However, Table 9 indicates that the non-radiological emissions would be minimal for operations. It is envisioned that each of the two facilities could process 2,500 kg (5500 lb) of feedstock for a total of 5,000 kg (11,000 lb) annually. The annual fuel requirement for the Natrium reactor is 2,780 kg (6130 lb) of the throughput of the facilities. Thus, the environmental impacts due to the Natrium fuel cycle would be 56 percent of the total production of the facilities.

EA Section 4.1.2.1 addresses the environmental impacts related to dose. For the pathways related to air emissions, the doses to the public and to workers from air exposure are well below their respective limits. Groundwater contamination from deposition of air emissions was also analyzed and the associated dose would be a small percentage of the 100 mrem per year dose limit. Finally, the surface soil pathway was analyzed and the sum of the fractions of all of the potential contaminants was less than one, thus concluding that the levels of contamination would not results in adverse human health impacts. Considering that the annual average fuel requirement of the Natrium reactor would represent 56 percent of the total production of the facilities, the attributable dose would be less than those indicated.

EA Section 4.1.2.2 addresses waste generation and management at the facility and indicates that the LLW expected to be generated annually is less than 20 cubic meters (700 cubic feet), which is an increase of less than 2.5 percent in the volume of LLW that is shipped off of the Idaho National Laboratory site annually. Considering that the annual average fuel requirement for the Natrium reactor would represent 56 percent of the total production of each facility, this would be an increase of only 1.4 percent in the volume of LLW shipped off site. Less than 1 cubic meter (35 cubic feet) of transuranic waste is expected to be generated by the facilities.

EA Section 4.1.2.3 addresses the estimation of radionuclide concentrations in surface soils, using a sum of fractions, for biological resources. The results of the analysis show that for each terrestrial animal that is a limiting specie, the sum soil concentration to Biota Concentration Guide ratios does not exceed one and that the limits would not be exceeded. Again, considering the annual average fuel requirement for the Natrium reactor would be 56 percent, the radionuclide concentration in soil attributable to the Natrium fuel cycle would be less.

6.1.1.4.5 Fuel Fabrication

Fuel fabrication to support operations at Kemmerer Unit 1 will occur at Global Nuclear Fuels - America, LLC’s (GNF-A) proposed Natrium Fuel Fabrication Facility (NFFF), adjacent to and within the contamination-controlled area of its current Wilmington, North Carolina, facility (Reference 6.1-3).

On March 6, 2023, GNF-A submitted an ER supplement for the NFFF. The ER supplement is based on prior environmental reviews associated with the renewal of the license for its existing Wilmington, North Carolina, fuel fabrication facility. The existing facility is authorized to process uranium with an enrichment of up to 5 weight percent U-235. The ER supplement and its conclusions constitute the environmental impacts assessment for the fuel fabrication portions of the fuel cycle for Kemmerer Unit 1. The NFFF will fabricate nuclear fuel at enrichments up to 20.0 weight percent U-235 and would produce metallic nuclear fuel assemblies to power the Natrium reactor. GNF-A anticipates that the processes and equipment to be used in the NFFF would be based on historical sodium fast reactor metal fuel production technologies developed at Idaho National Laboratory (Reference 6.1-4).

The throughput rate for the current fuel manufacturing facility at the site is approximately 1,200 MTU per year. The anticipated average fabrication throughput rate for the NFFF is estimated to be 18 MTU per year, which would be approximately a 1.5 percent increase over existing operations. GNF-A concluded that Natrium fuel production will not reduce any of the existing effluent streams at the site but would only add very small quantities to the existing streams (Reference 6.1-4).

The EA analysis demonstrated that the addition of the NFFF to provide fabrication of fuel with up to 20.0 weight percent U-235 would not change the scope or nature of the activity at the existing GNF-A facility at Wilmington, North Carolina, and the associated environmental impacts, considering the addition of the NFFF, would essentially be the same. The EA also concluded that there would be no significant changes in the types or significant increases in the amounts of effluents that could be released off site. The environmental impacts due to the fuel fabrication process are anticipated to be SMALL (Reference 6.1-4).

6.1.1.4.6 Reprocessing

The Nuclear Non-proliferation Act of 1978 effectively banned any reprocessing or recycling of spent fuel from United States commercial nuclear power. The ban on reprocessing spent fuel was lifted in 1981, but the combination of economics, uranium ore stockpiles, and nuclear industry stagnation provided little incentive for the industry to pursue reprocessing. The Energy Policy Act of 2005 authorized U.S. Department of Energy to research and develop proliferation-resistant fuel recycling and transmutation technologies that minimize environmental or public health and safety effects. Although Federal policy does not prohibit reprocessing, there are no commercial reprocessing facilities currently operating in the U.S. and no mature projects pursuing commercial spent fuel reprocessing or recycling in the U.S. (Reference 6.1-25).

SECY-21-0026, Discontinuation of Rulemaking-Spent Fuel Reprocessing, documents the NRC’s assessment that because there was only limited interest, the continuation of efforts for rulemaking necessary to license a reprocessing facility were not warranted and should be discontinued (Reference 6.1-23). As no progress has been made and (at least in the foreseeable feature) none will be made, it is anticipated that fuel cycle impacts of reprocessing resulting from Kemmerer Unit 1 are bounded by those identified in Table S-3A of WASH-1248 and Table 2.10 of NUREG-0116.

6.1.1.4.7 Waste Management

Radioactive waste resulting from the nuclear fuel cycle includes high-level waste and LLW (referred to as "other than high-level waste" in WASH-1248). High-level waste originates from spent fuel reprocessing during separation of the non-fissile material from fissile materials. LLW results from operations involving conversion, fuel fabrication, and fuel reprocessing. WASH-1248 acknowledges that determining the amount of waste is difficult to estimate; however, it provides an estimate of 14,000 cubic feet (400 cubic meters) for the total volume of LLW or, assuming no further compaction, 20,000 cubic feet (600 cubic meters) of packaged LLW (Reference 6.1-1, G-15).

The Natrium reactor's use of HALEU and metallic fuel does not allow for a direct comparison with the information for the model LWR in WASH-1248, NUREG-0116, and Table S-3. However, comparisons can be made based on the annual fuel requirement. Scaling of the impacts in Table S-3, WASH-1248 Table S-3A, and NUREG-0116 Table 2.10 is used to determine environmental impacts (with consideration of enrichment feed requirements). Where updated data is available, it can be used to supplement the discussions of environmental impacts.

6.1.2 Environmental Impacts

The environmental impacts of the current fuel cycle are expected to be bounded by those identified in WASH-1248 and NUREG-2249 based on improvements in technologies, processes, and reactor designs. These improvements include the following:

- Reduced reliance on coal for energy production (use of natural gas, nuclear, and renewables making up approximately 54 percent of the energy mix based on 2021 data) to support fuel cycle process electricity needs that results in reductions in carbon dioxide emissions
- More efficient use of nuclear fuels (i.e., increased burnup above the 33,000 megawatt-days or MTU assumed in WASH-1248) that results in less demand for material and thus impacts from mining and milling
- Increased use of ISR to reduce land, transportation of ore and tailings, and worker chemical and radiological exposure
- Upgrades in conversion facilities to meet more stringent fluoride discharge limits than those assumed in WASH-1248 (Reference 6.1-21)
- Use of gas centrifuge versus gaseous diffusion technology for enrichment leads to a reduction in the energy requirement for the process: 50 kilowatt-hours per SWU for gas centrifuge versus 2,500 kilowatt-hours per SWU for gaseous diffusion

6.1.2.1 Land Use

WASH-1248, Table S-3A, indicates that the largest use of land from the fuel cycle is attributed to mining. The land use requirements associated with the model mine are provided in Table 6.1-5. The model combined mine-mill (assumed to be an open pit mine) assumes that one-third of the total temporarily committed land and the remaining two-thirds are undisturbed.

The model mine and mill used in the evaluation is an open pit mine with a capacity of 1,600 metric (1,800 tons) of ore per day, which equals 960 metric (1,100 tons) of uranium octoxide per year. The annual capacity of the mine was sufficient to supply 5.3 model LWR annual fuel requirements. Accordingly, WASH-1248 determines the land use attributable to the model reactor, based on the yearly “use” of land (acreage divided by 10) and the fraction used by the model reactor (yearly “use” divided by 5.3) (Reference 6.1-1, A-1).

As indicated previously, the typical method of mining uranium has changed since the writing of WASH-1248, and the ISR is assumed to be the method by which uranium will be extracted for use in the Kemmerer Unit 1 fuel cycle. Because the process for uranium extraction is very different between the two methods, a scaling of impacts from those in WASH-1248 is not appropriate for determining the impacts from the Natrium fuel cycle. Thus, an evaluation, similar to that in WASH-1248, was performed for the Natrium fuel requirement for the mining and milling phase of the fuel cycle.

Section 4.1 of PNNL-29367, Rev. 1, provides an example for determining the impacts associated with land use for the Ludeman ISR Project (Reference 6.1-6). This example is used to determine land use impacts for the Natrium fuel cycle for Kemmerer Unit 1.

As indicated in the Pacific Northwest National Laboratory report, the Ludeman Project area is located on approximately 18,861 acres (7,632.8 hectares) of land, with a total potential land disturbance of 920 acres (370 hectares). Land within the proposed project area would be converted temporarily from its primary use as rangeland to use as an ISR facility, with facilities constructed and wellfields brought into production in a phased approach. At the end of ISR operations, final site reclamation would occur during decommissioning, and all lands would be returned to their current land use (i.e., no permanently committed land). The 12-year operations at Ludeman would result in production of 130,000 lb (59,000 kg) of yellowcake annually (Reference 6.1-6). The average yearly land use, based on a 12-year lifespan of the facility, is provided in Table 6.1-5.

Similar to the methodology in WASH-1248, an annual “use” of land is determined based on the disturbed or undisturbed acreage divided by the lifespan of the facility. The yearly amount of yellowcake required to support the annual fuel requirement (from Table 6.1-3) is compared to the annual production rate of yellowcake from the facility (130,000 lb [59,000 kg] per year) and the ratio applied to the annual “use” to determine the land use associated with the annual Natrium fuel cycle requirements (shown in Table 6.1-5).

Other fuel cycle phases are assumed to be similar enough that applying a ratio of the fuel requirement for UF_6 or the amount of enriched uranium to that for the model reactor (based on the model facility for each of the fuel cycle phases) provides representative results for land impacts due to the Natrium fuel cycle. Land use requirements associated with the full fuel cycle are provided in Table 6.1-6.

6.1.2.2 Water Use

Water is used as a coolant and in nuclear fuel cycle processes directly. Water impacts are identified for discharges to the air, surface water, and ground water in WASH-1248.

6.1.2.2.1 Water Use Associated with Power Generation

As indicated in WASH-1248, Table S-3A, the greatest use of water is for cooling the electric generating plant that is needed to supply energy requirements associated with the enrichment process. The electric generating plant is assumed to discharge to water bodies. As indicated in Section 6.1.1.3, the environmental impacts on water from power generation requirements for enrichment cannot be directly scaled from the power level and number of reactors proposed as has been done in the past. The differences in requirements for naturally enriched UF_6 and the amount of SWU required to reach the needed enrichment level for the Natrium fuel cycle are not proportional to those for the model LWR.

Approximately 116,000 kg (256,000 lb) SWU are required for the annual fuel requirements of the 1,000 MWe model plant with an energy consumption of 310 x 10^3 megawatt-hours (MWh). The associated water use is 11,006 million gallons (41,662 million liters) annually discharged to surface water bodies. As indicated in Table 6.1-3, approximately 125 MT SWU are needed to meet the annual fuel requirement for the Natrium reactor. This would require 313 x 10^3 MWh of electricity, assuming use of the gaseous diffusion technology, which was used to provide a direct comparison with the impacts identified in WASH-1248. This represents a factor of 1.01 of the energy consumption needed for the 1,000 MWe model plant (Table 6.1-4). The water use requirements associated with the enrichment phase of the Natrium fuel cycle would be approximately 11,116 million gallons (42,079 million liters) annually discharged to surface water bodies.

6.1.2.2.2 Water Discharged to Air and Ground

A small fraction of the total water use is related to the fuel cycle processes themselves. Per Table S-3A of WASH-1248 as modified by Table 2.10 of NUREG-0116, the total water discharges to the air is approximately 159 million gallons (602 million liters) annually, with approximately 94 percent from the milling and enrichment phases of the fuel cycle. The total water discharges to ground is approximately 164 million gallons (621 million liters) due to the mining phase of the fuel cycle.

With the exception of the mining and milling phases, water usage is determined by the fraction of the model reactor for the particular phase (in Table 6.1-4 and the information in Table S-3A of WASH-1248 and Table 2.10 of NUREG-0116). For the evaluation of the Natrium reactor annual fuel requirement for mining and milling, the use of ISR uranium recovery is assumed as strip and deep excavation mining techniques are no longer used. Water requirements are based on the water requirements for the Ludeman facility and the fraction of the production of the facility that would be attributable to the annual fuel requirement of the Natrium reactor. The results are given in Table 6.1-7.

6.1.2.3 Fossil Fuel Impacts

6.1.2.3.1 Direct and Indirect Consumption of Electric Energy

There are two types of consumptive uses of fossil fuel for electricity: indirect and direct. Indirect consumption of electricity is that which is attributed to operation of the equipment associated with different stages of the fuel cycle. It is assumed to be derived from coal in WASH-1248 and NUREG-0116. Direct consumption of fossil fuels is used for process heat. This was indicated as being the use of natural gas (but evaluated as an equivalent in electricity) in Table S-3 of WASH-1248.

6.1.2.3.2 Electricity Consumption

Per WASH-1248 and NUREG-0116, the greatest indirect consumer of electricity in the fuel cycle is the enrichment stage, requiring 310 x 10^3 MWh to support the annual fuel requirement for the model LWR, which represents approximately 97 percent of the consumption of electricity of the entire fuel cycle. The next greatest consumer of electricity is from reprocessing at 4 x 10^3 MWh (from NUREG-0116, Table 2.10), slightly greater than 1 percent of the amount of electricity used by the enrichment step.

Review of the information in WASH-1248 Table S-3A and NUREG-0116 Table 2.10 reveals that the primary users of direct electricity (shown as natural gas consumption) are milling, conversion, and reprocessing. Natural gas consumption for the fuel cycle is estimated to be 124 x 10^6 standard cubic feet (3.51 x 10^6 standard cubic meters) from Table 2.10 (updated from 92 x 10^6 standard cubic feet [2.6 x 10^6 standard cubic meters] in Table S-3A of WASH-1248). WASH-1248 indicated that the electric output equivalent of 92 x 10^6 standard cubic feet (2.6 x 10^6 standard cubic meters) of natural gas was approximately 9 x 10^3 MWh of electricity. Scaling to 124 x 10^6 standard cubic feet (3.51 x 10^6 standard cubic meters) from NUREG-0116 would represent approximately 12.2 x 10^3 MWh. Thus, direct energy consumption is small when compared to indirect energy consumption.

As indicated in Section 6.1.2.2.1, this would require [redacted] MWh of electricity, assuming use of the gaseous diffusion technology, for a direct comparison with the impacts identified in WASH-1248. This represents 1.01 times the energy consumption needed for the 1,000 MWe model plant. As indicated in Section 6.1.2, the use of gas centrifuge technology would represent a decrease in electricity consumption by a factor of 50 from that required by the gaseous diffusion process assumed in WASH-1248.

6.1.2.3.3 Estimates of Greenhouse Gas Emissions

In WASH-1248 and NUREG-0116, the energy requirements associated with enrichment are estimated to represent approximately 97 percent of that for the total fuel cycle. For purposes of these estimates, the energy requirements associated with enrichment are assumed to represent 97 percent of that for the total fuel cycle. Approximately [redacted] MWh are required to support the enrichment portion of the fuel cycle, and [redacted] MWh are required to support the total fuel cycle for the annual fuel requirement for Kemmerer Unit 1. These requirements are compared to the total amount of electric power generated in 2021 in the U.S. Table 6.1-8 provides the 2021 estimate of electricity generated in the U.S. and the fraction of that representing the requirements of the enrichment and total fuel cycle. Table 6.1-8 also includes the estimate of greenhouse gases (GHGs) (in carbon dioxide equivalents) produced by electricity generation in the U.S. in 2021. The estimated GHG emissions from the enrichment phase and total fuel cycle are estimated based on the fraction of the U.S. power generation represented by these electricity consumptions and the U.S. annual GHG emissions. Ohio carbon dioxide emissions from the energy sector are also included to be representative of the State housing the enrichment facility and Wyoming carbon dioxide emissions for comparison with the location of the plant site.

As previously discussed, the estimates of energy consumption are based on use of gaseous diffusion and coal-fired electricity generating units. Use of the gas centrifuge technology would result in a factor of 50 reduction in energy consumption and GHG emissions compared to that for the gaseous diffusion technology, and the current use of carbon-free energy sources would also serve to reduce the GHG emissions.

6.1.2.4 Chemical Effluents

6.1.2.4.1 Air Effluent

The chemical effluents to the air result from the energy generation to meet the energy consumption for the fuel cycle processes. As previously indicated, the enrichment process is the largest energy consumer in the fuel cycle process, requiring [redacted] MWh. According to the U.S. Energy Information Administration, the total U.S. electric generation for 2022 was 4.12 x 10^9 MWh (Reference 6.1-11, Table 4). The energy consumption associated with enrichment for the annual fuel requirement is very small when compared to the electricity generated in the U.S. annually. The gaseous and particulate chemical effluents is estimated to be proportional to that percentage of the gaseous and particulate chemical effluents generated annually, as shown in Table 6.1-9. Use of the gas centrifuge technology would result in a factor of 50 reduction in these emissions, based on a factor of 50 reduction in energy requirements.

6.1.2.4.2 Liquid Chemical Effluent

Liquid chemical effluent produced by the fuel cycle process is based on the information in Table S-3A of WASH-1248 and Table 2.10 of NUREG-0116 and the fraction of the Natrium reactor design relative to the model PWR. The results are given in Table 6.1-10.

6.1.2.4.3 Tailings Solutions and Solids Due to Milling

As indicated previously, uranium recovery is assumed to be via ISR and, as such, there are no tailings solutions and solids. Effluents associated with ISR are presented in Section 6.1.2.4.2.

6.1.2.5 Radioactive Effluent

Gaseous and liquid radioactive effluent resulting from fuel cycle operations are identified in 10 CFR 51.51, Table S-3. It is noted in the table that the health effects of radon-222 (Rn) and technetium-99 (Tc) were not addressed and were under consideration by the NRC. NUREG-1437, “Generic Environmental Impact Statement for License Renewal of Nuclear

Plants," was written to address the environmental impacts of continued operation of nuclear power plants beyond their original licensed life (i.e., license renewal). Included in Part 6 of Volume 1 of NUREG-1437 is an assessment of the 100-year dose commitment from the effluents identified in Table S-3 as well as a determination of doses due to Rn-222 and Tc-99. It is noted that the dose impacts from nuclear plant operations are identified in Section 5.9 and are not included in the dose estimates below.

NUREG-1437 estimated the total-body dose commitment from gaseous effluent, excluding the contribution from effluents from reactor operation or from Rn-222, to be 400 person-rem to the U.S. populations for each model reactor year (based on the information in Table S-3). Multiplying by a factor of 0.08 (from Table 6.1-4) accounts for the differences in the fuel cycle for the Natrium design and the model reactor. A dose commitment of 32 person-rem per year to the same population would result from gaseous effluents.

Similarly, NUREG-1437 estimated the total-body dose commitment from liquid effluent, excluding the contribution from effluents from reactor operation, to be 200 person-rem to the U.S. population for each model reactor year (based on the information in Table S-3). Accounting for the differences in the fuel cycle for the Natrium design and the model reactor, a dose commitment of 16 person-rem per year to the same population would result from liquid effluents.

The total 100-year dose commitment from liquid and gaseous effluent, excluding the contribution from reactor operations and Rn-222, would be the total of the dose commitment from gaseous effluent (32) plus that from liquid effluent (16) for a total of 48 person-rem per year.

As indicated previously, Rn-222 and Tc-99 were not included in WASH-1248, NUREG-0116, or Table S-3. NUREG-1437 indicates that Rn-222 is predominantly from mining and milling operations and from tailings. Tc-99 releases come from gaseous diffusion enrichment facilities.

NUREG-1437 attributes Rn-222 releases to mining, milling tailing, inactive tailing, and stabilized tails. The use of ISR is assumed; therefore, these sources of Rn-222 would not exist. Most of the radioactive effluents associated with uranium recovery using deep underground shafts or shallow open mining (orebody and tail pilings) remain underground with ISR (Reference 6.1-30). NUREG-1910, "Generic Environmental Impact Statement for In-Situ Leach Uranium Mining Facilities," indicates that measurements of downwind concentrations of radon at an operational ISR facility boundary were below 2.0 picocuries per liter, with a majority of measurements below 1 picocuries per liter (Reference 6.1-18, Section 4.2.11.2.1). In comparison, the average indoor Rn-222 concentration is 1.3 picocuries per liter (Reference 6.1-13).

The NRC considered the potential impacts associated with the release of Tc-99 in NUREG-1437, and Tc-99 comes predominantly from gaseous diffusion enrichment facilities. NUREG-1437 identified that the amount of release annually for the model reactor is 0.007 Curies from the reprocessing or recycled UF_6 and an additional 0.005 Curies that goes into groundwater at the Federal repository. Per NUREG-1437, the 100-year dose commitment based on these results is 100 person-rem per year. Considering the fraction of the impacts of the model reactor for annual operation of the Natrium reactor (0.08), the contribution would be 78 person-rem per year.

As indicated in the total-body, 100-year dose commitment for the total fuel cycle is obtained from the sum of the doses resulting from the gaseous and liquid effluent and is based on the values in Table S-3 (48 person-rem per year), from Rn-222 associated with milling (0 person-rem per year), from Rn-222 associated with tailings (0 person-rem per year), and from Tc-99 associated with the gas centrifuge process (8 person-rem per year), a total of 56 person-rem per year.

6.1.2.6 Radiological Wastes

6.1.2.6.1 LLW Solid Reactor Wastes

The total annual activity (in Curies) resulting from the operation of the plant is identified in Table 6.2-6 and is used in the analysis of the environmental impacts of transportation. The total annual activity contained in Kemmer Unit 1 radwaste is estimated to be 27.2 Curies. The total activity content from low-level radwastes identified in 10 CFR 51.51 Table S-3 is 9,100 Curies, which bounds the Kemmerer Unit 1 value.

6.1.2.6.2 Offsite Storage of Fuel

10 CFR 51.23(b) states that ERs described in 10 CFR Sections 51.50, 51.53, and 51.61 are not required to discuss the environmental impacts of spent nuclear fuel storage in a reactor facility storage pool or an interim spent fuel storage installation (ISFSI) for the period following the term of the reactor operating license, reactor combined license, or ISFSI license. The impact determinations in NUREG-2157 regarding continued storage are deemed incorporated into the environmental impact statements described in 10 CFR Sections 51.75, 51.80(b), 51.95, and 51.97(a).

The evaluation in NUREG-2157, "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel," (Reference 6.1-19, xxxi) is based on the following assumptions:

1. Institutional controls (in the form of regulations under 10 CFR Parts 71, Part 72, and Part 73) would remain in effect through the evaluated period and would provide the same level of control as currently exists.

2. Spent fuel would be removed from the spent fuel pool and placed in dry cask storage no later than 60 years after the end of the reactor's licensing life.

3. Spent fuel canisters and casks would be replaced approximately once every 100 years.

4. A Dry Transfer System would be built at the plant's ISFSI for fuel packaging.

5. The ISFSI and Dry Transfer System would be replaced approximately once every 100 years.

Although advanced nuclear reactors were not directly included in the evaluation documented in NUREG-2157, it is reasonable to assume that the conclusions made regarding the safe handling, storage, and management of spent fuel analyzed will apply to Kemmerer Unit 1. This is based on the validity of the assumptions that formed the basis of the analyses for the Natrium reactor and Kemmerer Unit 1.

Kemmerer Unit 1 would be subject to the regulations under 10 CFR Parts 71, 72, and 73. Spent fuel will remain in the spent fuel pool approximately 10 years, enough time for the decay heat to support loading in dry storage canisters. Thus, the need for the construction and use of an onsite ISFSI is already anticipated. Nothing specific to the Natrium technology is foreseen that would prevent the ability to complete removal of all spent fuel from the spent fuel pool and emplacement in dry cask storage within 60 years of the end of the reactor's life. Although not yet designed, structures and equipment will be made available for fuel packaging (Dry Transfer System) and continued on site storage similar to LWR sites. Finally, the evaluations included in Section 6.2 anticipate movements of spent fuel from the onsite ISFSI to a spent fuel repository for its final storage.

Based on the validity of the assumptions used in NUREG-2157, as applied to the Natrium reactor and the Kemmerer Unit 1 site, the same considerations and conclusions provided in NUREG-2157 (i.e., determination of a very low probably of an accident or a successful terrorist attack and associated determination of small environmental risk) would also apply to the continued storage of advanced nuclear reactor spent fuel.

6.1.2.7 Occupational Dose

The occupational dose associated with the reference reactor year (1,000 MWe LWR with an 80 percent capacity factor, used as the model reactor in WASH-1248 and NUREG-0116) is given to be 600 person-rem annually in NUREG-1437 (Vol 1, Part 6). Assuming the same number of workers are exposed, the total annual occupational dose of 600 person-rem would be scaled by the ratio of the fuel requirements of the Natrium fuel cycle to the model reactor (provided in Table 6.1-4), resulting in 48 person-rem.

6.1.2.8 Transportation Dose

Dose to the worker and the general public occur due to the transportation of radioactive materials between the facilities performing the various fuel cycle phases. The transportation dose to workers and the public is estimated in Table S-3 to be 2.5 person-rem per year for the reference reactor. This value reflects the information developed in NUREG-0116 (Table 4.35) for the uranium recycle only option. It considered exposure (person-rem) to both workers and the general public (onlookers and from the transportation of LLW, transuranics, and high-level waste). Doses to the worker and the general public from operation of the power reactor, itself, are analyzed in Section 6.2.

To account for the difference between the model reactor fuel cycle and that for the Natrium reactor, the scaling factor of 0.08 from Table 6.1-4 is applied to determine the adjusted radiological impacts to the assumed total exposed population (approximately 4.7 million people, from Table 4.35). This results a collective dose of 0.2 person-rem per year to the population identified in NUREG-0116.

The collective dose to the population within a 50-mile (80-kilometer) radius of the site is determined by scaling the collective dose from the population of 4.7 million people from NUREG-0116 to that for the population within 50 miles (80 kilometers) of Kemmerer Unit 1 (31,746 per Table 2.4-8 for year 2030). This results in a collective annual dose for the population within a 50-mile (80-kilometer) radius of 1.3 x 10^{-3} person-rem per year.

For comparative purposes, the estimated annual collective dose from natural background radiation (assumed to be approximately 0.300 rem) to the population within 50 miles (80 kilometers) of Kemmerer Unit 1 (31,746) is approximately 9,524 person-rem per year (Reference 6.1-14).

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Table 6.1-1 Kemmerer Unit 1 Reactor Parameters

Parameter	Value
Reactor Type	Sodium-Cooled Fast Reactor
Thermal Power Rating	840 megawatts thermal
Peak Electrical Power	500 megawatts electric
Type of fuel	Metallic Fuel
Fissile Material	Uranium-235
Enrichment (maximum) weight percent	[redacted]
Capacity Factor	92.50%

Table 6.1-2 Average Annual Uranium Fuel Requirements (Sheet 1 of 2)

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Information Withheld Under 10 CFR 2.390

Table 6.1-2 Average Annual Uranium Fuel Requirements (Sheet 2 of 2)

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Information Withheld Under 10 CFR 2.390

Table 6.1-3 Average Annual Uranium Recovery

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Assumes feed assay 0.711; rails assay =0.21	
[1] Uranium to Uranium Hexafluoride	1.48 From Reference 6.1-7
Enrichment rounded to 20 weight percent	
[2] Natural uranium metric tons per 29 metric tons product	1170 From Reference 6.1-31
[3] Separative Work Unit metric tons per metric tons product	45 From Reference 6.1-31
kilowatt-hours per Separative Work Unit-- Gaseous Diffusion	2500 From Reference 6.1-31
megawatt-hours per Separative Work Unit kilogram	2.5 From Reference 6.1-31
megawatt-hours per Separative Work Unit-- Gaseous Centrifuge	50 From Reference 6.1-31
Conversion (Yellowcake Requirements)	
megawatt-hours per Separative Work Unit-- Gaseous Centrifuge	0.05 From Reference 6.1-31
Weight of triuranium octoxide in pounds to produce to 1 pound of uranium in uranium hexafluoride	1.19 From Reference 6.1-7

Table 6.1-4 Fuel Requirement Scaling Factors

Characteristic	Lifetime Annual Average (Model Reactor)[1]	Lifetime Annual Average Natrium Reactor (Table 6.1-1 and Table 6.1-3)	Scaling Factor (Natrium to Model)
Weight Percent Uranium-235	3.2	[[	
Fuel Loading (Annual Average in metric tons of uranium)	35		
Enriched Uranium Hexafluoride (metric tons of uranium)	52		
Natural Uranium Hexafluoride (metric tons of uraniumfeed)	270		
Separative Work Unit (metric tons)	116		
Electrical Energy (Thousand megawatt-hours)	310		
Yellowcake (metric tons)	182		

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[1] From WASH-1248, Table S-1

[redacted] weight percent rounded to 20 weight percent for purposes of calculating SWU

Table 6.1-5 Fuel Cycle Mining and Milling Land Use to Support Annual Fuel Requirement

Land (acres)	NUREG-1248 [1] Model Reactor Impacts	Ludeman Annual	Kemmerer Unit 1 Fraction of Ludeman[2, 3]
Temporarily Committed	55	1572	[[
Undisturbed	38	1495	
Disturbed	17	77	
Permanently Committed	2	-	
Overburden Moved	2.7	[4]	]](a)(4)

1 Based on model mine: 3000-acre (1000-hectare) exclusion area, 1000-acre (400-hectare) disturbed area, 250-acre (100-hectare) overburden area, and a 10-year lifespan

2 Ludeman ISR Operation: 18,900-acre (7,650-hectare) project area, with 920-acre (370-hectare) disturbed area, and a 12-year lifespan of the facility (Reference 6.1-6)

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4 No overburden associated with ISR operation

Table 6.1-6 Fuel Cycle Land Use to Support Annual Fuel Requirement

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Table 6.1-7 Surface and Groundwater Use for the Annual Natrium Fuel Requirement (Millions of Gallons)

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]](a)(4)

Table 6.1-8 Estimates of GHG Emissions Related to the Annual Fuel Requirements for Kemmerer Unit 1

	U.S.	Kemmerer Unit 1 Enrichment Phase	Kemmerer Unit 1 Total Fuel Cycle
Annual Electricity Production[1] (megawatt-hours)	4.12×10^9	[[	
Annual Energy Requirement for Kemmerer Unit 1 (megawatt-hours)[2]	--		
Fraction of U.S. Annual Electricity Production	--		
U.S. 2021 Greenhouse Gas Emissions (million metric tons Carbon Dioxide Equivalent)[3] from Electric Power Generation	1603		
Estimated Kemmerer Unit 1 Greenhouse Gas Emissions (million metric tons Carbon Dioxide Equivalent) from Electricity Use for Annual Fuel Requirement	--		
Ohio 2021 Greenhouse Gas Emissions (million metric tons Carbon Dioxide)[4] from Electric Power Generation	69		
Wyoming 2021 Greenhouse Gas Emissions (million metric tons Carbon Dioxide)[5] from Electric Power Generation	36		]](a)(4)

1 Reference 6.1-11, Table 4

2 From Table 6.1-3

3 Reference 6.1-11, Table 3, U.S. emission rate: 857 lb/MWh

4 Reference 6.1-11, Table 3 Ohio emission rate: 1214.9 lb/MWh, Table 4 Generation: 1.26×10^8 MWh

5 Reference 6.1-11, Tables 3 Wyoming emission rate: 1847.4 lbs/MWh, Table Generation: 4.35×10^7 MWh

Enrichment phase is assumed to represent 97% of total electricity requirement

Table 6.1-9 Estimates of Principal Effluents Related to the Annual Fuel Requirements for Kemmerer Unit 1

	Total United States	Kemmerer Unit 1 Enrichment Phase[2]	Kemmerer Unit 1 Total Fuel Cycle[2]
Sulfur Dioxide[1] (in tons)	1.09×10^{6}	[[	
Nitrogen Oxides[1] (in tons)	1.03×10^{6}		
Particulates (Particulate Matter 2.5, in tons)[3]	1.02×10^{5}		]][(a)(4)]

1 Based on emission rates in Table 1 and U.S. Net Generation in Table 2 from Reference 6.1-11 (U.S Net Generation: 4.12 x 109 megawatt-hours)

Sulfur Dioxide total output rate (in pounds/megawatt-hour): 0.53

Nitrogen Oxides total output rate (in pounds/megawatt-hour): 0.50

Kemmerer Unit 1 Enrichment Energy Requirement from Table 6.1-4

2 Enrichment phase is assumed to represent 97% of total electricity requirement

3 2020 data (from Reference 6.1-12) based on U.S. Net Generation

Particulate $Matter_{2.5}$: 0.0495 pounds/megawatt-hour

Table 6.1-10 Liquid Chemical Effluent for the Annual Natrium Fuel Requirement

[[

]](a)(4)

Information Withheld Under 10 CFR 2.390

6.2 Transportation of Fuel and Wastes

Evaluating the environmental impacts of operating Kemmerer Unit 1 includes assessing the radiological and non-radiological impacts of transporting unirradiated fuel, irradiated fuel, and radioactive waste (radwaste). Under 10 Code of Federal Regulations (CFR) 51.50, the Kemmerer Unit 1 environmental report must address the requirements in 10 CFR 51.52.

Per 10 CFR 51.52, it must be demonstrated that the reactor and the transportation of fuel and radwaste to and from the reactor meet all of the conditions in 10 CFR 51.52(a), or the requirement in 10 CFR 51.52(b) must be met. As demonstrated below, all conditions in 10 CFR 51.52(a) are not met; therefore, the requirement in 10 CFR 51.52(b) must be met. Accordingly, the environmental report contains a full description and detailed analysis of the environmental effects of transporting fuel and wastes to and from the reactor to meet 10 CFR 51.52(b). Also included are the values determined by the analysis that represent the contribution of such effects to the environmental costs of licensing the reactor.

Discussed below are the required conditions delineated in 10 CFR 51.52(a) and the ability of Kemmerer Unit 1 to meet these conditions.

<u>Reactor Core Thermal Power</u>

The requirement in 10 CFR 51.52(a)(1) is that the reactor has a core thermal power not exceeding 3,800 megawatts-thermal.

Meets condition: Kemmerer Unit 1 has a core thermal power of 840 megawatts-thermal, which is within the 3,800 megawatts-thermal limit and meets the condition.

<u>Fuel Form</u>

Two of the requirements in 10 CFR 51.52(a)(2) are that the reactor fuel must be in the form of sintered uranium dioxide pellets and encapsulated in zircaloy rods.

Does not meet condition: The Natrium fuel is metallic, not sintered uranium dioxide pellets, and the cladding material is a steel alloy; thus, the condition is not met.

<u>Fuel Enrichment</u>

The remaining requirement of 10 CFR 51.52(a)(2) is that the fuel has a uranium-235 enrichment not exceeding 4% by weight.

Does not meet condition: The enrichment of the Natrium fuel varies, but the maximum is [redacted] percent by weight, which exceeds the 4 percent by weight limit. Thus, the condition is not met.

<u>Average Fuel Irradiation</u>

The first of two requirements in 10 CFR 51.52(a)(3) is that the average level of irradiation of the irradiated fuel from the reactor does not exceed 33,000 megawatt-days per metric ton of uranium.

Does not meet condition: Average burnup in the Natrium fuel is in the range of that exhibited in Generation III+ light water reactor designs and Power Reactor Innovative Small Module, which exceeds the 33,000 megawatt-days per metric ton of uranium limit; thus, the condition is not met.

Time After Discharge of Irradiated Fuel Before Shipment

The second requirement of 10 CFR 51.52(a)(3) is no irradiated fuel assembly is shipped until at least 90 days after it is discharged from the reactor. In addition, 10 CFR 961, Standard Contract for Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste (Appendix E, General Specifications), requires a minimum cooling time for fuel of 5 years for disposal.

Meets condition: Generally, fuel is cooled at least 5 years in the pool before being transferred to a cask for onsite storage (before transport off site for disposal), with a period of 3 years being the shortest allowed by the Nuclear Regulatory Commission and an industry average of 10 years. It is expected that storage and transportation casks will be similar to those currently licensed under 10 CFR Part 72. Irradiated assemblies at Kemmerer Unit 1 will be stored in the spent fuel pool until the decay heat is low enough to support economic loading of dry storage canisters. The decay time is anticipated to be approximately 10 years; thus, the condition to ship fuel after at least 90 days from discharge from the reactor is met.

Radwaste Packaging and Shipping

The requirement of 10 CFR 51.52(a)(4) is that, with the exception of irradiated fuel, all radioactive waste shipped from the reactor is packaged and in a solid form.

Meets condition: The types of solid radwaste generated at Kemmerer Unit 1 are expected to be similar to those generated by light water reactors, dry active waste (e.g., filters, personal protective equipment). Thus, it is reasonable to assume that radwaste from Kemmerer Unit 1 will also be shipped as packaged and in solid form; thus, the condition is met.

Transportation of Unirradiated Fuel

The first requirement of 10 CFR 51.52(a)(5) is that unirradiated fuel is shipped to the reactor by truck.

Meets condition: It is anticipated that the Kemmerer Unit 1 unirradiated fuel will be shipped by truck; thus, the condition to ship unirradiated fuel by truck is met.

Transportation of Irradiated Fuel

The second requirement of 10 CFR 51.52(a)(5) is that irradiated fuel is shipped from the reactor by truck, rail, or barge.

Meets condition: With the conceptual dry storage canister weight expected to exceed the truck transportation weight limit, it is anticipated that irradiated fuel at Kemmerer Unit 1 will be shipped by rail; thus, the condition to ship irradiated fuel by truck, rail, or barge is met.

Transportation of Radwaste

The third requirement of 10 CFR 51.52(a)(5) is that radioactive waste other than irradiated fuel is shipped from the reactor by truck or rail.

Meets condition: It is anticipated that radwaste from Kemmerer Unit 1 will be shipped by truck or rail; thus, the condition of shipping radwaste by truck or rail is met.

Table S-4 includes additional considerations used to determine the environmental impacts of transportation of fuel and wastes to and from the reactor for normal and accident conditions of transport. A comparison of those conditions to those expected for Kemmerer Unit 1 are the following:

Heat Generated

Table S-4 indicates that the heat per irradiated fuel cask in transit is 250,000 British thermal units per hour.

Meets condition: The anticipated average heat load for the Kemmerer Unit 1 irradiated fuel in the transit cask is estimated to be 32.3 kilowatts (110,000 British thermal units per hour), which is less than the limit of 250,000 British thermal units per hour; thus the condition is met.

Weight (governed by Federal or State restrictions)

Table S-4 indicates that the weight will be governed by Federal or State restrictions to 73,000 pounds (33,000 kilograms) per truck or 100 tons (90 metric tons) per cask per rail car.

Meets condition: Truck transport is anticipated to be used for shipments weighing less than 73,000 pounds (33,000 kilograms). Any shipment with a weight greater than 73,000 pounds (33,000 kilograms) will be via rail. Rail shipments will not exceed 100 tons (90 metric tons) per cask per rail car. Thus, the condition is met.

Traffic Density

Table S-4 indicates that truck traffic density is less than 1 per day for truck and 3 per month for rail.

Meets condition: The number of annual truck shipments for unirradiated fuel, irradiated fuel, and radwaste are 4.1, 12, and 75, which is less than the traffic density of 1 per day (or 365 shipments per year); thus, the limit is not exceeded, and the condition is met.

6.2.1 Components of a Full Description and Detailed Analysis

As indicated above, Kemmerer Unit 1 does not meet all of the conditions in 10 CFR 51.52(a), and, in accordance with 10 CFR 51.52(b), the environmental report must contain a full description and detailed analysis of the environmental effects of transportation of fuel and wastes to and from the reactor, including values for the environmental impacts under normal conditions of transport and for the environmental risks from accidents in transport.

According to RG 4.2, the analysis should include the following:

- Transportation of unirradiated fuel: radiological impacts associated with normal conditions and non-radiological impacts associated with accidents
- Transportation of irradiated fuel: radiological impacts associated with normal conditions and accidents and non-radiological impacts associated with accidents
- Transportation of radwaste: radiological impacts associated with normal conditions and non-radiological impacts associated with accidents

Note that accident conditions associated with unirradiated fuel and radwaste are not required to be evaluated for radiological impacts.

This section discusses the evaluation of the impacts from the transportation of fuel and waste to and from Kemmerer Unit 1 and, as required by RG 4.2, compares the consequences to those in Table S-4 of 10 CFR 51.52 for the reference reactor. It includes a discussion of the methodology, the input parameters, and the results of the analysis. As indicated in Section 9.3, two alternative sites were considered for Kemmerer Unit 1. The alternative sites are within 90 miles (145 kilometers) of the proposed Kemmerer Unit 1 Site. As this distance is a small fraction of the transport distances shown in Section 6.2.1.1 below, the results of this analysis are applicable to the alternative sites at Naughton 12 and Jim Bridger 22.

The transportation analysis for Kemmerer Unit 1 was performed using the Web-Based Transportation Routing Analysis Geographic Information System (WebTRAGIS) and Radioactive Material Transport Code (RADTRAN) Version 6.02.1 computer codes.

The WebTRAGIS model is a geographical information system tool for modeling transportation routing. It is deployed as a browser-based application, and the routing engine is located on a server at Oak Ridge National Laboratory. WebTRAGIS calculates routing using databases for highway, rail, and waterway infrastructures in the continental United States.

WebTRAGIS was used to develop a routing based upon the transportation of hazardous materials. WebTRAGIS also provides information on population densities for all transportation segments using the LandScan USA population distribution data model (Reference 6.2-5). WebTRAGIS was used to determine the exposed population within a half-mile band on either side of the route. The routing and population information from WebTRAGIS was input directly into RADTRAN.

RADTRAN was used to calculate the risks of transporting radiative materials. NRC-RADTRAN Version 1.0 (Reference 6.2-3) provides a graphical user interface for RADTRAN Version 6.02.1 (Reference 6.2-7). RADTRAN was used to determine doses to the population and the maximally exposed individual (MEI) from normal conditions and accidents during transportation.

Doses to transport workers and members of the public located along transportation routes were calculated based on the annual number of shipments for each type of material, as provided in Section 6.2.2. The input parameters used in RADTRAN to perform this analysis are provided in Table 6.2-1. Table 6.2-5 and Table 6.2-6 show the activities of irradiated fuel and radwaste.

Accident severity levels were taken from PNNL-29365, where Release Fraction Group 1 corresponds to the Natrium uranium metal fuel. Other assumptions that are not site-specific are based on NUREG/CR-6672 (Reference 6.2-9), NUREG-2125 (Reference 6.2-10), and DOE/EM/NTP/HB-01 (Reference 6.2-2), a Department of Energy handbook on transportation risk.

Table S-4 from 10 CFR 51.52(c) provides the environmental impact of transportation to and from the reference light water reactor and includes doses to transportation workers and members of the public located along the transportation route. In general, the doses provided in the table are based on calculations from WASH-1238 and are a function of shipping distance, dose rate, package contents, population density, shipping frequency, and accident frequency (Reference 6.2-1). The calculated results for Kemmerer Unit 1 are compared to those in Table S-4.

6.2.1.1 Radiological Impacts – Normal Conditions of Transport (Incident-Free)

Normal or "incident-free" doses are calculated based on the dose rate from the transportation package, the number of exposed individuals and their locations relative to the package, the exposure time (transit and stop times), and the number of annual shipments to which the individuals are exposed. Population doses are calculated for the following people:

- Transport crew workers
- People in other vehicles along the transport route
- People residing along the transport corridor
- People at vehicle stops for refueling and rest

Normal doses are also calculated to the following MEIs:

- Inspector at vehicle stop
- Worker at vehicle stop
- Resident along transport route

Normal Transportation of Unirradiated Fuel

WebTRAGIS was used to determine the route from the fuel fabrication facility supplying unirradiated fuel, Global Nuclear Fuels - Americas, LLC in Wilmington, North Carolina, to the Kemmerer Unit 1 Site (Reference 6.2-4). The distance from the Wilmington facility to the site is 2,131 miles (3,430 kilometers). Table 6.2-7 shows the doses to the population are within the limits of 10 CFR 51.52, Table S-4. Table 6.2-8 shows the doses to the MEI.

Normal Transportation of Irradiated Fuel

WebTRAGIS was used to determine the route between the Kemmerer Unit 1 site and a proposed geological repository at the Yucca Mountain site. The distance between the two points is 640 miles (1,030 kilometers). Table 6.2-7 shows the doses to the population are within the limits of 10 CFR 51.52, Table S-4. Table 6.2-8 shows the doses to the MEI.

Normal Transportation of Radwaste

WebTRAGIS was used to determine the route between the Kemmerer Unit 1 Site and the US Ecology low-level waste disposal site in Hanford, Washington. The US Ecology Hanford Site was selected as it is open to the Northwest Low-Level Compact of which Wyoming is a member (Reference 6.2-8 and Reference 6.2-11). The distance between the two points is 727 miles (1,170 kilometers). Table 6.2-7 shows the doses to the population are within the limits of 10 CFR 51.52, Table S-4. Table 6.2-8 shows the doses to the MEI.

6.2.1.2 Radiological Impacts – Accident Conditions of Transport

Accident dose risks are calculated based on the probability of an accident occurring and the postulated release fractions and respirable fractions by radionuclide group, based on the following exposure pathways:

- Cloudshine—external dose from passing plume
- Groundshine—external dose from plume activity deposited on the ground
- Inhalation—internal dose from inhalation of plume activity
- Resuspension—internal dose from resuspension of radioactive materials deposited on the ground

In addition to an accident that causes activity to be released, another scenario considered was loss of shielding where package lead shielding is degraded, resulting in higher direct gamma dose rates. However, NUREG/CR-6672 indicates that, for a given package, the dose due to a loss of shielding is bounded by that of an accident that releases activity. Hence, loss of shielding is not modeled.

RADTRAN was used to determine doses due to accidents involving shipments of irradiated fuel during transportation from the point of origin (Kemmerer Unit 1) to its disposal facility (Yucca Mountain). The resulting dose risk to the population is 5.6×10^{-6} person-rem per reference reactor year.

6.2.1.3 Non-Radiological Impacts of Transport

In addition to radiological impacts, non-radiological impacts due to transportation probabilities of occurrence of accident, injury, and fatality are calculated based on the event rates per unit distance and the round-trip distances for the transport of unirradiated fuel, irradiated fuel, and radwaste. Round-trip distances are used because a non-radiological event can occur even during the return trip despite no radioactive material being present. Table 6.2-9 shows the impacts to the population. Table 6.2-10 shows that the number of reference reactor years between occurrences of injuries and fatalities are greater than those in 10 CFR 51.52, Table S-4.

6.2.2 Number of Shipments and Normalization of Shipments

In order to perform the transportation analyses, the average number of annual shipments for unirradiated fuel, irradiated fuel, and radwaste must be determined.

The number of annual shipments at Kemmerer is normalized to the "reference reactor" and adjusted for the quantity limit per shipment:

- The number of shipments is scaled to the reference reactor at 880 megawatts-electric.
- Total number of shipments of unirradiated fuel is based on a 40-year plant life and is equal to the sum of the initial shipment and 39 annual reload shipments.
- The number of shipments of irradiated fuel is based on a shipment cask capacity of 0.5 metric tons of uranium per shipment.
- The number of shipments of radwaste is based on a shipment capacity of 2.34 cubic meters (82.6 cubic feet) per shipment.

Once the number of shipments in each category has been determined, it is scaled to the power level of the reference reactor to facilitate a direct comparison of the impacts with those presented in Table S-4. Dividing the reference reactor power of 880 megawatts-electric by the Natrium reactor's minimum power of 319 megawatts-electric and its capacity factor of 92.5 percent yields a normalization factor of approximately 3.0.

6.2.2.1 Number of Shipments of Unirradiated Fuel

Based on the initial core load and the subsequent reloads of Type 1 and Type 1B fuels, as shown in Table 6.2-1, the average annual shipment of unirradiated fuel over 40 years is approximately 27 assemblies. Global Nuclear Fuels - Americas, LLC estimates that a shipping container will accommodate two assemblies per package and 10 packages per shipment. This equates to an annual average of 1.4 shipments, which scales to 4.1 shipments when normalized to the power level of the reference reactor.

6.2.2.2 Number of Shipments of Irradiated fuel

The average annual shipment of irradiated fuel over 40 years is approximately 23 assemblies. Applying the RG 4.2 limit of 0.5 metric tons of uranium per shipment yields an annual average of 4.0 shipments, which scales to 12 shipments when normalized to the power level of the reference reactor.

6.2.2.3 Number of Shipments of Radwaste

The average annual shipment of radwaste over 40 years is 2,070 cubic feet (58.6 cubic meters). Applying the RG 4.2 limit of 2.34 cubic meters (82.6 cubic feet) per shipment yields an annual average of approximately 25 shipments, which scales to approximately 75 shipments when normalized to the power level of the reference reactor.

References

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Table 6.2-1 Kemmerer Unit 1 Parameters

Parameter	Kemmerer Unit 1 Value
Core Thermal Power	840 megawatts thermal
Fuel Assembly Description	Type 1: Metallic uranium alloyed, sodium-bonded slug fuel with 10% zirconium (uranium-10 zirconium) and shield slugs within pin with fission gas plenum Type 1B: Metallic uranium alloyed, mechanically bonded annular fuel with no zirconium (uranium-0 zirconium) and shield slugs within pin with fission gas plenum
Average Irradiation Level of Irradiated Fuel	Greater than 33,000 megawatt-days per metric ton of uraium
Spent Fuel Storage Capacity Onsite	540 assemblies
Minimum Time Between Removal from Reactor and Shipment	10 years
Radioactive Waste Treatment and Packaging	Packaged and in solid form
Unirradiated Fuel Transportation Packaging	Capacity: 2 assemblies per package, 10 packages per truck, with a size of approximately 227 inches by 29.5 inches by 30.7 inches
Irradiated Fuel Transportation Packaging	Capacity: 0.5 metric tons of uranium per shipment, with a size approximately 223 inch length by 75.5 inch diameter, weight 118,000 pounds per shipment
Radioactive Waste Transportation Packaging	Volume 82.6 cubic feet per shipment, container 55-gallon drum
Transportation Package Dose Rates at 1 meter	Unirradiated Fuel: 0.1 millirem/hour Irradiated Fuel: 14 millirem/hour Radwaste: 1 millirem/hour
Shipping Routes	Unirradiated Fuel: Wilmington, North Carolina, to Kemmerer, Wyoming Irradiated Fuel: Kemmerer, Wyoming, to Yucca Mountain, Nevada Radwaste: Kemmerer, Wyoming, to Hanford, Washington
Transport Modes	Unirradiated Fuel: Truck Irradiated Fuel: Rail Radwaste: Truck or Rail
Shipping Route Data	Table 6.2-2, Table 6.2-3, Table 6.2-4
Average Heat Load for Irradiated Fuel in Transit	Less than 32.3 kilowatts
Maximum Gross Vehicle Weight for Transport	Truck: 118,000 pounds Rail: Less than 100 tons

Table 6.2-2 Unirradiated Fuel Transport Routing Information

State/Classification	Distance (kilometers)	Population Density (people/square kilometer)
North Carolina/Rural	289.44	328.3
North Carolina/Suburban	280.01	7,395
North Carolina/Urban	16.2	13,387.6
Tennessee/Rural	268.93	158.7
Tennessee/Suburban	184.6	7,533.9
Tennessee/Urban	16.71	8,000.4
Kentucky/Rural	131.03	86.3
Kentucky/Suburban	18.76	1,544.2
Illinois/Rural	206.18	225.4
Illinois/Suburban	55.98	2,597.4
Illinois/Urban	1.04	1,361.3
Missouri/Rural	386.29	97.9
Missouri/Suburban	187.96	8,972.2
Missouri/Urban	33.07	22,454.7
Iowa/Rural	18.93	14.7
Iowa/Suburban	2.35	100.8
Nebraska/Rural	686.95	48.8
Nebraska/Suburban	31.65	2,932.8
Nebraska/Urban	4.44	3,839
Wyoming/Rural	564.32	96.6
Wyoming/Suburban	44.78	3,081.5
Wyoming/Urban	0.87	2,763.3

Table 6.2-3 Irradiated Fuel Transport Routing Information

State/Classification	Distance (kilometers)	Population Density (people/square kilometer)
Wyoming/Rural	79.32	4.6
Wyoming/Suburban	5.47	502.3
Utah/Rural	441.19	130.3
Utah/Suburban	129.87	6,658.5
Utah/Urban	39.18	14,620.5
Arizona/Rural	45.4	7.2
Arizona/Suburban	1.61	183.1
Nevada/Rural	229.52	17.5
Nevada/Suburban	26.99	4,858.1
Nevada/Urban	14.23	5,515.2

Table 6.2-4 Radwaste Transport Routing Information

State/Classification	Distance (kilometers)	Population Density (people/square kilometer)
Wyoming/Rural	79.32	4.6
Wyoming/Suburban	5.47	502.3
Utah/Rural	187.23	52.4
Utah/Suburban	52.48	1,294.9
Utah/Urban	0.24	1,313.4
Idaho/Rural	365.34	104.4
Idaho/Suburban	75.53	2,247.5
Idaho/Urban	2.33	4,617.8
Oregon/Rural	311.15	85
Oregon/Suburban	24.46	2,516.8
Oregon/Urban	0.21	1,330.6
Washington/Rural	47.51	28.5
Washington/Suburban	20.9	3,001.5
Washington/Urban	0.09	1,295.9

Table 6.2-5 Irradiated Fuel Activity at Shipment

	Activity/Assembly (Curies)	
Isotope	**Demo**	**Commercial**
Krypton-85	9.18×10^{2}	2.89×10^{2}
Cesium-134	1.78×10^{2}	3.54×10^{-2}
Cesium-137	1.29×10^{4}	1.88×10^{4}
Antimony-125	1.09×10^{2}	1.12×10^{-1}
Barium-137m	1.22×10^{4}	1.78×10^{4}
Strontium-90	1.05×10^{4}	1.27×10^{4}
Ruthenium-106	2.65×10^{1}	5.29×10^{-8}
Europium-152	1.31	4.43
Europium-154	9.22×10^{1}	5.35×10^{1}
Europium-155	1.98×10^{2}	9.55
Promethium-147	2.67×10^{3}	1.30
Samarium-151	3.46×10^{2}	7.65×10^{2}
Cerium-144	1.27×10^{1}	1.79×10^{-11}
Plutonium-238	8.28×10^{1}	8.79×10^{2}
Plutonium-239	1.54×10^{2}	3.89×10^{2}
Plutonium-240	2.07×10^{1}	1.54×10^{1}
Plutonium-241	1.52×10^{2}	5.76×10^{2}
Total	4.05×10^{4}	5.24×10^{4}
Mass (metric tons of uranium)	7.92×10^{-2}	8.55×10^{-2}
Decay (year)	10	40

Table 6.2-6 Radwaste Activity at Shipment

	Activity (Curies per year)	
Isotope	Demo	Commercial
Cesium-134	2.05	3.26
Cesium-137	7.01	1.10×10^{1}
Iodine-131	1.36×10^{-4}	1.93×10^{-4}
Iodine-132	5.21×10^{-5}	7.41×10^{-5}
Xenon-131m	1.00	9.33×10^{-1}
Xenon-133	1.72×10^{1}	1.60×10^{1}
Total	2.72×10^{1}	3.11×10^{1}
Volume (cubic feet)	2.07×10^{3}	2.07×10^{3}

Table 6.2-7 Radiological Impacts of Normal Transportation to Population

Transport Package	Normalized Average Annual Shipments	Dose (person-rem) per Reference Reactor Year		
		Transportation Workers	Public Onlookers	Residents Along Route
Unirradiated Fuel	4.1	2.9×10^{-2}	1.0×10^{-2}	1.1×10^{-2}
Irradiated Fuel	12	3.4	3.5×10^{-1}	5.1×10^{-1}
Radwaste	75	1.7	7.7×10^{-1}	1.4×10^{-1}
10 Code of Federal Regulations 51.52 Table S-4		4.0	3.0	3.0

Table 6.2-8 Radiological Impacts of Normal Transportation to MEI

Transport Package	Dose (rem) per Reference Reactor Year		
	Truck Inspector	Person at Truck Stop	Residents Along Route
Unirradiated Fuel	1.5×10^{-3}	2.6×10^{-5}	2.0×10^{-8}
Irradiated Fuel	6.8×10^{-1}	1.4×10^{-2}	1.1×10^{-5}
Radwaste	2.9×10^{-1}	5.5×10^{-3}	4.2×10^{-6}

Table 6.2-9 Non-Radiological Impacts of Transportation Accidents

Transport Package	Total Annual Distance (kilometers)	Impact per Reference Reactor Year		
		Accident	Injury	Fatality
Unirradiated fuel	2.78×10^{4}	1.0×10^{-2}	7.1×10^{-3}	3.4×10^{-4}
Irradiated Fuel	2.42×10^{4}	7.2×10^{-3}	5.4×10^{-3}	2.5×10^{-4}
Radwaste	1.75×10^{5}	5.7×10^{-2}	4.7×10^{-2}	1.3×10^{-3}

Table 6.2-10 Non-Radiological Transportation Impact Occurrence Rates

Transport Package	Reference Reactor-Years Between Events	
	Injury	Fatality
Unirradiated Fuel	1.4E+02	3.0E+03
Irradiated fuel	1.8E+02	4.0E+03
Radwaste	2.1E+01	7.8E+02
10 Code of Federal Regulations 51.52, Table S-4	1.0E+01	1.0E+02

6.3 Decommissioning

Decommissioning is the safe removal of a facility or site from service and termination of its license and the reduction of residual radioactivity below the levels set by regulation. The Nuclear Regulatory Commisison requires that a nuclear facility be decommissioned in accordance with Nuclear Regulatory Commission regulations within 60 years of the cessation of operations. The regulations for decommissioning are provided in 10 CFR 50.82. At the completion of decommissioning and after dose criteria are met, the facility operating license can be terminated.

10 CFR 20 Subpart E provides the dose criteria, which reflect the facility's intended end state (unrestricted or restricted use). Decommissioning under unrestricted release assumes that no institutional controls are needed to meet the 25-millirem per year total effective dose equivalent dose limit. Decommissioning under restricted release is the release of the property with institutional controls to maintain doses under prescribed limits.

The requirements that the licensee must meet to decommission a nuclear power facility are specified in 10 CFR 50.82:

- A certification that the licensee has decided to permanently cease operations and has submitted this documentation to the Nuclear Regulatory Commission within 30 days
- A certification that all fuel has been removed from the reactor
- A post-shutdown decommissioning activities report (PSDAR) within two years of the certification of the permanent cessation of operations
- A license termination plan (LTP) that provides the plan for decommissioning the plant and removing radioactivity to a level that meets regulation and that requests termination of the plant's operating license and which must be submitted at least two years before termination of the license date

In accordance with 10 CFR 50.82(a)(4), a PSDAR is required to be submitted within 2 years of the permanent cessation of plant operations. The PSDAR contains a description of the planned decommissioning activities along with a schedule for their accomplishment, a discussion that provides the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by previously issued General Environmental Impact Statement (GEIS), and a site-specific decommissioning cost estimate. Per 10 CFR 50.82(a)(6), licensees are prohibited from performing decommissioning activities that result in significant environmental impacts not previously reviewed under 10 CFR 50.82.

In addition to the evaluation required in the PSDAR, RG 1.179 indicates that the LTP must include a supplement to the plant's environmental report to accomplish the following:

- Describe the detailed environmental impacts of the site-specific termination activities
- Compare the impacts of the site-specific impact with previously analyzed decommissioning activities (e.g., in the Decommissioning GEIS, NUREG-0586 [Reference 6.3-2])
- Analyze the environmental impacts of the site-specific activities, including alternative actions and mitigating actions

As a detailed site-specific evaluation will be provided, in accordance with regulation, at the time of cessation of operations, this section addresses only general environmental impacts of decommissioning.

In addition to requirements related to the evaluation of environmental impacts, 10 CFR 50.75 requires a power reactor applicant or a holder of an operating license to provide reasonable assurance that adequate funds for performing decommissioning are available at the end of facility operations. Actions needed to meet these requirements will be undertaken in support of the operating license application.

6.3.1 Generic Environmental Impact Statement Scope

The scope of Supplement 1 of the Decommissioning GEIS addresses the decommissioning activities performed to remove radioactive materials from the plant from cessation of power operations until the license is terminated. With the exception of decommissioning planning, it does not include the activities performed before the cessation of operations.

The Decommissioning GEIS evaluated the environmental impact resulting from each of the three decommissioning methods:

<u>DECON</u>: The equipment, structures, and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license shortly after cessation of operations.

<u>SAFSTOR</u>: The facility is placed in a safe, stable condition and maintained in that state (safe storage) until it is subsequently decontaminated and dismantled to levels that permit license termination. During SAFSTOR, a facility is left intact, but the fuel is removed from the reactor vessel, and radioactive liquids have been drained from systems and components and processed. Radioactive decay occurs during the SAFSTOR period, which reduces the quantity of contaminated and radioactive material that must be disposed of during decontamination and dismantlement. The definition of SAFSTOR also includes the decontamination and dismantlement of the facility at the end of the storage period to complete decommissioning.

<u>ENTOMB</u>: Radioactive structures, systems, or components are encased in a structurally long-lived substance, such as concrete. The entombed structure is appropriately maintained, and continued surveillance is carried out until the radioactivity decays to a level that permits termination of the license.

All three options are available for the decommissioning of Kemmerer Unit 1. A decommissioning method has not been selected at this time; however, it is anticipated that license termination under unrestricted release will be sought. Decommissioning activities associated with the DECON options are considered to bound the other two options. SAFSTOR allows for decay of the radioactivity, which reduces doses related to decommissioning and demolition activities and the amount of low-level waste requiring disposal. ENTOMB allows structures (with engineering and institutional controls) to be left onsite, reducing the amount of low-level waste requiring disposal.

Activities and associated impacts considered in Supplement 1 of the Decommissioning GEIS, include the following (as they apply to the DECON alternative):

- Activities performed to remove the facility from service after the permanent cessation of operations
- Activities performed in support of radiological decommissioning, including decontamination and dismantlement of radioactive structures, systems, or components and any activities required to support the decontamination and dismantlement process
- Activities performed in support of dismantlement of non-radiological structures, systems, or components
- Activities performed to support license termination (e.g., surveys)
- Human health impacts from radiological and non-radiological decommissioning activities

The Decommissioning GEIS assessed the impact of light water reactors of varying sizes; however, it also assessed impacts from non-light water reactor decommissioning, including fast breeder reactors and high-temperature gas-cooled reactors. As indicated in Chapter 3 of the Decommissioning GEIS, Fermi Unit 1, a 200-MW thermal, sodium cooled fast breeder reactor, used sodium coolant in its primary and intermediate loops to generate steam provided to the turbine generators to produce electricity. The Natrium Reactor Plant employs a similar technology, fast reactor technology using sodium as a primary and intermediate coolant, but with a tertiary salt loop to generate steam provided to the turbine generators to produce electricity, as indicated in Chapter 3.

The Decommissioning GEIS indicates that previous or anticipated decommissioning activities for a fast breeder reactor are not expected to result in impacts different from those found at other nuclear facilities. Thus, the Decommissioning GEIS indicated that the environmental impacts identified were applicable to Fermi Unit 1 as well. Given the similarities between the fast breeder reactor and Natrium technology, it has been concluded that the types of decommissioning impacts described in the Decommissioning GEIS are also applicable to Kemmerer Unit 1.

As indicated in Table 6-1 of the Decommissioning GEIS, generally the impacts of decommissioning were considered to be small and generic; however, some site-specific issues were identified in the areas of Land Use, Ecology, Environmental Justice, and Cultural and Historic Resources. These impacts mostly relate to activities performed offsite or beyond the operational area. Generally, activities associated with decommissioning are similar to those associated with construction; therefore, it is anticipated that the impacts from decommissioning will be similar to those from construction, as addressed in Chapter 4. However, these will be evaluated in more detail (and with up-to-date information) in the PSDAR and the LTP.

6.3.2 Decommissioning Funding Certification

The certification required by 10 CFR 50.33(k)(1) will be provided in the operating license application.

6.3.3 Air Quality Impacts and Greenhouse Gases

The equipment and vehicles used during decommissioning will be similar to those used during construction and will emit greenhouse gases (GHGs), principally carbon dioxide. RG 4.2 refers to ISG COL/ESP-ISG-026, Attachment 1, for guidance on determining impacts due to GHGs , based upon a 1,000-megawatt-electric plant (Reference 6.3-1). Table A-1 identifies the GHG emissions associated with equipment used in preconstruction, construction, and decommissioning, and it is anticipated that the equipment used in decommissioning will be similar. Table A-2 identifies the GHG emissions associated with the workforce. Table A-3 provides GHG emissions over the life of the plant (including decommissioning).

As indicated in Section 4.7, the GHG impacts from the construction of Kemmerer Unit 1 will be bounded by those indicated in the Interim Staff Guidance. Similarly, there are no activities that will alter the relative numbers of the decommissioning workers to construction workers identified in the Interim Staff Guidance. Therefore, GHG emissions attributed to Kemmerer Unit 1 decommissioning will also be bounded by those identified in ISG COL/ESP-ISG-026.

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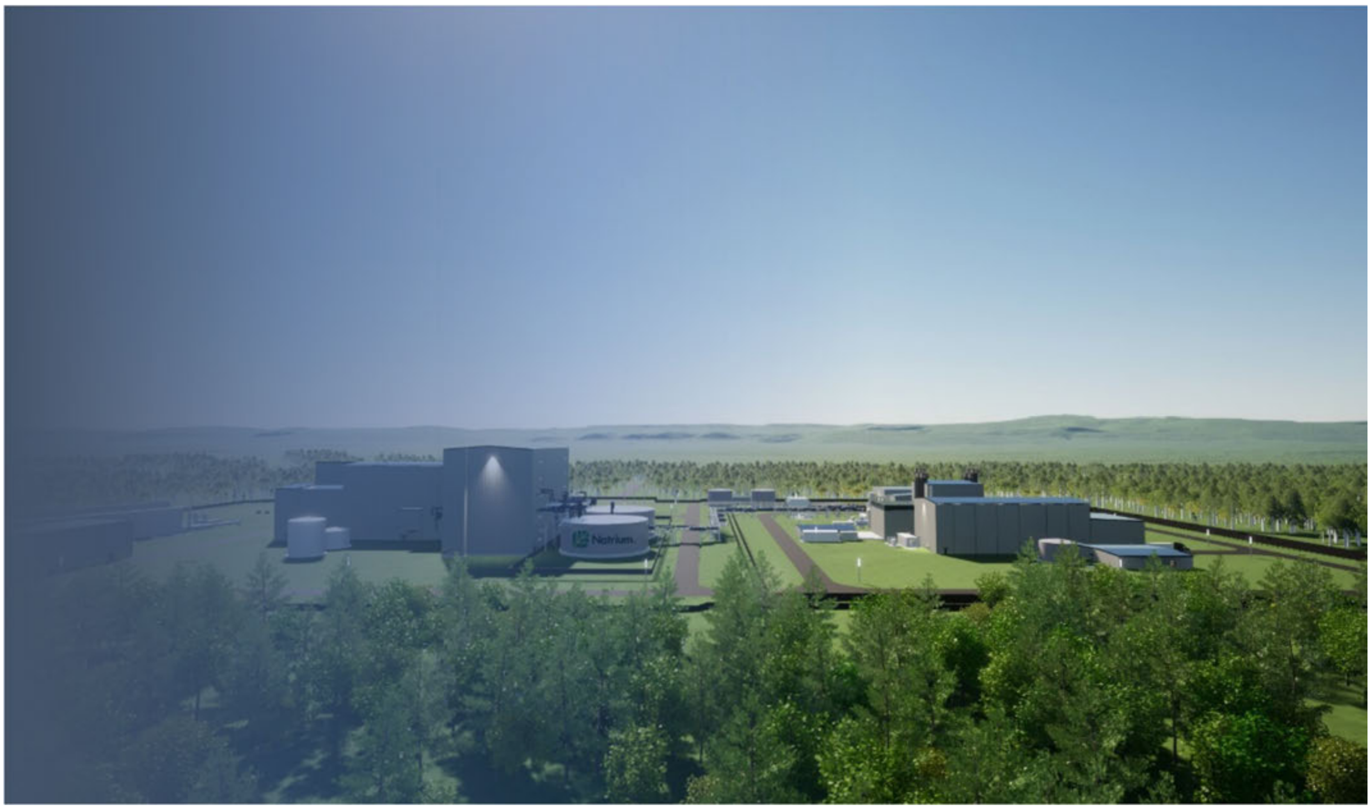

Kemmerer Power Station Unit 1
ER, Chapter 7

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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Chapter 7 Cumulative Impacts

Cumulative impacts of past, present, and reasonably foreseeable future actions in the geographic areas of interest for various impacted resources are described in this chapter. Table 7.0-1 presents the impacted areas which were considered for each of the resources.

The chapter contains the following sections:

- Past, Present, and Reasonably Foreseeable Future Activities – Section 7.1
- Impact Assessment – Section 7.2

The impacts of the building activities and operation of Kemmerer Unit 1, as described in Chapters 4 and 5, are combined with other past, present, and reasonably foreseeable future actions in the region that could affect the same resources, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. The cumulative impacts discussed in this chapter are those expected to overlap with the impacts of the building activities and operation of Kemmerer Unit 1 due to timing and geographic area. Not all the impacts of the activities and operation of Kemmerer Unit 1 will be cumulative with other past, present, and reasonably foreseeable actions. In addition, the impacts of the building activities are based on existing environmental conditions, so the impact analyses have already accounted for past and present actions.

To identify potential projects that could contribute to cumulative impacts, a search was conducted for Federal, non-Federal, and private actions within the resource impact areas of Kemmerer Unit 1 that had applied for an Industrial Siting Permit from the Wyoming Department of Environmental Quality or had completed an environmental assessment or environmental impact statement. This was accomplished by searching Federal (e.g., Bureau of Land Management National Environmental Policy Act Register), State (e.g., Wyoming Department of Environmental Quality Industrial Siting Division, Wyoming Department of Transportation), and local websites. The list was refined to projects that were within the resource areas identified in Table 7.0-1, then within the required time frame of building activities or operation of Kemmerer Unit 1. Projects in the vicinity of Kemmerer Unit 1 were also included (i.e., Sodium Test and Fill Facility, US 189 intersection, conversion of Units 1 and 2 of Naughton Power Plant). The search did not find anticipated regional changes not associated with an individual project that could result in cumulative impacts during building activities and operation of Kemmerer Unit 1.

Table 7.0-1 Resource Impact Area by Specific Resource (Sheet 1 of 2)

Resource	Resource Impact Area
Land Use	Kemmerer Unit1 Site; water, transmission and co-located macro-corridors; and vicinity
Water Use and Quality	Surface Water Source: • Viva Naughton Reservoir • Hams Fork River • North Fork Little Muddy Creek Groundwater: • Kemmerer Unit1 Site
Terrestrial Ecology	Kemmerer Unit1 Site; water, transmission, and co-located macro-corridors; and vicinity
Aquatic Ecology	Hams Fork River North Fork Little Muddy Creek
Socioeconomics and Environmental Justice	Demographic Region (50-mile [80-kilometer] radius) Economic Region (three-county region for construction; two-county region for operation)
Historic and Cultural Resources	Direct Area of Potential Effect Indirect Area of Potential Effect (5-mile [8-kilometer] radius)
Air Resources	Kemmerer Unit1 Site Lincoln County
Nonradiological Health	Etiological Agents and Emerging Contaminants • North Fork Little Muddy Creek Public and Occupational Health: • Workforce Noise: • Kemmerer Unit 1 Site • Nearest Resident • Noise Sensitive Receptors Transportation: • Workforce and Transportation Infrastructure Electromagnetic Fields and Electric Shock: • Kemmerer Unit 1 Site and transmission corridor and co-located macro-corridors Water Resources: • North Fork Little Muddy Creek
Radiological Health	Area that has the potential to increase radiological exposure at any location within a 50-mile (80-kilometer) radius of Kemmerer Unit 1

Table 7.0-1 Resource Impact Area by Specific Resource (Sheet 2 of 2)

Resource	Resource Impact Area
Postulated Accidents	Area that has the potential to increase risks at any location within a 50-mile (80-kilometer) radius of Kemmerer Unit 1
Fuel Cycle, Transportation, and Decommissioning	Fuel Cycle: • Nationwide Transportation: • Nationwide Decommissioning: • Within a 50-mile radius of Kemmerer Unit 1 for socioeconomics • Nationwide for radioactive waste disposal

7.1 Past, Present, and Reasonably Foreseeable Future Projects

Table 7.1-1 identifies projects in the region surrounding the Kemmerer Unit 1 Site. The locations of these projects are shown in Figure 7.1-1. Each project was considered for cumulative impacts as they relate to the geographical area associated with each resource (Table 7.0-1).

Proposed projects by Glenrock Energy and Kanata Clean Power, and Trisight, LLC that will use coal from Kemmerer Mine, which is currently used as fuel by Naughton Power Plant, have been considered. The proposed Glenrock Energy and Kanata Clean Power facility, known as Kemmerer Decarbonization Works, will convert coal into a gas, refine that gas into hydrogen, and add nitrogen to make ammonia while capturing the carbon emitted in the process and storing it underground (Reference 7.1-3). TriSight plans to produce fertilizer and beauty products from Kemmerer Mine coal. Any cumulative impacts due to the proposed Kemmerer Decarbonization Project and TriSight facility could not be estimated because of the lack of information available in the public domain.

The Sodium Test and Fill Facility (TFF) is a non-nuclear testing facility located on a parcel of approximately 35 acres (14 hectares) that is owned by TerraPower, LLC directly north of Kemmerer Unit 1. The TFF parcel includes approximately 17.5 acres (7 hectares) designated for construction of the TFF and 14.5 acres (5.9 hectares) to be used temporarily for construction staging and laydown. The remaining land will be largely undisturbed, except for utility poles to bring power from the existing electrical distribution line in the adjoining US 189 right of way to the TFF. The TFF will be used to support Kemmerer Unit 1 and the liquid sodium reactor industry. Construction of the TFF is planned to begin in 2024. The construction phase will include a peak workforce of approximately 120 to 150 people and is estimated to take roughly 29 to 35 months to complete. The TFF is expected to operate for 20 years with a workforce of 20 to 30 people (Reference 7.1-5). Construction of the TFF will partially coincide with building activities for Kemmerer Unit 1 but is not anticipated to overlap with the peak workforce.

Units 1 and 2 of Naughton Power Plant will be converted from coal to natural gas. PacifiCorp plans to complete the coal-to-gas conversion by 2026 and requires a workforce of approximately 450 people over a 90-day outage. Units 1 and 2, as well as Unit 3, which was converted to natural gas in 2019, are expected to continue operating through 2036 (Reference 7.1-12). The Naughton Power Plant electric distribution and water supply systems will serve both Naughton and Kemmerer Unit 1 during the period of overlapping operations.

There are planned renewable energy facilities in the region:

- Lincoln Solar I is a planned photovoltaic solar facility located approximately 8 miles (13 kilometers) south of the Town of Cokeville in Lincoln County. Construction activities were anticipated to begin in June of 2022 and continue through December 2023. It was anticipated that the site will be fully operational by October 2023. The estimated construction workforce ranges from 26 at the beginning of construction to 175 approximately a year later and will average approximately 102 workers (Reference 7.1-2).

- Uinta Wind is a proposed wind farm located in northwest Uinta County. In 2022, Uinta Wind revised its plans and currently proposes to construct and operate up to 35 wind turbines capable of generating up to 120 megawatts of wind energy on 16 sections of land (Reference 7.1-9). Construction is expected to begin by the fourth quarter of 2024 (Reference 7.1-8). Construction is anticipated to peak at 141 workers and the long-term operation workforce is anticipated to consist of approximately 7 people (Reference 7.1-9).

PacifiCorp plans to complete Subsegment D3 of the Energy Gateway West transmission project. The proposed Subsegment D3 is a new 200-mile long (322-kilometer), 500 kV transmission line and associated infrastructure running from the new Anticline substation near Jim Bridger Power Plant in central Wyoming to the existing Populus substation near Downey in southeastern Idaho. The new transmission line right of way will traverse Lincoln County to the north of the City of Kemmerer. The transmission line is scheduled to come online in 2028 (Reference 7.1-12).

The ExxonMobil LaBarge Carbon Capture Project includes:

- Additions to the Shute Creek Gas Plant,
- Additions to the CO_2 Sales Facility,
- Construction of a CO_2 disposal well, and
- Construction of a non-jurisdictional 9-mile (14-kilometer) CO_2 pipeline.

The Shute Creek Gas Plant and CO_2 Sales Facility are on ExxonMobil property, and the carbon dioxide (CO_2) disposal well and pipeline will be located on Bureau of Land Management-owned property. The Shute Creek Gas Plant is approximately 33 miles (53 kilometers) northeast of Kemmerer. The CO_2 Sales Facility is located just east of the Shute Creek Gas Plant in northwest Sweetwater County. The primary access to the project from the east will be via I-80, north on WY 372, west on Ranch Road 4-86, and southwest on CR 340 to the Shute Creek Facility. Access from the west will be via I-80, north on US 189 (passing the Kemmerer Unit 1 Site), then east on US 30, north on WY 240, and east on CR 340. ExxonMobil evaluated the potential use of buses, primarily for peak construction months, to transport construction workers to temporary housing locations in Green River, Rock Springs, or Kemmerer (Reference 7.1-6). Construction is planned for August 2022 through December 2024, commissioning and startup activities from December 2024 to April 2025, and commercial operation commencing in July 2025 (Reference 7.1-7).

There are planned soda ash facilities in the Green River Basin. Two projects were identified for potential cumulative impacts:

- Ciner proposes to construct a new refinery unit (Unit 8) and associated facilities to produce soda ash at its Big Island Mine and Refinery facility. The Ciner facility is located off of WY 372, approximately 22 miles (35 kilometers) north of Green River, in

Sweetwater County. The peak number of construction workers anticipated is 560, 85 percent of which Ciner anticipates will be hired from outside the region. Ciner will hire up to 71 additional staff to operate and maintain the project. (Reference 7.1-4)

- Pacific Soda proposes to employ solution mining technologies to mine trona beds 2,300 feet (700 meters) below the surface. The proposed Dry Creek Trona Mine project area is located south of I–80 and west of WY 530, approximately 20 miles (32 kilometers) southwest of the city of Green River in Sweetwater County. The proposed mine is in the known sodium leasing area, a geologic designation in the Green River Basin where developable trona deposits are known to occur. The estimated number of workers for construction is 2,772 at the peak, assuming 95 percent of workers will be employed from outside the region. The estimated number of employees needed for operation is 540. An Industrial Siting Permit application was anticipated in the 4th quarter of 2023; however, no public record of the applion could be found.

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Table 7.1-1 Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Analysis (Sheet 1 of 4)

Project Name	Summary of Project	Location Relative to Kemmerer Unit 1	Status
Nuclear Industry Projects			
Sodium Test and Fill Facility	The TFF will further the design of the Natrium reactor and associated technologies. The mission of the TFF is two-fold: to test the readiness of various equipment in a simulated condition that will be expected during normal operation of the plant and to precondition and temporarily store sodium required to fill the Kemmerer Unit 1 reactor and its auxiliary systems before start-up.	Adjacent N	The proposed facility will be constructed from 2024 through 2026.
Other Energy Projects			
Naughton Power Plant	Units 1 and 2 coal-to-natural gas conversion in 2026, extended operation through 2036 (Reference 7.1-12).	3.8 miles NW	Retrofit from coal to natural gas in 1st quarter of 2026. Extended operation through 2036.
Lincoln Solar 1	80 megawatt alternating current solar project with a direct current-coupled 50 megawatt energy storage system	28.1 miles NW	Operational in 2023.
Uinta Wind	120 megawatt wind farm consisting of up to 35 wind turbines located within 16 sections of land. The site plan includes three sections of public land managed by the Bureau of Land Management. Project site includes approximately 27,907 acres in Uinta County (mostly in T17, R119W)	24.3 miles SW	Construction to start in 4th quarter of 2024. Operation to begin by end of 2026.

Table 7.1-1 Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Analysis (Sheet 2 of 4)

Project Name	Summary of Project	Location Relative to Kemmerer Unit 1	Status
Transmission Projects			
Gateway West Transmission Project Segment 4-WY, Anticline to Wyoming/Idaho (i.e., Subsegment D3) (Reference 7.1-1)	200-mile, high voltage 500 kV transmission line from Anticline substation in central Wyoming to the Populus substation in southeastern Idaho	Direction and distance varies along the route	Scheduled to be placed in service in 2028 (Reference 7.1-12)
Mining Projects			
None			
Transportation Projects			
WYDOT US 189 Intersection	Construction of new US 189 intersection to access the Kemmerer Unit 1 site		Construction of site access to be completed in 4th quarter of 2024
Kemmerer Wildlife Crossing Project	Construction of one overpass, eight underpasses, and fencing improvement along US 189. There is insufficient detail to evaluate for cumulative effects.	Along US 189 between the Kemmerer Unit 1 Site and Evanston.	Completed over two to three construction seasons beginning in 2024 (Reference 7.1-14)
US 30 realignment (Reference 7.1-15)	2.72-mile realignment of US 30 from Sage Creek to Kemmerer planned for fiscal year 2025.		Planned for Fiscal Year 2025
I-80 bridge replacement (Reference 7.1-15)	Bridge replacement along I-80 west of Lyman		Planned for Fiscal Year 2028

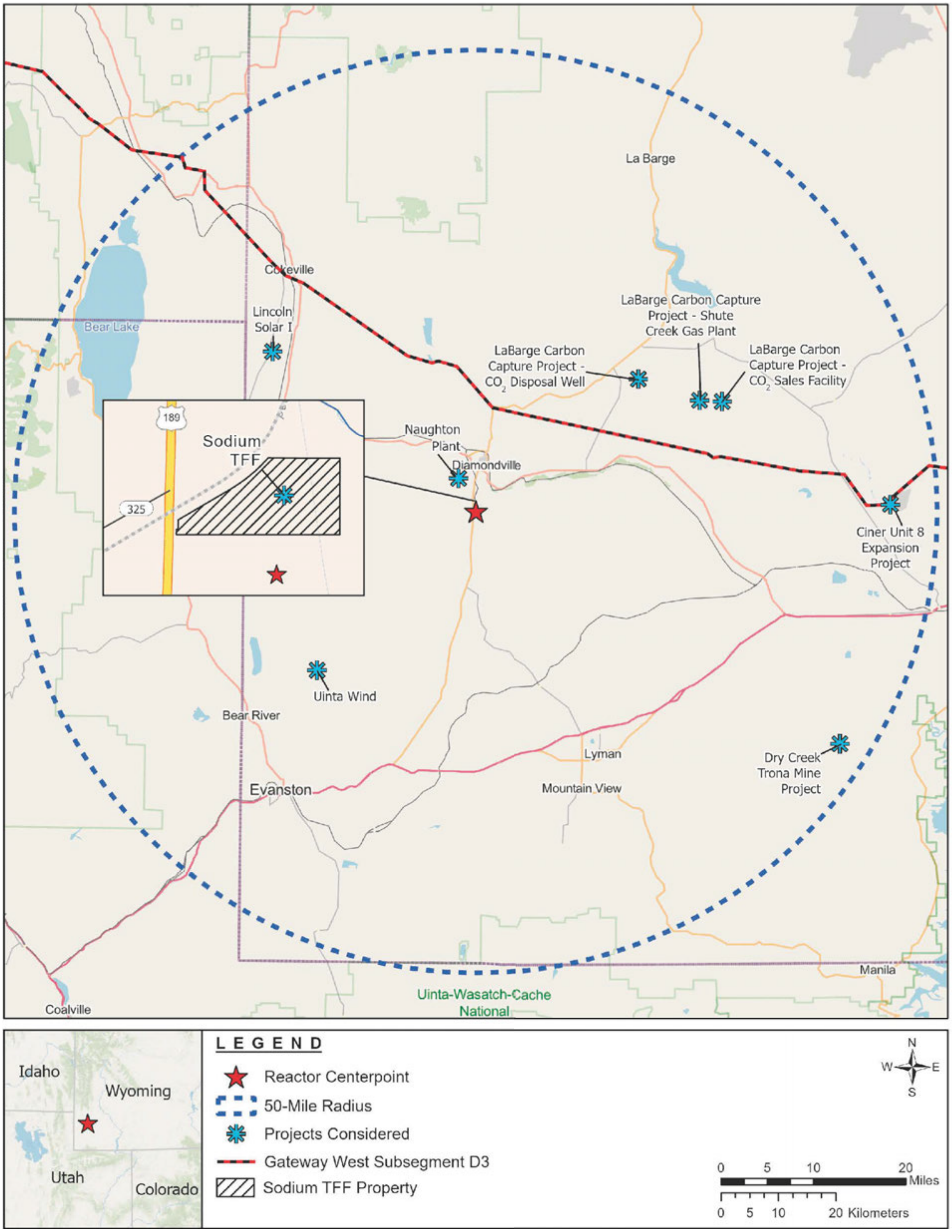
Table 7.1-1 Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Analysis (Sheet 3 of 4)

Project Name	Summary of Project	Location Relative to Kemmerer Unit 1	Status
Other Actions/Projects			
ExxonMobil LaBarge Carbon Capture Project	The Project includes 1) additions to the Shute Creek Gas Plant in Lincoln County (Section 14, T22N, R112W), 2) additions to the CO_2 Sales Facility in Sweetwater County (Section 18, T22N, R11W), 3) construction of a CO_2 disposal well (Section 18,T22N, R13W), and a 9-mile CO_2 pipeline in Lincoln County. The Shute Creek Gas Plant and CO_2 Sales Facility are on ExxonMobil property, and the CO_2 disposal well and pipeline will be located on Bureau of Land Management-owned property (Reference 7.1-6).	27.1 miles ENE	Construction: Ongoing, August 2022 through December 2024 Operation: July 2025 (Reference 7.1-7)
Dry Creek Trona Mine (Reference 7.1-10 and Reference 7.1-11)	Construction and operation of mining facilities to employ solution mining technologies to mine trona beds 2,300 feet below the surface. The proposed project area is located south of I-80 and west of WY 530, approximately 20 miles southwest of the city of Green River.	46.8 miles SE	Construction to start after completion of Bureau of Land Management National Environmental Policy Act process (in progress) and other Federal, State, and local permits (estimated 2024). Construction duration is 56 months.Refinery commissioning: 24 months after construction start (Reference 7.1-11).

Table 7.1-1 Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Analysis (Sheet 4 of 4)

Project Name	Summary of Project	Location Relative to Kemmerer Unit 1	Status
Ciner Unit 8 Expansion Project (Reference 7.1-4)	Construction and operation of a new refinery unit (Unit 8), rail track loop, and associated facilities to produce 1.1M tons per year of additional soda ash. The project is located at the Big Island Mine and Refinery facility off WY-372 approximately 22 miles north of Green River in Sections 10, 11, 14, and 15;T20N, R109W.	44.9 miles E	Planned 24-month construction schedule delayed by Covid and ownership changes. Documentation as to whether the project has commenced construction is not available (Reference 7.1-13).

Figure 7.1-1 Projects Considered In Cumulative Impacts



7.2 Impact Assessment

7.2.1 Land Use

The Kemmerer Unit 1 Site comprises approximately 290 acres (117 hectares) in Lincoln County, Wyoming. Kemmerer Unit 1 will be developed along a major highway (US 189), in close proximity to the county's largest city, and in an area with existing industry. The site is zoned for industrial development, and the associated water supply pipeline and transmission lines will cross land that is zoned for industrial use with the exception of one parcel which is zoned rural. The proposed action is aligned with local zoning and land use goals.

More than 90 percent of the land cover in the vicinity is shrub/scrub rangeland (Table 2.1-1). Construction of Kemmerer Unit 1 will result in approximately 218 acres (88 hectares) of shrub/scrub rangeland being permanently disturbed for the power plant. Construction of the transmission lines and water supply pipeline will disturb approximately an additional 223 acres (94 hectares) of shrub/scrub rangeland in the vicinity. Given that there is abundant, similar land in Lincoln and surrounding counties, the land use impacts from the construction of Kemmerer Unit 1 are anticipated to be SMALL.

The construction of the Sodium Test and Fill Facility (TFF) will permanently disturb another 17.5 acres (7.1 hectares) of shrub/scrub rangeland and temporarily disturb an additional 14.5 acres (5.9 hectares) adjacent to the Kemmerer Unit 1 Site. The land occupied by the TFF is zoned for industrial use. The cumulative impact of converting approximately 235 acres (95 hectares) of rangeland to industrial use for Kemmerer Unit 1 and the TFF is anticipated to be SMALL.

The realignment of 2.7 miles (4.3 kilometers) of US 30 could convert additional land area to transportation infrastructure. The construction for the US 189 intersection will largely take place within the existing Wyoming Department of Transportation right of way. A minimal amount of land area will be disturbed on the adjacent parcels to extend existing culverts running underneath the highway. Some construction within the stream crossing under US 189 may be required. The cumulative land use impacts of these projects in the vicinity are anticipated to be SMALL.

7.2.2 Water Resources

7.2.2.1 Surface Water

Based on a review of the history of surface water use and surface water resources planning in the Green River Basin, it was determined that past and present industrial and agricultural uses of the surface waters in the basin has remained largely the same. The storage of water in Viva Naughton Reservoir and Kemmerer Reservoir for industrial use and for drinking water supply for the City of Kemmerer had an impact on surface water resources in the past, as a diversion of flow from the Hams Fork River. No diversions for surface water use are included in the proposed action, and no changes to existing water rights and no additional surface water right users have been identified for the upcoming development projects in Table 7.1-1.

To better manage surface water resources in the Green River Basin, current water use across the basin and projections of future water use were reviewed to identify areas of future water supply concern (Reference 7.2-25). The most recent Green River Basin Plan report available provides projected water use to 2055 based on 2010 water use estimates (Reference 7.2-25).

7.2.2.1.1 Projected Changes in Industrial Water Use

An agreement with PacifiCorp will be in place to allow all the units at Naughton Power Plant to run simultaneously with Kemmerer Unit 1 within the existing water rights allocated to PacifiCorp. Therefore, no significant impacts to surface water resources are expected as a result of the unit conversions to natural gas.

7.2.2.1.2 Projected Changes in Irrigation Water Use (Agriculture)

In the high-growth scenario of the 2010 Green River Basin Plan, it is stated a modest increase in irrigation is projected. The water use projections for the high-growth scenario estimated an additional 26,000 acre-feet (32,000,000 cubic meters) of irrigation water for agriculture will be consumptively used annually, or a 6.5 percent increase. Considering the lack of change in water usage since the 1970 Green River Basin plan was prepared, the 6.5 percent increase was determined to be a reasonable estimate for the high-growth scenario. An additional consumptive water use by the agriculture sector is the direct consumption of water by livestock. Under the high-growth scenario, the number of animal units is projected to increase from 156,767 in 2005 to 203,035 in 2055 (Reference 7.2-25).

7.2.2.1.3 Impacts to Surface Water Quality

Sections 4.2 and 4.10 discuss water quality effects during building activities for Kemmerer Unit 1. Sections 5.2 and 5.10 discuss water quality effects during plant operation.

Section 4.2 indicates that any impacts to surface water quality during construction will be temporary, SMALL, and do not appear to warrant mitigation beyond the best practices required by permits. Section 4.10 concludes that anticipated impacts to nonradiological health from building activities are anticipated to be SMALL and in compliance to best management practices, the Stormwater Pollution Prevention Plan, and the other requirements of the Wyoming Department of Environmental Quality Large Construction General Permit.

The water quality in North Fork Little Muddy Creek will be maintained with added discharge from the site because the discharge will be compliant with Wyoming Pollutant Discharge Elimination System permit requirements, as described in Section 5.2. Wastewater and stormwater discharge will meet end of pipe limitations, as described in Section 5.10. Potential cumulative impacts from the discharge of nonradioactive liquid waste are anticipated to be SMALL.

7.2.2.1.4 Summary of Cumulative Impacts on Surface Water Resources

Of the projects listed in Table 7.1-1, the ones that were considered for cumulative impacts on surface water resources are Naughton Power Plant and the TFF. Kemmerer Unit 1 will release plant wastewater discharge to combine with the plant discharge from Naughton Power Plant in North Fork Little Muddy Creek. The TFF will not discharge plant wastewater into North Fork Little

Muddy Creek. All other projects listed in Table 7.1-1, including conversions at Naughton Power Plant, do not significantly affect the use of surface water resources, or their surface water use negligible.

Due to extensive past modification and use of surface waters from the Green River Basin and minimal modifications to present surface water use in the basin, the cumulative effect of the proposed action, including effects associated with past, present, or reasonably foreseeable future projects, are anticipated to be SMALL.

7.2.2.2 Groundwater

Groundwater use in the vicinity and region is not extensive, and cumulative impacts as a result of the known projects, including TFF and Naughton Power Plant unit conversions to natural gas, are not anticipated to have long-term impacts on groundwater levels and availability. There is no expected impact to groundwater resources during plant operation because the site does not use groundwater in any water system.

7.2.2.2.1 Groundwater Use

In addition to impacts from building and operation, the cumulative impacts assessment includes impacts from other past, present, and reasonably foreseeable projects that could affect groundwater use in the vicinity of the Kemmerer Unit 1 Site. These projects are listed in Table 7.1-1. Groundwater at the TFF will only be extracted during building activities, and will be limited to beneficial uses during building activities, such as dust suppression. Dewatering quantities have not been confirmed. The effects of dewatering at TFF are temporary, and the groundwater regime is expected to recover prior to dewatering activities for Kemmerer Unit 1. Dewatering activities for Kemmerer Unit 1 are expected to result in a temporary impact from drawdown adjacent to North Fork Little Muddy Creek.

7.2.2.2.2 Groundwater Quality

Groundwater quality is not expected to be impacted by the proposed action, as described in Section 4.2, or the TFF, since dewatering activities are temporary and water quality will be protected through adherence to the Wyoming Department of Environmental Quality Large Construction General Permit.

The ExxonMobil carbon dioxide disposal well is unlikely to impact the Kemmerer Unit 1 or TFF sites due to distance and depth of injection. The location of an injection well is selected such that the injectate is retained within a deep geologic formation with minimal risk of leakage. Therefore, the construction of carbon dioxide disposal wells as part of the LaBarge Carbon Capture project will not contribute to cumulative impacts to groundwater quality.

7.2.2.2.3 Summary of Cumulative Impacts on Groundwater

The projects in Table 7.1-1 that were considered for cumulative impacts on groundwater resources are Naughton Power Plant and the TFF. Dewatering activities for Kemmerer Unit 1 are expected to cause a temporary drawdown adjacent to North Fork Little Muddy Creek. As the

Hilliard Shale is not an aquifer, other projects in the area are unlikely to use groundwater (see Section 2.2). Therefore, cumulative impacts to groundwater, including the effects associated with past, present, or reasonably foreseeable future projects, are anticipated to be SMALL.

7.2.3 Ecological Resources

Direct and indirect impacts of the proposed action on ecological resources are discussed in Section 4.3 and Section 5.3. In all cases, impacts are anticipated to be SMALL after implementation of mitigation measures described in the sections. Two projects have been identified that could have cumulative effects on ecological resources: (1) construction of the TFF and (2) conversion from coal to natural gas of two generating units and continued operations at Naughton Power Plant which is approximately 3.8 miles (6.1 kilometers) northwest of the Kemmerer Unit 1 Site.

7.2.3.1 Terrestrial Ecology

Most of the projects in Table 7.1-1 are too far from the Kemmerer Unit 1 Site to create impacts that are cumulative. Two projects have been identified that could have cumulative effects on ecological resources: (1) construction of the TFF, which will be immediately adjacent to the Kemmerer Unit 1 Site, and (2) conversion from coal to natural gas of two generating units at Naughton Power Plant.

7.2.3.1.1 Test and Fill Facility

Construction of Kemmerer Unit 1 will result in approximately 218 acres (88 hectares) of rangeland being permanently disturbed by activities such as clearing, grubbing, and grading. Approximately 138.8 acres (56.2 hectares) of inter-mountain basin big sagebrush shrubland and approximately 78.9 acres (31.9 hectares) of greasewood flat vegetation will be affected. The construction of the TFF will permanently disturb another 17.5 acres (7.1 hectares) of shrubland and temporarily disturb 13.7 acres (5.5 hectares) of shrubland and 0.8 acres (0.3 hectares) of greasewood flat vegetation. A total of 235 acres (95 hectares) of sagebrush shrubland and greasewood flat vegetation will therefore be eliminated, and lost as wildlife habitat, in the development of the two facilities. Although considerable, 235 acres (95 hectares) represent a very small fraction of the 32 million acres (13 million hectares) of shrubland and grassland in the Wyoming Basin (Reference 7.2-11). The cumulative impact of clearing 235 acres (95 hectares) of rangeland, and wildlife habitat, for the two neighboring facilities is anticipated to be SMALL.

Expanding the area of disturbance to evaluate cumulative impacts from the Kemmerer Unit 1 and TFF areas of disturbance does not encroach on the habitat of any Federally listed species, candidate for Federal listing, or species proposed for Federal listing. Both Kemmerer Unit 1 and the TFF are within the Pronghorn Crucial Winter Range/Year-long Range (see Section 2.3.1). The total area, 235 acres (95 hectares), that will be permanently disturbed for both projects is less than 0.4 percent of the Cumberland Flats Pronghorn Crucial Winter Range/Year-long Range and have little or no impact on the species’ management.

Dewatering activities for Kemmerer Unit 1 are expected to result in drawdown extending to the wetland area adjacent to North Fork Little Muddy Creek. Current plans for TFF call for dewatering as many as eight shafts for approximately 6 months during construction until steel liners have been installed and grouted in place (Reference 7.2-5). The dewatering at TFF is also expected to drawdown groundwater levels. The effects of TFF dewatering will be temporary and the groundwater regime is expected to recover prior to dewatering activities for Kemmerer Unit 1, so the potential impacts will not be additive.

Because of the overlap in construction of the TFF and Kemmerer Unit 1, which will take place on adjoining properties, there is potential for cumulative impacts to North Fork Little Muddy Creek's wetlands and aquatic biota from erosion and sedimentation. Although impacts are additive, they are anticipated to be SMALL because of the mitigation measures imposed by the Wyoming Department of Environmental Quality Large Construction General Permit and, if applicable, U.S. Army Corps of Engineers Nationwide Permit 14.

7.2.3.1.2 Naughton Power Plant Coal to Gas Conversion

Conversion of Naughton Power Plant Units 1 and 2 from coal to natural gas will overlap with construction of the TFF and land clearing and site preparation at the Kemmerer Unit 1 Site. Although this will be a major undertaking involving a large construction workforce of approximately 450 workers, much of the work will take place in previously developed or disturbed areas. No land-clearing is anticipated. There will be generally higher levels of disturbance from noise, movement, and equipment exhausts at Naughton Power Plant during the conversion, but impacts will be local and affect wildlife in the immediate vicinity of the plant.

The cumulative impacts of building and operating the TFF and Kemmerer Unit 1 on terrestrial resources will be detectible and measurable but are not anticipated to destabilize any plant or animal community. While impacts will be noticeable locally, they will not be evident on a landscape scale (i.e., northern portion of Cumberland Flats) or regional scale (i.e., Wyoming Basin). As noted in Section 2.3.1.3, the TFF and Kemmerer Unit 1 sites are not high-quality wildlife habitats, as they are adjacent to US 189 and have historically been used by the herds of sheep that are moved through the valley in spring and fall.

Cumulative impacts on terrestrial ecology from Kemmerer Unit 1, TFF, and Naughton Power Plant conversion are anticipated to be SMALL.

7.2.3.2 Aquatic Ecology

There are no waterbodies on the TFF site and therefore there will be no direct impacts to aquatic ecology. There could be indirect impacts to water quality and aquatic communities if soil disturbed during construction of the TFF is carried into North Fork Little Muddy Creek with storm water runoff. However, the distance between the TFF construction area and the stream and the stormwater and erosion control best management practices that will be implemented as a condition of the Large Construction General Permit are expected to minimize impacts. The TFF has no liquid discharges during operation and therefore will have negligible impacts to North Fork Little Muddy Creek.

Kemmerer Unit 1 is scheduled to become operational in 2031. Naughton Power Plant, originally scheduled for retirement by 2026, is expected to operate through 2036 (Reference 7.2-22). As a consequence of the delayed retirement of Naughton Power Plant, both plants will be discharging to North Fork Little Muddy Creek for approximately 5 years.

As currently configured, effluent (mostly cooling tower blowdown) from Naughton Power Plant is discharged to an unnamed ephemeral stream that is a tributary of North Fork Little Muddy Creek. This unnamed tributary flows into North Fork Little Muddy Creek north of the Kemmerer Unit 1 Site. Under normal circumstances, Naughton Power Plant effluent comprises most of the flow in this tributary and in the upper reaches of North Fork Little Muddy Creek. When Naughton Power Plant ceases operation, in 2036, this tributary and North Fork Little Muddy Creek upstream of the Kemmerer Unit 1 discharge will be substantially reduced. Based on observations made by biologists in August 2023, when Naughton Power Plant flow was diverted to replace a pump, North Fork Little Muddy Creek will be reduced to a series of puddles above the location of the planned Kemmerer Unit 1 discharge when Naughton Power Plant ceases operation (Reference 7.2-1).

With no Naughton Power Plant discharge, benthic organisms in the section of North Fork Little Muddy Creek above the Kemmerer Unit 1 discharge will be eliminated. Fish in this portion of the creek will retreat to downstream locations with adequate flow, unless they are stranded in pockets of standing water. Fish trapped in puddles and mudholes will not survive, unless rainstorms and freshets raise stream levels and allow them to escape. The loss of benthic organisms and small numbers of fish in the dewatered stream reach will adversely affect aquatic biota in upper reaches of North Fork Little Muddy Creek but should have minimal long-term impacts on the downstream aquatic communities of North Fork Little Muddy Creek and Little Muddy Creek.

Cumulative impacts to aquatic ecology from Kemmerer Unit 1, the TFF, and the shutdown of Naughton Power Plant, and accompanying flow reduction in North Fork Little Muddy Creek, are anticipated to be SMALL.

7.2.4 Socioeconomics Resources

The focus of this analysis is the cumulative impacts within the three-county economic region described in Section 4.4 during the Kemmerer Unit 1 construction period. Socioeconomic impacts are based on the year when the cumulation of project workforces reaches a peak. Nine other projects are anticipated to take place in or near the three-county economic region. The projects will have both beneficial and adverse socioeconomic impacts. In-migrating project populations will consume housing and public services, spend their salaries and wages, and pay taxes to governments in the economic region. The estimated in-migrating direct workforces for the cumulative projects are summarized in Table 7.2-1.

In total, 5,407 workers are projected to migrate into the economic region in 2026, the peak year of this analysis. This total includes 5,103 direct workers (Table 7.2-1), which consists of 5,092 construction workers and 11 operation workers, plus 304 Kemmerer Unit 1 in-migrating indirect workers (Table 4.4-1).

Cumulative project impacts to the regional economy and government tax coffers will generally be beneficial (Table 7.2-2). Increases in employment, wages, and taxes will benefit local and regional residents, businesses, and multiple levels of government. Property tax payments will be LARGE and beneficial to Lincoln County (Sections 4.4.3.2 and 5.4.3.2). Unemployment in the economic region will be significantly reduced, by 25 percent or more (Section 4.4.3.1.1). As discussed in Section 4.4.3.2.6, adverse impacts could occur when the construction workforces leave the area. Therefore, impacts to the economy and taxes are expected to be SMALL to LARGE and beneficial or adverse.

In 2026, there could be insufficient temporary and permanent housing to support the cumulative in-migrating workforces and baseline users. There were 4,376 vacant and available housing units, including permanent and temporary housing, in the economic region in the 2020 to 2022 timeframe (Section 4.4.4.3). To alleviate this issue, local officials are planning for the construction of a large number (1,000+) of permanent and temporary housing units in the Kemmerer and Diamondville area (Section 2.4). Workers will likely consume most, if not all, vacant housing closest to the Kemmerer Unit 1 Site and, if necessary, expand their search to areas farther from the site. Impacts to housing will be LARGE throughout the economic region.

The increased population will cause additional pressure on community services and infrastructure. Water resources in the economic region will be sufficient to accommodate the cumulative in-migrating workforce populations (Sections 4.4.4.4 and 5.4.4.4). Wastewater treatment capacity in the economic region will accommodate the cumulative in-migrating workforce population, with the exception of the Kemmerer and Diamondville Water & Wastewater Joint Powers Board system in Lincoln County. For this system, impacts to wastewater treatment capacity are expected to be SMALL to MODERATE during construction (Section 4.4.4.4.2). They could be mitigated to SMALL by the Joint Powers Board (Section 4.4.4.4). As for cumulative adverse impacts to police, fire, medical, and education services, as discussed in Sections 4.4.4.4 and 5.4.4.4, the State of Wyoming has assistance programs to mitigate these impacts. For these resources, Wyoming Department of Environmental Quality's impact assistance payments and the State's education equalization programs will likely mitigate the cumulative impacts to SMALL.

The construction and operation of Kemmerer Unit 1 and the offsite water supply pipeline and electrical transmission lines will generate noise, vibration, odors, exhaust, and visual intrusions. Aside from TFF and the US 189 intersection, none of the projects listed in Table 7.1-1 are close enough to contribute to cumulative physical impacts.

The transportation impacts associated with Kemmerer Unit 1 will be focused on US 189 south of US 30 and north of the Uinta-Lincoln County line. Of the projects listed in Table 7.1-1, only Naughton Power Plant and TFF traffic impacts occur along this segment of US 189. While deliveries or workers commuting to the ExxonMobil Carbon Capture project may use this segment of US 189, truck deliveries and oversized loads are expected to be scheduled outside of peak travel periods. Their workforce is expected to reside in Kemmerer and other communities to the north and will not contribute to the peak commuting traffic associated with Kemmerer Unit 1. The Uinta Wind project is reached via the Whitney Canyon Haul Road accessed from the west using WY 89 to CR 103, or from the east using US 189. Traffic for Uinta Wind will leave US 189 well south of Kemmerer Unit 1. Their workforce is expected to reside in communities along the I-80 corridor and are not expected to travel the segment of US 189 affected by Kemmerer Unit 1. The conversion of Naughton Power Plant to natural gas is scheduled for the first quarter of 2026, a small overlap with Kemmerer Unit 1 prior to its peak construction. The US 189 intersection will be completed prior to Kemmerer Unit 1 preconstruction activities and will mitigate traffic impacts during construction of the TFF.

As discussed in Sections 4.4.4.1 and 5.4.4.1, US 189's Level of Service (LOS) will be adversely affected during peak commuting hours during construction and operation experiencing a decrease of LOS A to LOS C and D near the site entrance, accounting for the design of the new intersection. Based on location and timing, the other projects in Table 7.1-1 are anticipated to have a small incremental impact in addition to that of Kemmerer Unit 1's impact of MODERATE.

Cumulative socioeconomic impacts are expected to range from SMALL to LARGE and be beneficial or adverse.

7.2.5 Environmental Justice

The environmental justice part of the cumulative impacts analysis uses the minority and low-income population baseline data from Section 2.5. As presented in Section 2.5, it was determined that there was one block group in Summit County, Utah, and six block groups in Sweetwater County that have significant minority and low-income populations. The block group in Summit County, Utah, is approximately 40 miles (64 kilometers) southwest of the Kemmerer Unit 1 Site and outside of the economic region. The block groups in Sweetwater County are in or near the towns of Green River and Rock Springs. The closest minority or low-income population block group is located approximately 27 miles (43.5 kilometers) east of the Kemmerer Unit 1 Site.

Impacts from noise, air emissions, and water discharges will not extend to the closest minority or low-income population block group. Thus, no disproportionate high and adverse health and environmental impacts on minority or low-income populations are expected.

Most minority and low-income workers and their families reside in Sweetwater County and could be impacted by the housing shortages created by the cumulative workforces. In 2026, the available stock of lower-priced housing could be depleted first, and prices and rents of all housing types could increase. Because the low-income populations are located in Green River and Rock Springs where the housing impacts in Sweetwater County will be most profound, they will experience disproportionately high adverse impacts.

With respect to the economy, LARGE adverse impacts could occur when the construction workforces leave the area, eliminating the economic stimulus and indirect jobs they generated. There could be a commensurate increase in unemployment. It is unknown how the other cumulative projects plan to address their impacts to the socioeconomic environment, so this analysis can only describe mitigating actions resulting from the Kemmerer Unit 1 project. Figure 3.3-4 indicates that the Kemmerer Unit 1 out-migration will occur gradually over the last couple years of the construction phase, and the loss of construction workers will be partially offset by some in-migrating operation workers. The gradual nature of the decline in the construction workforce will help mitigate the impact to communities in the economic region from the destabilizing effects of a sudden decrease in workers and their families. Another mitigating factor will be the higher average annual wages and associated multiplier effects expected with the operation workers.

Kemmerer Unit 1 impacts to the economic region's economy will likely be mitigated to SMALL to MODERATE and lessen the intensity of the LARGE, adverse impacts created by the increase in unemployment at the end of all of the construction projects. Minority and low-income populations that will have benefited from the increase in jobs and wages in Sweetwater County will also be affected by the loss of those jobs and wages. Low-income populations will be particularly susceptible to the effects of job and wage gains and losses. By their very nature, they will experience disproportionately high and adverse impacts.

7.2.6 Historic and Cultural Resources

The primary perspective of this analysis is that of Section 106 of the National Historic Preservation Act (54 USC § 306108) and its enabling regulations, 36 CFR Part 800. The geographic area of interest for discussion of potential cumulative impacts to historic and cultural resources is the same direct and indirect area of potential effect described in Section 2.6.

Sections 4.6 and 5.6 discuss the effects of the construction and operation of Kemmerer Unit 1 on historic and cultural resources. In the direct area of potential effect, these sections identify an adverse effect to one prehistoric archaeological site that is eligible for the National Register of Historic Places, 48LN740. The sections also note that adverse effects to a second prehistoric archaeological site which is eligible for the National Register of Historic Places, 48LN8940, due to the planned installation of utility lines to connect Kemmerer Unit 1 to infrastructure at Naughton Power Plant, may be avoided by use of horizontal directional drilling to install the water line beneath the site and by aerially spanning the site with the electrical transmission lines. It is anticipated that a Programmatic Agreement or Memorandum of Agreement will be developed describing the measures that will be taken to mitigate or avoid project effects on these two historic properties. There are no other historic properties or contributing elements of historic properties in the direct area of potential effect. Assuming that a Programmatic Agreement or Memorandum of Agreement is implemented, the effect of Kemmerer Unit 1 on historic properties in the direct area of potential effect is anticipated to be SMALL.

The TFF will be situated on a 35-acre (14-hectare) parcel at the northwestern corner of the Kemmerer Unit 1 Site. A Class III survey of the TFF area identified no archaeological sites eligible for the National Register of Historic Places. Consequently, development of the TFF will result in no effects on historic properties and the cumulative effect of Kemmerer Unit 1 along with the TFF is anticipated to be SMALL.

Construction of the entrance road to the project will entail alterations to US 189 adjacent to the direct effects area of potential effect. The alterations will involve widening the highway in the vicinity of the entrance to provide a left turn lane. Roadwork is anticipated to extend to the portion of the US 189 right of way within 48LN740. The area within the right of way has been found to not be contributing to the eligibility of 48LN740 and there will be no adverse effects to cultural resources. The cumulative effect is anticipated to be SMALL.

In the 5-mile (8-kilometer) buffer surrounding the 1,508-acre (610-hectare) direct effects study area, one action has been identified as reasonably foreseeable, converting Naughton Power Plant Units 1 and 2 from coal to natural gas and operating them until 2036. With development of Kemmerer Unit 1, there will be no cumulative effects from this action since the conversion will take place within an existing facility, and no disturbance of currently undeveloped land will be required. As discussed in Section 5.6.2.2, potential visual effects due to the plume from

Kemmerer Unit 1’s mechanical draft cooling tower will be intermittent and is anticipated to be SMALL, and the cumulative visual effects of the continued operation of Naughton Power Plant in addition to the introduction of the plume from Kemmerer Unit 1 are also expected to be SMALL.

7.2.7 Air Resources

7.2.7.1 Summary of Cumulative Impacts during Building Activities

Construction-related air quality effects will be minimized by compliance with Federal, State, and local regulations that govern construction activities and emissions. Section 4.7 describes the impact of emissions associated with criteria air pollutants; sulfur dioxide, particulate matter of a diameter of 10 micometers or less, carbon monoxide, and nitrogen dioxide, as well as the impact from commuting related to building activities at Kemmerer Unit 1.

Air emission-producing equipment will be permitted under the Wyoming Department of Environmental Quality Air Quality Division New Source Review regulations. The greenhouse gas of primary concern is carbon dioxide. Section 4.7 estimates that, for a 7-year schedule of building activities, the total set of greenhouse gas emissions will be equivalent to 82,000 metric tons of carbon dioxide. The section concludes that atmospheric impacts of greenhouse gases from building activities for Kemmerer Unit 1 are anticipated to be MODERATE.

Air quality impacts from building activities will be mitigated by fugitive dust, sediment, and erosion controls as well as phasing construction to minimize daily emissions. The impacts associated with building activities from the TFF will be negligible compared to those from the building of Kemmerer Unit 1, at less than 10 percent of the impact based on comparison of estimated area disturbed. Additionally, the impact of commuting during building activities is negligible, at less than 10 percent of the impact, based on comparison to the estimated commuting for Kemmerer Unit 1. The cumulative impacts to air quality from the building activities of TFF are anticipated to be SMALL and mitigation does not appear to be warranted. The cumulative impacts to air quality from the conversion activities at Naughton Power Plant are considered during operation, as converted units will be active during the operation of Kemmerer Unit 1 and not just during short term building activities.

7.2.7.2 Summary of Cumulative Impacts during Operation

Operational impacts from fogging, icing, shadowing, and drift deposition of the Kemmerer Unit 1 cooling-tower were modeled, as described in Section 5.7. Impacts related to fogging, ground-level humidity, icing, precipitation, and interaction with existing pollution sources are anticipated to be SMALL, and mitigation does not appear to be warranted.

Standby diesel generators present on the Kemmerer Unit 1 Site and the TFF site will comply with all applicable U.S. Environmental Protection Agency and State guidelines. In addition, traffic emissions during operation from commuters and delivery vehicles will generate emissions, as described in Section 4.7. The impacts associated with commuting related to TFF operation is negligible, at less than 10 percent of the impact, based on comparison to the estimated commuting for Kemmerer Unit 1. Therefore, the cumulative impact to air quality from building activities at Kemmerer Unit 1 and the TFF are anticipated to be SMALL and mitigation does not appear to be warranted.

Impacts to air resources will be mitigated to the extent practicable by complying to air permits, such as Title V of the Clean Air Act, and the Prevention of Significant Deterioration permit.

The air quality impacts associated with transmission lines installed to serve Kemmerer Unit 1 are anticipated to be SMALL and mitigation does not appear to be warranted.

The conversions at Naughton Power Plant are anticipated to occur during building activities for Kemmerer Unit 1 and are anticipated to be operating during Kemmerer Unit 1 operation. The conversion of the coal fired plants at Naughton Power Plant to natural gas after 2025 will reduce nitrogen oxides, sulfur dioxide, and carbon dioxide emissions, as shown in Table 7.2-3 (Reference 7.2-22). The cumulative impacts to air quality from the operation of Naughton Power Plant after conversion are anticipated to be SMALL. The cumulative impacts to air resources during operation from Naughton Power Plant unit conversions and all other sources are anticipated to be SMALL and mitigation does not appear to be warranted.

7.2.7.3 Greenhouse Gases

Section 7.2.7.1 and Section 7.2.7.2 discuss the cumulative impacts of greenhouse gases from Kemmerer Unit 1. Section 2.7.1.5 describes the regional effects likely to occur due to the long-term alteration in various climate parameters as a result of climate change. Section 2.2.1.1.6 describes the drought characteristics of the region and projections as a result of climate change. The intensity of future droughts is projected to increase, even if precipitation amounts increase. Increases in evaporation rates due to rising temperatures may increase the rate of soil moisture loss during dry spells. These climactic changes will stress water resources in Wyoming.

Although the national and global cumulative impacts from greenhouse gas emissions are anticipated to be MODERATE, the incremental contribution to global cumulative impacts from Kemmerer Unit 1 are not detectable on a national or global scale, and are therefore anticipated to be SMALL.

7.2.8 Nonradiological Health

7.2.8.1 Public and Occupational Health

As concluded in Sections 4.8.1 and 5.8.1, people working or living near Kemmerer Unit 1 will not experience physical impacts from the effects of noise, fugitive dust, and gaseous emissions greater than those that will be considered an annoyance or nuisance. Impacts to public health from Kemmerer Unit 1 are anticipated to be SMALL. Aside from the TFF and the US 189 intersection, the projects listed in Table 7.1-1 will not be close enough for effects from noise, fugitive dust, and gaseous emissions impacts to be cumulative. Construction of the US 189 intersection will be completed prior to beginning preconstruction activities. Construction of the TFF will be completed prior to peak construction activities of Kemmerer Unit 1. The cumulative effects are anticipated to have SMALL impacts to public health.

7.2.8.2 Noise

As indicated in Section 4.8.2, there are no noise-sensitive receptors in the immediate area of the Kemmerer Unit 1 Site. The closest noise-sensitive receptor will be the nearest resident, approximately 2.8 miles (4.5 kilometers) from Kemmerer Unit 1, who will experience noise levels of less than 65 A-weighted decibels. The projects listed in Table 7.1-1 will not be close enough to sensitive receptors to contribute to cumulative noise impacts or will not overlap the peak construction timeframe for Kemmerer Unit 1. Noise impacts from other projects in the area will not be cumulative with those of Kemmerer Unit 1, and noise impacts are anticipated to be SMALL.

7.2.8.3 Transportation

The distance driven for commuting and delivering materials to and from Kemmerer Unit 1, as well as the other projects listed in Table 7.1-1, will increase the number of vehicle accidents involving injuries and fatalities. However, other than Naughton Power Plant and TFF, the projects will occur beyond the vicinity, or as for the US 189 intersection, not have a temporal overlap. The cumulative impacts to human health from vehicle accidents based on rates calculated from Wyoming Department of Transpiration data for crashes, injuries, and fatalities will be dependent on the total distance from all the projects. Distance estimates could not be made for other projects without a high degree of uncertainty, so cumulative impacts to human health from vehicle accidents have not been estimated.

7.2.8.4 Electromagnetic Fields

The existing transmission corridors at Naughton Power Plant shown in Figure 2.1-10, and modifications to the existing system to support the switchyard for Kemmerer Unit 1, are described in Section 3.2. Since the transmission corridor will pass through areas that did not previously convey transmission power lines, potential nonradiological health impacts from exposure to acute electromagnetic fields is expected at nearby facilities, such as the TFF.

Acute effects can be controlled and minimized by conformance with National Electrical Safety Code criteria and adherence to the standards for new transmission lines and the new switchyard proposed at Kemmerer Unit 1.

Due to the lack of conclusive results, significant effects including chronic and acute impacts to health from electromagnetic fields cannot be declared as a cumulative impact from the projects described in Table 7.1-1 (Reference 7.2-15).

7.2.9 Radiological Health

As described in Section 4.9, the radiological impacts during construction at the site are anticipated to be SMALL. Section 5.9 details the radiological impacts from normal operation and confirms that doses to workers, the public, and other biota will comply with regulatory limits. Consistent with commercial nuclear standards, Kemmerer Unit 1 will implement designed features and administrative controls to maintain occupational and public radiation exposures below regulatory limits and as low as reasonably achievable.

The NRC has used 50 miles (80 kilometers) as the radius bounding the geographic area of interest for evaluating doses to the public from routine releases from nuclear power plants. Among the projects listed in Table 7.1-1, no nuclear facilities have been identified that will have any potential impacts on radiological health within the geographic area of interest (Reference 7.2-17, Reference 7.2-18, Reference 7.2-19). Furthermore, other facilities in the geographic area of interest, such as industrial facilities and hospitals, may use radiological materials, but their potential contributions to the cumulative dose received by the Kemmerer Unit 1 Site maximally exposed individual is negligible.

Therefore, the cumulative impacts to radiological health at any location within 50 miles (80 kilometers) of Kemmerer Unit 1 is anticipated to be SMALL.

7.2.10 Postulated Accidents

As described in Section 5.11, the environmental impacts from a postulated accident at Kemmerer Unit 1, considering both design basis accidents and severe accidents, are anticipated to be SMALL.

Offsite radiological consequences of design basis accidents are assessed based on conservatively performed safety analyses of the design. The design basis accidents analyzed are described in Table 5.11-2, and the resulting doses, as presented in Table 5.11-19, are within the acceptance criteria in 10 CFR 50.34. Therefore, the environmental impacts of desing basis accidents for Kemmerer Unit 1 are anticipated to be SMALL.

The environmental risks of severe accidents are evaluated based on the severe accident types, source terms, and probabilities determined from the Probabilistic Risk Assessment described in PSAR Section 3.1. As indicated in Section 5.11.2, only internally initiated events have been evaluated at this time; external events will be evaluated at the operating license stage. The MACCS computer code is used to estimate severe accident risks based on site-specific meteorology, population, and land-use data. The MACCS-modeled doses for the applicable environmental exposure pathways, provided in Table 5.11-21, demonstrate that the individual risks for early fatality and latent cancer fatality meet the NRC's Safety Goals (51 FR 30028), as quantified in Regulatory Guide 1.233, Revision 0, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light Water Reactors." The calculated population dose risk from severe accidents for Kemmerer Unit 1 is approximately one-tenth of one percent of the estimated dose risk from routine releases and, as shown in Table 5.11-22, is bounded by the dose risks for Generation III and newer, large light water reactors. Therefore, the environmental impacts of postulated severe accidents for Kemmerer Unit 1 are anticipated to be SMALL.

This cumulative analysis considers risk from potential severe accidents at other existing and proposed nuclear facilities that have the potential to increase risks at any location within the geographic area of interest. The geographic area of interest for impacts is the area within a 50-mile (80-kilometer) radius about the Kemmerer Unit 1 Site. The 50-mile (80-kilometer) radius was selected to cover the potential risk overlaps from two or more nuclear facilities. There are no existing or proposed nuclear facilities identified that will contribute to risk within this geographic area of interest (Reference 7.2-17, Reference 7.2-18, Reference 7.2-19).

Therefore, the cumulative risks from postulated accidents at any location within 50 miles (80 kilometers) of Kemmerer Unit 1 are anticipated to be SMALL.

7.2.11 Fuel Cycle, Transportation, and Decommissioning

7.2.11.1 Fuel Cycle

Impacts from the uranium fuel cycle for Kemmerer Unit 1 include impacts from uranium recovery, conversion, enrichment, deconversion, metalization, fuel fabrication, reprocessing of irradiated fuel, storage and disposal of wastes, and disposal of irradiated fuel. As described in Section 6.1, although the enrichment and fuel form of the metallic fuel differ from a 1000-MWe reference reactor (uranium dioxide), the need for enrichment of the fissile material and the phases of the fuel cycle are essentially the same. There are increased uranium hexafluoride feed requirements as well as increases in the separative work units, and the associated electricity demand required for the higher enrichment of fuel. Table 6.1-4 provides scaling factors between the fuel used by Kemmerer Unit 1 and the reference reactor fuel.

This cumulative analysis considers impacts over the uranium fuel cycle associated with the operation of Kemmerer Unit 1 along with impacts from past, present, and reasonably foreseeable actions that may contribute to cumulative impacts within the geographic area of interest. The geographic area of interest for impacts of the uranium fuel cycle is nationwide.

As discussed in Section 6.1.1.4.1, uranium for Kemmerer Unit 1 may come from new or pre-existing sources. Historically, the majority of uranium has been imported, with domestic uranium mines and mills closing due to market conditions. Domestically produced uranium accounted for only 5 percent of uranium deliveries in the United States in 2022 (Reference 7.2-6). Therefore, for new sources of uranium, uranium recovery could be performed outside of the country. For pre-existing sources of uranium, such as inventories procured from a National Laboratory or Federal Agency, the environmental impacts from uranium recovery have already been evaluated and realized. Therefore, no additional environmental impacts from the recovery of uranium associated with Kemmerer Unit 1 are currently expected within the geographic area of interest. As discussed in Section 6.1.1.4.4, for uranium sourced from recycled EBR-II materials, the environmental impacts from conversion and enrichment also have already been realized.

As indicated in Section 6.1.2.6.2, NUREG-2157, “Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel,” evaluates the environmental impacts of the storage of spent fuel, including cumulative impacts (Reference 7.2-16). The conclusions made in NUREG-2157 regarding continued storage of spent fuel are applicable to Kemmerer Unit 1.

Therefore, the cumulative impacts from Kemmerer Unit 1 on other existing and planned nuclear fuel cycle facilities are anticipated to be SMALL.

7.2.11.2 Transportation of Fuel and Wastes

Section 6.2 describes the environmental impacts of transporting unirradiated fuel, irradiated fuel, and radioactive waste (radwaste) associated with Kemmerer Unit 1. Probable transportation routes were bounded by shipping unirradiated fuel 2,131 miles (3,430 kilometers) from North Carolina by truck, shipping irradiated fuel 640 miles (1,030 kilometers) to Nevada by rail, and shipping radwaste 727 miles (1,170 kilometers) to Washington by truck or rail. An estimated 1.4 shipments of unirradiated fuel to the facility will occur each year. Approximately 25 shipments of low-level radwaste will be sent from the facility each year for offsite disposal. Irradiated fuel will be stored ons ite for a minimum of 10 years, resulting in an estimated annual average of 4 shipments of irradiated fuel. As shown in Section 6.2.1.1, the doses to the population from the incident-free transportation of fuel and radwaste are within the limits of 10 CFR 51.52, Table S-4; therefore, the impacts from incident-free transportation of fuel and radwaste for Kemmerer Unit 1 are anticipated to be SMALL.

Nonradiological transportation impacts are discussed in Section 6.2.1.3. The calculated number of reference reactor years between occurrences of injuries and fatalities are presented in Table 6.2-10 and are bounded by the values in 10 CFR 51.52, Table S-4.

This cumulative analysis considers impacts from the transportation of fuel and radwaste for Kemmerer Unit 1 along with impacts from past, present, and reasonably foreseeable actions that may contribute to cumulative impacts within the geographic area of interest. The geographic area of interest for impacts of fuel and radwaste transportation is nationwide.

Geographically, Kemmerer Unit 1 is near both I-80, the East-West running main road transportation corridor in the region, and a segment of the Union Pacific rail system which generally runs East-West in the region (Reference 7.2-27). Although potential cumulative impacts to major transportation routes are anticipated to be SMALL, local roads and rail lines in the immediate vicinity of Kemmerer Unit 1 will experience an increase in fuel and radwaste shipments. No past, present, or reasonably foreseeable future projects have been identified within 50 miles (80 kilometers) of Kemmerer Unit 1 which will contribute to shipments of fuel and radwaste to and from the region (Reference 7.2-17, Reference 7.2-18, Reference 7.2-19). There may be shipments of fuel and radwaste that originate and terminate outside the 50-mile (80-kilometer) region but pass through the region. The impacts from each shipment will be very small.

The cumulative impacts of transportation of unirradiated fuel to, along with irradiated fuel and radwaste from, Kemmerer Unit 1 are anticipated to be SMALL, and the incremental contribution to cumulative impacts from other projects are anticipated to be SMALL.

7.2.11.3 Decommissioning

Section 6.3 describes the general environmental impacts of decommissioning Kemmerer Unit 1. Decommissioning involves the employment of workers to safely remove the facility or site from service, terminate its license, and reduce residual radioactivity below the levels set by regulation. The environmental impacts associated with decommissioning are covered by the Decommissioning Generic Environmental Impact Statement in NUREG-0586, Supplement 1, in which they are considered to be SMALL and generic (Reference 7.2-14).

This cumulative analysis considers impacts from decommissioning Kemmerer Unit 1 along with impacts from past, present, and reasonably foreseeable actions that may contribute to cumulative impacts within the geographic area of interest. The geographic area of interest for impacts of decommissioning is the area within a 50-mile (80-kilometer) radius about the Kemmerer Unit 1 Site for socioeconomic impacts and nationwide for the final disposal of radioactive waste.

No other permanently shutdown, operating, or planned nuclear facilities have been identified within 50 miles (80 kilometers) of the Kemmerer Unit 1 Site (Reference 7.2-17, Reference 7.2-18, Reference 7.2-19). Therefore, there is no contribution to the cumulative impacts of decommissioning for these types of facilities. Radioactive waste generated during operation and decommissioning of Kemmerer Unit 1 will require disposal at existing facilities that are located outside the region. Given the volumes of radioactive waste received at these facilities from entities such as the nuclear power industry, medical industry, and research and development, the operation and decommissioning of Kemmerer Unit 1 will not contribute significantly to radioactive waste management and disposal resources.

Therefore, the cumulative impacts from decommissioning Kemmerer Unit 1 are anticipated to be SMALL.

7.2.12 Summary

A summary of potential cumulative impacts related to resources affected by the project is presented in Table 7.2-2. No mitigation measures have been identified to reduce cumulative impacts.

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Table 7.2-1 Estimated Cumulative In-Migrating Workforces

Project Name	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Kemmerer Unit 1		300	1,373	1,611	1,630	1,264	435
Sodium Test and Fill Facility	122	107	69	30	20	20	20
WYDOT Highway 189 Intersection	27	-	-	-	-	-	-
Naughton Power Plant Units 1 and 2 Coal-to-Gas Conversion	-	-	428	-	-	-	-
ExxonMobil LaBarge Carbon Capture Project[a]	215	215	11	11	11	11	11
Uinta Wind[b]	117	117	113	7	7	7	7
Lincoln Solar 1[c]	161	161	-	-	-	-	-
Ciner Unit 8 Expansion Project[d]	476	476	476	71	71	71	71
Gateway West Transmission - Subsegment D3[e]	-	-	-	313	313	12	12
Dry Creek Trona Mine[f]	2,633	2,633	2,633	2,633	540	540	540
Total Non-Local Workers	3,751	4,009	5,103	4,676	2,592	1,925	1,096

a. Reference 7.2-9, Reference 7.2-10

b. Reference 7.2-26, Reference 7.2-12, Reference 7.2-13

c. Reference 7.2-3

d. Reference 7.2-4

e. Reference 7.2-2, Reference 7.2-23, Reference 7.2-24

f. Reference 7.2-20, Reference 7.2-21. Assumes 95 percent in-migration for construction.

Table 7.2-2 Potential Cumulative Impacts
(Sheet 1 of 4)

Resource	Description of Potential Cumulative Impacts	Significance of Potential Cumulative Impacts
Land Use	Estimated disturbance of: Kemmerer Unit 1 (218 acres or 88 hectares) and TFF (17.5 acres or 7.1 hectares). TFF construction will also result in temporary disturbance of 14.5 acres (5.9 hectares).	SMALL
Hydrology and Water Use	Wastewater discharge from Kemmerer Unit 1 will combine with flow from Naughton Power Plant. Discharge flow will be within existing water rights allocated to PacifiCorp. No significant impacts to water resources are expected as a result of the unit conversions to natural gas.	SMALL
	Dewatering at TFF is expected to temporarily drawdown groundwater levels. The groundwater regime is expected to recover prior to dewatering activities for Kemmerer Unit 1 so the potential impacts will not be additive.	SMALL
Ecological Resources	Loss of approximately 218 acres (88 hectares) of rangeland from construction of Kemmerer Unit 1. TFF will permanently disturb another 17.5 acres (7.1 hectares) of shrubland and temporarily disturb 13.7 acres (5.6 hectares) of shrubland and 0.8 acres (0.3 hectares) of greasewood flat vegetation. A total of 235 acres (95 hectares) of sagebrush shrubland and greasewood flat vegetation will therefore be eliminated and lost as wildlife habitat in the development of the two facilities.	SMALL
	With Naughton Power Plant shutdown, flows in the section of North Fork Little Muddy Creek above the Kemmerer Unit 1 discharge will be reduced. Loss of benthic organisms and small numbers of fish in the dewatered stream reach will adversely affect aquatic biota in upper reaches of North Fork Little Muddy Creek but should have minimal long-term impacts on the downstream aquatic communities of North Fork Little Muddy Creek and Little Muddy Creek.	SMALL

Table 7.2-2 Potential Cumulative Impacts
(Sheet 2 of 4)

Resource	Description of Potential Cumulative Impacts	Significance of Potential Cumulative Impacts
Socioeconomics	Construction and operation of the cumulative projects in the economic region in 2026 will increase employment and stimulate local and regional economies through increases in wages and taxes. Most economic impacts will be beneficial. Adverse impacts could occur when the cumulative construction workforces leave the area, eliminating the indirect jobs and economic stimulus they generated.	SMALL to LARGE
	During peak commuting hours, travelers on US 189 will experience a decrease from LOS A to LOS C and D near the site entrance accounting for the design of the new intersection. Other projects will have small incremental impacts.	MODERATE
	The existing and potential new inventory of vacant housing in the economic region will not be sufficient for the in-migrating construction and operation workforces in 2026.	LARGE
	The current capacity of most existing public services will be burdened by the in-migrating workforces, but most impacts will be mitigated to SMALL by Wyoming Department of Environmental Quality's impact assistance payments and the State's education equalization programs. Only wastewater treatment in Lincoln County will experience a SMALL to MODERATE impact and the impact will go unmitigated.	SMALL to MODERATE
Environmental Justice	Adverse impacts to housing cost and availability, and the economy, will be disproportionately high and adverse for low-income populations in Green River and Rock Springs.	Disproportionately High and Adverse
	Adverse impacts from the effects of job and wage gains and losses will be disproportionately high and adverse for low-income populations.	Disproportionately High and Adverse
Historic and Cultural Resources	Construction of Kemmerer Unit 1 will result in an adverse effect to one prehistoric archaeological site that is eligible for the National Register of Historic Places. Assuming that a Programatic Agreement or Memorandum of Agreement is implemented, the effect of Kemmerer Unit 1 on historic properties in the direct area of potential effect will be mitigated. Improvements to US 189 may affect the same archaeological site. Development of the TFF will result in no effects on historic properties.	SMALL

Table 7.2-2 Potential Cumulative Impacts
(Sheet 3 of 4)

Resource	Description of Potential Cumulative Impacts	Significance of Potential Cumulative Impacts
Air Resources	The total set of greenhouse gas emissions for a 7 year schedule of building activities will be equivalent to 82,000 metric tons of carbon dioxide, as discussed in Section 4.7.	SMALL
	Fugitive dust, sediment, and erosion controls will minimize air resource impacts.	SMALL
	The emissions from commuting construction workers and facility-related air emissions examined in Section 4.7 will be MODERATE.	MODERATE
Nonradiological Health	People working or living near Kemmerer Unit 1 will experience physical impacts from noise, fugitive dust, and gaseous emissions no greater than those that will be considered an annoyance or nuisance. The cumulative impacts to human health from vehicle accidents will be dependent on the total distance driven for all the projects.	SMALL (physical impacts) Dependent on distance driven (transportation)
Radiological Health	No existing or planned nuclear facilities have been identified that will have the potential to increase radiological exposure at any location within 50 miles (80 kilometers) of Kemmerer Unit 1. Potential contributions from other nearby facilities, such as industrial facilities and hospitals that may use radiological materials, to the cumulative dose received by the Kemmerer Unit 1 site maximally exposed individual (discussed in Section 5.9) is negligible.	SMALL
Postulated Accidents	No existing or planned nuclear facilities have been identified that will result in increased risks from postulated accidents to any location within 50 miles (80 kilometers) of Kemmerer Unit 1.	SMALL

Table 7.2-2 Potential Cumulative Impacts (Sheet 4 of 4)

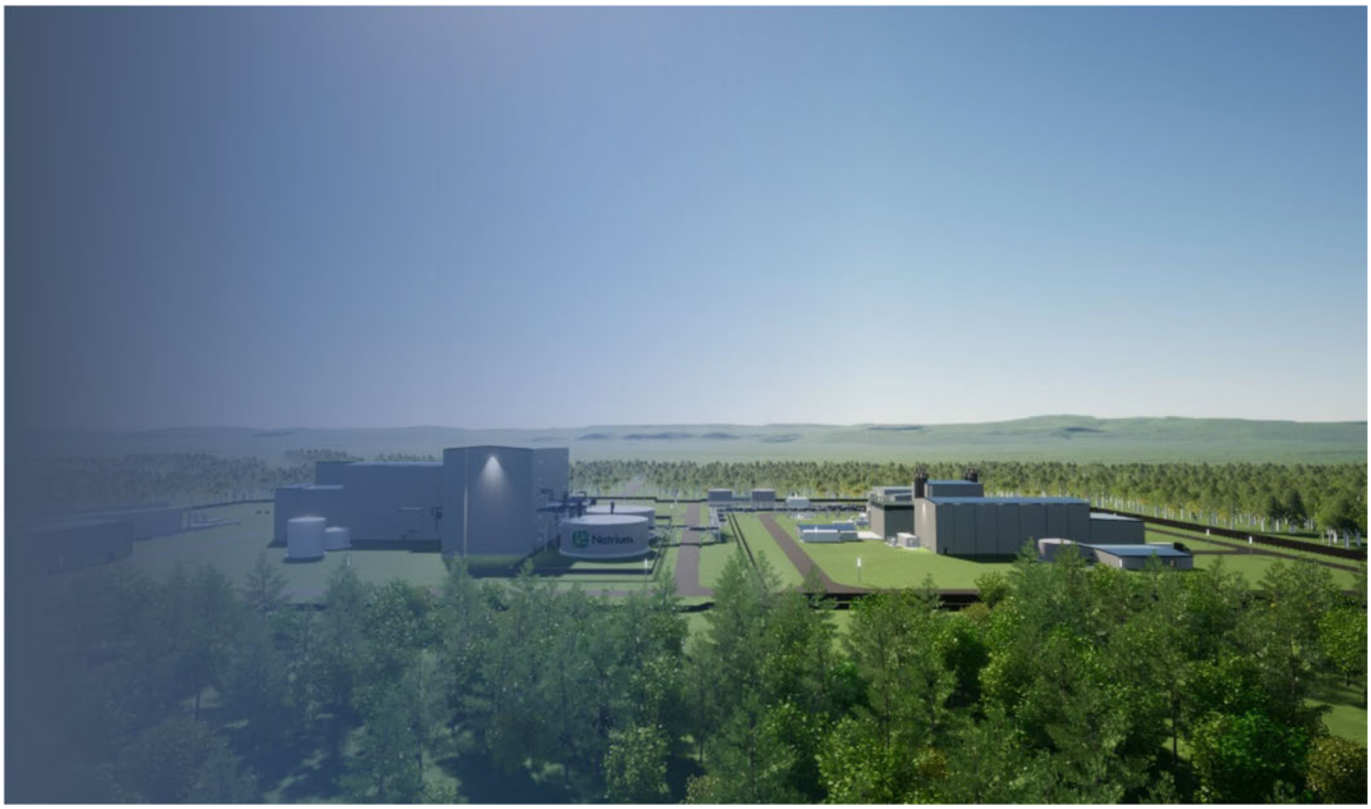
Resource	Description of Potential Cumulative Impacts	Significance of Potential Cumulative Impacts
Fuel Cycle, Transportation, and Decommissioning	While there are differences in enrichment and fuel form, the need for enrichment and the phases of the uranium fuel cycle for Kemmerer Unit 1 are essentially the same as that of the 1000 MWe reference reactor. No existing or planned nuclear facilities have been identified that will contribute to uranium fuel cycle impacts within 50 miles (80 kilometers) of Kemmerer Unit 1, and Kemmerer Unit 1 does not represent a significant impact on other existing or planned uranium fuel cycle facilities within the region of interest.	SMALL
	Local roads and rail lines in the immediate vicinity of Kemmerer Unit 1 will experience an increase in fuel and radwaste shipments. No existing or planned facilities have been identified within 50 miles (80 kilometers) of Kemmerer Unit 1 which will contribute to shipments of fuel and radwaste within the region. Shipments from outside the region may pass through the region. The impact from each shipment will be very small.	SMALL
	No other permanently shutdown, operating, or planned nuclear facilities have been identified within 50 miles (80 kilometers) of Kemmerer Unit 1 that will undergo decommissioning. The volume of waste produced from decommissioning Kemmerer Unit 1 will not contribute significantly to radioactive waste management and disposal resources.	SMALL

Table 7.2-3 Comparison of Naughton Power Plant Units 1 and 2 Conversion Emission Changes

Pollutant	Naughton Power Plant Coal Emissions from 2023 (tons/yr)[a]	Conversion Reductions Factor[b]	Estimated Emissions for Naughton Power Plant after Natural Gas Conversion after 2025 (tons/yr)
Sodium Dioxide	1,434	~0.1	143
Nitrogen Oxides	2,247	~0.25	562
Carbon Dioxide	2,298,852	~0.7	1,609,196

a. Reference 7.2-7

b. Reference 7.2-8



Kemmerer Power Station Unit 1
ER, Chapter 8

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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Chapter 8 Need for Power

8.0 Need for Power

The goal of the need for power analysis is to provide confidence that the power generated by Kemmerer Unit 1 will be produced and consumed in a manner consistent with the stated purpose and need of the project. In previous U.S. Nuclear Regulatory Commission (NRC) licensing actions, under 10 CFR Parts 50 and 52, the purpose and need have typically been described in terms of providing a specific quantity of baseload electricity to a defined service area within a defined time-period. However, neither the National Evironmental Policy Act nor NRC regulations require the purpose and need statement to be restricted to baseload generating capacity. Some projects have other purposes. Understanding these purposes provides greater insight to the benefits of the proposed project and in defining reasonable alternatives identified in Chapter 9.

Additional purposes related to the purpose and need and need for power evaluation are further described in the Draft Advanced Nuclear Reactor Generic Environmental Impact Statement. In the Draft Advanced Nuclear Reactor Generic Environmental Impact Statement, the NRC articulates that the Atomic Energy Act requires the environmental consequences of the project be weighed against the benefits, and that historically the primary benefit of nuclear power generation projects has been to provide electrical power to the grid. And, it is with this, that the need for power in new reactor environmental impact statements has been evaluated by NRC. However, as acknowledged in the Draft Advanced Nuclear Reactor Generic Environmental Impact Statement, some advanced nuclear reactors, as with Kemmerer Unit 1, may be built for additional purposes such as the generation of process heat, to desalinate water, or as a research and demonstration project. In such cases, the NRC states that the applicant will need to present the need for the project (10 CFR 51.45(b)).

As presented in Section 1.2, the proposed action and the purpose and need for the Natrium Demonstration Project is as follows:

> *The proposed Federal action is for the NRC to authorize the construction and operation of Kemmerer Unit 1 in support of participation in the Advanced Reactor Demonstration Program.*
>
> *The purpose and need of the proposed action is to demonstrate the Natrium advanced reactor while ultimately replacing electricity generation capacity in the PacifiCorp service area following planned retirement of existing coal-fired facilities, furthering the environmental goals of the United States Government for achieving a carbon net-zero emission goal by 2050, and providing operational flexibility through energy storage to complement a region with high penetration of renewables.*

The additional purposes for Kemmerer Unit 1, therefore, include:

- Participation in the U.S. Department of Energy Advanced Reactor Demonstration Program, realizing the need for the United States leadership in design, development, and successful deployment of advanced reactors
- Utimately replacing generating capacity with planned retirement of coal-burning facilities, realizing the need for carbon free energy; meeting Federal Executive Order 14008

- Furthering the environmental goals of the U.S. to achieve a carbon net-zero carbon goal by 2050
- Attaining the need for energy storage capabilities to complement renewables

PacifiCorp's resource planning, which evaluates and establishes the need for power, while characterizing the physical, geographic, regulatory, and administrative provisions that affect the forecast supply and demand for power, is also informed by the regulatory requirements that are aligned with many of the additional purposes and need for the project. For instance, the analysis accounts for policies such as: the current tax policy (i.e., the Inflation Reduction Act), current environmental regulations (i.e., the Ozone Transport Rule), and expectations of future tightening of environmental regulations related to emissions from fossil fuel resources. In addition, two of PacifiCorp's jurisdictions also require an increasing proportion of their resource supply be non-emitting (Reference 8.0-1, 9).

The subsequent subsections detail the analysis that PacifiCorp performed as part of its Integrated Resource Plan (IRP). Section 8.1 provides a description of the power market in which Kemmerer Unit 1 will operate. The analysis, as it relates to the need for power and power supply and demand, is included in Sections 8.2 and 8.3. The need for the project, as a participant in the Advanced Reactor Demonstration Program, is presented in Section 8.4. Section 1.3 provides an anticipated date for commencement of full commercial operation of the proposed project.

PacifiCorp's IRP, along with supporting analysis, is the primary references used to support the evaluation to ensure the evaluation is:

- Systematic
- Comprehensive
- Subject to confirmation
- Responsive to forecasting uncertainty

PacifiCorp's long-term resource planning has demonstrated that Kemmerer Unit 1 will be part of a least-cost and least-risk portfolio to meet customer requirements. The 2023 IRP also reflects transmission upgrades resulting from PacifiCorp's cluster study process for evaluating proposed resource additions (Reference 8.0-1, 9 and 11). The content of this chapter is organized into the following sections:

- Description of the Power Market - Section 8.1
- Power Demand - Section 8.2
- Power Supply - Section 8.3
- Summary of the Need for Power Analysis and Conclusions - Section 8.4

References

8.0-1 (PacifiCorp 2023). PacifiCorp. "2023 Integrated Resource Plan (Amended Final)," Volume 1. May 31, 2023.https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2023-irp/2023_IRP_Volume_I_Final_5-31-23.pdf.

8.1 Description of the Power Market

The specific market structure under which Kemmerer Unit 1 will operate is described in this section. A description of the power market is included along with identifying, from a geographic perspective, the relationship to PacifiCorp's Region of Interest.

Bulk Power System, Western Interconnection, and Western Electricity Coordinating Council

Four major electric system networks serve the United States, Canada, and Mexico. Two major networks, the Western Interconnection and Eastern Interconnection, are divided roughly where the Rocky Mountains meet the Great Plains. Quebec and most of Texas are served by their own interconnections. The generating resources and high-voltage transmission equipment that make up these networks constitute the bulk power system. Together these components generate and deliver electricity to customers across North America. (Reference 8.1-6)

The North American Electric Reliability Corporation (NERC) is the electric reliability organization with oversight from the Federal Energy Regulatory Commission. NERC oversees six regional reliability entities. Regional reliability entities have responsibility delegated by NERC for ensuring bulk power system reliability and security within their respective areas. The Western Electricity Coordinating Council is the regional entity responsible for the Western Interconnection and includes Wyoming. The Western Electricity Coordinating Council is required by NERC to monitor and enforce reliability standards by users, owners, and operators of the bulk power system. In addition, the Western Electricity Coordinating Council provides an environment for the development of reliability standards and the coordination of the operating and planning activities of its members, as set forth in the Western Electricity Coordinating Council Bylaws. (Reference 8.1-6)

Balancing Authorities, PacifiCorp East

The actual operation of the electric system is managed by entities called balancing authorities. Most balancing authorities are electric utilities that have taken on the balancing responsibilities for a specific portion of the power system. A balancing authority ensures, in real time, that power system demand and supply are balanced. This balance is needed to maintain the safe and reliable operation of the power system. If demand and supply fall out of balance, local or wide-area blackouts can result. Balancing authorities are responsible for maintaining operating conditions under mandatory reliability standards issued by NERC and approved by the Federal Energy Regulatory Commission and, in Canada, by Canadian regulators. (Reference 8.1-3)

The Western Interconnection consists of 37 balancing authorities: 34 in the United States, 2 in Canada, and 1 in Mexico (Reference 8.1-3). PacifiCorp is a balancing authority that has two balancing authority areas, PacifiCorp East and PacifiCorp West (Reference 8.1-5, 93). Both of PacifiCorp's balancing authority areas are located within the Western Interconnection. Kemmerer Unit 1 will be located within the PacifiCorp East balancing area.(Reference 8.1-6) PacifiCorp operates its balancing authority areas in accordance with NERC reliability standards.

Regional Transmission Organizations and Independent System Operators

Regional Transmission Operators (RTOs) and Independent System Operatiors (ISOs) coordinate, control, and monitor parts of the electric grid. RTOs and ISOs operate the transmission system independently of, and foster competition for electricity generation among, wholesale market participants. RTOs and ISOs do not own transmission or generation assets, nor do they serve or establish pricing for retail electric customers. There are currently three ISOs and four RTOs that operate within the U.S. (Reference 8.1-2)

Utilities in areas where there is no RTO or ISO, as is the case where Kemmerer Unit 1 will be located, serve all of these functions for their own territories (Reference 8.1-2). As such, PacifiCorp is responsible for reliably serving its customers, as these loads are not part of an RTO or ISO.

Energy Imbalance Market, Western Energy Imbalance Market

PacifiCorp balances its short-term resource supply and retail demand by transacting with neighboring balancing authority areas and other counterparts. For balancing purposes, PacifiCorp combined its resources with those of the California ISO (CAISO) through the creation of an energy imbalance market. (Reference 8.1-5, 42) The Western Energy Imbalance Market is a real-time wholesale energy market operated by the CAISO. The Western Energy Imbalance Market became operational November 1, 2014, and as of August 2021 has seen NV Energy, Puget Sound Energy, Arizona Public Service, Portland General Electric, Powerex, Idaho Power, Balancing Authority of Northern California, Salt River Project, Seattle City Light, Los Angeles Department of Water and Power, Northwestern Energy, and Public Service Company of New Mexico join the energy imbalance market. Avista Utilities, Tucson Electric Power, Tacoma Power, and Bonneville Power Administration joined in 2022, with Avangrid Renewables, El Paso Electric, and Western Area Power Administration joining in 2023. (Reference 8.1-5, 42), (Reference 8.1-1, Table 1)

Increased renewable generation has contributed to the need for balancing sub-hourly demand and supply across a broader and more diverse market. A significant contributor to energy imbalance market benefits is transfers across balancing authority areas, providing access to lower-cost supply, while factoring in the cost of compliance with greenhouse gas emissions regulations when energy is transferred into the CAISO balancing authority area. CAISO does not have any other grid operator responsibilities for PacifiCorp’s service areas. Building on the success of Western Energy Imbalance Market, in 2022 PacifiCorp, along with CAISO and other stakeholders, collaborated to develop a market design for an extended day ahead market that CAISO plans to launch in 2025. (Reference 8.1-5, 40, 42, and 90)

PacifiCorp

PacifiCorp provides retail electrical service to customers in six states, Utah, Oregon, Washington, Wyoming, Idaho, and California, and procures generation resources to serve those customers. As such, PacifiCorp files an IRP on a biennial basis with each of the state utility commissions. The IRP fulfills PacifiCorp’s commitment to develop a long-term resource plan that considers cost, risk, uncertainty, and the long-term public interest. The IRP is developed through a collaborative public input process with involvement from regulatory staff, advocacy groups, and other interested parties. (Reference 8.1-5, 35)

The primary objective of the IRP is to identify the best mix of resources to serve customers in the future. The best combination of resources is determined through analysis that measures cost and risk. The least-cost, least-risk resource portfolio, defined as the preferred portfolio, is the portfolio that can be delivered through specific action items at a reasonable cost and with manageable risks while considering customer demand for clean energy and ensuring compliance with state and federal regulatory obligations. (Reference 8.1-5, 9)

The 2023 IRP also includes the transmission upgrades required for proposed new resource additions. The transmission upgrades and the accompanying resources reflect the results of PacifiCorp's cluster study process for evaluating proposed resource additions. In 2020, PacifiCorp transitioned from a serial queue study process that evaluated one generator at a time to an annual cluster study process, which is one study for all new requests in a given area. (Reference 8.1-5, 11 and 12)

By evaluating all newly proposed resource additions in an area at the same time, the cluster study process identifies collective solutions that can allow projects to move forward. As a result, many of the transmission upgrades and resource additions in the first five years of the IRP preferred portfolio reflect cluster study requests submitted in the past two years. The IRP endogenous transmission modeling includes the consideration of 1) new incremental transmission options tied to resource selections, 2) existing transmission rights tied to the use of post-retirement brownfield sites, 3) incorporation of costs associated with these transmission options, and 4) transmission options that interact with multiple or complex elements of the IRP transmission topology. (Reference 8.1-5, 12 and 23)

The PacifiCorp service territory is selected as the intended service area. The primary criteria that were used in the selection of the service area include:

- Ability to meet the Advanced Reactor Demonstration Program schedule
- Planned retirement of coal plants to demonstrate ability to replace a high carbon resource with carbon-free energy
- High penetration of renewables to demonstrate complementary energy storage

Additional motivations in selecting the PacifiCorp service territory as the intended service area include the following:

- PacifiCorp's IRP indicated coal plant retirement dates in concert with the Advanced Reactor Demonstration Program schedule
- In PacifiCorp's service area, California, Oregon, and Washington have each adopted a mandatory renewable portfolio standard, and Utah has adopted a renewable portfolio standard goal (Reference 8.1-5, 76)
- Wyoming Governor Mark Gordon, in a March 2021 State of the State address, called on the state to transition to net-zero carbon emissions within the next three decades (Reference 8.1-4)

Kemmerer Unit 1 will be located in Wyoming and is identified in the preferred portfolio as part of PacifiCorp's IRP. Kemmerer Unit 1 will interconnect to PacifiCorp's transmission system.

References

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8.2 Power Demand

The current and forecast demand for baseload and peak power, along with how the capacity and energy of Kemmerer Unit 1 will be used, is discussed in this section. PacifiCorp's assessment of its load and resource balance, including longterm load forecasts for both energy and coincident peak load, are integral inputs to its Integrated Resource Plan analysis.

PacifiCorp's 2023 IRP is developed by working through fundamental planning steps that begin with development of key inputs and assumptions to inform the modeling and portfolio development process. The portfolio development process is where a range of different resource portfolios that meet projected gaps in the load and resource balance is developed. Variants of the top performing resource portfolio are then developed to further analyze impacts of specific resource actions within the top performing portfolio. PacifiCorp then analyzes these different resource portfolios to measure the comparative cost, risk, reliability, and emission levels in determining the preferred portfolio. (Reference 8.2-7, 9 and 10)

Capacity balances are an input to the IRP analysis. The balances are composed of a year-by-year comparison of projected loads against the existing resource base, with and without available market purchases, assumed coal unit retirements, and incremental new energy efficiency savings from the preferred portfolio before adding new generating resources. (Reference 8.2-7, 147)

The presented capacity balance is developed by first determining the system coincident peak load for each of the first ten years of the planning horizon. Then the annual firm capacity availability of the existing resources is determined for each of these annual system summer and winter peak periods, as applicable, and summed as follows:

Existing Resources = Thermal + Hydro + Renewable + Storage + Firm Purchases + Qualifying Facilities – Firm Sales

The peak load, private generation, demand response, existing energy efficiency, and new energy efficiency (from the preferred portfolio) are netted together for each of the annual system summer and winter peaks, as applicable, to compute the annual peak obligation:

Obligation = Load – Private Generation – Demand Response – New and Existing Energy Efficiency

The level of reserves to be added to the obligation is then calculated. This is accomplished by taking the net system obligation calculated above multiplied by the 13 percent planning reserve margin adopted for the 2023 IRP. The formula for this calculation is as follows:

Planning Reserves = Obligation x Planning Reserve Margin

Finally, the annual capacity position is derived by adding the computed reserves to the obligation and then subtracting that amount from existing resources, including available market purchases, as shown in the following formula:

> Capacity Position = (Existing Resources + Available Market purchases) – (Obligation + Planning Reserves). (Reference 8.2-7, 163 and 164)

Table 8.2-4 through Table 8.2-7 show the annual capacity balances and component line items for the summer peak and winter peak. Balances for PacifiCorp's system as well as the east and west control areas, PacifiCorp East and PacifiCorp West, are shown in Table 8.2-8. While the PacifiCorp East and PacifiCorp West balancing areas are broken out separately, the PacifiCorp system is planned for and dispatched on a system basis. (Reference 8.2-7, Table 6.11 and 6.12)

There are several factors influencing the forecast demand for power accounted for in the analysis:

- Projected Growth: On average, non-California Independent Service Organization Western Electricity Coordinating Council regional demand grew 1.1 percent in 2022 to 469,000 megawatt-hours (MWh), and demand is expected to continue growing to approximately 474,000 MWh in 2023. Generally, non-California Independent Service Organization Western Electricity Coordinating Council utilities have adjusted their 5-year load expectations up for two reasons. The first reason is the broad sector emissions reductions targets which are electrifying residential, transportation, and industrial processes. The second reason is population growth in the Pacific Northwest and Arizona as a result of people moving for job opportunities and lower costs of living. Interconnection-wide peak hour demand occurs in the summer. Based on data submitted by balancing authorities, the peak demand for the Western Interconnection is expected to grow from 175 gigawatts (GW) in 2023 to 194 GW in 2032, an increase of almost 11 percent. (Reference 8.2-7, 49 and 118)
- Demand Side Management: For resource planning purposes, PacifiCorp classifies demand side management resources into four categories. These resources are captured through programmatic efforts that promote efficient electricity use through various intervention strategies aimed at changing energy use during peak periods (load control), timing (price response and load shifting), intensity (energy efficiency), or behaviors (education and information). These programs will reduce the need to buy reserve power on the market and create greater customer benefits. In the coming years, the ongoing conservation and cost-effective, demand-response initiatives will seek to deliver 799 MW of energy efficiency between 2023 and 2026 and 372 MW of demand response between 2023 and 2026. The four categories include the following:
    - Demand Response - Resources from fully dispatchable or scheduled firm capacity product offerings and programs: Program examples include residential and small commercial central air conditioner load control programs that are dispatchable and irrigation load management and interruptible or curtailment programs (which may be dispatchable or scheduled firm, depending on the particular program design or event noticing requirements).

- Energy Efficiency - Resources from non-dispatchable, firm energy, and capacity product offerings and programs: Energy efficiency programs are energy and related capacity savings which are achieved through facilitation of technological advancements in equipment, appliances, structures, or repeatable and predictable voluntary actions on a customer's part to manage the energy use at their business or home. These programs generally provide financial incentives or services to customers to improve the efficiency of existing or new residentia or commercial buildings.
- Price Response and Load Shifting - Resources from price-responsive energy and capacity product offerings and programs: Price response and loadshifting programs seek to achieve short duration (hour by hour) energy and capacity savings from actions taken by customers voluntarily, based on a financial incentive or signal.
- Education and Information - Non-incentivised behavioral-based savings achieved through broad energy education and communication efforts: Education and information programs promote reductions in energy or capacity usage through broad-based energy education and communication efforts. The program objectives are to help customers better understand how to manage their energy usage through no-cost actions such as conservative thermostat settings and turning off appliances, equipment, and lights when not in use. (Reference 8.2-7, 156 and 157)

● Climate Change: PacifiCorp's load forecast is based on historical weather, adjusted for expectations and impacts from climate change. The historical weather is defined by the 20-year period of 2002 through 2021. The climate change weather uses the data from the historical period and adjusts the percentile of the data to achieve the expected target average annual temperature and calculate the heating degree day and the cooling degree day impacts and peak producing weather impacts within the energy forecast and peak forecast (Reference 8.2-7, 126).

● Electrification Adjustment: The load forecast used for the 2023 IRP portfolio development includes the PacifiCorp's expectations for transportation electrification based on current and expected electric vehicle adoption trends (Reference 8.2-7, 84).

● Regulatory Planning Environment:
  - In 2015, the U.S. Environmental Protection Agency (EPA) revised the ozone National Ambient Air Quality Standards. States were then required to submit revised State Implementation Plans by 2018 to comply with the new, more stringent standards. EPA took two actions in 2023 to address the states' downwind impacts obligations under the 2015 National Ambient Air Quality Standards. First, in February 2023, EPA disapproved 21 states' submissions. Each of those states proposed to take no action to revise their State Implementation Plans, having concluded that existing controls were adequate or that they did not contribute significantly to nonattainment or interfere with maintenance of federal ozone standards in other states. Second, on March 15, 2023, EPA issued a Federal Implementation Plan, the Good Neighbor Plan, covering those 21 states, as well as two additional states that had not submitted any revisions to their plans. Various states, including Utah, and private

parties, including PacifiCorp, have filed lawsuits challenging EPA's disapproval of states' plans as well as the Good Neighbor Plan. On February 21, 2024, the U.S. Supreme Court is scheduled to hear oral argument in a consolidated action of a number of applications to postpone implementation of the EPA's Good Neighbor Plan (Reference 8.2-1).

- In 2019, the Washington Legislature approved the Clean Energy Transformation Act, which requires that 100 percent of electricity sales in Washington be 100 percent renewable and non-emitting by 2045. PacifiCorp filed its first Clean Energy Action Plan for the Clean Energy Transformation Act in its 2021 IRP and laid the groundwork for compliance with the Clean Energy Transformation Act in an analysis based on the preferred portfolio. PacifiCorp filed its first Clean Energy Implementation Plan on December 30, 2021, and has refiled this document responsive to Washington staff and stakeholder feedback in March 2023.
- In 2021, Oregon passed House Bill 2021, which directs utilities to reduce emissions levels below 2010–2012 baseline levels by 80 percent by 2030, 90 percent by 2035, and 100 percent by 2040. Utilities will also convene a Community Benefits and Impacts Advisory Group. The 2023 IRP includes modeling to support House Bill 2021 which is expanded upon in PacifiCorp's first Oregon Clean Energy Plan submission and filed concurrently with the IRP. (Reference 8.2-7, 39 and 73)

The analysis shows that after incorporating future energy efficiency savings from the preferred portfolio, PacifiCorp's system is capacity deficient, before adding proxy resources, beginning in 2026, as shown in Table 8.2-5 (Reference 8.2-7, 147).

References

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Table 8.2-1 Historical Summer Peak - System Capacity Loads and Resources without Resource Additions (Sheet 1 of 2)

East						
	2017	**2018**	**2019**	**2020**	**2021**	**2022**
Thermal	6,406	6,403	6,123	5,963	5,478	-
Hydroelectric	103	107	114	74	86	108
Renewable	201	196	194	406	668	-
Purchase	249	249	249	242	193	-
Qualifying Facilities	656	648	691	891	537	-
Class 1 DSM	323	323	323	323	-	-
Sale and Sales and Ancillary Services	(652)	(655)	(655)	(655)	(20)	(267)
Non-Owned Reserved	(37)	(35)	(35)	(35)	-	-
East Existing Resources	7,249	7,236	7,004	7,210	6,943	6,268
Load	7,008	6,853	6,911	7,039	7,096	7,274
Private Generation	(33)	(108)	(166)	(125)	(51)	(57)
Interruptible	(195)	(195)	(195)	(177)	-	-
DSM	(138)	(118)	(172)	-	-	-
Existing - Demand Response	-	-	-	-	(520)	(594)
Existing - Energy Efficiency	-	-	-	-	(43)	-
New Energy Efficiency	-	-	-	(144)	(48)	(134)
East Total Obligation	6,643	6,432	6,378	6,592	6,434	6,489
Planning Reserve Margin (13%) - East Reserves	889	862	855	880	836	844
East Obligation + Reserves	7,532	7,294	7,233	7,471	7,271	7,332
East Position	(283)	(58)	(229)	(261)	(327)	(1,065)
Available Front Office Transactions	318	318	318	309	0	0
Source:	Reference 8.2-2	Reference 8.2-3	Reference 8.2-3	Reference 8.2-4	Reference 8.2-5	Reference 8.2-6

Numbers in parentheses are negative.

Table 8.2-1 Historical Summer Peak - System Capacity Loads and Resources without Resource Additions (Sheet 2 of 2)

West						
	2017	**2018**	**2019**	**2020**	**2021**	**2022**
Thermal	2,247	2,254	2,254	2,048	2,139	-
Hydroelectric	855	861	747	570	577	955
Renewable	93	90	88	383	194	-
Purchase	18	18	1	1	1	-
Qualifying Facilities	195	235	220	390	158	-
Class 1 DSM	3	3	3	3	-	-
Sale and Sales and Ancillary Services	(165)	(165)	(165)	(165)	(109)	(209)
Non-Owned Reserved	(2)	(3)	(3)	(3)	-	-
West Existing Resources	3,244	3,294	3,146	3,227	2,961	3,177
Load	3,155	3,238	3,279	3,387	3,351	3,372
Private Generation	(1)	(13)	(19)	(21)	(23)	(28)
Interruptible	0	0	0	0	-	-
DSM	(67)	(64)	(94)	-	-	-
Existing - Demand Response	-	-	-	-	0	0
Existing - Energy Efficiency	-	-	-	-	(24)	-
New Energy Efficiency	-	-	-	(81)	(26)	(73)
West Total Obligation	3,087	3,161	3,166	3,285	3,278	3,271
Planning Reserve Margin (13%) - West Reserves	401	411	412	427	426	425
West Obligation + Reserves	3,488	3,572	3,578	3,712	3,704	3,696
West Position	(245)	(279)	(432)	(484)	(743)	(520)
Available Front Office Transactions	1,352	1,352	1,352	1,159	500	500
Source:	Reference 8.2-2	Reference 8.2-3	Reference 8.2-3	Reference 8.2-4	Reference 8.2-5	Reference 8.2-6

Numbers in parentheses are negative.

Table 8.2-2 Historical Winter Peak - System Capacity Loads and Resources without Resource Additions (Sheet 1 of 2)

East						
	2017	**2018**	**2019**	**2020**	**2021**	**2022**
Thermal	6,514	6,513	6,233	6,020	5,478	-
Hydroelectric	71	72	72	54	50	80
Renewable	201	196	199	992	765	-
Purchase	734	734	734	727	173	-
Qualifying Facilities	647	691	742	672	204	-
Class 1 DSM	21	0	0	0	-	-
Sale	(170)	(173)	(173)	(173)	(16)	(212)
Non-Owned Reserved	(37)	(35)	(35)	(35)	-	
East Existing Resources	7,981	7,998	7,772	8,258	6,654	5,781
Load	5,550	5,560	5,590	5,629	5,538	5,691
Private Generation	(11)	(0)	(0)	(1)	(0)	(1)
Interruptible	(195)	(195)	(195)	(177)	-	-
Existing Class2 DSM	(92)	(56)	(84)	(107)	-	-
Existing - Demand Response	-	-	-	-	(239)	(322)
Existing - Energy Efficiency	-	-	-	-	(32)	-
New Energy Efficiency	-	-	-	-	(39)	(108)
East Total Obligation	5,252	5,310	5,311	5,344	5,229	5,260
Planning Reserve Margin (13%) - East Reserves	708	716	716	718	680	684
East Obligation + Reserves	5,961	6,025	6,026	6,062	5,908	5,944
East Position	2,020	1,973	1,746	0	746	(163)
Available Front Office Transactions	318	318	318	309	300	300
Source:	Reference 8.2-2	Reference 8.2-3	Reference 8.2-3	Reference 8.2-4	Reference 8.2-5	Reference 8.2-6

Numbers in parentheses are negative.

Table 8.2-2 Historical Winter Peak - System Capacity Loads and Resources without Resource Additions (Sheet 2 of 2)

West						
	2017	**2018**	**2019**	**2020**	**2021**	**2022**
Thermal	2,308	2,316	2,316	2,040	2,205	-
Hydroelectric	993	917	943	670	497	1,038
Renewable	93	90	95	672	105	-
Purchase	6	1	1	1	1	-
Qualifying Facilities	200	224	211	142	53	-
Class 1 DSM	0	0	0	0	-	-
Sale and Sales and Ancillary Service	(162)	(162)	(162)	(154)	(88)	(192)
Non-Owned Reserved	(2)	(3)	(3)	(3)	-	-
West Existing Resources	3,436	3,383	3,402	3,369	2,773	3,168
Load	3,264	3,342	3,376	3,416	3,318	3,330
Private Generation	(1)	0	(0)	(0)	(0)	(0)
Interruptible	0	0	0	0	-	-
DSM	(74)	(55)	(80)	(89)	-	-
Existing - Demand Response	-	-	-	-	0	0
Existing - Energy Efficiency	-	-	-	-	(23)	-
New Energy Efficiency	-	-	-	-	(25)	(76)
West Total Obligation	3,188	3,286	3,295	3,327	3,270	3,253
Planning Reserve Margin (13%) - West Reserves	414	427	428	432	425	423
West Obligation + Reserves	3,603	3,713	3,723	3,759	400	3,676
West Position	(167)	(330)	(321)	(390)	2,373	(508)
Available Front Office Transactions	1,352	1,352	1,352	1,159	700	700
Source:	Reference 8.2-2	Reference 8.2-3	Reference 8.2-3	Reference 8.2-4	Reference 8.2-5	Reference 8.2-6

Numbers in parentheses are negative.

Table 8.2-3 Historical Summer and Winter Peak - System Capacity Loads and Resources without Resource Additions

Summer Peak	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Total Resources	10,493	10,530	10150	10,437	9,904	9,445
Obligation	9,730	9,594	9544	9,876	9,712	9,760
Reserves	1,290	1,273	1266	1,307	1,263	1,269
Obligation + Reserves	11,020	10,867	10811	11,183	10,975	11,029
System Position	(527)	(337)	(661)	(746)	(1,071)	(1,584)
Available Front Office Transactions	1,670	1,670	1,670	1,468	500	500
Source:	Reference 8.2-2	Reference 8.2-3	Reference 8.2-3	Reference 8.2-4	Reference 8.2-5	Reference 8.2-6
Winter Peak	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Total Resources	11,417	11,381	11,174	8,270	9,427	8,950
Obligation	8,441	8,596	8,606	10,014	8,498	8,513
Reserves	1,123	1,143	1,144	1,325	1,105	1,107
Obligation + Reserves	9,564	9,739	9,750	11,339	9,603	9,620
System Position	1,854	1,643	1,425	(3,070)	(176)	(670)
Available Front Office Transactions	1,670	1,670	1,670	1,468	1,000	1,000
Source:	Reference 8.2-2	Reference 8.2-3	Reference 8.2-3	Reference 8.2-4	Reference 8.2-5	Reference 8.2-6

Numbers in parentheses are negative.

Table 8.2-4 East Summer Peak - System Capacity Loads and Resources without Resource Additions

East																				
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**
Thermal	5,271	5,056	4,873	4,893	4,857	4,523	4,191	4,332	4,454	3,866	2,352	2,347	2,338	2,759	2,198	1,100	1,111	710	748	827
Hydroelectric	87	70	65	65	65	62	60	62	64	59	53	53	52	62	57	47	47	41	43	47
Renewable	771	648	541	460	480	484	405	412	388	376	364	356	332	419	346	300	305	261	257	263
Storage	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Purchase	104	100	31	27	26	23	22	22	23	21	19	19	19	22	20	16	16	14	15	17
Qualifying Facilities	834	983	576	375	358	329	285	296	275	265	241	241	225	261	192	173	170	151	152	154
Sale	(21)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Existing Resources	**7,047**	**6,857**	**6,087**	**5,821**	**5,786**	**5,422**	**4,963**	**5,125**	**5,205**	**4,608**	**3,029**	**3,017**	**2,966**	**3,523**	**2,812**	**1,636**	**1,649**	**1,178**	**1,215**	**1,308**
Load	7,485	7,720	7,889	7,886	8,074	8,406	8,376	8,516	8,731	8,849	8,981	9,134	9,301	9,541	9,680	9,844	9,987	10,160	10,340	10,565
Private Generation	(83)	(118)	(157)	(200)	(248)	(301)	(263)	(311)	(364)	(418)	(472)	(522)	(571)	(620)	(668)	(716)	(763)	(808)	(856)	(902)
Existing- Demand Response	(159)	(166)	(132)	(112)	(107)	(98)	(93)	(97)	(96)	(87)	(76)	(78)	(78)	(94)	(80)	(66)	(68)	(61)	(65)	(68)
Existing- Energy Efficiency	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)	(70)
New Energy Efficiency	(71)	(99)	(162)	(231)	(321)	(412)	(484)	(581)	(739)	(848)	(931)	(1,023)	(1,096)	(1,205)	(1,368)	(1,437)	(1,529)	(1,592)	(1,638)	(1,612)
East Total Obligation	**7,101**	**7,267**	**7,368**	**7,272**	**7,328**	**7,525**	**7,466**	**7,457**	**7,461**	**7,426**	**7,432**	**7,442**	**7,486**	**7,553**	**7,494**	**7,556**	**7,558**	**7,630**	**7,712**	**7,913**
Planning Reserve Margin (13%)	923	945	958	945	953	978	971	969	970	965	966	967	973	982	974	982	983	992	1,003	1,029
East Obligation + Reserves	8,024	8,212	8,326	8,218	8,281	8,503	8,437	8,427	8,431	8,391	8,399	8,409	8,459	8,535	8,468	8,538	8,541	8,622	8,715	8,942
East Position	(977)	(1,355)	(2,239)	(2,397)	(2,494)	(3,081)	(3,473)	(3,302)	(3,227)	(3,783)	(5,370)	(5,392)	(5,493)	(5,013)	(5,656)	(6,902)	(6,891)	(7,443)	(7,500)	(7,633)
Available Market Purchases	325	325	325	325	325	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: Reference 8.2-7. Numbers in parentheses are negative.

Table 8.2-5 West Summer Peak - System Capacity Loads and Resources without Resource Additions

West																				
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**
Thermal	631	603	575	585	579	560	542	468	481	446	397	396	395	466	289	234	237	206	217	240
Hydroelectric	604	535	515	525	520	502	486	503	517	480	426	426	424	501	461	374	379	329	346	383
Renewable	120	118	91	87	85	84	80	82	83	70	67	68	64	80	65	56	62	54	56	56
Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Purchase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Qualifying Facilities	255	291	200	150	139	128	110	115	111	105	96	97	92	111	90	79	77	68	69	71
Sale	(75)	(54)	(51)	(50)	(50)	(48)	(43)	(46)	(47)	(42)	(38)	(38)	(37)	(43)	(40)	(34)	(34)	(29)	(30)	(33)
West Existing Resources	**1,536**	**1,493**	**1,331**	**1,297**	**1,274**	**1,226**	**1,176**	**1,123**	**1,148**	**1,061**	**950**	**949**	**939**	**1,115**	**866**	**711**	**722**	**629**	**658**	**716**
Load	3,656	3,863	4,067	4,140	4,309	4,481	4,655	4,711	4,873	4,913	4,992	5,070	5,147	5,230	5,320	5,400	5,481	5,575	5,667	5,807
Private Generation	(25)	(37)	(51)	(67)	(83)	(101)	(85)	(100)	(117)	(135)	(153)	(169)	(185)	(199)	(214)	(228)	(242)	(256)	(270)	(283)
Existing- Demand Response	(8)	(7)	(7)	(6)	(6)	(5)	(5)	(5)	(5)	(5)	(4)	(4)	(4)	(5)	(4)	(4)	(4)	(3)	(3)	(4)
Existing- Energy Efficiency	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)
New Energy Efficiency	(37)	(66)	(107)	(125)	(150)	(182)	(193)	(228)	(269)	(277)	(313)	(337)	(343)	(369)	(406)	(440)	(429)	(423)	(434)	(485)
West Total Obligation	**3,556**	**3,722**	**3,871**	**3,911**	**4,039**	**4,162**	**4,342**	**4,347**	**4,451**	**4,466**	**4,491**	**4,529**	**4,584**	**4,627**	**4,665**	**4,697**	**4,775**	**4,863**	**4,929**	**5,005**
Planning Reserve Margin (13%)	462	484	503	508	525	541	564	565	579	581	584	589	596	601	606	611	621	632	641	651
West Obligation + Reserves	4,018	4,205	4,374	4,420	4,564	4,703	4,906	4,912	5,030	5,047	5,075	5,117	5,180	5,228	5,271	5,308	5,396	5,495	5,570	5,656
West Position	(2,482)	(2,712)	(3,044)	(3,122)	(3,290)	(3,476)	(3,730)	(3,789)	(3,882)	(3,986)	(4,125)	(4,169)	(4,241)	(4,113)	(4,406)	(4,597)	(4,675)	(4,866)	(4,913)	(4,940)
Available Market Purchases	3,000	3,000	3,000	3,000	3,000	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500

Source: Reference 8.2-7. Numbers in parentheses are negative.

Table 8.2-6 East Winter Peak - System Capacity Loads and Resources without Resource Additions

East																				
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**
Thermal	5,894	5,321	5,478	5,151	5,547	5,383	4,804	4,613	5,407	4,786	3,201	3,007	2,712	2,702	2,471	1,398	1,307	934	876	941
Hydroelectric	71	57	56	54	57	58	54	54	61	58	56	52	47	49	52	46	44	41	39	42
Renewable	790	999	877	827	921	682	568	585	604	618	501	491	466	535	507	397	358	364	327	337
Storage	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Purchase	116	70	34	28	28	27	24	24	27	25	24	22	20	21	22	20	19	18	17	18
Qualifying Facilities	243	274	234	217	233	183	166	169	182	179	151	138	127	129	130	107	102	94	91	92
Sale	(23)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Existing Resources	**7,093**	**6,721**	**6,679**	**6,279**	**6,786**	**6,333**	**5,617**	**5,445**	**6,280**	**5,667**	**3,933**	**3,711**	**3,373**	**3,438**	**3,182**	**1,968**	**1,829**	**1,452**	**1,349**	**1,429**
Load	5,833	5,890	6,032	6,039	6,253	6,426	6,496	6,586	6,680	6,739	6,882	6,990	7,093	7,171	7,319	7,448	7,592	7,711	7,816	7,969
Private Generation	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Existing- Demand Response	(68)	(63)	(59)	(48)	(49)	(46)	(41)	(41)	(47)	(44)	(42)	(39)	(35)	(37)	(39)	(34)	(34)	(32)	(30)	(32)
Existing- Energy Efficiency	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)
New Energy Efficiency	(41)	(80)	(150)	(180)	(238)	(301)	(346)	(416)	(544)	(598)	(669)	(729)	(770)	(827)	(951)	(986)	(1,025)	(1,090)	(1,057)	(1,144)
East Total Obligation	**5,684**	**5,707**	**5,783**	**5,771**	**5,926**	**6,038**	**6,069**	**6,089**	**6,048**	**6,056**	**6,130**	**6,181**	**6,246**	**6,266**	**6,289**	**6,387**	**6,492**	**6,549**	**6,688**	**6,751**
Planning Reserve Margin (13%)	739	742	752	750	770	785	789	792	786	787	797	804	812	815	818	830	844	851	869	878
East Obligation + Reserves	6,423	6,449	6,535	6,521	6,696	6,823	6,858	6,880	6,835	6,843	6,927	6,985	7,059	7,080	7,106	7,217	7,336	7,400	7,558	7,629
East Position	670	272	144	(242)	90	(490)	(1,241)	(1,435)	(554)	(1,176)	(2,994)	(3,274)	(3,685)	(3,643)	(3,924)	(5,249)	(5,507)	(5,948)	(6,209)	(6,200)
Available Market Purchases	325	325	325	325	325	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300

Source: Reference 8.2-7. Numbers in parentheses are negative.

Table 8.2-7 West Winter Peak - System Capacity Loads and Resources without Resource Additions

West																				
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**
Thermal	745	707	687	672	701	698	655	563	630	606	575	541	490	514	369	325	307	291	271	291
Hydroelectric	749	692	655	642	670	680	637	637	714	684	657	616	556	581	614	541	517	484	451	485
Renewable	89	100	91	83	85	72	66	76	83	75	59	61	54	64	65	51	46	46	46	50
Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Purchase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Qualifying Facilities	81	84	79	72	69	67	60	60	67	61	57	55	50	52	53	46	44	42	40	42
Sale	(80)	(58)	(55)	(53)	(56)	(48)	(43)	(45)	(50)	(46)	(41)	(39)	(36)	(40)	(39)	(34)	(30)	(30)	(27)	(29)
West Existing Resources	**1,586**	**1,526**	**1,459**	**1,417**	**1,470**	**1,471**	**1,377**	**1,292**	**1,445**	**1,381**	**1,308**	**1,234**	**1,116**	**1,172**	**1,063**	**929**	**885**	**834**	**782**	**841**
Load	3,485	3,738	3,911	3,993	4,148	4,336	4,397	4,415	4,530	4,562	4,607	4,654	4,702	4,772	4,830	4,878	4,943	4,995	5,054	5,132
Private Generation	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Existing- Demand Response	0	0	0	(0)	0	0	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Existing- Energy Efficiency	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)	(29)
New Energy Efficiency	(35)	(66)	(98)	(168)	(214)	(244)	(310)	(331)	(360)	(399)	(426)	(469)	(506)	(581)	(597)	(634)	(663)	(648)	(719)	(671)
West Total Obligation	**3,421**	**3,643**	**3,783**	**3,795**	**3,905**	**4,062**	**4,057**	**4,054**	**4,141**	**4,133**	**4,151**	**4,155**	**4,166**	**4,161**	**4,202**	**4,214**	**4,249**	**4,317**	**4,304**	**4,430**
Planning Reserve Margin (13%)	445	474	492	493	508	528	527	527	538	537	540	540	542	541	546	548	552	561	560	576
West Obligation + Reserves	409	407	4,274	4,289	4,413	4,591	4,585	4,581	4,679	4,670	4,690	4,695	4,708	4,702	4,749	4,762	4,802	4,878	4,864	5,006
West Position	1,176	1,119	(2,815)	(2,872)	(2,942)	(3,120)	(3,208)	(3,289)	(3,234)	(3,289)	(3,382)	(3,461)	(3,592)	(3,530)	(3,686)	(3,832)	(3,917)	(4,044)	(4,082)	(4,165)
Available Market Purchases	3,000	3,000	3,000	3,000	3,000	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700

Source: Reference 8.2-7. Numbers in parentheses are negative.

Table 8.2-8 System Summer and Winter Peak - System Capacity Loads and Resources without Resource Additions

System																				
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**
Summer																				
Total Resources	8,584	8,351	7,418	7,118	7,060	6,648	6,139	6,248	6,352	5,668	3,979	3,965	3,905	4,638	3,678	2,346	2,371	1,808	1,873	2,025
Total Obligation	10,657	10,989	11,239	11,184	11,367	11,686	11,808	11,804	11,912	11,892	11,924	11,970	12,070	12,180	12,159	12,253	12,333	12,493	12,641	12,918
Planning Reserves (13%)	1,385	1,429	1,461	1,454	1,478	1,519	1,535	1,535	1,549	1,546	1,550	1,556	1,569	1,583	1,581	1,593	1,603	1,624	1,643	1,679
Obligation + Reserves	12,043	12,417	12,700	12,638	12,845	13,206	13,343	13,339	13,461	13,438	13,474	13,526	13,640	13,763	13,739	13,845	13,937	14,117	14,285	14,598
System Position	(3,459)	(4,066)	(5,283)	(5,519)	(5,785)	(6,557)	(7,204)	(7,091)	(7,109)	(7,769)	(9,495)	(9,561)	(9,734)	(9,126)	(10,061)	(11,499)	(11,566)	(12,309)	(12,412)	(12,573)
Available Market Purchases	3,325	3,325	3,325	3,325	3,325	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Uncommitted FOTs to meet remaining Need	3,459	4,066	5,283	3,325	3,325	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Net Surplus/ (Deficit)	**0**	**0**	**0**	**(2,194)**	**(2,460)**	**(6,057)**	**(6,704)**	**(6,591)**	**(6,609)**	**(7,269)**	**(8,995)**	**(9,061)**	**(9,234)**	**(8,626)**	**(9,561)**	**(10,999)**	**(11,066)**	**(11,809)**	**(11,912)**	**(12,073)**
Winter																				
Total Resources	8,678	8,248	8,138	7,696	8,257	7,804	6,994	6,737	7,726	7,048	5,241	4,945	4,489	4,610	4,245	2,897	2,714	2,285	2,131	2,270
Total Obligation	9,104	9,350	9,566	9,566	9,831	10,101	10,126	10,143	10,190	10,189	10,281	10,336	10,412	10,427	10,491	10,601	10,741	10,865	10,992	11,181
Planning Reserves (13%)	1,184	1,215	1,244	1,244	1,278	1,313	1,316	1,319	1,325	1,325	1,337	1,344	1,354	1,355	1,364	1,378	1,396	1,413	1,429	1,454
Obligation + Reserves	10,288	10,565	10,809	10,810	11,109	11,414	11,442	11,461	11,514	11,513	11,617	11,680	11,766	11,782	11,855	11,979	12,138	12,278	12,422	12,635
System Position	(1,609)	(2,318)	(2,671)	(3,114)	(2,852)	(3,610)	(4,448)	(4,724)	(3,788)	(4,466)	(6,376)	(6,735)	(7,277)	(7,173)	(7,609)	(9,082)	(9,424)	(9,992)	(10,291)	(10,364)
Available Market Purchases	**3,325**	**3,325**	**3,325**	**3,325**	**3,325**	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Uncommitted FOTs to meet remaining Need	1,609	2,318	2,671	3,114	2,852	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Net Surplus/ (Deficit)	**0**	**0**	**0**	**0**	**0**	**(2,610)**	**(3,448)**	**(3,724)**	**(2,788)**	**(3,466)**	**(5,376)**	**(5,735)**	**(6,277)**	**(6,173)**	**(6,609)**	**(8,082)**	**(8,424)**	**(8,992)**	**(9,291)**	**(9,364)**

Source: Reference 8.2-7. Numbers in parentheses are negative.

8.3 Power Supply

The PacifiCorp IRP process includes fundamental planning steps that begin with the development of key inputs and assumptions to inform the modeling and preferred portfolio-development process. The portfolio-development process is informed by analyzing a range of different resource portfolios that meet projected gaps in the load and resource balance presented in Section 8.2, each characterized by the type, timing, and location of new resources in PacifiCorp's system. (Reference 8.3-1, 9)

8.3.1 Existing Supply of Generating Capacity

The existing supply of generating capacity in the PacifiCorp planning area is a key input to PacifiCorp's modeling efforts. The existing supply of generating capacity presented below for the PacifiCorp power market is disaggregated by fuel type. (Reference 8.3-1, 147)

8.3.1.1 Thermal Plants

A listing of PacifiCorp's existing coal- and natural gas-fueled thermal plants is provided in Table 8.3-1 and Table 8.3-2. The tables also include the "Retirement Year" or "Assumed End of Life Year" that reflects the year a resource retires or converts to another energy source (e.g., coal to natural gas). The existing total nameplate capacity is 5,246 megawatts (MW) for coal and 3,137 MW for natural gas (Reference 8.3-1, Tables 6.2 and 6.3).

8.3.1.2 Renewable Resources

8.3.1.2.1 Wind

PacifiCorp either owns wind resources or purchases wind resources under contract. The existing wind facilities owned by PacifiCorp are shown in Table 8.3-3 followed by the existing wind power-purchase agreements (PPA) in Table 8.3-4. The total capacity of PacifiCorp-owned wind resources is 2,935 MW, and the total non-owned wind resources is 2,535 MW (Reference 8.3-1, Tables 6.4 and 6.5).

8.3.1.2.2 Solar

PacifiCorp has a total of 87 solar projects under contract representing 3,278 MW of nameplate capacity. Of these, two recently signed solar resources also include a total of 350 MW of battery storage. The solar resources are listed in Table 8.3-5 (Reference 8.3-1, Table 6.6).

8.3.1.2.3 Geothermal

PacifiCorp owns and operates the Blundell geothermal plant in Utah, which uses naturally created steam to generate electricity. The plant has a net generation capacity of 34 MW. Blundell is a fully renewable, zero-discharge facility. The Oregon Institute of Technology added a new small qualifying facility (QF) using geothermal technologies to produce renewable power for the campus that is rated at 0.28 MW. PacifiCorp also has a Power-Purchase Agreement with the 20 MW Soda Lake geothermal project located in Nevada, which became operational in November 2019 (Reference 8.3-1, 153 and 154).

8.3.1.2.4 Biomass and Biogas

PacifiCorp has biomass and biogas agreements with 12 projects totaling approximately 80 MW of nameplate capacity (Reference 8.3-1, 154).

8.3.1.2.5 Storage

In addition to the battery storage component of the solar projects described in Section 8.3.1.2.2, PacifiCorp has two existing or committed battery storage projects totaling approximately 3 MW of nameplate capacity, Panguitch with a capacity of 1 MW and Oregon Institute of Technology with a capacity of 2 MW. Both are new projects added in the 2023 IRP (Reference 8.3-1, 154).

8.3.1.2.6 Renewables—Private Generation

Table 8.3-6 provides a breakdown of private generation customers and capacity. As of March 12, 2023, 99.68 percent of the private generation customers were solar, accounting for 99.51 percent of the capacity of private generation (Reference 8.3-1, 154).

8.3.1.2.7 Hydroelectric Generation

PacifiCorp owns or purchases nearly 1,400 MW of hydroelectric generation capacity. In addition to being non-emitting generation sources, hydro resources provide various operational benefits that can include flexible generation, spinning reserves, and voltage control. PacifiCorp-owned hydroelectric plants are located in California, Idaho, Montana, Oregon, Washington, Wyoming, and Utah (Reference 8.3-1, 154).

The amount of electricity available from hydroelectric plants is dependent upon a number of factors, including the water content of snowpack accumulations in the mountains upstream of its hydroelectric facilities and the amount of precipitation that falls in its watershed. Operational limitations of the hydroelectric facilities are affected by varying water levels, licensing requirements for fish and aquatic habitat, and flood control. Table 8.3-7 provides the capacity for each of PacifiCorp's owned hydroelectric generation facilities. PacifiCorp-owned existing hydroelectric capacity is 968 MW, and its hydroelectric-purchased capacity is 463 MW (Reference 8.3-1, 155 and Table 6.9).

8.3.2 Existing Demand Side Management Resource Summary

Table 8.3-8 summarizes PacifiCorp's existing demand side management programs, their assumed impact, and how the programs are treated for purposes of incremental resource planning. Note that since incremental energy efficiency is determined as an outcome of the resource portfolio modeling and is characterized as a new resource in the preferred portfolio, existing energy efficiency appears as having zero MW. Similarly, demand response resources available to the preferred portfolio are characterized as incremental (Reference 8.3-1, Table 6.10).

8.3.3 Known or Anticipated Power Purchases or Sales

PacifiCorp obtains the remainder of its capacity and energy requirements through long-term firm contracts, short-term firm contracts, and spot market purchases. Figure 6.2 of the IRP presents the contract capacity in place for 2023 through 2042. As shown in the figure, major capacity reductions in solar purchases, wind purchases, and Qualifying Facility contracts occur. For planning purposes, PacifiCorp assumes interruptible load contracts and demand responses are extended through the end of the IRP study period. All contracts are shown at their peak capacity contribution levels. (Reference 8.3-1, 159 and Figure 6.2)

8.3.4 Potential Capacity Additions, Retirements, Uprates, and Fuel Switches - Developing The Preferred Portfolio

The purpose of the load and resource balance is to compare annual obligations (demand) to the annual capability of PacifiCorp's existing resources after retirements and future energy efficiency savings from the 2023 IRP preferred portfolio without new generating resource additions (Reference 8.3-1, 160).

In developing the modeling inputs, PacifiCorp produced a range of different resource portfolios that met projected gaps in the load and resource balance, each uniquely characterized by the type, timing, and location of new resources in PacifiCorp's system. The resource portfolios produced for the 2023 IRP were created considering a wide range of potential coal and natural gas retirement dates, options to convert to gas or to retrofit for carbon capture utilization and sequestration for certain coal units, options to install selective catalytic reduction or selective non-catalytic reduction technologies, and other planning uncertainties. (Reference 8.3-1, 9)

PacifiCorp then developed variants of the top-performing resource portfolio to further analyze impacts of specific resource actions within the top-performing portfolio. In the resource portfolio analysis step, PacifiCorp conducted targeted reliability analysis to ensure portfolios had sufficient flexible capacity resources to meet reliability requirements. PacifiCorp then analyzed these different resource portfolios to measure the comparative cost, risk, reliability, and emission levels. This resource portfolio analysis ultimately informed selection of the least-cost and least-risk portfolio, the 2023 IRP preferred portfolio, the portfolio that can be delivered through specific action items at a reasonable cost and with manageable risks while considering customer demand for clean energy and ensuring compliance with Federal and State regulatory obligations. (Reference 8.3-1, 9 and 10)

References

8.3-1 (PacifiCorp 2023). PacifiCorp. "2023 Integrated Resource Plan (Amended Final)." Volume I. May 31, 2023. https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2023-irp/2023_IRP_Volume_I_Final_5-31-23.pdf. Accessed: November 4, 2023.

Table 8.3-1 Thermal Plants – Coal

Coal Plant	State	PacifiCorp Percentage Share (%)	Assumed End of Life Year	Nameplate Capacity (MW)
Colstrip 3	Montana	10	2025	74
Colstrip 4	Montana	10	2029	74
Craig 1	Colorado	19	2025	82
Craig 2	Colorado	19	2028	79
Dave Johnston 1	Wyoming	100	2028	99
Dave Johnston 2	Wyoming	100	2028	106
Dave Johnston 3	Wyoming	100	2027	220
Dave Johnston 4	Wyoming	100	2039	330
Hayden 1	Colorado	24	2028	44
Hayden 2	Colorado	13	2027	33
Hunter 1	Utah	94	2031	418
Hunter 2	Utah	60	2032	269
Hunter 3	Utah	100	2032	471
Huntington 1	Utah	100	2032	459
Huntington 2	Utah	100	2032	450
Jim Bridger 1 GC 24	Wyoming	67	2037	354
Jim Bridger 2 GC 24	Wyoming	67	2037	359
Jim Bridger 3 GC 30	Wyoming	67	2037	349
Jim Bridger 4 GC 30	Wyoming	67	2037	351
Naughton 1 GC 26	Wyoming	100	2036	156
Naughton 2 GC 26	Wyoming	100	2036	201
Wyodak	Wyoming	80	2039	268
TOTAL – Coal				**5,246**

Table 8.3-2 Thermal Plants – Natural Gas

Natural Gas Plant	State	PacifiCorp Percentage Share (%)	Assumed End of Life Year	Nameplate Capacity (MW)
Chehalis	Washington	100	2043	500
Currant Creek	Utah	100	2045	540
Gadsby 1	Utah	100	2032	64
Gadsby 2	Utah	100	2032	69
Gadsby 3	Utah	100	2032	105
Gadsby 4	Utah	100	2032	40
Gadsby 5	Utah	100	2032	40
Gadsby 6	Utah	100	2032	40
Hermiston	Oregon	100	2036	237
Lake Side	Utah	100	2047	580
Lake Side 2	Utah	100	2049	677
Naughton 3	Wyoming	100	2036	247
TOTAL – Natural Gas				**3,137**

Table 8.3-3 Utility-Owned Wind Resources

Utility-Owned Wind Projects	State	Capacity (MW)
Goodnoe Hills East	Washington	94
Leaning Juniper	Washington	101
Marengo I	Washington	156
Marengo II	Washington	78
Cedar Springs 2	Wyoming	199
Dunlap 1	Wyoming	111
Ekola Flats 1	Wyoming	250
Foote Creek I	Wyoming	41
Glenrock I	Wyoming	99
Glenrock III	Wyoming	39
High Plains	Wyoming	99
McFadden Ridge 1	Wyoming	29
Pryor Mountain	Wyoming	240
Rolling Hills	Wyoming	99
Seven Mile Hill	Wyoming	99
Seven Mile Hill II	Wyoming	20
TB Flats 1-2	Wyoming	500
Foote Creek II-IV	Wyoming	43
Rock Creek I	Wyoming	190
Rock Creek II	Wyoming	400
Rock River	Wyoming	50
TOTAL – Owned Wind		**2,935**

Table 8.3-4 Non-Owned Wind Resources
(Sheet 1 of 2)

Power Purchase Agreements	State	PPA or QF	Capacity (MW)
Wolverine Creek	Idaho	PPA	65
Combine Hills	Washington	PPA	41
Cedar Springs I	Wyoming	PPA	199
Cedar Springs III	Wyoming	PPA	120
Three Buttes Power	Wyoming	PPA	99
Top of the World	Wyoming	PPA	200
Meadow Creek Project Five Pine	Idaho	QF	40
North Point	Idaho	QF	80
Mariah	Oregon	QF	10
Orem Family	Oregon	QF	8
Latigo	Utah	QF	60
Mountain Power I	Utah	QF	61
Mountain Power II	Utah	QF	80
Power County Park North	Utah	QF	23
Power County Park South	Utah	QF	23
Spanish Fork Park 2	Utah	QF	19
Tooele	Utah	QF	3
Big Top	Washington	QF	2
Butter Creek Power	Washington	QF	5
Chopin	Washington	QF	8
Four Corners	Washington	QF	10
Four Mile Canyon	Washington	QF	10
Orchard 1	Washington	QF	10
Orchard 2	Washington	QF	10
Orchard 3	Washington	QF	10
Orchard 4	Washington	QF	10
Oregon Trail	Washington	QF	9.9
Pacific Canyon	Washington	QF	8
Sand Ranch	Washington	QF	10
Three Mile Canyon	Washington	QF	8
Wagon Trail	Washington	QF	3
Ward Butte	Washington	QF	7
BLM Rawlins	Wyoming	QF	0.1
Pioneer Park I	Wyoming	QF	80
Cedar Creek	Idaho	PPA	152
Anticline	Wyoming	PPA	101
Boswell	Wyoming	PPA	320

Table 8.3-4 Non-Owned Wind Resources
(Sheet 2 of 2)

Power Purchase Agreements	State	PPA or QF	Capacity (MW)
Cedar Springs IV	Wyoming	PPA	350
Two Rivers	Wyoming	PPA	280
TOTAL – Purchased Wind			**2,535**

Table 8.3-5 Solar Resources
(Sheet 1 of 3)

Power Purchase Agreements	State	PPA or QF	Solar Capacity (MW)	Storage Capacity (MW)
Black Cap	Oregon	PPA	2	-
Millican	Oregon	PPA	59	-
Old Mill	Oregon	PPA	5	-
Oregon Solar Incentive Project	Oregon	PPA	9	-
Prineville	Oregon	PPA	39	-
Appaloosa Solar IA	Utah	PPA	120	-
Appaloosa Solar IB	Utah	PPA	80	-
Castle Solar (Retail 1)	Utah	PPA	20	-
Castle Solar (Retail 2)	Utah	PPA	20	-
Cove Mountain	Utah	PPA	58	-
Cove Mtn II	Utah	PPA	121	-
Elektron Solar 20Yr	Utah	PPA	10	-
Elektron Solar 25Yr	Utah	PPA	69	-
Graphite	Utah	PPA	79	-
Horseshoe	Utah	PPA	63	-
Hunter	Utah	PPA	99	-
Milford	Utah	PPA	98	-
Pavant III	Utah	PPA	20	-
Rocket	Utah	PPA	79	-
Sigurd	Utah	PPA	79	-
Adams	Oregon	QF	10	-
Bear Creek	Oregon	QF	10	-
Black Cap II	Oregon	QF	8	-
Bly	Oregon	QF	8	-
Buckaroo Solar 1	Oregon	QF	3	-
Buckaroo Solar 2	Oregon	QF	3	-
Captain Jack	Oregon	QF	2.7	-
Elbe	Oregon	QF	10	-
Ivory	Oregon	QF	10	-
Linkville Solar	Oregon	QF	3	-
Merrill	Oregon	QF	10	-
Norwest Energy 2 (Neff)	Oregon	QF	10	-
Norwest Energy 4 (Bonanza)	Oregon	QF	6	-
Norwest Energy 7 (Eagle Point)	Oregon	QF	10	-
Norwest Energy 9 Pendleton	Oregon	QF	6	-

Table 8.3-5 Solar Resources
(Sheet 2 of 3)

Power Purchase Agreements	State	PPA or QF	Solar Capacity (MW)	Storage Capacity (MW)
OR Solar 1, LLC (Sprague River)	Oregon	QF	7	-
OR Solar 2, LLC (Agate Bay)	Oregon	QF	10	-
OR Solar 3, LLC (Turkey Hill)	Oregon	QF	10	-
OR Solar 5, LLC (Merrill)	Oregon	QF	8	-
OR Solar 6, LLC (Lakeview)	Oregon	QF	10	-
OR Solar 7, LLC (Jacksonville)	Oregon	QF	10	-
OR Solar 8, LLC (Dairy)	Oregon	QF	10	-
OSLH Collier	Oregon	QF	10	-
Pilot Rock Solar 1	Oregon	QF	3	-
Pilot Rock Solar 2	Oregon	QF	3	-
Skysol	Oregon	QF	54	-
Solorize Rogue	Oregon	QF	0.1	-
Tumbleweed	Oregon	QF	10	-
Tutuilla Solar	Oregon	QF	3	-
Wallowa County	Oregon	QF	0.4	-
Beryl	Utah	QF	3	-
Buckhorn	Utah	QF	3	-
CedarValley	Utah	QF	3	-
Chiloquin	Utah	QF	10	-
Enterprise	Utah	QF	77	-
Escalante I	Utah	QF	77	-
Escalante II	Utah	QF	77	-
Escalante III	Utah	QF	77	-
Ewauna	Utah	QF	1	-
Ewauna II	Utah	QF	3	-
Granite Mountain - East	Utah	QF	78	-
Granite Mountain - West	Utah	QF	49	-
GranitePeak	Utah	QF	3	-
Greenville	Utah	QF	2	-
Iron Springs	Utah	QF	78	-
Laho	Utah	QF	3	-
Milford 2	Utah	QF	3	-
Milford Flat	Utah	QF	3	-
Pavant	Utah	QF	48	-
Pavant II	Utah	QF	49	-
Quichapa I	Utah	QF	3	-

Table 8.3-5 Solar Resources
(Sheet 3 of 3)

Power Purchase Agreements	State	PPA or QF	Solar Capacity (MW)	Storage Capacity (MW)
Quichapa II	Utah	QF	3	-
Quichapa III	Utah	QF	3	-
Red Hill	Utah	QF	78	-
South Milford	Utah	QF	3	-
SunE1	Utah	QF	3	-
SunE2	Utah	QF	3	-
SunE3	Utah	QF	3	-
Three Peaks	Utah	QF	78	-
Woodline	Utah	QF	8	-
Sunnyside Solar	Washington	QF	5	-
Sage I	Wyoming	QF	20	-
Sage II	Wyoming	QF	20	-
Sage III	Wyoming	QF	17	-
Sweetwater	Wyoming	QF	79	-
Green River	Utah	PPA	400	200
Faraday	Utah	PPA	525	150
TOTAL – Purchased Solar			**3,278**	**350**

Table 8.3-6 Private Generation Customers and Capacity

	Solar	Wind	Gas[1]	Hydro	Mixed[2]
Nameplate (kW)	772,160	847	784	965	1,233
Capacity (Percentage of Total)	99.51%	0.11%	0.10%	0.12%	0.16%
Number of Customers	86,449	192	3	21	63
Customer (Percentage of Total)	99.68%	0.22%	0.00%	0.02%	0.07%

[1] Gas includes: biofuel, waste gas, and fuel cells

[2] Mixed includes projects with multiple technologies; one project is solar and biogas, and the others are solar and wind.

Table 8.3-7 PacifiCorp Hydroelectric Generation Facilities (Sheet 1 of 2)

Plant	River System	State	Capacity (MW)
East			
Cutler	Bear	Utah	29
Grace	Bear	Utah	33
Oneida	Bear	Utah	27.9
Soda	Bear	Utah	14
Small East [1]	Other	Utah	20.5
West			
Bend	Other	Oregon	1
Big Fork	Other	Montana	4.6
Swift 1	Lewis	Washington	263.6
Yale	Lewis	Washington	163.6
Merwin	Lewis	Washington	151
Clearwater 1	N. Umpqua	Oregon	17.9
Clearwater 2	N. Umpqua	Oregon	31
Fish Creek	N. Umpqua	Oregon	10.4
Lemolo 1	N. Umpqua	Oregon	32
Lemolo 2	N. Umpqua	Oregon	38.5
Slide Creek	N. Umpqua	Oregon	18
Soda Springs	N. Umpqua	Oregon	11.6
Toketee	N. Umpqua	Oregon	45
Eagle Point	Rogue	Oregon	2.8
Prospect 1	Rogue	Oregon	4.6
Prospect 2	Rogue	Oregon	36
Prospect 3	Rogue	Oregon	7.7
Prospect 4	Rogue	Oregon	0.9
Fall Creek	Other	Oregon	2
Wallowa Falls	Other	Oregon	1.1
Owned Hydroelectric			**968**
QF	Various	California	9.4
QF	Various	Idaho	22.7
QF	Various	Oregon	40.0
QF	Various	Utah	2.2
QF	Various	Washington	2.9
Swift 2[2]	Lewis	Washington	51.8
Copco 1	Klamath [3]	Oregon/California	28
Copco 2	Klamath [3]	Oregon/California	34
Iron Gate	Klamath [3]	Oregon/California	18.8

Table 8.3-7 PacifiCorp Hydroelectric Generation Facilities (Sheet 2 of 2)

Plant	River System	State	Capacity (MW)
JC Boyle	Klamath [3]	Oregon/California	83
Mid-Columbia	Columbia	Washington	170
Hydroelectric Contracts			**463**
TOTAL – Hydroelectric			**1,431**

[1] Includes Ashton, Paris, Pioneer, Weber, Stairs, Granite, Veyo, Sand Cove, Viva Naughton, and Gunlock.

[2] Cowlitz County PUD owns Swift No. 2, and it is operated in coordination with other Lewis River projects by PacifiCorp.

[3] The Klamath projects are being operated by PacifiCorp under an agreement with the Klamath River Renewal Corporation (KRRC) until the KRRC commences removal activities, expected in 2024.

Table 8.3-8 Existing Demand Side Management Resource Summary

Program	Description	Energy Savings or Capacity at Generator	Included as Existing Resources for 2023-2042 Period
Demand Response	Residential/small commercial air conditioner load control	135 MW summer[1]	Yes
	Irrigation load management	210 MW summer	Yes
	Interruptible contracts	239 MW summer	Yes
	WattSmart Batteries	11 MW summer	Yes
	WattSmart Business[2]	30 MW summer	Yes
Energy Efficiency	PacifiCorp and Energy Trust of Oregon programs	0 MW[3]	No. Energy efficiency programs are modeled as resource options in the portfolio-development process and included in the preferred portfolio.
Price Response and Load Shifting	Time-based pricing	Energy and capacity impacts are not available/measured	No. Historical savings from customer responses to pricing signals are reflected in the load forecast.
	Inverted rate pricing	Energy and capacity impacts are not available/measured	No. Historical savings from customer response to pricing structure is reflected in load forecast.
Education and Information	Energy education	Energy and capacity impacts are not available/measured	No. Historical savings from customer participation are reflected in the load forecast.

[1] A/C load control is based on long duration event characterization which assumes 50% cycling of A/Cs. A faster event (<1 hr) is characterized as 270 MW in the model.

[2] Commercial and industrial curtailment programs have been recently approved in OR, WA, ID, and UT. Totals represent the existing resources at the time of modeling which were less than currently approved and effective programs in March 2023.

[3] Due to the timing of the 2023 IRP load forecast, there is a small amount (100 MW) of existing Energy Efficiency included.

8.4 Summary of the Need for Power or Need for Project Analysis and Conclusions

8.4.1 Need for Project

Section 1.2 describes the purposes and need for Kemmerer Unit 1. Beyond the need for power, the purposes of Kemmerer Unit 1 include the following:

- Participation in the U.S. Department of Energy Advanced Reactor Demonstration Program, realizing the need for the U.S. leadership in design, development, and successful deployment of advanced reactors
- Ultimately replacing generating capacity from planned retirement of coal-burning facilities, realizing the need for carbon free energy; meeting Federal Executive Order 14008
- Furthering the environmental goals of the U.S. to achieve a carbon net-zero carbon goal by 2050
- Attaining the need for energy storage capabilities to complement renewables

<u>Participation in U.S. Department of Energy Advanced Reactor Demonstration Program</u>

The U.S. Department of Energy implements programs such as the Advanced Reactor Demonstration Program in support of its mission to maintain the Nation's technological leadership position in the global nuclear industry and ensure national energy security. The U.S. Department of Energy identified that work remains to ensure continued U.S. leadership in the research, design, and development of advanced reactors and to ensure the successful deployment of these reactors in the U.S. and international marketplaces. In support of this mission need, the U.S. Department of Energy developed the Advanced Reactor Demonstration Program with funding provided through the Fiscal Year 2020 Consolidation Appropriations Act, (H.R. 1865) (Reference 8.4-2).

Elements of the Advanced Reactor Demonstration Program include advanced reactor demonstrations, risk reduction for future demonstrations, regulatory development, and advanced reactor safeguards. The advanced reactor demonstrations portion of the program serves to speed the demonstration of technologies through cost-shared partnerships with U.S. industry. The supported projects must result in a fully functional advanced reactor being licensed by the U.S. Nuclear Regulatory Commission within 7 years of the award. The Natrium Reactor Plant was selected by the U.S. Department of Energy to demonstrate the advanced reactor and molten salt energy storage system. Deployment of the Natrium Reactor Plant at the Kemmerer Unit 1 Site supports participation in the Advanced Reactor Demonstration Program.

<u>Need for Power</u>

PacifiCorp's IRP analysis shows that after incorporating future energy efficiency savings from the preferred portfolio, PacifiCorp's system is capacity deficient, before adding proxy resources, in the summer and winter starting in 2026. PacifiCorp's modeling and planning process identified the preferred portfolio, the best combination of resources determined through analysis that measures cost and risk. The least-cost, least-risk resource portfolio, defined as the preferred portfolio, is the portfolio that can be delivered through specific action items at a reasonable cost and with manageable risks while considering customer demand for clean energy and ensuring compliance with Federal and State regulatory obligations. (Reference 8.4-1, 9, 147)

The 2023 IRP preferred portfolio specifically includes Kemmerer Unit 1 and anticipates operation by summer 2030. By the end of 2032, the preferred portfolio includes 1,000 megawatts (MW) of additional advanced nuclear resources, and through 2037, the preferred portfolio includes 1,240 MW of non-emitting peaking resources. Advancement of these two technologies will be critical to the planned transition of coal resources in a way that will minimize impacts to employees and communities. Over the 20-year planning horizon, the 2023 IRP preferred portfolio includes 9,114 MW of new wind and 7,855 MW of new solar. (Reference 8.4-1, 10)

As presented in the preceding sections, PacifiCorp's IRP analysis meets the following four acceptance criteria:

- Systematic. PacifiCorp's IRP analysis has been performed according to an objective, thorough, methodical, deliberate, and organized manner leading to a conclusion supported by the data.
- Comprehensive. PacifiCorp's IRP analysis is detailed, broad in scope, and includes a sufficient number of relevant factors so that the reviewer can reasonably conclude that the analysis may be considered "complete."
- Subject to confirmation. PacifiCorp's IRP process analysis is independently reviewed or confirmed by another entity.
- Responsive to forecasting uncertainty. PacifiCorp's IRP modeling methodology is stable and robust and is not unduly affected by the presence of outliers or other small departures from the modeled assumptions and remains capable of characterizing the relative importance of uncertainty among input variables during sensitivity analyses.

Systematic and Comprehensive

PacifiCorp's IRP was developed by working through five fundamental planning steps that are both systematic and comprehensive and begin with development of key inputs and assumptions that inform the modeling and portfolio-development process. PacifiCorp's selection of the 2023 IRP preferred portfolio is supported by this data analysis as outlined in Sections 8.2 and 8.3 (Reference 8.4-1, 9-10).

Subject to Confirmation

PacifiCorp's 2023 IRP was developed through an open and extensive public process, with input from a diverse group of stakeholders including customer advocacy groups, community members, regulatory staff, and other interested parties allowing for both confirmation and feedback regarding the analysis. The topics covered at the stakeholder meetings included all facets of the IRP process, ranging from specific input assumptions to the portfolio modeling and risk analysis strategies employed. Throughout this effort, PacifiCorp received valuable input from stakeholders and presented findings from a broad range of studies and technical analyses that shaped and informed the 2023 IRP. (Reference 8.4-1, 9)

Responsive to Forecasting Uncertainty

The resource portfolios produced for the 2023 IRP were created considering forecasting uncertainties such as effects from current federal emissions regulations, and pending federal regulations on new source review and greenhouse gas emissions. A plannig resource margin of 13 percent was also applied. The planning resource margin represents an incremental capacity requirement, applied as an increase to the obligation to ensure that there will be sufficient capacity available on the system to manage uncertain events, such as weather and outages, and known requirements, such as operating reserves. (Reference 8.4-1, 43, 163-164)

Regulatory Compliance, Coal Replacement and Carbon Reduction

The preferred portfolio is responsive to the rapidly expanding arena of new Federal and State regulatory requirements, most notably the Federal Inflation Reduction Act and expansion of the Ozone Transport Rule. PacifiCorp’s analysis ensured that compliance could be achieved by maintaining reliable service with incremental investments in transmission infrastructure and non-emitting sources, such as Kemmerer Unit 1, along with other nonemitting, flexible resources capable of responding to changes in energy from an increasing supply of wind and solar resources. (Reference 8.4-1, 9)

Inclusion of Kemmerer Unit 1 in the preferred portfolio assists in addressing the capacity deficiency, supports compliance with Federal regulations, and aligns with the purpose and need of the project.

References

8.4-1 (PacifiCorp 2023). PacifiCorp. “2023 Integrated Resource Plan (Amended Final).” Volume II. May 31, 2023. https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2023-irp/2023_IRP_Volume_II_Final_5-31-23.pdf. Accessed November 4, 2023.

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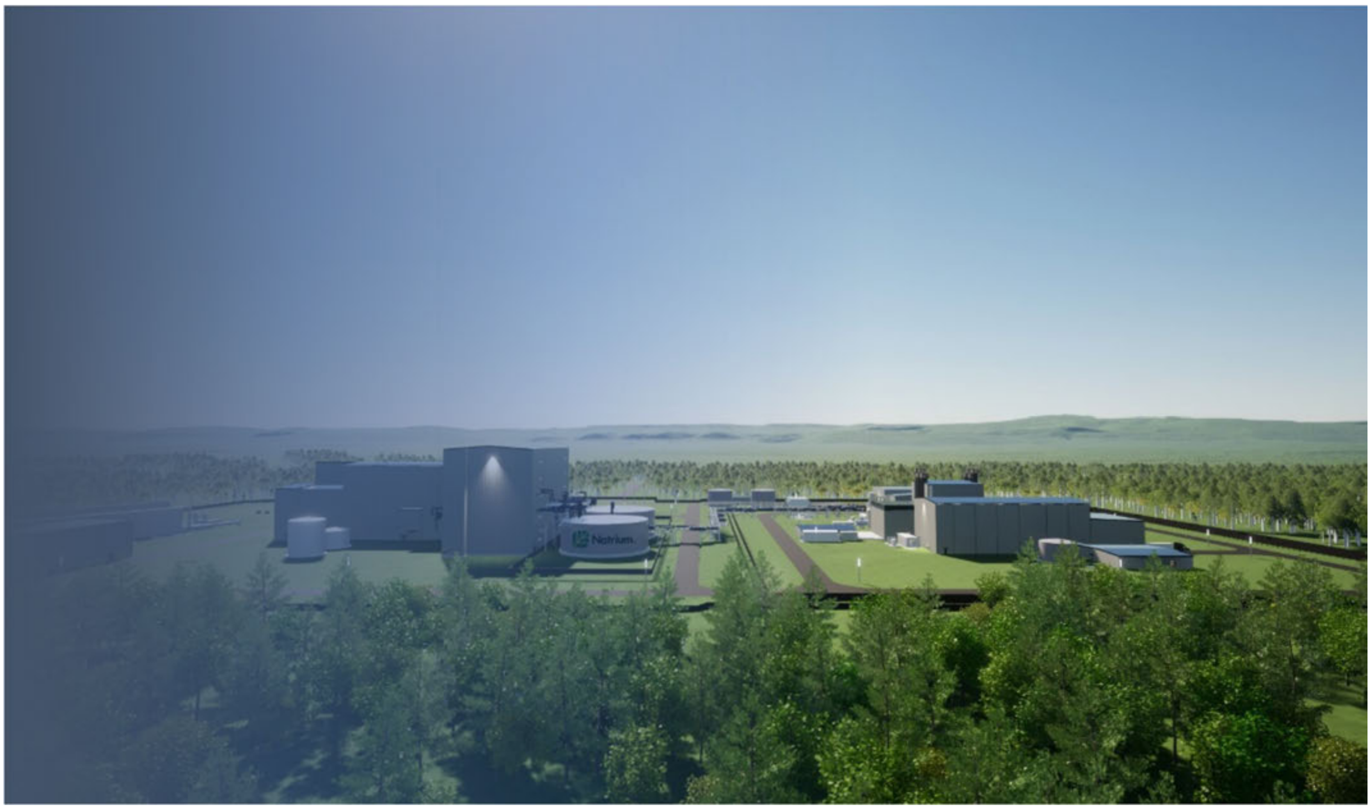

Kemmerer Power Station Unit 1
ER, Chapter 9

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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Chapter 9 Environmental Impacts of Alternatives

9.0 Environmental Impacts of Alternatives

Section 102(2)(C)(iii) of the National Environmental Policy Act of 1969 (NEPA) requires Environmental Impact Statements to discuss “a reasonable range of alternatives to the proposed agency action, including an analysis of any negative environmental impacts of not implementing the proposed agency action in the case of a no action alternative, that are technically and economically feasible, and meet the purpose and need of the proposal.” NEPA Section 102(2)(H) also requires agencies to “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” In turn, as required by 10 CFR 51.45(b)(3), an applicant's environmental report must discuss alternatives to the proposed action with sufficiently complete detail to aid the Commission in fulfilling these statutory obligations.

As presented in Section 1.2, the proposed action, the purpose, and the need for Kemmerer Unit 1 is as follows:

> The proposed Federal action is for the U.S. Nuclear Regulatory Commission to authorize the construction and operation of Kemmerer Unit 1 in support of participation in the Advanced Reactor Demonstration Program.
>
> The purpose and need of the proposed action is to demonstrate the Natrium advanced reactor while ultimately replacing electricity generation capacity in the PacifiCorp service area following planned retirement of existing coal-fired facilities, furthering the environmental goals of the United States Government for achieving a carbon net-zero emission goal by 2050, and providing operational flexibility through energy storage to complement a region with high penetration of renewables.

As acknowledged in the draft advanced nuclear reactor Generic Environmental Impact Statement (Reference 9.0-1), some advanced nuclear reactors, as with Kemmerer Unit 1, may be built for “additional purposes” other than traditional baseload power generation (e.g., to generate process heat, to desalinate water, or as a research and demonstration project). As such, each alternative analysis developed considers the additional purposes of Kemmerer Unit 1 in relation to the need for the project.

Details within this chapter support the evaluation of impacts of the no action alternative as specified by NEPA Section 102(2)(C)(iii). Descriptions are provided to afford sufficient detail to assess the impacts of alternative generation or plant systems relative to those of the proposed action, purpose, and need.

This chapter includes the following sections:

- No-Action Alternative – Section 9.1
- Energy Alternatives – Section 9.2
- Site-Selection Process – Section 9.3
- System Alternatives – Section 9.4

References

9.0-1 (NRC 2021). U.S. Nuclear Regulatory Commission. “NUREG-2249, Generic Environmental Impact Statement for Advanced Nuclear Reactors, Draft Report for Comment.” October 2021. Accession No. ML21222A055. https://www.nrc.gov/docs/ML2122/ML21222A055.pdf. Accessed February 20, 2024.

9.1 No-Action Alternative

Under the no-action alternative, the U.S. Nuclear Regulatory Commission will not issue the Construction Permit for an advanced commercial nuclear power reactor, a Natrium Reactor Plant, at the Kemmerer Unit 1 Site. The no-action alternative will result in a project delay and potentially jeopardize the Natrium Demonstration Project.

The no-action alternative will prevent achieving the following project objectives:

- The Advanced Reactor Demonstration Program may not be realized:
  - Assurance of continued U.S. leadership in the research, design, and development of advanced reactors
  - Assurance of the successful deployment of advanced reactors in the U.S. and international marketplaces
- The Natrium Demonstration Project would not be achieved:
  - To provide carbon-free electric power production, furthering the environmental goals of the U.S. Government for achieving a net-zero emission goal, economy-wide, by no later than 2050 (Reference 9.1-1)
  - To provide carbon-free energy to areas with retiring or planned closures of coal power generators. As coal plants retire due to utility pledges to cut carbon emissions, communities nationwide face the loss of affordable, reliable energy and also well-paying, highly skilled jobs
  - To provide operational flexibility through energy storage to complement renewables
- Kemmerer Unit 1 would not be constructed or operated; therefore, the environmental impacts and benefits from building and operating Kemmerer Unit 1 would not occur. The following benefits, including the economic benefits, would not be realized:
  - The direct employment of 1,712 people at the peak of construction and 250 workers during operations:

    During operations, 220 operations workers would migrate into the economic region. As described in Section 5.4, the creation of 220 Kemmerer Unit 1 operations jobs would inject $6.4 to $64 million per year into the economic region economy and replace displaced jobs. For each of the new 220 operations jobs, an estimated 1.8559 indirect jobs would be created and result in an additional 408 jobs in the economic region for a total of 628 new jobs. This increase in employment and procurement of needed goods and services associated with operation of Kemmerer Unit 1 could inject millions of dollars into the regional economy.

- Economic benefits to communities undergoing the loss of jobs from retiring coal plants:

  Operations of Kemmerer Unit 1 would further the U.S. Government’s Justice40 Initiative to ensure that Federal agencies work with State and local communities to deliver at least 40 percent of the overall benefits from Federal investments in climate and clean energy to disadvantaged communities. (Reference 9.1-1).

- Replacement of baseload generation capacity to be lost with the retirement of two coal units:

  Though PacifiCorp is planning for the conversion of coal units to natural gas at Naughton Power Plant, the addition of advanced nuclear generation capacity supplied by Kemmerer Unit 1 operations would address the clean energy investment requirements from the Justice40 Initiative.

PacifiCorp has committed to support the development of the Kemmerer Unit 1 Site to bring it to the market for the benefit of grid reliability and stability in Wyoming and Utah. PacifiCorp has also committed to retire coal units by 2030. The preferred portfolio in the PacifiCorp 2023 Integrated Resource Plan includes 500 megawatts (MW) from the nuclear power plant at Kemmerer Unit 1, 1,000 MW of additional advanced nuclear resources, and through 2037 the preferred portfolio includes 1,240 MW of other non-emitting peaking resources. PacifiCorp plans 11 pumped hydroelectic storage projects in Utah, Wyoming, Oregon, Idaho, and Washington. PacifiCorp is pursuing permit applications with federal regulators to advance these projects; no formal plans have been made at this time. Over the 20-year planning horizon, the PacifiCorp 2023 Integrated Resource Plan preferred portfolio also includes 9,114 MW of new wind and 7,855 MW of new solar resources. (Reference 9.1-2)

Although the no-action alternative would not result in the adverse environmental impacts that the proposed Kemmerer Unit 1 would, the substantial technological and economic benefits to the local community, Lincoln County, the State of Wyoming, and the Nation that would result from the building and operating an advanced sodium reactor will not be realized under the no-action alternative.

References

9.1-1 (EO14008 2021). *“Executive Order on Tackling the Climate Crisis at Home and Abroad.”* January 27, 2021. Posted by the Environmental Protection Agency on March 16, 2021. https://www.regulations.gov/document/EPA-HQ-OPPT-2021-0202-0012. Accessed March 2022.

9.1-2 (PacifiCorp 2023). “Integrated Resource Plan.” Volumes 1 and 2. May 31, 2023. https://www.pacificorp.com/energy/integrated-resource-plan.html. Accessed February 29, 2024.

9.2 Energy Alternatives

Energy alternatives, other than nuclear energy, that have the potential to meet the purpose and need for the proposed project are analyzed in this section. The evaluation of energy alternatives is generally a two-step process. The first step in the process is to identify reasonable energy alternatives, eliminating energy sources that cannot meet the purpose and need. The next step in the evaluation is to compare the impacts of the identified reasonable energy alternatives (energy sources that can meet the purpose and need) to the impacts of the proposed project and determine if any of the alternative sources are environmentally preferable to the proposed project.

9.2.1 Identification of Reasonable Energy Alternatives

Step one of the process involves evaluating the energy alternatives considered to determine if any of the alternatives are reasonable (i.e., has the potential to meet the purpose and need for the project). Table 9.2-1 provides an analysis of each energy alternative considered with respect to each component of the purpose and need statement to determine its reasonableness. In order to analyze each energy alternative, the purpose and need statement was divided into the four components shown in Table 9.2-1.

Since Kemmerer Unit 1 is considered a demonstration of the Natrium advanced reactor, no energy alternatives meet the purpose and need. If the Kemmerer site is not constructed and operated, the benefits of this demonstration project will not be realized.

This conclusion is consistent with Regulatory Guide 4.2, Revision 3, “Preparation of Environmental Reports for Nuclear Power Stations,” Draft Regulatory Guide DG-4032; Proposed Revision 4 to Regulatory Guide 4.2, Section 9.0; and the draft Advanced Nuclear Reactor (ANR) Generic Environmental Impact Statement. As identified in the draft ANR Generic Environmental Impact Statement, the range of alternative energy sources constituting reasonable alternatives for each proposed ANR project, akin to the Natrium Demonstration Project, may differ. For example, the draft ANR Generic Environmental Impact Statement provides that if the purpose and need statement was to “demonstrate a specific type of advance reactor technology to supply power,” then coal, natural gas, wind, or solar would not be reasonable alternatives because they do not demonstrate the specific type of ANR technology; therefore, the Environmental Impact Statement would not evaluate them.

As shown in Table 9.2-1, each of the following alternative energy sources considered would not meet the Department of Energy criteria stipulated for participation in the Advanced Reactor Demonstration Program (Reference 9.2-1):

- Wind
- Solar
- Hydroelectric
- Geothermal
- Fuel Cells
- Biomass

- Municipal Solid Waste or Landfill Gas
- Coal
- Natural Gas
- Petroleum
- Integrated Gasification Combined Cycle

Additionally, the United States Government goal for achieving a carbon net-zero emission by 2050 could be impacted since each of the following alternative energy sources have at least one component of the purpose and need statement that is not be met (Reference 9.2-2):

- Biomass
- Municipal Solid Waste/Landfill Gas
- Coal
- Natural Gas
- Petroleum
- Integrated Gasification Combined Cycle

The possibility of replacing electricity generation capacity in the PacifiCorp service area following planned retirement of existing coal-fired facilities was also a consideration.

There are no other sources of energy, other than advanced nuclear, identified that can meet the purpose and need statement for the Natrium Demonstration Project.

References

9.2-1 (DOE 2021). U.S. Department of Energy (DOE), *Advanced Reactor Demonstration Program, Office of Nuclear Energy*. 2021. https://www.energy.gov/ne/advanced-reactor-demonstration-program, Accessed April 19, 2023.

9.2-2 (EO14008 2021). "Executive Order on Tackling the Climate Crisis at Home and Abroad." January 27, 2021. Posted by the Environmental Protection Agency on March 16, 2021. https://www.regulations.gov/document/EPA-HQ-OPPT-2021-0202-0012. Accessed March 2022.

Table 9.2-1 Energy Alternative Analysis Summary

Energy Alternative	Ability of Energy Alternative to Satisfy Purpose and Need Component (Yes/No)			
	Construct and operate Natrium advanced reactor in support of participation in the Advanced Reactor Demonstration Program	Replace generation capacity with planned retirement of existing coal-fired facilities	Further environmental goals of the U.S. (achieve a carbon net-zero goal by 2050)	Provide operational flexibility via energy storage
Wind	No	No	Yes	Yes[1]
Solar	No	No	Yes	Yes[1]
Hydroelectric	No	Yes	Yes	No
Geothermal	No	No	No	No
Fuel Cells	No	No	No	No
Biomass	No	No	No	No
Municipal Solid Waste or Landfill Gas	No	No	No	No
Coal	No	Yes	No	No
Natural Gas	No	Yes	No	No
Petroleum	No	Yes	No	No
Integrated Gasification Combined Cycle	No	Yes	No	No

Notes:

1. Assuming supplemental battery storage is available.

9.3 Site Selection Process

The National Environmental Policy Act of 1969, as amended, mandates that reasonable alternatives to an action be evaluated. Consistent with this requirement, the Kemmerer Unit 1 site selection process focuses on alternative sites that were considered to be reasonable. A comparative analysis of the proposed and alternative sites is provided in this section. The objective of this analysis is to verify there are no alternative sites environmentally preferable or obviously superior to the proposed site for Kemmerer Unit 1. The process used to identify possible sites for the first Natrium Reactor Plant and the logical approach to identify a range of reasonable alternative sites meeting the purpose and need of the proposed action are described below.

The Site Selection Report for the Natrium Demonstration Project was prepared to identify and evaluate possible sites for the building and operating of the first Natrium Reactor Plant in support of the U.S. Department of Energy Advanced Reactor Demonstration Program (ARDP). The report was performed consistent with applicable NRC guidance (e.g., Regulatory Guide 4.2, Revision 3, “Preparation of Environmental Reports for Nuclear Power Stations,” Regulatory Guide 4.7, Revision 3, “General Site Suitability Criteria for Nuclear Power Stations,” and NUREG-1555) and industry best practices, such as the Electric Power Research Institute Advanced Nuclear Technology: Site Selection and Evaluation Criteria for Nuclear Power Generation Facilities (Reference 9.3-17).

Prior to development of the site selection process, the potential for replacement of a coal power plant with a forecasted retirement schedule that aligned with the schedule objectives in the ARDP was investigated. Replacing a coal-fired power plant which is projected for retirement offers several key advantages:

- Carbon footprint reduction
- Potential cost savings from reuse of existing infrastructure and linear facilities
- Job creation and economic stability for the host communities

In conjunction with PacifiCorp, four coal power plants were identified and assessed to determine the licensing feasibility and identify potential regulatory, environmental, or engineering obstacles for advancing the identified sites as “potential sites” at that stage in the site selection process: (1) Naughton, (2) Jim Bridger, (3) Dave Johnston, and (4) Wyodak.

The framework of the Site Selection Report was devised to meet obligations for participation in the ARDP, business objectives (including high carbon energy replacement), NRC licensing requirements, and fulfilling National Environmental Policy Act requirements.

The following sections describe the process used to identify and evaluate potential sites for building and operating the first Natrium Reactor Plant. The site selection process proceeded through the following steps that successively reduced the number of sites down to a final proposed site and two alternative sites:

1. Define business objectives and the region of interest (ROI)
2. Screen the ROI to identify candidate areas

3. Identify potential sites within the candidate areas
4. Identify candidate sites through the application of suitability criteria and the modified Delphi process
5. Select the proposed site, Kemmerer Unit 1, and the alternative sites from the candidate sites

9.3.1 The Region of Interest

The ROI is typically selected based on geographic boundaries or the relevant service area for the proposed plant. In defining the ROI, particular consideration was given to meeting the obligations set forth in the ARDP along with business objectives.

There were several considerations, informed by the purpose and need and business objectives, that were used in defining the ROI. A few of the primary considerations included:

- Ability to meet ARDP schedule
- Ability to replace high carbon energy in a high carbon region or service area with carbon free energy, contributing to the U.S. Government goals for achieving a 50 to 52 percent reduction from 2005 levels in economy-wide net greenhouse gas pollution by 2030 and a net-zero carbon emission economy by 2050
- Ability to provide energy storage in a region with a high penetration of renewable energy

In alignment with these considerations, the PacifiCorp service territory was designated as the ROI. The primary motivations include:

- PacifiCorp is one of TerraPower, LLC’s partners in the ARDP
- PacifiCorp’s 2021 Integrated Resource Plan indicates coal plant retirement dates in concert with the ARDP schedule
- In PacifiCorp’s service territory, California, Oregon, and Washington have each adopted a mandatory Renewable Portfoloio Standard, and Utah has adopted a Renewable Portfolio Standard goal (Reference 9.3-43). In 2020, for the portion of the service territory in Wyoming, renewable energy sources generated about 15 percent of the electricity in the State (Reference 9.3-12)
- Wyoming Governor Mark Gordon, in a March 2021 State of the State address, called on the State to transition to net-zero carbon emissions within the next three decades (Reference 9.3-22)

Figure 9.3-1 illustrates PacifiCorp’s service territory, inclusive of PacifiCorp Power and Rocky Mountain Power service areas (Reference 9.3-31).

9.3.2 Candidate Areas

The identification of candidate areas emphasized screening out areas that were inconsistent with the purpose and need and that could increase the risk to obtaining a license to construct the Natrium Reactor Plant in the ROI or fulfill the requirements of the ARDP. The exclusion and avoidance criteria applied were primarily a compilation of criteria based on the selected guidance documents for larger light water reactors. As a result, many of the criteria, in particular the health and safety criteria, serve as surrogates for the Natrium Reactor Plant and remain relevant in screening areas that serve to reduce the licensing risk.

The identified potential brownfield sites, four coal plants, were evaluated to ensure environmental criteria were applied during the identification of candidate sites.

Table 9.3-1 lists the screening criteria applied to the ROI. The screening process used Geographic Information System (GIS) techniques to screen areas not meeting each identified criteria. The different GIS layers were then combined to form an aggregate layer to identify potential candidate areas. At the conclusion of the screening process, the areas not screened out were identified as candidate areas, and a land search using GIS spatial modeling processes was then used to identify connected plots of land that could potentially support the land requirements for siting. Figure 9.3-2 illustrates the ROI aggregate screening results. Figure 9.3-3 illustrates the 12 identified candidate areas.

9.3.3 Potential Sites

Once the 12 candidate areas within the ROI were identified for further screening, the potential sites within the screened candidate areas were identified.

To accomplish this, the candidate areas were further screened using criteria to identify optimum areas to site a Natrium Reactor Plant. The key difference in the application of screening criteria in this step was the introduction of data at a more refined scale. The criteria at this step also began to look at positive attributes that supported the business objectives (e.g., looking for sites within candidate areas close to transmission and other load structures). The selected criteria (listed in Table 9.3-2) were chosen through a vetting process amongst a select group of siting subject matter experts.

Through the application of screening criteria at this more refined scale, significant portions of the candidate areas were screened to identify potential sites. After application of the screening criteria, a land search using GIS spatial modeling processes was used to identify connected plots of land that could support the land requirements. Figure 9.3-4 illustrates the screening results. There were no additional potential sites that met the purpose and need identified after application of the criteria.

Results from the pre-site selection feasibility assessment were used to determine specific parcels of land at or near identified coal sites to be further considered as Potential Sites. The four coal power plants that were reviewed for the pre-site selection feasibility assessment included: (1) Jim Bridger Power Plant, (2) Naughton Power Plant, (3) Dave Johnston Power Plant, and (4) Wyodak Power Plant. The Wyodak Plant was not moved forward as a Potential Site because the site reconnaissance failed to identify a parcel of sufficient size for the proposed action.

The identified Potential Sites include:

- Naughton 19/20
- Naughton 12
- Jim Bridger 22
- Dave Johnston 31

9.3.4 Candidate Sites

Four potential sites within the ROI were identified for further screening to select the candidate sites. The application of suitability criteria was used instead of the application of the exclusionary and avoidance criteria used in the identification of candidate areas and potential sites. Selected suitability criteria represented requirements that affect the relative environmental suitability or cost of developing the site, but may not reflect unacceptable environmental stress, licensing challenges, or excessive additional cost. Unique characteristics to the ROI, along with the purpose and need, led to incorporation of suitability characteristics not listed in the Electric Power Research Institute siting guide. This evaluation included input from several subject matter experts which resulted in the final selected suitability criteria presented in Table 9.3-3.

To evaluate the suitability of each potential site, each suitability criterion was evaluated independently by designated subject matter experts. The evaluation was accomplished by defining a utility function that translated quantifiable site characteristics into a common suitability scale expressing preferences for one site over another. The suitability scale ranged from one to five, where 1 was the lowest level of suitability and 5 was the highest (most preferable). Emphasis was placed on defining utility functions that reflected site conditions and technical concerns unique to the ROI and purpose and need.

In addition to defining a utility function and associated suitability scale for each suitability criterion, a weighting factor for each suitability criterion was determined using the modified Delphi technique. The Delphi technique is characterized by an iterative methodology that begins with the value or weight factor assignment for each suitability criterion by each participant, a statistical analysis, and group discussion. This process was employed until group stability was achieved via statistical analysis and agreement within the group that their scores would unlikely change further. In the final round, the standard deviation of the weight factors assigned by each participant for each suitability criterion was less than 2.2 points. Additionally, for each suitability criterion, when comparing the mean of the weight factors assigned by each participant from the previous round to the final round, the values differed by less than 0.7 points. Through this process, the collective judgment of the convened group assigned a weighting factor, or relative importance factor, to each suitability criterion for the site selection study. The determined weighting factors reflected the trade-offs between suitability criteria.

The plot in Figure 9.3-5 demonstrates that the total weighted scores of the top three potential sites were within one standard deviation, with only Dave Johnston 31’s score outside of the one standard deviation. The primary factor for Dave Johnston 31 achieving a lower weighted scoring in comparison to the top three potential sites was the scoring related to: (1) the ability to meet the ARDP and project objectives and (2) transmission grid congestion and competition criteria.

These two criteria were the highest-weighted, and while the results emphasized that the Dave Johnston 31 site is a feasible site, the site would encounter more difficulties in meeting the ARDP schedule.

Therefore, the following three sites moved forward as candidate sites include:

- Naughton 19/20
- Naughton 12
- Jim Bridger 22

9.3.5 Proposed and Alternative Sites

9.3.5.1 Identification of Proposed and Alternative Sites

The three identified candidate sites were further screened to arrive at the proposed and alternative sites. The objective was to provide further insight into specific issues or criteria that were viewed as important to the site selection decision. The analysis included an initial confirmation and verification of site conditions determined by desktop methods in the previous steps along with the pre-site selection feasibility assessment.

The process was conducted in two phases. The initial phase included the review of reconnaissance-level data for each of the candidate sites to determine if there were any gaps or inequities with respect to the available data. The initial site conditions determined previously were verified to identify if the performance of on-site investigations was necessary.

Three candidate sites (Naughton 19/20, Naughton 12, and Jim Bridger 22) were located at or near adjacent parcels to a retiring coal plant.

The next phase, site layout feasibility analysis, consisted of developing preliminary site layouts for each of the candidate sites to ensure that the plant can be accommodated. The site layout feasibility analysis focused on the ability of the site to accommodate the Natrium Reactor Plant layout within the known parameters of the design at that time.

Once the two initial phases were completed, additional suitability screening criteria using more detailed site-specific data developed from onsite verification surveys and the site layout feasibility analysis was conducted and structured specifically to select the proposed site that best meets the ARDP and project objectives. The goal of the additional suitability analysis was to provide further insights into each of the three selected acceptable candidate sites by investigating the unique site characteristics, including topographic and other environmental features, associated with each of the acceptable candidate sites in relation to the placement of the Natrium Reactor Plant on the site.

9.3.5.1.1 Identification of Data Gaps – Exploratory Borings

The data gap analysis revealed a gap in subsurface conditions at the Naughton 19/20 site. Therefore, two exploratory borings were drilled to a depth of approximately 100 feet (30 meters). In general, the borings encountered overburdened silty to clayey soils to depths of 20 to 29 feet (6.1 to 8.8 meters) overlying weathered to unweathered siltstone. The weathered siltstone extended to depths of 36 to 46 feet (11 to 14 meters) and was underlain by unweathered siltstone. The unweathered siltstone was massive and contained few fractures. Groundwater was encountered between 17 and 33 feet (5.2 to 10 meters) below ground surface.

9.3.5.1.2 Site Layout Feasibility Analysis

The goal of the site layout feasibility analysis was to provide further insights into each of the three selected candidate sites. The site layout feasibility analysis investigated the unique site characteristics, including topographic and other environmental features, associated with each of the candidate sites in relation to the placement of the Natrium Reactor Plant on the identified candidate site. This included the investigation of constructability or environmental issues which could impact placement of the Natrium Reactor Plant on a candidate site.

9.3.5.1.3 Suitability Analysis

Table 9.3-4 describes the refined suitability criteria selected for the comparative analysis to further evaluate the three identified candidate sites to determine the proposed site. A summary of the comparative analysis is found in Table 9.3-5.

Each of the three candidate sites remained feasible sites. Based on scoring and the candidate site suitability issues comparative analysis presented in Table 9.3-5, the selected proposed and alternative sites were identified:

Proposed Site: Naughton 19/20 (Kemmerer Unit 1) – meets business objectives, land availability, and ARDP schedule

Alternative Sites: Naughton 12 – meets business objectives and ARDP schedule Jim Bridger 22 – meets business objectives and land availability

9.3.5.2 Alternative Site Review

A review of the two alternative sites is presented to determine whether either of the alternative sites would be environmentally preferable or obviously superior to the proposed site. An evaluation and comparison of the proposed and alternative sites were performed for each resource area. For the purpose of the alternative site analysis, it was assumed no modifications to the Natrium Reactor Plant conceptual design would be required for placement of the plant at the alternative sites.

Potential impacts from building and operating the plant at the proposed and alternative sites are analyzed, and a single significance level of potential impact is assigned according to the criteria described in Section 1.0.

9.3.5.2.1 Evaluation of Naughton 12

Naughton 12 is an undeveloped site in Sections 11 and 12, T20N, R117W, south of and adjacent to Naughton Power Plant in Lincoln County, Wyoming (Figure 9.3-6). It is accessed from CR 304 (Elkol Road). The site is approximately 1.5 miles (2.4 kilometers) southwest of the Kemmerer municipal boundary and approximately 2.7 miles (4.3 kilometers) northwest of the Kemmerer Unit 1 Site. For the purpose of analysis, it was assumed that the Natrium Reactor Plant, including a sodium-cooled fast reactor with a molten salt energy storage system, would be constructed. The closed-loop cooling system would consist of a mechanical draft cooling tower with makeup water via pipeline from the Naughton Power Plant's Raw Water Settling Basin. The plant would discharge cooling tower blowdown and other wastewater to a tributary to North Fork Little Muddy Creek. Two transmission lines would be required to connect the site to the Naughton Power Plant switchyard. To analyze the effects of building a new nuclear plant, the construction and operation practices described in Chapters 4 and 5 were assumed generally to be applied to the Naughton 12 site, thereby allowing for a consistent description of the impacts. The conceptual layout for Naughton 12 is shown in Figure 9.3-7.

Land Use

Based on the conceptual site layout developed for the Naughton 12 site, the following land requirement assumptions were made which form the basis of the environmental comparison of alternative sites:

- The assumed facility footprint would require approximately 58 acres (23 hectares). New facilities at the plant site would include the nuclear reactor, energy island, support buildings, cooling tower, switchyard, access road, parking, and stormwater retention ponds.
- Based on a conceptual site layout developed for Naughton 12, site access would be from CR 304 (Elkol Road). A portion of CR 304 would be widened to accommodate anticipated traffic levels attributable to construction.
- The makeup water pipeline corridor would extend approximately 1.8 miles (2.9 kilometers) to the Naughton Power Plant Raw Water Settling Basin. Assuming a corridor width of 50 feet (15 meters), approximately 11 acres (4.5 hectares) would be required for the water pipeline.
- The assumed length of conceptual transmission corridor routing to the Naughton Power Plant switchyard is approximately 1.6 miles (2.6 kilometers). Assuming a corridor width of 250 feet (76.2 meters), approximately 47 acres (19 hectares) would be required for the transmission lines.
- Additional acreage would be required to support construction activities (e.g., laydown areas and parking, batch plant, fill and spoil areas). The additional land required during construction is estimated at approximately 81 acres (33 hectares). These areas are expected to continue to serve plant operations and maintenance. Therefore, it is assumed that the additional construction area would be permanently disturbed.

Based on the sub-totals above for both onsite and offsite plant components, the total area potentially affected at the Naughton 12 site is estimated at approximately 197 acres (79.7 hectares).

Figure 2.1-6 presents the land cover for the vicinity of Kemmerer Unit 1, including the Naughton 12 site. The land cover of the Naughton 12 site is predominantly shrub/scrub (approximately 99 percent). Other land cover includes man-made ponds associated with Naughton Power Plant or Kemmerer Mine and developed areas along CR 304 which runs along the southeast boundary of the Naughton 12 site.

The Naughton 12 site is located on privately owned land that is zoned for industrial use (Reference 9.3-29). The site is adjacent to a flue gas desulfurization waste pond at Naughton Power Plant. The construction support area of the Naughton 12 site and portions of the water pipeline and transmission corridors fall within the Kemmerer Mine's permit boundary. Offsite areas that would support construction activities (e.g., borrow pits, quarries, and disposal sites) would be commercial vendor locations.

Given the nuclear plant and the water pipeline and transmission lines would be located on an existing industrial site already dedicated to electrical power generation, no land use conversion would be needed to support construction or operations. The only other additional impacts to land use from operations will be the impacts of salt deposition and shadowing from the mechanical draft cooling tower. Modeling of fogging, icing, shadowing, and drift deposition was not performed for the Naughton 12 site, but the plume characteristics would be expected to be similar to the evaluation of the Kemmerer Unit 1 Site described in Sections 5.3 and 5.7. The predicted salt deposition and shadowing from the plume are not expected to significantly affect offsite areas. No land use conversion would result from operation of the cooling towers. Impacts of construction and operation to land use would be SMALL.

Hydrology

Naughton Power Plant, along with Kemmerer Unit 1 and Naughton 12, is located in the Green River Basin. Water availability and use for the Naughton 12 site will be the same as Kemmerer Unit 1. As presented in Section 2.2, water availability for Kemmerer Unit 1 was determined by examining both stream flow availability and the water rights. Based on Table 2.2-7 for average monthly flow at the United States Geological Survey (USGS) Hams Fork stream gauge and Table 2.2-8 for the monthly maximum water usage for Naughton Power Plant and Kemmerer Unit 1, there is sufficient flow in Hams Fork River to meet the water demands for both plants, assuming that the future water demands of Naughton Power Plant will not change.

It is assumed that, similar to Kemmerer Unit 1, Naughton 12 raw makeup water for Naughton 12 would be supplied via pipeline from Naughton Power Plant's Raw Water Settling Basin, located approximately 1.7 miles (2.7 kilometers) away (see Figure 9.3-7). Kemmerer Unit 1 would use the same water supply from the Naughton 12 site. The Raw Water Settling Basin covers 88.6 acre-feet (109,286 cubic meters) and currently holds approximately 76 acre-feet (94,000 cubic meters) or about 3-4 days of water storage for the existing Naughton Power Plant. The distance to the Raw Water Settling Basin would be considerably less than the distance from the Kemmerer Unit 1 Site.

Naughton Power Plant has seven industrial ponds on the property, including four flue gas desulfurization ponds, two ash ponds, and one settling pond or Raw Water Settling Basin. Flue Gas Desulfurization Pond 2 is undergoing groundwater remediation (as of 2024 according to the PacifiCorp 2023 Integrated Resource Plan). The contamination plume is less than 0.5 mile (0.8 kilometer) from Naughton 12. PacifiCorp is the responsible party and is conducting the cleanup (Reference 9.3-46).

Groundwater use will be limited to beneficial uses during building activities as described in Sections 3.3 and 4.2, such as use of dewatering water for dust suppression. Groundwater use for plant operations is not proposed due to poor water quality and groundwater depth, as stated in Section 2.2. Long-term use of groundwater for operations could cause a depletion in groundwater supply in the immediate vicinity of the Naughton 12 site.

Wastewater treatment for Naughton Power Plant consists of two settling ponds used for evaporation and waste storage. The southernmost pond, former location of outfall 001, accepts all wastewater from Naughton Plant Units 1 and 2, including treated sewage from the onsite wastewater treatment facility. The northernmost pond, former location of outfall 002, accepts all wastewater for Naughton Power Plant Unit 3. Outfall 003 discharges cooling tower blowdown, boiler water treatment blowdown, boiler quench water, and treated sewage from Naughton Power Plant's onsite wastewater treatment plant. The same cooling technology is proposed for the plant at the Naughton 12 site mechanical draft cooling tower. The plant discharge for Naughton 12 would be discharged to an unnamed tributary to North Fork Little Muddy Creek.

The Naughton 12 site is adjacent to a developed parcel, and there are no significant topographical changes between the existing Naughton Power Plant and the Naughton 12 site. Minimal portions of Naughton Power Plant are located in a U.S. Federal Emergency Management Agency (FEMA) mapped 100-Year floodplain (Zone A) according to FEMA's Flood Insurance Rate Map (Reference 9.3-21). The limits of study for the FEMA 100-year floodplain, according to the FEMA FIRM Map Panel 56023C2230D for the Naughton 12 site, ends east of the proposed plant area (Reference 9.3-21). Despite a lack of floodplain data at the Naughton 12 site, it is expected the limits of the 100-year floodplain would follow the stream boundaries. Coordination with Lincoln County for the Floodplain Development Permit would determine whether a flood study is required at the proposed plant location.

Construction of the proposed plant at the Naughton 12 site would result in unavoidable impacts to water resources including streams, wetlands, and 100-year floodplains. To maintain the drainage associated with the stream during and after building activities, the stream will be rerouted to a location following existing contours. Site grading within the 100-year floodplain will be limited to the greatest extent practicable, and where impacts cannot be avoided, site drainage will follow a natural pattern. Building activities would be conducted to minimize and avoid impacts to the greatest extent possible to protect water quality and maintain existing hydrologic functions at the site, in compliance with all required permits. As described in Section 4.2, surface water will also be trucked to the Naughton 12 site from Kemmerer-Diamondville Water and Wastewater Joint Powers Board to support building activities. No surface water use is proposed within the disturbance area for building activities. Groundwater from dewatering activities will be used for dust suppression and treated as discharge to a tributary to North Fork Little Muddy Creek. Therefore, hydrology impacts in terms of surface water and groundwater use and water quality from building activities are anticipated to be SMALL.

Proposed hydrological alterations to the Naughton 12 site for plant operations would be minimal in terms of surface water use. Reuse of existing water infrastructure at Naughton Power Plant would greatly minimize the need for significant alterations for water supply. As previously stated, the primary water supply for Naughton Power Plant is the Viva Naughton Reservoir. An existing, 316(b) compliant intake structure exists on Hams Fork River that uses the best available technology to deliver water to the plant via a pipeline to the Raw Water Settling Basin. Impacts to streams and wetlands would be SMALL as a result of building activities, assuming mitigation for hydrologic impacts be met. Impacts as a result of operations will be SMALL for water use and water quality since stormwater and plant discharge leaving the site will follow natural contours using culverts and other water management structures, to maintain hydrologic conditions to the extent practicable. The discharge will be conveyed via a tributary to North Fork Little Muddy Creek. Therefore, impacts associated with hydrological alterations to surface and groundwater resources from plant operations, would be SMALL and are expected to be similar to the anticipated impacts for Kemmerer Unit 1.

Terrestrial Ecology

The Naughton 12 site is 2.7 miles (4.3 kilometers) northwest of the Kemmerer Unit 1 Site and lies within the same Wyoming Basin eco-region, which is dominated by big sagebrush steppe and big sagebrush shrubland vegetation communities. Land cover at the Naughton 12 site is almost entirely scrub-shrub with three vegetation communities represented: sagebrush shrubland (approximately 66 percent), sagebrush steppe (approximately 3 percent), and greasewood flat (approximately 31 percent). An unnamed tributary of North Fork Little Muddy Creek flows east across the site, then merges with three more small tributaries before emptying into North Fork Little Muddy Creek 1.3 miles (2.1 kilometers) downstream of the site. The Naughton 12 site also contains portions of two wetlands, one 2.5 acres (1 hectare) (west of the nuclear plant) and one 0.5 acre (0.2 hectare) (east of the nuclear plant) (Reference 9.3-54). The routes for the transmission lines and water supply lines cross approximately 4.3 acres (1.7 hectares) of wetland and 963.6 linear feet (293.7 linear meters) of stream.

The majority of the Naughton 12 site was included in the study area of the baseline ecological surveys for the proposed project, and species observed in the utility corridor portion of the study area during the baseline surveys are assumed to be those using the Naughton 12 site. Vesper sparrows (*Poecetes gramineus*), Brewer’s sparrows (*Spizella breweri*), sage thrashers (*Oreoscoptes montanus*), and horned larks (*Eremophila alpestris*) were the songbirds most frequently observed in upland portions of the Naughton 12 site in 2022 and 2023 (Reference 9.3-55; Reference 9.3-56). Gadwalls (*Mareca strepera*), mallards (*Anas platyrhychos*), and American avocets (*Recurvirostra americana*) were observed using a wetland (designated Wetland 4 in Reference 9.3-54) in the northwest corner of the site. Red-tailed hawks (B*uteo jamaicensis*), turkey vultures (*Cathartes aura*), and golden eagles (*Aquila chrysaetos*) were the raptors most often observed. Uinta ground squirrels (*Urocitellus armatus*), least chipmunks (*Tamias minimus*), and white-tailed prairie dogs (*Cynomys leucurus*) were the most abundant small mammals. Coyotes (*Canis latrans*) and pronghorns (*Antilocapra americana*) were occasionally observed, and mule deer (*Odocoileus hemionus*) sign was present (Reference 9.3-55; Reference 9.3-56).

The U.S. Fish and Wildlife Service (FWS) Information for Planning and Consultation report for the Naughton 12 site indicated that six Federally listed species, one species proposed for listing, and one candidate for listing could be "potentially affected by activities at this location" (Reference 9.3-68):

- Bonytail (*Gila elegans*); endangered
- Colorado pikeminnow (*Ptychocheilus lucius*); endangered
- Humpback chub (*Gila cypha*); threatened
- Razorback sucker (*Xyrauchen texanus*); endangered
- North American wolverine (*Gulo luscus*); proposed threatened
- Yellow-billed cuckoo (*Coccyzus americanus*); threatened
- Monarch butterfly (*Danaus plexippus*); candidate species
- Ute ladies'-tresses (Spiranthes diluvialis); threatened

A desktop review of the scientific literature, Wyoming Natural Diversity Database (WYNDD) species occurrence records, and survey results suggest that only two of these species—the Monarch butterfly and Ute ladies'-tresses could occur in the vicinity of the Naughton 12 site. Monarch butterflies have been observed across the State of Wyoming but very little is known about their distribution, abundance, and seasonal movement. No monarch butterflies were observed during the 2022-2023 surveys (see Section 2.3.1.4). Wetlands on and adjacent to the Naughton 12 site do not provide suitable habitat for Ute ladies'-tresses (Reference 9.3-57, Reference 9.3-59).

No Federally listed species, species proposed for listing, or candidates for listing were observed by biologists conducting wildlife surveys in 2022 and 2023 (Reference 9.3-55, Reference 9.3-56). None has been observed during other reconnaissance surveys of wildlife. None was observed during wetland surveys in 2022 (Reference 9.3-54) or aquatic surveys in 2022 and 2023 (Reference 9.3-2, Reference 9.3-3).

A review of the WYNDD database indicated that 58 Wyoming Species of Greatest Conservation Need could occur within 5 miles (8 kilometers) of the Naughton 12 site (Reference 9.3-93). Ten of these species were observed in the utility corridor portion of the study area during the 2022 and 2023 surveys (Section 2.3, Table 2.3-3): Brewer's sparrow, ferruginous hawk (*Buteo regalis*), Franklin's gull (*Leucophaeus pipixcan),* golden eagle, greater sage grouse (*Centrocercus urophasianus*), loggerhead shrike (*Lanius ludovicianus)*, sage thrasher, Swainson's hawk (*Buteo swainsoni)*, American white pelican (*Pelecanus erythrorhynchos*), and white-tailed prairie dog.

The entire Naughton 12 site as well as 35 acres (14 hectares) within the transmission corridor and 6.7 acres (2.7 hectares) within the water supply corridor lie within an area designated as pronghorn crucial winter, year-long range (Reference 9.3-83). Mule deer crucial winter range lies 3.3 miles (5.3 kilometers) northeast of the site (Reference 9.3-86). Crucial winter, year-long range for moose is 4.7 miles (7.6 kilometers) northeast of the site (Reference 9.3-82). Development of the Naughton 12 site would not encroach on either of these ranges. No WGFD-designated migration corridors established in Executive Order2020-01 overlap with the site or utility corridors.

The Naughton 12 site is 2.1 miles (3.4 kilometers) east of a Greater Sage Grouse Core Population Area. The closest occupied sage grouse lek (G-Anna Richey) is 4.0 miles (6.4 kilometers) southwest of the site (Reference 9.3-87; Reference 9.3-88).

Construction of the nuclear power plant at the Naughton 12 site would permanently disturb approximately 138 acres (56 hectares) of rangeland (mostly big sagebrush shrub-steppe). Construction disturbance would displace common wildlife species associated with sagebrush shrublands and steppe communities such as pronghorns, coyotes, Uinta ground squirrels, white-tailed prairie dogs, sage thrashers, vesper sparrows, horned larks, and Northern sagebrush lizards. Preconstruction surveys of construction sites for nests of ground- and shrub-nesting birds, including burrowing owls, would be required to prevent the “taking” of migratory birds or their nests.

Construction of the nuclear plant would eliminate approximately 138 acres (56 hectares) of pronghorn crucial winter, year-long range. Another 35 acres (14 hectares) of pronghorn crucial winter, year-long range would be temporarily disturbed by construction of the two transmission lines and 6.7 acres (2.7 hectares) would be temporarily disturbed for construction of the water supply pipeline. The total acreage (180 acres or 72.5 hectares) that would be disturbed is expected to be less than 0.3 percent of the Cumberland Flats pronghorn crucial winter range/year-long range and have little or no impact on the species’ management. Areas disturbed during construction of linear utilities would be revegetated, as necessary, with native grasses and forbs. These areas could be used by pronghorn, other large and small mammals, and a variety of sagebrush-associated birds once stabilized and revegetated.

Based on the conceptual layout in Figure 9.3-7, building the nuclear plant at the Naughton 12 site would necessitate filling a wetland and re-routing a portion of the intermittent stream that flows through the site. This would require an Individual Permit from the USACE. An Individual Permit is required when projects have more than minimal individual or cumulative impacts to wetlands, typically when wetland impacts exceed 0.5 acre (0.2 hectare). Construction of the transmission lines would span any wetlands or streams along the route. Construction of the water supply line would employ horizontal directional drilling at stream and wetland crossings to avoid impacts to resources within the corridor.

In summary, construction of the nuclear plant at the Naughton 12 site would involve the elimination of 138 acres (56 hectares) of rangeland, mostly sagebrush shrubland-steppe habitats, and the displacement of sagebrush-dependent wildlife. No Federally listed species or designated critical habitat would be affected. Therefore, construction impacts would be SMALL.

Because vegetation and wildlife communities at the Naughton 12 and Kemmerer Unit 1 Sites are very similar, the Naughton 12 site would not offer any obvious advantages with respect to terrestrial ecological impacts and would not be environmentally preferable. Because construction of the nuclear plant at the Naughton 12 site would require filling wetlands and relocating an intermittent stream, the Kemmerer Unit 1 Site would be preferable with respect to impacts to waters of the U.S.

Salts and other impurities in cooling tower drift have damaged sensitive vegetation at some coastal power plants, but modeling of salt deposition rates for Kemmerer Unit 1 (see Section 5.3.1.1) indicated that maximum expected salt deposition rates would be well below those known to cause harm to sensitive plants. Because a plant at the Naughton 12 site would use cooling water and cooling tower makeup from the same source as Kemmerer Unit 1 (Hams Fork River), salt deposition rates would be similar to those described in Section 5.3. There would be minor disturbance impacts to wildlife associated with operations, including noise from vehicles, equipment, and the public address system. Small numbers of birds could be harmed by collisions with tall structures, such as the meteorological tower. Overall, impacts from operation at Naughton 12 are expected to be SMALL.

Aquatic Ecology

While best management practices would be used to mitigate construction impacts to North Fork Little Muddy Creek, some disturbed soil from building activities would likely be carried into the stream with stormwater runoff. Construction-related sedimentation could, depending on the effectiveness of mandated erosion controls, have a small, localized effect on common benthic macroinvertebrates. Impacts to fish in North Fork Little Muddy Creek would likely be limited to displacement of individual fish, which will move up- or downstream in response to turbidity or sediment deposition. Construction impacts to aquatic communities are expected to be SMALL.

The small tributary streams that cross the Naughton 12 site have not been surveyed for fish or aquatic macroinvertebrates. If fish are present, they are likely to be common Green River Basin species that tolerate temperature extremes and unpredictable flow regimes, such as the hardy Cyprinids found in North Fork Little Muddy Creek.

The Naughton 12 site would employ closed-cycle cooling (cooling towers), withdrawing makeup from Hams Fork River and discharging to North Fork Little Muddy Creek. The cooling system and impacts would be the same as those described in Section 5.3 for Kemmerer Unit 1. Closed-cycle cooling systems, like the one that would be used at the proposed power plant for operations, withdraw a relatively small amount of water for cooling tower makeup which limits impacts to aquatic biota and also have Wyoming Pollutant Discharge Elimination System (WYPDES)-permitted discharges that must meet State water quality standards to ensure impacts to aquatic communities are SMALL.

Socioeconomics

Because of the proximity of the sites, most socioeconomic data and analyses for Kemmerer Unit 1 would also apply to construction and operation of a nuclear power plant at the Naughton 12 site. Workforce sizes, types, and settlement patterns would be the same. Because both sites would be drawing the workforce from the same communities, the increased demands on housing and community services, such as utilities, schools, hospitals, and police and fire protection, would be the same. Therefore, the Naughton 12 site analysis focuses on the resource areas where the two sites would differ.

Physical Impacts

The construction and operation activities would be similar and given the proximity of the sites, the physical impacts are expected to be similar. The distance from the Naughton 12 site to the nearest residence is 3.2 miles (5.2 kilometers), slightly less than for Kemmerer Unit 1 but still far enough for effects to attenuate with distance before reaching sensitive receptors. The physical impacts of odors, noise, vibration, lighting, would mingle with those of the Naughton Power Plant and Kemmerer Mine. Therefore, the physical impacts of construction and operation of the proposed nuclear power plant at the Naughton 12 site would be SMALL.

Taxes

The anticipated property taxes would be paid to Lincoln County and its taxing jurisdictions during construction and operations. In 2021, Lincoln County and its taxing jurisdictions levied a total of $47,190,727 in property taxes (Table 2.4-20). Tax payments to Lincoln County and its taxing jurisdictions for a nuclear power plant at the Naughton 12 site are estimated to reach $11.7 million by the final year of construction (based on cost of construction). In total, the estimated tax payments represent a LARGE impact to total 2021 property tax levies in the county. For the operations period, estimated total payment to all taxing entities would be approximately $7.1 million (0.71 percent effective tax rate in Sweetwater County), annually. This payment would represent a MODERATE impact to the total 2021 property tax levies in the county.

The Naughton 12 site is located in the Lincoln County School District #2 (LCSD #2) tax district, which was dependent on the state to meet its annual guarantee in Funding Year 2021-2022 (Reference 9.3-81). The state redirected about $33 million to the District so the District would meet its guarantee. Increased tax revenues would have only a SMALL, beneficial impact on LCSD #2, as the state has and would continue to make up the difference between the District’s local revenues and its guarantee. If the District collects more than its guarantee in property tax revenues, the state will recapture the excess revenues and redistribute them. In 2020-2021, LCSD #2’s revenues totaled $56,724,927, including tax and non-tax revenues (Reference 9.3-79). The education-related portion of the projected construction-phase property taxes for the nuclear plant, $8.2 million, represents about 14.5 percent of those total revenues.

In-migrating construction and operation workers would result in larger enrollments at LCSD #1, and the Uinta and Sweetwater County districts in the economic region. These districts would not receive direct property tax revenues from the plant, but because one of the components of the School Foundation Program funding formula is based on enrollment, increases in the number of students would lead to increased funding. Increases in enrollment would also result in additional expenses. Fiscal impacts to LCSD #1 and the other school districts, from increased enrollment, would likely be SMALL. LCSD #1 was also dependent on the state to meet its guarantee in Funding Year 2021-2022. The state redirected about $0.9 million to that district. No funds were redirected to Uinta County’s school district in Funding Year 2021-2022 (Reference 9.3-81).

For these reasons, the potential beneficial impacts of property taxes collected during construction and operation of the nuclear plant would range from SMALL to LARGE in Lincoln County.

Transportation

The regional and local road system is shown on Figure 2.4-3. CR 304 would be used to access the Naughton 12 site and CR 304 would be accessed from US 189. A portion of CR 304 would be improved to accommodate anticipated traffic levels attributable to construction. The construction and operation workforces and truck shipments would be the same as for the proposed action and transportation impacts are expected to be similar. Therefore, the transportation impacts of construction of the proposed nuclear power plant at the Naughton 12 site would be MODERATE during peak hours and otherwise SMALL and transportation impacts of operation would be SMALL to MODERATE during peak hours and otherwise SMALL.

Aesthetics

Given the proximity of the Naughton 12 site to the Kemmerer Unit 1 Site, the aesthetic impacts are expected to be similar. The plant would not be easily visible from the urban and residential areas at Kemmerer and Diamondville due to the intervening ridges and the plant would blend in the viewscape with the existing Naughton Power Plant. Therefore, the aesthetic impacts of construction and operation of the proposed nuclear power plant at the Naughton 12 site would be SMALL.

Environmental Justice

Because of the proximity of the two sites, the demographic profile for the Naughton 12 site would be the same as described in Section 2.5 for the Kemmerer Unit 1 Site. The geographic area of interest for environmental justice for the Naughton 12 site includes the 50-mile radius and extends beyond the 50-mile (80-kilometer) radius to the cities of Green River and Rock Springs, in Sweetwater County.

The locations of minority and low-income populations in relation to the Naughton 12 site are the same as those for Kemmerer Unit 1. There are a total of seven block groups in the geographic area of interest with populations meeting the NRC's criteria (Table 2.5-1 and Table 2.5-3, Figure 2.5-1 through Figure 2.5-5). There are no American Indian reservations within 50 miles (80 kilometers) of the Naughton 12 site or in Green River and Rock Springs.

Human Health and Environmental Impacts

There are three primary pathways for health and environmental impacts: soil, water, and air. The closest minority or low-income population block group is located roughly 27 miles (43 kilometers) east of the Naughton 12 site. The human health and environmental impact conclusions for the Naughton 12 site would be the same as those determined for the Kemmerer Unit 1 Site (see Section 4.5.1 and Section 5.5.1).

Socioeconomic Impacts

For the following resource areas, impacts to minority and low-income populations would be the same as those determined for the Kemmerer Unit 1 Site: physical impacts, demography, economy, taxes, transportation, aesthetics, recreation, housing, public services (water, wastewater, police, fire, and medical), and education (see Section 4.5 and Section 5.5).

Historic and Cultural Resources

The geographic area of interest for evaluation for the Naughton 12 site was divided into a direct Area of Potential Effects (APE), comprising the site and any offsite areas that would be required (e.g., transmission lines and pipeline), and an indirect APE, comprising a 5-mile (8-kilometer) buffer around the direct APE. Data for this analysis was obtained from two sources. The principal source of information was a file check of the Wyoming Cultural Records Office (WYCRO), Laramie, for the respective geographic area of interest. The direct APE was also largely included in the 1,508-acre (610-hectare) study area for Kemmerer Unit 1, which was subject to the Class III field survey described in Section 2.6. This field survey added several archaeological resources at the Naughton 12 direct APE that were not identified by the WYCRO file check.

The WYCRO site file check and the Class III archaeological survey of the direct APE of the Naughton 12 site identified a total of eight archaeological sites. The eight sites include five prehistoric and three historic period sites. Six of the sites are located within the Naughton 12 site and one each is in the transmission corridor and in the water line corridor leading to connections at Naughton Power Plant. None of the sites in the direct APE of Naughton 12 is eligible for the National Register of Historic Places (NRHP). Based on the available information, construction at the Naughton 12 site would therefore not result in any adverse effects to historic and cultural resources within the direct APE. Direct impacts to cultural resources at the Naughton 12 site from construction and operation of the proposed nuclear plant would therefore be SMALL.

Identified potential indirect effects of building and operating the nuclear plant at the Naughton 12 site are anticipated to be similar to those associated with the proposed site as described in Section 4.6.2.2. These potential indirect effects are visual in character. Of the 10 sites evaluated in Table 4.6-1, two, 48LN2739_1 and _2, are more than 5 miles (8 kilometers) away from Naughton 12 and can be omitted from this analysis. Although no photosimulation views to the Naughton 12 site have been prepared for the remaining eight visually sensitive resources, review of Table 4.6-1 and of the intervening terrain as depicted by Google Earth suggests that the results would be similar to those for the Kemmerer Unit 1 Site, with the Naughton 12 site not intervisible from approximately three sites and the remaining sites either having weak visual contrast and no adverse effect or having strong visual contrast but representing localities whose current condition no longer warrants categorizing them as visually sensitive. Indirect impacts to cultural resources at the Naughton 12 site from construction and operation of the proposed nuclear power plant would therefore be SMALL.

Air Resources

The portion of Lincoln County where Kemmerer Unit 1 and Naughton 12 are located is designated as attainment with respect to the National Ambient Air Quality Standards (NAAQS) (40 CFR 81.310 - Reference 9.3-16). The nearest nonattainment area is the Upper Green River Basin (UGRB) Ozone Nonattainment Designation area consisting of all of Sublette County and portions of Lincoln and Sweetwater counties (Figure 9.3-8). Currently, for the 2008 Ozone NAAQS, the U.S. Environmental Protection Agency (EPA) designated the UGRB as nonattainment. However, monitored ozone in the UGRB was in attainment for the 2008 Ozone

NAAQS by the attainment date of July 2015 and Wyoming Department of Environmental Quality (WYDEQ) is assessing a pathway for submitting a request to the EPA to redesignate the UGRB back to attainment for the 2008 Ozone NAAQS.

Criteria pollutant emissions from building and operating the Natrium Reactor Plant at Naughton 12 would be comparable to the emissions generated at Kemmerer Unit 1 as described in Sections 4.7 and 5.7. Building impacts would be temporary and would be similar to those from large-scale construction projects. Criteria pollutants would be generated from onsite fossil-fueled construction equipment and vehicles. The quantity of criteria pollutant emissions generated by building activities would be small compared to total emissions from fossil units at Naughton Power Plant. It is expected that standby diesel generators would be used no more than permitted for “standby” use. The criteria pollutants generated would be regulated in accordance with WYDEQ. Therefore, similarly, airborne releases of criteria pollutants would be small and would comply with WYDEQ regulations.

Air quality impacts are considered small if the increase in regional pollutant concentrations attributable to the new source (1) would not appreciably alter visibility, (2) would not exceed EPA significant impact levels, and (3) would not cause a violation of the most restrictive ambient air quality standards. Air pollutant emissions from traffic, construction equipment, and fugitive dust will occur. State and Federal regulations will be met. Exceedances of EPA significant impact levels will occur for PM_{10} from dust generated from construction equipment during building activities, NOx generated from conservative estimates for construction equipment, and CO generated from construction commuters. During operations, there would not be any exceedances of EPA significant impact levels. Therefore, it is anticipated the impacts to air quality from building activities at the proposed nuclear power plant at Naughton 12 would be MODERATE. It is anticipated the impacts to air quality from operating the proposed nuclear power plant at Naughton 12 would be SMALL.

Nonradiological Health

As described in Sections 4.8 and 5.8 for the Kemmerer Unit 1 Site, people working or living near the Naughton 12 site would not experience physical impacts from physical effects of noise, fugitive dust, and gaseous emissions greater than those that would be considered an annoyance or nuisance. Impacts to air and water quality from construction and operations would be SMALL. Because the construction and operation practices described in ER Chapters 4 and 5 would generally be applied to the Naughton 12 site, the occupational health impacts would be same as the proposed action.

The construction and operations workforces would be the same as Kemmerer Unit 1 and given the proximity of the two sites, the mileage for commuting and truck deliveries would likewise be similar. Therefore, the human health impacts due to vehicle accidents would be similar to those presented in Sections 4.8.3 and 5.8.6 for the proposed action.

The generation of nonradiological waste is expected to be similar to the nonradiological waste generated at Kemmerer Unit 1. See discussion of nonradiological waste information for Kemmerer Unit 1 in Sections 3.4.3 and 5.10. Therefore, impacts are expected to be SMALL.

Radiological Health

The background radiological characteristics of Kemmerer Unit 1 described in Section 2.9 are applicable to the nearby Naughton 12 site. The radiological impacts during construction for the people working at the Naughton 12 site would be the same as the impacts described for Kemmerer Unit 1 in Section 4.9, which are anticipated to be SMALL. During operation, the radiological health impacts at the Naughton 12 site would be equivalent to the impacts discussed in Section 5.9 for Kemmerer Unit 1, such that the impacts are anticipated to be SMALL and would not exceed the radiological dose limits (e.g., offsite dose less than 100 mrem/yr).

Because the radiological characteristics and health impacts described in ER Chapters 2, 4, and 5 would generally be applied to the Naughton 12 site, the radiological health impacts would be the same as the proposed action and, therefore, are anticipated to be SMALL.

Postulated Accidents

The potential environmental impacts from a postulated accident, considering both design basis accidents and severe accidents, for Kemmerer Unit 1 are described in Section 5.11. The design basis accidents (DBAs) and severe accidents analyzed to date for Kemmerer Unit 1 are applicable to the Naughton 12 site. Therefore, the potential impacts of a postulated accident at the Naughton 12 site are anticipated to be SMALL.

9.3.5.2.2 Cumulative Impacts Analysis for Naughton 12 Site

The past, present, and reasonably foreseeable Federal, non-Federal, and private projects within the region of interest of the Naughton 12 site that could have cumulative impacts with the proposed action are described in Table 7.1-1 and shown in Figure 7.1-1. These projects have either requested an ISP or other permit or license or had an environmental assessment or environmental impact statement completed.

Land Use

Table 7.1-1 lists several development projects well outside of the vicinity of Naughton 12. Projects within the vicinity such as the conversion of Naughton Power Plant from coal to natural gas would not involve land use changes. The realignment of 2.7 miles (4.3 kilometers) of US 30 could convert additional acres to transportation infrastructure.

Construction activity for the US 189 intersection would occur within the existing Wyoming Department of Transportation (WYDOT) right-of-way (ROW) with the exception that widening the highway could require extending the culverts that pass under the highway. The construction activity associated with the culverts could extend beyond the ROW into the adjacent parcels.

The Sodium Test and Fill Facility would be constructed on approximately 17.5 acres (7.1 hectares) within a 35-acre (14-hectare) parcel that is zoned for industrial use. An additional 14.5 acres (5.9 hectares) would be used as laydown and may be restored or reused for another purpose when no longer required by the Sodium Test and Fill Facility. A power line would be constructed to deliver electricity from the existing transmission line running in the US 189 ROW to the Sodium Test and Fill Facility (Reference 9.3-11).

As described in Sections 4.4 and 5.4, the residences of the in-migrating construction and operations direct and indirect workforces would be distributed across the economic region. Within the vicinity, residential development is expected within Kemmerer and Diamondville municipal limits. Kemmerer city officials are reviewing, for approval, single- and multi-family housing development plans. An initial proposal housing subdivision proposal is for approximately 250 single-family houses numbers and a re-zoning request was approved for 87 acres (35 hectares) to allow multifamily housing of up to 20 apartments or condominiums per acre (Reference 9.3-30). In addition, the private land in the vicinity zoned rural would allow residential development on 5-acre (2-hectare) land parcels (Reference 9.3-28 and Reference 9.3-29). These other developments within the vicinity would involve minimal acreage and be governed by zoning requirements.

Combining the proposed action's land use conversion with the other developments would have a SMALL cumulative impact to land use in resource area encompassing the site, offsite areas, and the vicinity.

Hydrology

Based on a review of the history of surface water use and surface water resources planning in the Green River Basin for the proposed site (Kemmerer Unit 1), it was determined that past and present use of the surface waters in the basin most surface water users has remained the same. The storage of water in Viva Naughton Reservoir and Kemmerer Reservoir for industrial use and for drinking water supply for the City of Kemmerer had an impact on surface water resources in the past, as a diversion of flow from the Hams Fork River. However, no diversions for surface water use are proposed, and no changes to existing water rights and no additional surface water right users have been identified for the upcoming development projects identified in Table 7.1-1.

To better manage the surface-water resources in the Green River Basin, current water use across the basin and projections of future water use were reviewed to identify areas of future water supply concern as explained in Section 7.2.

The nuclear power plant at the Naughton 12 site will discharge plant waste water into North Fork Little Muddy Creek that will combine with the flow from the existing Naughton Power Plant units from Outfall 003 Naughton Power Plant as well as Kemmerer Unit 1 at the Naughton 12 site will not significantly affect surface water resources, or their surface water use is insignificant for each project.

Due to extensive past modification and use of surface waters from the Green River Basin, extensive modifications to hydrology at the Naughton 12 site for the ash ponds, and minimal modifications to present surface water use in the basin, the cumulative effect of the proposed action, including effects associated with past, present, or reasonably foreseeable future projects, are anticipated to be SMALL.

Terrestrial Ecology

Direct and indirect impacts on ecological resources at the Naughton 12 site were determined to be SMALL, assuming mitigation commitments are adhered to. Most of the projects in Table 7.1-1 are too far from the Naughton 12 site to create impacts that are cumulative.

The conversion from coal to natural gas of two generating units at the Naughton Power Plant would overlap with construction of a nuclear power plant at the Naughton 12 site. Although this would be a major undertaking involving a large construction workforce, virtually all of the work will take place in previously developed or disturbed areas. No land-clearing is anticipated. There will be generally higher levels of disturbance (noise, movement, equipment exhausts) at Naughton Power Plant during the conversion but impacts would be local, affecting wildlife in the immediate vicinity of the plant. Cumulative impacts on terrestrial resources would be detectible and measurable but would not destabilize any plant or animal community on a landscape scale or regional scale. Although impacts would be additive, they would still be SMALL.

Aquatic Ecology

The Naughton 12 site is only 2.7 miles (4.3 kilometers) from the Kemmerer Unit 1 Site. Like Kemmerer Unit 1, the Naughton 12 nuclear plant would use the existing intake structure on Hams Fork River that conveys water to the Naughton Power Plant Raw Water Settling Basin. From the Raw Water Settling Basin, water for cooling tower makeup would be pumped to the Naughton 12 nuclear plant's cooling tower basin. Impacts to Hams Fork River aquatic biota would be the same, whether the Naughton 12 or Kemmerer Unit 1 location was selected. The Naughton 12 site is further (approximately 1.6 mile) from North Fork Little Muddy Creek than the Kemmerer Unit 1 Site and would presumably discharge into the small unnamed stream that flows through the site. Discharging Naughton 12 effluent to the unnamed tributary of North Fork Little Muddy Creek may be less disruptive to North Fork Little Muddy Creek biota than discharging to North Fork Little Muddy Creek, as both temperature and flow velocity of the discharge would be reduced as it flows to the creek. Differences would be subtle, however, if discernible at all. Section 7.2.3 describes the cumulative impact of eliminating the Naughton Power Plant discharge to North Fork Little Muddy Creek (loss of some benthic organisms and displacement of fish), which would be SMALL. If the Naughton 12 site were selected, the cumulative impact of the Naughton Power Plant shutdown would be essentially the same, and also SMALL.

Socioeconomics

The cumulative impacts for the Naughton 12 site would be similar to those described for the Kemmerer Unit 1 site in Chapter 7. The economic region is the same and most socioeconomic data and analyses for the Kemmerer Unit 1 Site would also apply to the Naughton 12 site. Workforce sizes, types, and settlement patterns would be the same. Because development at either site would be drawing the workforce from the same communities, the increased demands on housing and community services, such as utilities, schools, hospitals, and police and fire protection would be the same. Cumulative effects such as increased demand for housing and community services would be the same as for the proposed action. Therefore, the Naughton 12 site analysis focuses on the resource areas where the two sites would differ.

Physical Impacts

Given the proximity of the Naughton 12 site to Naughton Power Plant and Kemmerer Mine, the physical effects of odors, noise, vibration, and lighting would mingle with those of the other facilities. The industrial sites are far enough away for the effects to attenuate with distance before reaching sensitive receptors. Therefore, the cumulative physical impacts of construction and operation would be SMALL.

Transportation

The transportation impacts of a nuclear power plant at the Naughton 12 site would be focused on US 189 and CR 304. Of the developments in Table 7.2-1, the greatest cumulative effect would be from the combined Naughton Power Plant conversion and Naughton 12 traffic which would both travel on US 189 to its intersection with CR 304. Then, in approximately 0.25 mile (0.4 kilometer), Naughton Power Plant traffic would turn north onto CR 302. The combined traffic could result in traffic congestion along US 189 in addition to CR 304. The conversion of two units at Naughton Power Plant to natural gas is scheduled for first quarter 2026 and overlap with Naughton 12 construction prior to peak construction. During peak hour traffic during peak construction for Kemmerer Unit 1, US 189 would operate at LOS D and result in MODERATE impacts. Construction of a nuclear power plant at the Naughton 12 site would require modifications to CR 304 to accommodate anticipated traffic levels during peak construction. Similar to Kemmerer Unit 1, the cumulative traffic impacts are estimated at MODERATE impacts during peak hours.

Aesthetics

The plant and adjacent industrial facilities would not be easily visible from the urban and residential areas at Kemmerer and Diamondville due to the intervening ridges. On the Cumberland Flats and the plant would blend in the viewscape with the existing Naughton Power Plant. Therefore, the cumulative impact of Naughton 12 along with the existing adjacent industry would be SMALL.

Environmental Justice

As stated previously, the Naughton 12 site is located about 2.7 miles northwest of the Kemmerer Unit 1 Site. Because they are very near one another, most socioeconomic data and analyses for the Kemmerer Unit 1 Site would also apply to the Naughton 12 site. Workforce sizes, types, and settlement patterns would be the same. Therefore, the Naughton 12 site analysis of cumulative impacts would be very similar to that of the Kemmerer Unit 1 analysis of cumulative impacts.

Health and Environmental Impacts

Health and environmental impacts to the general population from construction and operation of Naughton 12 via the three pathways of soil, water, and air, would be SMALL. Combining Naughton 12's physical impacts with the other developments would have SMALL cumulative impacts. The closest minority or low-income population block group is located roughly 27 miles (43 kilometers) east of the Naughton 12 site. At this distance, physical impacts attributable to the nuclear power plant would have attenuated. Therefore, there would be no disproportionately high and adverse impacts to minority or low-income populations within the economic region via soil, water, or air pathways that would affect the health and environment of populations studied in this environmental justice analysis.

Socioeconomic Impacts

As presented in Section 7.2.5, the cumulative workforces, including the Kemmerer Unit 1 workforce, would cause large adverse impacts to the economy and housing. These impacts and mitigations would also apply to the Naughton 12 site and are summarized below.

With respect to the economy, LARGE, adverse impacts could occur when the construction workforces would leave the area, eliminating the indirect jobs and economic stimulus they would generate. There could be a commensurate increase in unemployment. It is unknown how the other cumulative projects would address their impacts to the socioeconomic environment, so this analysis can only describe mitigating actions resulting from the nuclear power plant. Figure 3.3-4 indicates that the Kemmerer Unit 1 (or Naughton 12) out-migration would occur gradually over the last couple of years of the construction phase, and the loss of construction workers would be partially offset by some in-migrating operations workers. The gradual nature of the decline in the construction workforce would help mitigate the impacts from the destabilizing effects of a sudden decrease in workers and their families. The higher average annual wages and associated multiplier effects expected with the operations workers would replace those of a share of the construction workforce.

Also, communication will be maintained with local and regional government authorities and the media to disseminate project construction- and operations-related information that could have socioeconomic impacts on the region, enabling governments, businesses, and individuals to make informed decisions and economic choices.

Even now, local agencies, organizations, businesses, and individuals are acting with the understanding that much of the positive economic impact of the construction of the nuclear power plant would be temporary and is expected to diminish when construction is complete.

Therefore, Naughton 12 impacts to the economic region economy would likely be mitigated to small and lessen the intensity of the LARGE, adverse impacts created by the increase in unemployment at the end of all of the construction projects.

Minority and low-income populations that would have benefited from the increase in jobs and wages in Sweetwater County would also be affected by the loss of those jobs and wages. Low-income populations would be particularly susceptible to the effects of job and wage gains and losses. By their very nature, they are disproportionately affected.

All vacant and available housing in the economic region would be occupied by the cumulative projects and an estimated 496 workers and family members would have to seek housing outside of the economic region, if possible. The cumulative impacts to housing in the economic region would be LARGE.

Most minority and low-income workers and their families reside in Sweetwater County and could be impacted by the housing shortages created by the cumulative workforces. The available stock of lower-priced housing would likely be depleted first, and housing shortages would increase the prices and rents of all housing types. Because the low-income populations are located in Green River and Rock Springs, where the housing impacts in Sweetwater County would be most profound, they could experience, disproportionately, these high and adverse impacts.

Historic and Cultural Resources

One action has been identified as reasonably foreseeable: converting the two coal-fired units of Naughton Power Plant with natural gas and operating them into the middle 2030s. As discussed in Section 7.2.5 for Kemmerer Unit 1, there would be no cumulative effects from this action since the conversion would take place within an existing facility, and no disturbance of currently undeveloped land would be required. As discussed in Section 5.6.2.2 for Kemmerer Unit 1, potential visual effects due to the plume from the mechanical draft cooling tower at Naughton 12 would be intermittent and SMALL, and the cumulative visual effects of the continued operation of Naughton Power Plant plus the introduction of the cooling tower plume at the Naughton 12 site are likewise expected to be SMALL. Cumulative impacts on cultural resources are expected to be SMALL.

Air Resources

Air quality impacts expected for Kemmerer Unit 1 at the Naughton 12 site and reviewed past, present, and foreseeable future projects were considered in the cumulative impacts analysis. Air emissions of criteria pollutants would be above 100 tons per year for CO, NOx, and PM_{10} without mitigation. Hazardous air pollutants would be below 10 tons per year, individually, and 25 tons per year combined. Emissions would comply with Title V and any non-Title V permitting requirements. Standard control measures would be used to mitigate fugitive dust releases. It is, therefore, anticipated that the cumulative impacts to air quality from building activities and operations would be MODERATE.

Climate Change

Climate change has global implications that the construction, operation, and decommissioning of the proposed nuclear power plant at the Naughton 12 site would not alter. However, climate change may result in new site conditions that could alter the impact assessments made for the proposed plant and cumulative impact assessment for the projects reviewed in Table 7.1-1. Based on best available information about the state of climate change, it is anticipated that the cumulative impacts to climate change from construction and operations of the proposed plant and reviewed past, present, and foreseeable future projects would be SMALL.

Nonradiological Health

Naughton 12 construction and operations would not contribute to cumulative nonradiological human health impacts for the residents in the area due to such effects as noise, dust, and gaseous emissions. Effects to workers at nearby industry would be managed through compliance with Occupational Safety and Health Administration standards and implementation of industry safety programs. Therefore, cumulative impacts due to physical effects and occupational injuries would be SMALL. The Annual Average Daily Traffic and WYDOT vehicle crash, injury, and fatality rates presented in Section 2.8.1 account for the vehicle traffic from Naughton Power Plant and other existing industry along US 189. The increased traffic along US 189 would increase the potential for a crash resulting in injury or fatality. As discussed in Section 7.2.8.3, the cumulative impacts to human health from vehicle accidents based on rates calculated from WYDOT data for crashes, injuries, and fatalities would be dependent on the total mileage from all the projects.

The generation of nonradiological waste is expected to be similar to the nonradiological waste generated at Kemmerer Unit 1 for both building activities and plant operations, as explained in Section 9.3.5.2.1. Construction and operations of the Naughton 12 site would contribute to cumulative nonradiological waste impacts when combined with the other projects in Lincoln County. It is expected that each industrial facility in the surrounding area identified in Table 7.1-1 would comply with applicable Federal, State, and local regulations to ensure proper disposal of nonradiological waste. Nonradiological waste impacts from liquid, gaseous, and solid wastes would be SMALL, and mitigation would not be warranted for releases during normal activities. The implementation of adequate training and management practices are expected to minimize the potential for accidental releases and the environmental impact of accidental releases.

Radiological Health

For the analysis of cumulative radiological impacts for the Naughton 12 site (which is similar to the analysis for the proposed site), the geographic area of interest is considered to be the area that has the potential to increase radiological exposure at any location within a 50-mile (80-kilometer) radius of the plant. As explained in Section 7.2.9, the NRC historically has used 50 miles (80 kilometers) as the radius bounding the geographic area for evaluating doses to the public from routine releases from nuclear power plants. No nuclear facilities or other facilities that use radiological materials have been identified that would have any potential impacts on radiological health within the geographic area of interest, as shown in Table 7.1-1.

Therefore, the cumulative impacts to radiological health at any location within 50 miles of the Naughton 12 site are anticipated to be SMALL.

Postulated Accidents

The results of the cumulative analysis conducted for the proposed site in Section 7.2.10 are applicable to the Naughton 12 site. The analysis for the proposed site considered DBAs and severe accidents at other existing and proposed nuclear facilities that have the potential to increase risks at any location within the geographic area of interest. The geographic area of interest for impacts is within a 50-mile radius of the Naughton 12 site. The 50-mile (80-kilometer) radius was selected to cover any overlaps in potential risk from two or more nuclear facilities. There are no existing or proposed nuclear facilities identified that would contribute to risk within this geographic area of interest; therefore, the cumulative impacts from postulated accidents at any location within 50 miles of the Naughton 12 site are anticipated to be SMALL.

9.3.5.2.3 Evaluation of Jim Bridger 22

Jim Bridger 22 is an approximately 442 acre (179 hectare), largely undeveloped site in Section 22, T21N, R101W, approximately 23.5 miles (37.8 kilometers) east of Rock Springs and 7 miles (11 kilometers) north of Point of Rocks, in Sweetwater County, Wyoming (Figure 9.3-9). For the purpose of analysis, it was assumed that the Natrium Reactor Plant, including a sodium-cooled fast reactor with a molten salt energy storage system, would be constructed. The closed-loop cooling system would consist of a mechanical draft cooling tower with makeup water via pipeline from the Jim Bridger Reservoir. The plant would operate with zero wastewater discharge. Blowdown from the cooling tower would be discharged into the Jim Bridger Plant evaporation pond located about 1.7 miles (2.7 kilometers) southwest of the site. Two transmission lines would be required to connect the site to the Jim Bridger Plant switchyard. To analyze the effects of building a new nuclear plant, the construction and operation practices described in Chapters 4 and 5 were assumed generally to be applied to the Jim Bridger 22 site thereby allowing for a consistent description of the impacts. The conceptual layout for Jim Bridger 22 is shown in Figure 9.3-10.

Land Use

Based on the conceptual site layout developed for the Jim Bridger 22 site, the following land requirement assumptions were made which form the basis of the environmental comparison of alternative sites:

- The facility footprint would require approximately 63 acres (25 hectares). New facilities at the plant site would include the nuclear reactor, energy island, support buildings, cooling tower, switchyard, access road, parking, and stormwater retention ponds.
- Based on a conceptual site layout developed for the Jim Bridger 22 site, access would be from CR 18 (Superior Cutoff Road) which is reached from I-80 via SR 377 to CR 15 (Nine Mile Road). CR 18 is unpaved and would require upgrade to accommodate anticipated traffic levels and material deliveries attributable to construction.
- The makeup water pipeline corridor would extend approximately 3.9 miles (6.3 kilometers) to the Bridger Reservoir. Assuming a corridor width of 50 feet (15 meters), approximately 24 acres (9.7 hectares) would be required for the pipeline corridor.
- The assumed length of transmission corridor routing to the Bridger Power Plant switchyard is approximately 3.7 miles (6.0 kilometers). Assuming a corridor width of 250 feet (76 meters) approximately 113 acres (45.7 hectares) would be required for the transmission lines.
- Additional acreage would be required to support construction activities (e.g., additional laydown areas and parking, batch plant, fill/spoil areas). The additional land required during construction is estimated at approximately 78 acres (32 hectares). These areas are expected to continue to serve plant operations and maintenance. Therefore, it is assumed that the additional construction area would be permanently disturbed.
- The need for a heavy haul road to convey construction materials to the site during construction has not been established.

Based on the sub-totals above for both onsite and offsite plant components, the total area potentially affected at the Jim Bridger 22 site is estimated at approximately 278 acres (112 hectares), as shown in Figure 9.3-10.

The Jim Bridger 22 site and surrounding area except for the Jim Bridger Plant and coal mines are largely undeveloped. The site has been disturbed from well drilling and borings conducted from previous site characterization activities. The nearest urban areas are the small towns of Point of Rocks and Superior. Both are approximately 7 miles (11 kilometers) from the plant site. The Jim Bridger 22 site and surroundings are dominated by shrub/scrub rangeland.

The Jim Bridger 22 site has no active mining or oil and gas wells. The site is surrounded on three sides by coal mining operations. The Bridger Mine, is to the north and east. The Leucite Hills Mine operated by the Black Butte Coal Company, is to the southwest. The surrounding land has a few active gas wells with the closest being west of the site and north of CR 18. This active gas well is under the South Black Rock lease held by the Sunshine Valley Petroleum Company. An active gas field, Deadman Wash, lies southwest of the site, much of it lying within the Leucite Hills Mine Permit boundary, and could be crossed by the water and transmission corridors (Reference 9.3-77).

There are no transmission lines or pipelines within the Jim Bridger 22 site. The existing transmission ROW running east-west to the Jim Bridger Plant switchyard would be crossed by the water pipeline to reach the Bridger Reservoir. The transmission lines would intersect with the existing transmission ROW to reach the switchyard. Existing natural gas and petroleum product pipelines traversing east-west run south of the Bridger Reservoir, south of the water and transmission corridors (Reference 9.3-77).

The Jim Bridger 22 site is located on privately owned land that is zoned for mineral development (MD-1). Power plants of any type are conditional uses in MD-1 districts, Conditional uses may be allowed subject to approval by the Planning and Zoning Commission, but no more than two conditional uses are allowed per lot or parcel. (Reference 9.3-52. District Use Chart). As discussed in Section 2.4.2.4.2, about 73 percent of Sweetwater County is under federal management, primarily the Bureau of Land Management (BLM). In much of the surrounding 10-mile (16-kilometer) area, the BLM-administered land is a “checkerboard” pattern of 1 square mile sections alternating between BLM and private ownership, interspersed with an occasional state-owned parcel (Reference 9.3-23). The conceptual corridors would cross BLM-administered lands to reach the infrastructure at the Jim Bridger Plant. Use of the lands would be subject to right of way grants issued by the BLM.

The only other additional impacts to land use from operations will be the impacts of salt deposition and shadowing from the mechanical draft cooling tower. Modeling of fogging, icing, shadowing, and drift deposition was not performed for the Jim Bridger 22 site, but the plume characteristics would be expected to be similar to the evaluation of Kemmerer Unit 1 described in Sections 5.3 and 5.7. The predicted salt deposition and shadowing from the plume are not expected to significantly affect offsite areas. No land use conversion would result from operation of the cooling towers.

Use of the site would convert the land from its current undeveloped status to industrial use. However, the Jim Bridger 22 site's zoning allows development of a power plant, and the surrounding area has existing industrial development. The land use impact would be SMALL for construction and operations.

Hydrology

Water resources available for use at the Jim Bridger 22 site are also located in the Green River Basin. Water supplied to the Jim Bridger Plant is provided via an existing, 316(b) compliant cooling water intake structure on the Green River, and delivered to the plant through a pipeline to the Jim Bridger Reservoir. PacifiCorp maintains a contract for storage water from the Fontenelle Reservoir for use at the Jim Bridger Plant during times of severe drought (Reference 9.3-51).

According to the 2010 Green River Basin Plan, the Jim Bridger Plant was originally designed for up to six coal-fired generating units, despite only having four 500-megawatt units constructed and in operation. Cooling water for the existing plant is supplied by a 62.8 cubic feet (1.78 cubic meters) per second direct flow water right from the Green River (see water rights information in Table 2.2-8).

In addition to river water sourced from the Green River, makeup water for the closed-cycle recirculating cooling water system is supplemented by water from Bridger Coal Underground Mine. A pipeline was constructed supplying approximately 3,500 gallons per minute (gpm) of makeup water from the mine to the Jim Bridger Plant. The use of the Bridger Coal mine water supply has resulted in reduced raw water makeup demand from the Green River. (Reference 9.3-42).

Water resources available at the Jim Bridger Plant could reasonably be shared with the proposed nuclear power plant, so long as the Jim Bridger Plant does not plan for expansion in the future. According to the PacifiCorp 2023 Integrated Resources Plan, the Jim Bridger Plant does not have definitive plans in place for expansion. A significant amount of capital investment would be needed to add two additional units. (Reference 9.3-45)

Table G.1 of Appendix G in the PacifiCorp 2023 Integrated Resources Plan states the four year average for plant water consumption at the Jim Bridger Plant from 2019 to 2022 is 19,064 acre-feet peryear or approximately 26.3 cubic feet per second (Reference 9.3-46). Since the Jim Bridger plant appears to be using approximately 42 percent of their direct flow surface water rights, there is flexibility to meet the average water consumption demand for the proposed plant as described in Sections 2.2 and 5.2 (3,689 gallons per minute or approximately 8.22 cubic feet per second). Assuming no changes to the cooling water intake structure are needed to increase the flow of raw water supplied to the proposed plant and supplemental water supply from the Bridger Coal Mine is still available, impacts to surface water supply will be SMALL.

Raw water for Kemmerer Unit 1 at the Jim Bridger 22 site would be supplied by water from the Green River stored in the Jim Bridger Reservoir, which is appropriated through PacificCorp's water rights (Permit #32112/1968 State of Wyoming Proof of Appropriation of Water). The 92-acre (37-hectare) reservoir has a 14-day supply for the existing Jim Bridger Plant water demands, and is located south of the proposed site location, approximately 41 miles (66 kilometers) from the cooling water intake structure on the Green River. A water pipeline would run northeast from the Jim Bridger Reservoir to the proposed plant location as shown in Figure 9.3-10. (Reference 9.3-8) The distance from the proposed plant to the Jim Bridger Reservoir and water pipeline are considerably less than the distances to the Raw Water Settling Basin and water pipeline infrastructure from Naughton Power Plant to the Kemmerer Unit 1 Site.

There are no public water reserves or areas of hydrologic concern near the proposed plant at the Jim Bridger 22 site. The closest area of hydrologic concern is the Town of Superior Recharge Area, which is several miles to the west. (Reference 9.3-8) There are no sole source aquifers within the proposed site area. (Reference 9.3-15) A review of permitted water well records from the Wyoming State Engineers Office indicates that there are no public or private drinking wells near the proposed site. The only wells reported were shallow monitoring wells installed in 1990 associated with PacifiCorp's Power Plant operations. (Reference 9.3-8)

Groundwater flow is generally to the southeast, away from the Jim Bridger 22 site. Since groundwater availability is not easily accessible onsite, groundwater use will be limited to beneficial uses during building activities, such as use of dewatering water for dust suppression. Groundwater use for plant operations is not proposed due to sufficient surface water supply to meet plant water demands. No subsurface investigations were conducted for the Jim Bridger site. However, known seepage from Flue Gas Desulfurization Pond 1 located just north of the Jim Bridger Unit has created a groundwater plume beneath the general area of the Flue Gas Desulfurization Ponds 1 and 2. This plume is presently controlled Flue Gas Desulfurization by a series of groundwater pump back wells which discharge the pumped water back into Flue Gas Desulfurization Pond 2. There are 56 wells installed on site for groundwater quality observation and an associated program of groundwater sampling and monitoring.

Construction dewatering water would be discharged in compliance with a Wyoming Department of Environmental Quality General Permit for Temporary Discharges Involving Construction Activities (WYG740000). This permit requires water discharge sampling and testing and includes discharge effluent limits to ensure waters of the state are protected (Reference 9.3-92). All other stormwater and building activities will be covered under a Large Construction General Permit.

The existing Jim Bridger Plant is a zero-discharge facility that utilizes evaporation ponds in lieu of releasing plant water discharge to a nearby waterway. The proposed nuclear power plant at the Jim Bridger 22 site would also use evaporation ponds due to a lack of discharge point to a nearby waterway. Therefore, the plant would not require a Wyoming Pollutant Discharge Elimination System permit from the Wyoming Department of Environmental Quality.

The Jim Bridger 22 site is adjacent to a developed parcel and roadway, there are moderate topographical changes between the existing Jim Bridger Plant and the proposed site at the Jim Bridger 22 location. Significant earthwork would be required, based on the general topography of the site, particularly the steep slopes on the northeast side of the site, to support installation of the plant, construction facilities and to install suitable heavy haul roads with reasonable grades. See proposed layout in Figure 9.3-10.

The proposed plant at the Jim Bridger 22 site is located outside of mapped FEMA 100-year floodplains according to FEMA Community Panel Number 560087 0050 A (Reference 9.3-21). Despite a lack of floodplain data for the Jim Bridger 22 site, it is expected the limits of the

100-year floodplain would follow the stream boundaries. Coordination with Lincoln County for the Floodplain Development Permit would determine whether a flood study is required at the proposed plant location.

Proposed hydrological alterations to the Jim Bridger 22 site would be minimal assuming mitigation for hydrologic impacts can be met per conditions set by Federal, State, and local agencies. Reuse of existing water infrastructure at the Jim Bridger Plant would greatly minimize the need for any significant alterations for water supply. As previously stated, the primary water supply for the Jim Bridger Plant is the Jim Bridger Reservoir. An existing, 316(b) compliant intake structure exists on the Green River that uses best available technology to deliver water to the plant via a pipeline to the Jim Bridger Reservoir. No plant discharge would be released from the plant into surface waters and further groundwater contamination concerns from plant operations would be avoided. All discharge will go into an existing evaporation pond. A disadvantage of a zero-discharge facility is no return of surface water to nearby water resources, resulting in the loss of surface water in the Green River Basin. Site grading within the 100-year floodplain will be limited to the greatest extent practicable, and where impacts cannot be avoided, stormwater drainage will follow a natural pattern. Building activities will be conducted to minimize and avoid impacts to the greatest extent possible to protect water quality (using Best Management Practices) and maintain existing hydrologic functions at the site, in compliance with all required permits. No water quality impacts are anticipated for plant operations. Therefore, impacts associated with hydrological alterations to surface and groundwater resources, are expected to be SMALL.

Terrestrial Ecology

The Jim Bridger 22 site lies within the Wyoming Basin sagebrush shrubland-steppe eco-region, a region of arid grasslands and shrublands that is among the driest and windiest places in the U.S. Average annual rainfall in the region ranges from 8 to12 inches (20 to 30 centimeters); average annual snowfall ranges from 29 to 78 inches (74 to 198 centimeters) (Reference 9.3-24). Sagebrush steppe and sagebrush shrubland communities in southwest Wyoming are often dominated or co-dominated by Wyoming big sagebrush (*Artemis tridentata* ssp *wyomingensis*), with a mix of other shrubs (e.g., Gardners saltbush [*Atriplex gardneri*], green rabbitbrush [*Ericameria teretifolia]*, rubber rabbitbrush [*Ericameria nauseosa*], broom snakeweed [*Gutierrezia sarothrae*], and black greasewood [*Sarcobatus vermiculatus*]); hardy, cool-season grasses (e.g., bluebunch wheatgrass [*Pseudoroegneria spicata*], Sandberg bluegrass [*Poa secunda*], western wheatgrass [*Pascopyrum smithii*], crested wheatgrass [*Agropyron cristatum*]; and scattered forbs (e.g., milkvetch [*Astrolagus* spp], pussytoes [*Antennaria* spp], phlox [*Phlox* spp], fleabane [*Erigeron* spp], arrowleaf balsamroot [*Balsamorhiza sagittata*]) (Reference 9.3-26).

Wildlife in the vicinity of the Jim Bridger 22 site include a variety of ground- and shrub-nesting birds, small mammals, and larger mammals (including big-game species), for the most part common species that are widely distributed across the Wyoming Basin. Avian species observed in 2022 surveys of a parcel south of the site included horned larks (*Eremophila alpestris*), western meadowlarks (*Sturnella neglecta*), mourning doves (*Zenaida macroura*), black-billed magpies (*Pica hudsonia*), common ravens (*Corvus corax*), and turkey vultures (*Cathartes aura*) (Reference 9.3-7). A single red-tailed hawk (*Buteo jamaicensis*) and a single Swainson’s hawk

(*Buteo swainsoni*) were also observed. Industrial ponds around the Jim Bridger Plant attract waterfowl, such as mallards (*Anas platyrhynchos*) and American widgeon (*Anas americana*), and shorebirds, such as great blue herons (*Ardea herodias*) (Reference 9.3-7). Common small mammals in this part of Wyoming include least chipmunk (*Tamias minimus*), white-tailed prairie dog (*Cynomys leucurus*), and white-tailed jackrabbit (*Lepus townsendii*) (Reference 9.3-39; Reference 9.3-95). Coyotes (*Canis latrans*) and red foxes (*Vulpes vulpes*) are also commonly observed in the area. Pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemonius*), important Wyoming game species, were both observed by biologists who conducted wildlife surveys in 2022 (Reference 9.3-7).

The Jim Bridger 22 site is surrounded on three sides by coal mining operations. The site is 1.3 miles (2.1 kilometers) south of the Bridger Mine's North Area, 1.3 miles (2.1 kilometers) west of the Bridger Mine's Central Area, and 1.0 mile (1.6 kilometers) north of the Leucite Hills Mine. It is approximately 2.5 miles (4.0 kilometers) northwest of the Jim Bridger Plant's generating facilities. CR 15 and 18 are a short distance from the eastern and northern boundaries of the Jim Bridger 22 site. Unpaved roads that connect the various facilities crisscross the areas south and east of the Jim Bridger 22 site. Although the rolling hills west of the site are largely undeveloped, the noise, night lights, movement of vehicles and people, and smells associated with the two mines and the Jim Bridger Plant reduce, to a significant degree, the value of the Jim Bridger 22 site as wildlife habitat.

Three small intermittent streams flow from west to east across the Jim Bridger 22 site, bend south and flow into Deadman Wash approximately 2.7 miles (4.3 kilometers) southeast of the site, according to the National Hydrography Dataset (Reference 9.3-75). There are narrow strips of riparian wetlands associated with these onsite streams totaling 6.22 acres (2.52 hectares), according to the National Wetlands Inventory (NWI) (Reference 9.3-67). Riparian wetlands on the site will be avoided. The conceptual water and transmission corridors are crossed by several more streams that flow in a southeasterly direction and into the various ponds and impoundments at the Jim Bridger Plant. There are 1.43 acres (0.58 hectare) of riparian wetlands in the water and transmission utility corridors (Reference 9.3-67). Construction of the transmission lines would span any wetlands or streams along the route. Construction of the water supply line would employ horizontal directional drilling at stream and wetland crossings to avoid impacts to resources within the corridor.

Based on a 2023 Information for Planning and Consultation review (Reference 9.3-69), seven Federally endangered, threatened, or candidate species could be affected by construction and operation of a nuclear plant at the Jim Bridger 22 site:

- Bonytail (*Gila elegans*); endangered
- Colorado pikeminnow (*Ptychocheilus lucius*); endangered
- Humpback chub (*Gila cypha*); threatened
- Razorback sucker (*Xyrauchen texanus*); endangered
- Yellow-billed cuckoo (*Coccyzus americanus*); threatened
- Monarch butterfly (*Danaus plexippus*); candidate species
- Ute ladies'-tresses (*Spiranthes diluvialis*); threatened

Desktop reviews of the scientific literature and WYNDD occurrence records suggest that none of these species is likely to occur in the vicinity of the Jim Bridger 22 site, with the possible exception of the monarch butterfly, which appears in unpredictable fashion across the state of Wyoming. There is no habitat in the vicinity that would support any of the other species: no large rivers (for the four fish species), no riparian woodlands (for the yellow-billed cuckoo), and no wet meadows or wetlands adjacent to perennial streams (for Ute ladies'-tresses).

A review of the WYNDD database in 2023 indicated that 49 Wyoming Species of Greatest Conservation Need could occur within 5 miles (8 kilometers) of the Jim Bridger 22 site (Reference 9.3-94). Five of these species were observed in 2019 by biologists conducting a habitat assessment and survey: sage thrasher (*Oreoscoptes montanus*), Brewer's sparrow (*Spizella breweri*), loggerhead shrike (*Lanius ludovicianus*), golden eagle (*Aquila chrysetos*), and Swainson's hawk (Reference 9.3-7). Several Brewer's sparrows and a single loggerhead shrike were also observed in June 2023 by a biologist who conducted a one-day reconnaissance of the Jim Bridger 22 site (Reference 9.3-58).

The Jim Bridger 22 site and the conceptual transmission corridor (113 acres or 45.7 hectares) and water supply corridor (24 acres or 9.7 hectares) lie within an area designated pronghorn crucial winter, year-long range (Reference 9.3-83). Mule deer crucial winter, year-long range (Reference 9.3-86) lies a short distance (0.46 miles or 0.74 hectares) west of the site. Elk crucial winter year-long range (Reference 9.3-84) lies 4.9 miles (7.9 kilometers) east of the Jim Bridger 22 site. Development of the Jim Bridger 22 site would not encroach on either of these ranges. No WGFD-designated migration corridors established in Executive Order 2020-01 overlap with the site or conceptual corridors. Pronghorn, as well as mule deer sign, were observed during the 2023 site reconnaissance.

The northern boundary of the Jim Bridger 22 site is approximately 1.9 miles (3.1 kilometers) from a Greater Sage Grouse Core Population area. There are eight occupied sage grouse leks arrayed in a semi-circle around the Jim Bridger 22 site and utility corridors. The closest occupied sage grouse lek ("Spring Butte") is 4.0 miles (6.4 kilometers) northwest of the Jim Bridger 22 site boundary. Other occupied leks are approximately 4.4 to 7.7 miles (7.7 to 12.4 kilometers) from closest site boundary or utility corridor (Reference 9.3-87; Reference 9.3-88).

Construction of the nuclear power plant at the Jim Bridger 22 site would permanently disturb 141 acres (57 hectares) of shrub-scrub habitats, according to the USDOI LANDFIRE Dataset (primarily Wyoming sagebrush-shrub and greasewood flats vegetation) (Reference 9.3-64). Construction disturbance could displace common wildlife species associated with sagebrush ecosystems such pronghorns, coyotes, badgers (*Taxidea taxus*), white-tailed jackrabbits, Wyoming ground squirrels (*Urocitellus elegans*), sage thrashers, vesper sparrows, horned larks, ferruginous hawks, and Northern sagebrush lizards (*Sceloporus graciosus*). Pre-construction surveys of construction sites for nests of ground- and shrub-nesting birds, including burrowing owls, would be required to prevent the "taking" of migratory birds or their nests.

Construction of the nuclear power plant at the Jim Bridger 22 site would eliminate approximately 141 acres (57 hectares) of pronghorn crucial winter, year-long range. Another 113 acres (46 hectares) of pronghorn crucial winter, year-long range would be temporarily disturbed by construction of the two transmission lines, while 24 acres (10 hectares) would be temporarily disturbed for construction of the water supply pipeline. The total acreage (278 acres or 113 hectares) that would be disturbed is expected to be less than 0.02 percent of the pronghorn crucial winter range/year-long range in the region and have little or no impact on the species' management. Areas disturbed during construction of linear utilities would be revegetated, as necessary, with native grasses and forbs. These areas could be used by pronghorns, other large and small mammals, and a variety of sagebrush-associated birds once stabilized and revegetated.

In summary, construction of the nuclear power plant at the Jim Bridger 22 site would involve the elimination of a small amount of sagebrush shrub-scrub habitat and the displacement of common sagebrush-associated wildlife species. No Federally listed species or designated critical habitat would be affected. Impacts from construction on terrestrial resources would therefore be SMALL. There would be minor operations-related impacts on wildlife associated with plant noise and night lighting, and occasional bird collisions with tall structures, but overall impacts would be SMALL.

Salts and other impurities in cooling tower drift have damaged sensitive vegetation at some coastal power plants, but modeling of salt deposition rates for Kemmerer Unit 1 (see Section 5.3.1.1) indicated that maximum expected salt deposition rates would be well below those known to cause harm to sensitive plants. Because vegetation in the vicinity of the Jim Bridger 22 site is very similar to that at the Kemmerer Unit 1 Site (sagebrush shrubland), impacts to vegetation are expected to be similar, and below those known to cause harm to plants. Modeling of salt deposition rates using site-specific inputs (makeup water quality, terrain, vegetation downwind of the plant) would be required to more precisely describe impacts, however. There would be minor disturbance impacts to wildlife associated with operations of a nuclear plant at the Jim Bridger 22 site, including noise from vehicles, equipment, and the public address system. Small numbers of birds could be harmed by collisions with tall structures, such as meteorological towers. Overall, impacts from operation of a nuclear power plant at the Jim Bridger 22 site are expected to be SMALL.

Aquatic Ecology

Based on the fact that they flow only intermittently, none of the streams that cross the Jim Bridger 22 site or associated corridors is believed to contain fish. These unnamed streams are tributaries of another intermittent stream, Deadman Wash. No information on fish communities in the vicinity of the Jim Bridger 22 site or Deadman Wash was found in a desktop review, presumably because they do not contain fish. Construction of a nuclear plant at the Jim Bridger 22 site would require a WYPDES Large Construction General Permit for Storm Water Discharges. Permittees are expected to minimize or eliminate pollutants, including sediment, in stormwater runoff from construction sites. A Stormwater Pollution Prevention Plan would be required as a condition of the permit that identifies best management practices that would be used to minimize pollution in stormwater runoff. Based on the fact that most land-disturbing activities would be confined to upland areas, that State-approved best management practices would be employed to minimize impacts, and that potentially affected streams do not appear to contain fish, impacts from construction of a nuclear power plant at the Jim Bridger 22 site is expected to have SMALL impacts on aquatic communities.

The Bridger Reservoir has been stocked with fish by the WGFD for decades and provides excellent fishing for both bank and boat fishers. In recent years, three species have been stocked: rainbow trout (*Oncorhynchus mykiss*), Snake River cutthroat trout (*Oncorhynchus clarkii*), and tiger trout (*Salmo trutta* × *Salvelinus fontinalis*) (Reference 9.3-89). There is scant information on the fish community of the Bridger Reservoir, other than WGFD stocking records and reports of anglers, which are focused on salmonids.

The Jim Bridger Plant obtains its cooling water from an intake structure on the Green River. From the Green River water is piped 42 miles to the Bridger Reservoir (Reference 9.3-42). Cooling water is stored in the Bridger Reservoir before being pumped as makeup to the Jim Bridger Plant's cooling towers. Although the Jim Bridger Plant had no discharge to waters of the state, it was required in 2017 to show compliance with Clean Water Act (CWA) Section 316(b) because it operated under a WYPDES industrial storm water permit. The Jim Bridger Plant's cooling system was subsequently determined by WYDEQ to be in compliance with CWA Section 316(b) because it used the Best Available Technology to minimize impingement mortality and entrainment (Reference 9.3-42). WYDEQ refers to closed-cycle recirculating cooling systems as a "pre-approved EPA technology."

The proposed nuclear plant would also employ closed-cycle cooling (cooling towers), withdrawing makeup from the Bridger Reservoir and discharging to an evaporation pond. There would be no discharge to waters of the state. The Jim Bridger Plant, which uses the same kind of cooling system, was determined by WYDEQ to be in compliance with CWA Section 316(b), because its cooling water system uses the Best Available Technology to minimize impingement mortality and entrainment, as described above (Reference 9.3-42).

The proposed power plant would employ closed-cycle cooling, known to reduce surface water withdrawal rates by 95 percent compared to open-cycle (once-through) cooling (79 FR 48303). Closed-cycle cooling would also achieve a commensurate reduction in impingement and entrainment rates. The combined impacts on Green River aquatic communities would be SMALL.

Socioeconomics

Physical Impacts

The construction and operation activities would be the same as for the proposed action. The nearest residences are in Point of Rocks to the south and Superior to the west, both approximately 7 miles (11 kilometers). Construction activities for the transmission lines and water supply pipeline would have a closer approach but would still be more than 3 miles (5 kilometers) away from the residences in Point of Rocks. The physical impacts of odors, noise, vibration, lighting, would mingle with those of the operating Jim Bridger Plant and the Leucite Hills Mine. Therefore, the physical impacts of construction and operation of a nuclear power plant at the Jim Bridger 22 site would be SMALL.

Also, the distance to the nearest residences would minimize visual impacts of construction activities and the structures during operations. The construction activities and the structures would also blend with the existing industry for visitors to the surrounding public lands. Therefore, the visual impacts of construction and operation of a nuclear power plant at the Jim Bridger 22 site would be SMALL.

Demography

The demographic analysis is based on the estimated maximum number of construction and operations workers migrating into the economic region during the construction period.

Based on the residential distribution of PacifiCorp's Jim Bridger Plant workforce, 100 percent of the construction and operations workforces for a nuclear power plant at the Jim Bridger 22 site were assumed to reside in Sweetwater County, making Sweetwater County the economic region for this analysis. The peak number of workers on site during construction would be 1,712. This includes 1,632 construction workers and 80 operations workers. Of the 1,632 construction workers, 1,550 would relocate to the economic region. The 80 operations workers would relocate to the economic region. In-migrating construction and operations workers would create 719 indirect jobs, 272 of which would be filled by local unemployed workers and 447 of which would be filled by workers migrating into the economic region. Hence, 2,077 workers (1,550 construction workers, 80 operations workers, and 447 indirect workers) would migrate into Sweetwater County during the peak of construction.

The nuclear plant would employ 250 operations workers, all of whom, would migrate into the economic region and create indirect jobs for 445 workers. None of the indirect workers would come from outside of the economic region, as the existing unemployed workforce and the 447 indirect workers that would migrate in during construction would be available to fill the indirect jobs.

The population distribution near the site is low, with typical rural characteristics. The 2020 population of Sweetwater County was 42,272 people (Table 2.4-4). The population within 50 miles (80 kilometers) of the site was 41,925 people (5.3 people per square mile), and the population within 20 miles (32 kilometers) of the site was 352 people (0.3 people per square mile). The nearest population center, as defined in 10 CFR 100, is Rock Springs, with a 2020 population of 23,526 (Table 2.4-3) and lies west-southwest of the Jim Bridger 22 site. Based on the sparseness and proximity matrix in NUREG-1437, the site is in a low population area.

Assumptions regarding workforce family characteristics and retention are presented in Table 4.4-1 and Table 4.4-2 (construction) and 5.4-a and 5.4-b (operations). As discussed in Section 4.4.2, approximately 37 percent of the in-migrating construction workforce, 80 percent of the operations workforce, and 80 percent of the in-migrating indirect workforce are likely to bring families during construction. Therefore, 992 workers would bring families into the economic region during peak construction. Assuming an average household size of 3.2 people for workers bringing families, construction would increase the population by 4,260 people, which represents a 10 percent increase in Sweetwater County's 2020 population. The 250 operations employees would translate into an additional 800 people (assuming an average family household size of 3.2 people). Based on 2020 census data, the addition of the new operations employees and their families would increase the population in Sweetwater County by 1.9 percent.

Economy

In 2021, Sweetwater County's labor force totaled 19,449. Of those labor force participants, 18,360 were employed and 1,089 were not, representing an unemployment rate of 5.6 percent (Table 2.4-8). For the same year, the state's unemployment rate was 4.5 percent (Table 2.4-8).

As described in Sections 4.4.3.1.2 and 5.4.3.1.2, the wages and salaries of the construction and operations workforces would have multiplier effects that would increase business activity, particularly in the retail and service sectors. This would have a positive impact on the business community and could provide opportunities for new businesses and jobs. The economic effects would be beneficial. Most direct jobs are assumed to be filled by in-migrating workforces.

Based on the peak number of workers on site during construction, it is estimated that 1,550 construction workers and 80 operations workers would migrate into Sweetwater County. Assuming a multiplier of 0.372 jobs (indirect only) for every construction job and a multiplier of 1.7809 jobs (indirect only) for every operations job (Reference 9.3-1), an influx of 1,550 construction and 80 operations workers would create 719 indirect jobs, for a total of 2,350 new jobs in the economic region. The economic impacts of construction of the proposed nuclear power plant would be SMALL to MODERATE and beneficial in Sweetwater County.

All operations workers were assumed to migrate into the economic region. Assuming a multiplier of 1.7809 jobs (indirect only) for every operations job at the nuclear power plant (Reference 9.3-1), an influx of 250 workers would create 445 indirect jobs for a total of 695 new jobs in the economic region.

Because most indirect jobs are service-related and not highly specialized, some indirect jobs would be filled by the unemployed in Sweetwater County. To be conservative, 25 percent of the local unemployed, 272 workers, are assumed to be available to the Project. The remaining indirect jobs are assumed to be filled by workers migrating into the economic region during construction. The in-migrating direct and indirect workers during construction would represent a 11.3 percent increase in 2021 employment. In-migrating workers during operations would represent a 1.4 percent increase in the 2021 employment.

With respect to Sweetwater County employment, the increase in Project-related workers would create a SMALL to MODERATE, beneficial impact. With respect to unemployment in Sweetwater County, Project-related jobs could reduce unemployment by 25 percent or more, creating a LARGE, beneficial impact. Therefore, the impacts of construction and operation of the nuclear power plant on the economy would be SMALL to MODERATE and beneficial.

Taxes

Property taxes would be paid to Sweetwater County and its taxing jurisdictions during construction and operation of the nuclear power plant. In 2021, Sweetwater County and its taxing jurisdictions levied a total of $135,382,460 in property taxes (Table 2.4-20). Tax payments to

Sweetwater County and its taxing jurisdictions for a nuclear power plant at the Jim Bridger 22 site are estimated to reach $12.8 million by the final year of construction (based on cost of construction). In total, the estimated tax payments represent a SMALL to MODERATE increase in total 2021 property tax levies in the county. For the operations period, total payment to all taxing entities would be approximately $7.8 million, annually. This payment would represent a SMALL increase in the total 2021 property tax levies in the county. For these reasons, it is concluded that the potential beneficial impacts of property taxes collected during construction and operation of the proposed project would be SMALL to MODERATE in Sweetwater County.

The site is located in the Sweetwater County School District #1 (SCSD #1) tax district, which was dependent on the state to meet its annual guarantee in Funding Year 2021-2022 (Reference 9.3-81). The State redirected about $40 million to the District so the District would meet its guarantee. Increased tax revenues would have only a SMALL, beneficial impact on SCSD #1, as the State has and would continue to make up the difference between the District's local revenues and its guarantee. If the District collects more than its guarantee in property tax revenues, the state will recapture the excess revenues and redistribute them. In Funding Year 2020-2021, SCSD #1 revenues totaled $124,937,077, including tax and non-tax revenues (Reference 9.3-80). The education-related portion of the projected construction-phase property taxes for the nuclear plant, $7.2 million, represents less than 10 percent of those total revenues.

In-migrating construction and operation workers would result in larger enrollments at SCSD #1 and Sweetwater County School District #2 (SCSD #2), as well. SCSD #2 would not receive direct property tax revenues from the plant, but because one of the components of the School Foundation Program funding formula is based on enrollment, increases in the number of students would lead to increased funding there. Increases in enrollment would also result in additional expenses. Fiscal impacts to SCSD #1 and SCSD #2, from increased enrollment, would likely be SMALL. SCSD #2 was also dependent on the state to meet its guarantee in Funding Year 2021-2022. The state redirected about $16 million to that district (Reference 9.3-81).

For these reasons, the potential beneficial impacts of property taxes collected during construction and operation of the proposed project will be SMALL to MODERATE in Sweetwater County.

Transportation

The major highway in the area is I-80 which would connect the site to the urban areas of Rock Springs and Green River on the west. The area also includes SR 377 and SR 371 and a network of county and other local roads. Access would be from I-80 at its intersection with SR 377 at Point of Rocks. Traffic to the nuclear plant would not travel through Point of Rocks. Residents of Point of Rocks and the Jim Bridger Plant workers could experience MODERATE to LARGE traffic impacts at peak commuting hours during construction and MODERATE during operations. Congestion at the I-80 on and off ramps and along SR 377 could be reduced by staggering arrivals and departure times for the Jim Bridger 22 workforce and not overlapping with the shift changes of the Jim Bridger Plant. Therefore, traffic impacts to the public could be mitigated to SMALL to MODERATE.

Aesthetics

As presented above in physical impacts, the visual impacts of construction and operation of a nuclear power plant at the Jim Bridger 22 site would be SMALL.

Recreation

There are no National parks, State parks, wildlife habitat management areas (Reference 9.3-85), or hunter management areas (Reference 9.3-90) within a 10-mile (16-kilometer) radius of the Jim Bridger 22 site. There are, however, numerous public lands, most owned by the BLM. Recreation and tourism activities within a 10-mile (16-kilometer) radius of the Jim Bridger 22 site include outdoor recreation at various historic and hiking trails (Reference 9.3-53), Killpecker Sand Dunes Open Play Area and Recreation Site (Reference 9.3-4), the Jim Bridger Reservoir Park (Reference 9.3-44), and the Superior Mail Arrow (Reference 9.3-5). The Point of Rocks Stage (coach) Station Historic Site (Reference 9.3-78) offers a couple of indoor activities in the forms of a museum and a collection of historic buildings.

The construction activities and the structures would also blend with the existing industry for visitors to the surrounding public lands. Therefore, the visual impacts of construction and operation of a nuclear power plant at the Jim Bridger 22 site would be SMALL.

The influx of workers during the nuclear plant construction could impact the use of recreation and tourism opportunities within the 10-mile vicinity. During the peak of construction, the in-migrating 4,260 workers and family members would represent a 10 percent increase in the 2020 population of Sweetwater County. The Jim Bridger Reservoir Park and the Killpecker Sand Dunes Open Play Area would be expected to increase by a similar percentage, as they are recreation facilities mostly used by residents. There are no stated maximum capacities for these sites. Impacts to the sites would likely be SMALL. With the exception of the Point of Rocks Stage Station museum and buildings, the remaining tourism sites are outdoors and have no stated maximum capacities. Impacts to these sites would also be SMALL. Workers and family members interested in the Point of Rocks Stage Station Historic Site could cause queues at the museum and other buildings, forcing some visitors to tour the grounds, only. However, this situation is expected to be infrequent and temporary. Impacts to this site would be SMALL most of the time. Occasionally, they could be MODERATE for short periods.

Impacts on tourism and recreation are considered small if current facilities are adequate to handle local levels of demand. No facilities are anticipated to be expanded or newly constructed; therefore, the impacts of facility construction and operation on tourism and recreation would be SMALL.

Housing

There are approximately 2,077 construction, operations, and indirect workers anticipated to migrate into Sweetwater County during construction of the nuclear power plant at the Jim Bridger 22 site.

As presented in Table 2.4-26 and Table 4.4-19, there were a total of 2,961 housing units, including permanent and temporary units, that were vacant and available in Sweetwater County in the 2020-2022 timeframe. The available housing is estimated to be sufficient to house the three workforces during construction.

However, given this increased demand for permanent housing, prices of existing housing could rise to some degree. Some new housing construction could result. Sweetwater County property tax recipients would benefit from increased property values and the possible addition of new houses to the tax rolls. Homeowners and landlords would benefit from increased property values. It is unlikely, but possible, that some low-income populations would be priced out of their rental housing due to potential upward pressure on permanent housing rents. Most effects would be temporary.

In summary, Sweetwater County has adequate housing resources for the entire construction workforce. The potential impacts of construction on housing would be MODERATE. Mitigation of the moderate impacts would most likely be market-driven but may take some time. Additional mitigation measures similar to those discussed in Section 4.4.2 could also be implemented. During operations, the smaller workforce would have SMALL impacts on housing.

The potential impacts of construction and operations on housing in Sweetwater County would be SMALL to MODERATE. Market forces would rebalance supply and demand in the County's housing market, once construction is complete. Additional mitigation would not be warranted.

Public Services

Public services include water supply and wastewater treatment facilities; police, fire, and medical facilities; and social services. As discussed in Population, above, construction of the proposed nuclear power plant at the Jim Bridger 22 site would increase the population in Sweetwater County by 4,260 people (10.1 percent). It is conservatively assumed 100 percent of the in-migrating construction workforce and their families would settle there. Operation of the nuclear power plant would increase the population in Sweetwater County by 800 (1.9 percent).

New construction or operations employees relocating from outside the region would most likely live in residentially developed areas, like Green River and Rock Springs, where adequate water supply and wastewater treatment facilities already exist.

The municipal water and wastewater facilities in the Sweetwater County have excess capacity: 8 million gallons per day and 2.35 million gallons per day (30.3 M and 8.9 M liters/day), (Tables 2.4-32 and 2.4-34). The impact to local water supply and wastewater treatment systems from Project-related population growth can be estimated by calculating the amount of water required by the in-migrating Project-related population. A population increase of 4,260 would increase consumption by 349,320 gallons per day (1,322,320 liters/day). There would be sufficient water and wastewater treatment capacity in Sweetwater County to accommodate the construction and operations workforces. Impacts to these facilities would be SMALL.

In 2019, Sweetwater County's persons per law enforcement officer ratio was 410:1 (Table 2.4-36). In 2019, the national average was 414 residents per police officer (Section 2.4.2.7.3). In 2021, the persons per firefighter ratio in Sweetwater County was 330:1

(Table 2.4-37). In 2022, the national average was 312 residents per firefighter (Section 2.4.2.7.3). The population increase in Sweetwater County from construction or operations employees relocating from outside the region could result in the need to hire additional emergency personnel. Impacts from personnel shortages in Sweetwater County could be MODERATE.

As indicated in Tables 2.4-38 and 2.4-39, Sweetwater County provides the most opportunities for medical care in the economic region. According to Table 2.4-38, there were 99 certified hospital beds, with an occupancy rate of 13 percent, in Sweetwater County. As stated previously, adding 4,260 residents to the Sweetwater County population would increase the population by 10.1 percent. A 10.1 percent increase in occupancy rates would still be well below total certified hospital bed capacities in Sweetwater County. The potential impacts of construction and operations on medical facilities are expected to be SMALL and mitigation does not appear to be warranted. Regarding the supply of health care professionals, Table 2.4-40 indicates that Sweetwater County and Southwest Wyoming have shortages in both primary care and mental health care. The addition of 4,260 new residents to the economic region would compound healthcare professional shortages and impacts are estimated to be MODERATE.

The nuclear power plant and the associated population influx would likely economically benefit the disadvantaged population. The additional direct jobs would increase indirect jobs that could be filled by currently unemployed workers, thus removing them from social services client lists.

Moderate impacts would be mitigated by the Industrial Sitting Council’s (ISC’s) Impact Assistance Tax Program. Through the Industrial Siting Permit process, affected communities in Sweetwater County would communicate their needs for police, fire, and medical professionals and equipment to the ISC. The ISC would use that information in determining the sizes of their impact assistance payments. Impacts would likely be mitigated to SMALL.

As discussed above, it is not expected that public services would be materially impacted by new construction or operations employees relocating from outside the region. Impacts on public services are considered to be small if there is little or no need for changes in the level of service provided to the community. Any moderate impacts would be mitigated to small impacts through the use of Wyoming’s Impact Assistance Tax Program. Therefore, the impacts of construction and operation of the proposed nuclear power plant on public services would be SMALL.

Education

As discussed previously, all in-migrating workers in the construction and operation workforces are anticipated to settle in Sweetwater County. In 2022, Sweetwater County had 22 K through 12 schools with a total enrollment of 7,355 students (Reference 9.3-91).

As discussed in Population, above, 992 of the in-migrating nuclear plant workers (during construction) are anticipated to bring families. As in Section 4.4.2, the average number of school-aged children per worker bringing a family is 0.88. This would increase the school-aged population in Sweetwater County by approximately 868 students. The student population in Sweetwater County would increase by 11.8 percent. Small impacts are generally associated with Project-related enrollment increases of up to 3 percent, and large impacts on local school systems are generally associated with Project-related enrollment increases greater than 8 percent (Reference 9.3-34). In Sweetwater County, the projected increase in the student population would constitute a large impact. The mitigating activities discussed in Section 4.4.4.4.6 would also apply at the Jim Bridger 22 site. The quickest mitigation would be to hire additional teachers and move modular classrooms to existing schools. The state's equalization programs would fund additional teachers and facilities. Impacts would be mitigated to SMALL. No additional mitigation would be warranted.

During operations, all 250 employees and their families are anticipated to migrate into Sweetwater County, increasing school enrollments by about 220 students. The student population in Sweetwater County would increase by 3 percent. This increase in student population would constitute a SMALL impact on the education system in Sweetwater County and mitigation would not be warranted.

Environmental Justice

The environmental justice analysis for the Jim Bridger 22 site was conducted in accordance with the methodology described in Section 2.5. Thirty-eight block groups were identified within the 50-mile (80-kilometer) radius. Consistent with NRC guidance, the geographic area defined for comparative analysis was Wyoming. Table 9.3-6 presents the results of the analysis. Five block groups were found to have significant Hispanic, Latino, or Spanish Origin Ethnicity populations. Three block groups were found to have significant Aggregate Minority populations. Two block groups were found to have significant low-income households. All block groups having significant minority or low-income populations are located in or near Green River and Rock Springs (Figure 9.3-11, Figure 9.3-12, and Figure 9.3-13). There are no American Indian reservations within 50 miles (80 kilometers) of the Jim Bridger 22 site.

Seasonal agricultural (migrant) workers may make up a portion of the minority population within the 50-mile (80-kilometer) radius. U.S. Department of Agriculture has collected information on farms that employ migrant labor. Table 9.3-7 presents farms that employ migrant labor in the counties which fall wholly or partially within the 50-mile (80-kilometer) region.

Human Health and Environmental Impacts

There are three primary pathways for health and environmental impacts: soil, water, and air. The closest minority or low-income population block group is located near Rock Springs approximately 23.1 miles (37.2 kilometers) southwest of the Jim Bridger 22 site. At this distance, physical impacts would have attenuated and environmental emissions would be in compliance with applicable regulatory and permit requirements, therefore, no disproportionately high and adverse human-health and environmental effects would be expected for construction or operations.

Socioeconomic Impacts

Impacts caused by Project employment and spending in the economic region would be SMALL to LARGE and beneficial during construction, the phase of the project with the most potential for adverse impacts. The in-migration of 1,630 construction and operations workers would create 719 indirect jobs in the region, potentially employing 272 unemployed workers creating upward pressure on local wages. Overall, the gain of construction jobs, population, and wage income would cause SMALL to MODERATE beneficial impacts in Sweetwater County. Economic impacts to minority and low-income populations in Sweetwater County would also be SMALL to MODERATE.

The minority and low-income populations are in and near Green River and Rock Springs. Interstate 80 would connect the site to Rock Springs and Green River and given the capacity of I-80 as presented in Table 2.8-1, traffic increases would not be noticeable. Further, the distance to Rock Springs from the I-80 ramps at SR 377 would allow traffic congestion to attenuate. Therefore, no disproportionately high and adverse impacts due to traffic would be expected.

The closest minority or low-income population block group is located near Rock Springs approximately 23.1 miles (37.2 kilometers) southwest of the Jim Bridger 22 site. At this distance, there would be no visual impacts, therefore, no disproportionately high and adverse effects due to the visual intrusion of the nuclear power plant would be expected.

As discussed above, the in-migrating workforces would be unlikely to constrain housing resources in the economic region during construction and operations. The increase in demand for permanent housing could cause prices of existing housing to rise to some degree. Some new housing construction could also result. It is unlikely, but possible, that some low-income populations could be priced out of their rental housing during operations due to potential upward pressure on permanent housing rents. Housing impacts were determined to be SMALL to MODERATE in Sweetwater County. Mitigation of the moderate impacts would most likely be market-driven but may take some time. Additional mitigation measures similar to those discussed in Section 4.4.2 could also be implemented. Therefore, no disproportionately high and adverse impacts are expected for the minority and low-income populations in Sweetwater County.

As discussed in Section 4.4.4.4, there is excess capacity in the water and wastewater systems in Sweetwater County. Project workers and their family members who would reside in Sweetwater County during construction and operations would not constrain supplies and processing capacities there. Project impacts to water and wastewater would be SMALL for all residents in the County, including minority and low-income residents.

With regard to police, fire, and medical capabilities, any shortages created or exacerbated by the Project would be mitigated by the ISC’s impact assistance payments. Project-related impacts to police, fire, and medical services in Sweetwater County during construction and operations would be mitigated to SMALL. Likewise, the State’s education equalization programs would ensure that school districts would have sufficient staff and facilities to accommodate any new students, so impacts to minority and low-income populations would also be mitigated to SMALL.

Therefore, no construction or operations-related impacts identified here are anticipated to have disproportionately high and adverse effects on minority or low-income populations in the demographic and economic regions.

Historic and Cultural Resources

The WYCRO site file check identified a total of nine archaeological sites in the direct APE of the Jim Bridger 22 site. Because no systematic field inventory of the direct APE has been completed, there may be yet additional unidentified sites within it. Review of WYCRO data and site forms available from WyoTrack shows that seven of the sites include a prehistoric or probable prehistoric component, including two sites that have secondary, unrelated historic components. Components at the remaining two sites are unidentified. Three sites are categorized as eligible for the NRHP, including one site in the facility footprint and two sites in the transmission and water line corridors. Four sites are not eligible for the NRHP, and two sites are unevaluated. Based on the available information, the Jim Bridger 22 site has the potential for affecting three or more historic properties. While it is likely that the two sites in the transmission and water corridors could be spanned below ground and aerially (for the water line and electrical line) similar to the way in which the NRHP eligible Site 48LN8940 in the Kemmerer Unit 1 macrocorridor may also be spanned (see Section 4.6.2.1), it is unclear whether impacts to the third site, in the facility footprint, could be avoided. If this site cannot be avoided, then mitigation measures would need to be implemented. In any case, development of the Jim Bridger 22 site alternative would require a Programmatic Agreement or Memorandum of Agreement to address potential impacts to cultural resources that are eligible for the NRHP. Direct impacts to cultural resources at the Jim Bridger 22 site from construction and operation of the proposed nuclear power plant would therefore be SMALL to MODERATE.

Using data from the WYCRO site file check, indirect, visual, effects were assessed for construction and operation of the nuclear plant at the Jim Bridger 22 site using a methodology like that used to identify potential visual cultural receptors for the proposed site (see Section 4.6.2.2). However, no field investigations were conducted, and no photo simulations were developed. To assess visual effects, a viewshed of the Jim Bridger 22 site was developed assuming a maximum height of the cooling stacks of 150 feet (45.7 meters). The viewshed was then used to select cultural resources in the WYCRO data whose NRHP status was identified as “Eligible,” “Listed,” or “Contributing.” This selected dataset was then further screened to identify those resources that might be visually sensitive. Such resources were those that were described in the WYCRO data as having archaeological features for which integrity of setting might be relevant in determining whether the sites are NRHP-eligible; these features included stone circles, cairns, and rock piles, but did not include sites only described as having surface features such as hearths, clusters of heat-altered rock, or fire-burned soil. This screening process identified seven archaeological sites that fall within the Jim Bridger 22 site viewshed, are potentially eligible for the NRHP, and have features that may be visually sensitive: 48SW3829, 48SW4381, 48SW6545/6547 (originally recorded as two adjoining sites; later merged into one site), 48SW17665, 48SW17915, 48SW17916, and 48SW18721. A review of the individual site forms accessed through WyoTrack found that one site, 48SW4381, was excavated and destroyed in the 1980s, indicating that there would be no visual effect at this location. Visual impact assessments had been conducted at three other sites, 48SW3829, 48SW17915, and 48SW17916, in connection with a proposed new electrical transmission line. The settings of these three sites are described as "visually degraded," indicating that to the extent that a power plant at the Jim Bridger 22 site might be visible from them, this visibility would likely result in no adverse effect to the resources. The remaining three sites, 48SW3829, 48SW6545/6547, and 48SW18721 lie approximately between 4.45 and 4.6 miles from the reactor at the Jim Bridger 22 site. While distance alone does not definitively indicate whether the nuclear plant would be visually intrusive at these sites, it does suggest that the visual effects of the facility on the sites might well be low contrast and non-adverse. Indirect impacts to cultural resources at the Jim Bridger 22 site from construction and operation of the proposed nuclear power plant would therefore be SMALL.

Air Resources

The portion of Sweetwater County where Jim Bridger 22 is located is designated as attainment with respect to the NAAQS (40 CFR 81.310 - EPA, 2024). The nearest nonattainment area is the UGRB Ozone Nonattainment Designation area consisting of all of Sublette County and portions of Lincoln and Sweetwater counties (Figure 9.3-8). Currently, for the 2008 Ozone NAAQS, the EPA designated the UGRB as nonattainment. However, monitored ozone in the UGRB was in attainment for the 2008 Ozone NAAQS by the attainment date of July 2015 and WYDEQ is assessing a pathway for submitting a request to the EPA to redesignate the UGRB back to attainment for the 2008 Ozone NAAQS.

Criteria pollutant emissions from building and operating the Natrium Reactor Plant of the proposed nuclear plant at the Jim Bridger 22 site would be comparable to the emissions generated at Kemmerer Unit 1 as described in Sections 4.7 and 5.7. Building impacts would be temporary and would be similar to those from large-scale construction projects. Criteria pollutants would be generated from onsite fossil-fueled construction equipment and vehicles. The quantity of criteria pollutant emissions generated by building activities would be small compared to total emissions from fossil units at the Jim Bridger Steam Plant. It is expected that standby diesel generators would be used no more than permitted for “standby” use. The criteria pollutants generated would be regulated in accordance with WYDEQ. Therefore, similarly, airborne releases of criteria pollutants would be small and would comply with WYDEQ regulations.

Makeup water from the Bridger Coal Underground Mine will be utilized as well as river water sourced from the Green River. Due to high total dissolved solids concentration of the mine water, the potential for higher PM_{10} air concentrations generated from the cooling tower would be likely. High efficiency drift eliminators installed at the cooling tower would mitigate the impact from using high dissolved solid makeup water (Reference 9.3-42).

Air quality impacts are considered small if the increase in regional pollutant concentrations attributable to the new source (1) would not appreciably alter visibility, (2) would not exceed EPA significant impact levels, and (3) would not cause a violation of the most restrictive ambient air quality standards. Air pollutant emissions from traffic, construction equipment, and fugitive dust will occur. State and Federal regulations will be met. Exceedances of EPA significant impact levels will occur for PM_{10} from dust generated from construction equipment during building activities, NOx generated from conservative estimates for construction equipment, and CO generated from construction commuters. During operations, there would not be any exceedances of EPA significant impact levels. Therefore, it is anticipated the impacts to air quality from building activities at the proposed nuclear power plant at Jim Bridger 22 would be MODERATE. It is anticipated the impacts to air quality from operating the proposed nuclear power plant at Jim Bridger 22 would be SMALL.

Nonradiological Health

Given that the nearest residences are approximately 7 miles (11 kilometers) from the Jim Bridger 22 site, residents would not experience physical impacts from physical effects of noise, fugitive dust, and gaseous emissions greater than those that would be considered an annoyance or nuisance. People working at the Jim Bridger Power Plant and the Leucite Hills Mine would have a greater exposure to physical effects of noise, fugitive dust, and gaseous emissions; however, the Jim Bridger 22 site is approximately 2.5 miles (4.0 kilometers) from Jim Bridger Plant and construction activities within the water and transmission corridors would be of a short duration. Due to the implementation of BMPs and compliance with regulations and permit conditions, impacts to air and water quality from construction and operations would be expected to be small. Nonradiological health impacts to the public would be SMALL.

It is assumed that the construction and operation practices described in ER Chapters 4 and 5 would generally be applied to the Jim Bridger 22 site, the occupational health impacts would be same as the proposed action.

The construction and operations workforces would be similar to Kemmerer Unit 1. The mileage for commuting would be dependent on available housing. The cities of Rock Spring and Green River are anticipated to have adequate available housing. The commute to and from Rock Springs and Green River would be 50 plus miles (over 80 kilometers) round trip. In the case of Kemmerer Unit 1, significant portions of the workforce would be commuting 100 miles (160 kilometers) round trip and more. Therefore, the overall commuting mileage is likely to be less than that of Kemmerer Unit 1 and the human health impacts due to vehicle accidents would be bounded by those presented in Sections 4.8.3 and 5.8.6.

The generation of nonradiological waste is expected to be less than the nonradiological waste generated at the existing Jim Bridger Plant. The discussion of nonradiological waste information expected for Kemmerer Unit 1 is in Sections 3.4.3 and 5.10. Therefore, impacts from nonradiological waste in comparison to the four units at the Jim Bridger Plant are anticipated to be SMALL.

Radiological Health

The background radiological characteristics of Kemmerer Unit 1 discussed in Section 2.9 are broadly applicable to the Jim Bridger 22 site. The radiological impacts during construction for the people working at the Jim Bridger 22 site would be the same as the impacts described for Kemmerer Unit 1 in Section 4.9, which are anticipated to be SMALL. During operation, the radiological health impacts at the Jim Bridger 22 site would be equivalent to the impacts discussed in Section 5.9 for Kemmerer Unit 1, such that the impacts are anticipated to be SMALL and would not exceed the radiological dose limits (e.g., offsite dose less than 100 mrem/yr).

Because the radiological characteristics and health impacts described in ER Chapters 2, 4, and 5 would generally be applied to the Jim Bridger 22 site, the radiological health impacts would be the same as the proposed action and, therefore, are anticipated to be SMALL.

Postulated Accidents

The potential environmental impacts from a postulated accident, considering both design basis accidents and severe accidents, for Kemmerer Unit 1 are described in Section 5.11. The DBAs and severe accidents analyzed to-date for Kemmerer Unit 1 are applicable to the Jim Bridger 22 site. Therefore, the potential impacts of a postulated accident at the Jim Bridger 22 site are anticipated to be SMALL.

9.3.5.2.4 Cumulative Impacts Analysis for the Jim Bridger 22 Site

The past, present, and reasonably foreseeable Federal, non-Federal, and private projects within the region of interest of the Jim Bridger 22 site that could have cumulative impacts with the proposed action are described in Table 9.3-8. These projects have either requested an ISP or other permit/license or had an environmental assessment or environmental impact statement completed. The locations of the projects are shown in Figure 9.3-14.

Land Use

The total area potentially affected at the Jim Bridger 22 site is estimated at approximately 278 acres (112 hectares). Construction of the nuclear power plant would permanently disturb 141 acres (57.4 hectares). The natural gas pipeline (MountainWest Overthrust JTL147) that will be built to connect MountainWest’s existing natural gas distribution line to the Jim Bridger Plant will require temporarily disturbing 20.6 acres (8.3 hectares), but only 2.3 acres (0.93 hectares) would be permanently disturbed (Reference 9.3-8). The conversion of the Bridger Plant from coal-fired to natural-gas fired generation will not require new land conversions. Although land use impacts would be additive, they would still be SMALL.

Hydrology

The construction and operation of the nuclear power plant at the Jim Bridger 22 site would not affect any impaired waters during building activities or plant operations. The closest designated impaired water is approximately 10 miles (16 kilometers) downstream at Point of Rocks (Reference 9.3-8).

Proposed water usage for the plant would increase water withdrawals for from the Green River, however the increase is not expected to be a significant loss in the Green River, and in the Green River Basin as explained in Section 2.2. The added water withdrawal to accommodate the new plant, on average, requires 3,689 gallons per minute or approximately 8.22 cubic feet per second. Surface water usage for the proposed plant would be within PacifiCorp’s existing water rights afforded to the Jim Bridger Plant.

The effects associated with the proposed site’s above ground facilities and roads in addition to the proposed linear facilities as shown in Figure 9.3-10 would result in negligible cumulative effects when compared to the impacts of the identified projects in Table 7.1-1. Additionally, surface waters and wetlands are protected by Federal, State, and local laws and regulations, which would limit impacts from future projects.

Terrestrial Ecology

Direct and indirect impacts on ecological resources at the Jim Bridger 22 site were determined to be SMALL, assuming mitigation commitments are adhered to. Most of the projects in Table 9.3-8 are too far from the Jim Bridger 22 site to create impacts that are cumulative.

Construction of the nuclear power plant at the Jim Bridger 22 site would permanently disturb 141 acres (57.4 hectares) of sagebrush-shrub habitat. The natural gas pipeline (MountainWest Overthrust JTL147) that will be built in 2024 to connect MountainWest's existing natural gas distribution line to the Jim Bridger Plant will require temporarily disturbing 20.6 acres (8.3 hectares) of big sagebrush-steppe, but only 2.3 acres would be permanently disturbed (for access roads and the two above-ground facilities) (Reference 9.3-8). The total amount of sagebrush-shrub or sagebrush-steppe habitat eliminated by the two projects would therefore be 143.3 acres (58.0 hectares). As a consequence, the two projects would also eliminate 143.3 acres (58.0 hectares) of pronghorn crucial winter, year-long range. Cumulative impacts on terrestrial resources would be detectible and measurable, but would not destabilize any ecological communities. Although impacts would be additive, they would be SMALL.

The conversion from coal to natural gas of two generating units at the Jim Bridger Plant would overlap with construction of the nuclear power plant at the alternative site. Although this would be a major undertaking involving a large construction workforce, virtually all of the work will take place in previously developed or disturbed areas. No land-clearing is anticipated. There will be generally higher levels of disturbance (noise, movement, equipment exhausts) at the Jim Bridger Plant during the conversion but impacts would be local, affecting wildlife in the immediate vicinity of the plant. Cumulative impacts on terrestrial resources would be detectible and measurable but would not destabilize any plant or animal community on a landscape scale or regional scale. Although impacts would be additive, they would still be SMALL.

Aquatic Ecology

PacifiCorp submitted a Permit Application Requirements document to WYDEQ in 2017 to demonstrate the Jim Bridger Plant's compliance with Section 316(b) of the Clean Water Act (Reference 9.3-42). Facilities with closed-cycle recirculating cooling systems (cooling towers) are, under most circumstances, considered to have the Best Available Technology to minimize impingement mortality and entrainment. The Jim Bridger Plant is currently replacing two coal-fired units (1 and 2) with natural gas-fired units, which are scheduled to go online in mid-2024. Bridger Units 3 and 4 will continue to operate as coal-fired units until 2030 when they will be converted to gas. If the nuclear power plant were to be built and operated at the Jim Bridger 22 site, it would go on line in late 2030, so it would obtain its cooling water from the Green River, already supplying Jim Bridger Units 1-4. A nuclear plant at the Jim Bridger 22 site would increase the amount of cooling water withdrawn from the Green River by approximately 16.3 percent. This would increase the amount of impingement mortality and entrainment by roughly the same amount. Although there would be a small increase in impingement mortality and entrainment, the new nuclear plant would presumably be in compliance with Section 316(b) of the CWA by virtue of its closed-cycle recirculating cooling system. WYDEQ refers to closed-cycle, recirculating cooling systems as a "pre-approved EPA technology." Although impacts to the Green River's fish community would be additive, they are expected to be SMALL.

Socioeconomics

Because construction impacts would be greater than those of operations, the focus of this analysis is the cumulative impacts during the construction of the nuclear plant. Socioeconomic impacts are based on the year when the cumulative in-migrating workforces would peak.

Physical Impacts

The distance to nearby residences of approximately 7 miles (11 kilometers) allows for attenuation of physical effects and cumulative impacts are not expected for physical impacts.

Demography

Table 9.3-9 lists in-migrating workforces for other construction projects that are anticipated to take place in or near the economic region for the Jim Bridger 22 site. A total of 5,643 workers would migrate into the economic region in 2027. The total includes 5,137 construction workers, 122 operations workers, and the Project's 383 in-migrating indirect workers. The estimated cumulative increase in population would be 10,691 from in-migrating workers and their family members, an increase of 25 percent in the 2020 population of the economic region. But many of the in-migrating workers would have to find housing elsewhere, resulting in a less than 25 percent increase in Sweetwater County's population. More housing detail can be found in Housing, below.

Economy

The economic stimulus created by the Project would be added to the economic stimulus created by the other projects in the area, increasing business opportunities and revenues, creating new jobs, and reducing unemployment in the economic region. The 5,643 workers that would migrate into the economic region would represent a 31 percent increase in economic region employment in 2021 (Table 2.4-8). Unemployment would be reduced by 25 percent or more. The cumulative impact would be LARGE when considering the changes in employment and LARGE when considering the changes in unemployment. LARGE, adverse impacts could occur when the construction workforces would leave the economic region, eliminating the indirect jobs and economic stimulus the in-migrating workforces generated.

As shown in Table 9.3-9, the Project workforce numbers would start to decline after 2027. The increase and gradual decline in the workforce after 2027 would mitigate the impact to communities in the economic region from the destabilizing effects of a sudden decrease in workers and their families. Another mitigating factor would be the higher average annual wages and associated multiplier effects expected with the in-migrating operations workers.

Taxes

Jim Bridger 22 property tax payment impacts are anticipated to be SMALL to MODERATE and beneficial and would be combined with the other project property taxes that would be paid in Sweetwater County. The cumulative impacts are also anticipated to be SMALL to MODERATE and beneficial for Sweetwater County property taxing authorities.

Transportation

Congestion at the I-80 on and off ramps and along SR 377 due to the impacts from Jim Bridger 22 would be up to LARGE during construction and MODERATE during operations. Traffic congestion would increase from the combined workforces of the Jim Bridger Plant (approximately 300 workers) and Jim Bridger 22. However, the impacts could be reduced by staggering arrivals and departure times for the Jim Bridger 22 workforce to not overlap with the shift changes of the Jim Bridger Power Plant. Therefore,cumulative traffic impacts to the public could be mitigated to SMALL to MODERATE during construction and operations.

Aesthetics

The construction activities and the structures would also blend with the existing industry for visitors to the surrounding public lands. Therefore, the cumulative visual impact would be SMALL.

Housing

There were 2,961 vacant and available housing units, including permanent and temporary housing, in the economic region in the 2020 to 2022 time frame. This level of vacant and available housing would not be sufficient to accommodate the estimated 5,643 workers from the cumulative projects. Therefore, the cumulative impacts to housing and land use patterns in the economic region would be LARGE and adverse. The housing shortage could also be exacerbated by tourists in the area, especially during special events and the summer months.

Public Services

The increased population will cause additional pressure on community services and infrastructure. Water and wastewater resources in the economic region are anticipated to be sufficient to accommodate the cumulative in-migrating workforce populations (see Jim Bridger 22 analysis above).

As for cumulative adverse impacts to police, fire, and medical services, as described in Sections 4.4.4.4 and 5.4.4.4, the State of Wyoming has an assistance program to mitigate these impacts. For these resources, Wyoming Department of Environmental Quality’s impact assistance payments are anticipated to mitigate the cumulative impacts to SMALL.

Education

Cumulative project in-migration would include 2,008 school-age children, 868 (2027) of which would be from the nuclear plant. Economic region school enrollment would increase when these children are added. Sweetwater County enrollment was 7,355 in 2022. These students would represent a 27 percent increase in the economic region’s enrollment in 2022, creating a large impact. However, some workers and families would be unable to reside in Sweetwater County, so the impact could be less. In any event, Wyoming’s education equalization programs, would mitigate capacity issues and personnel shortages in schools and districts to SMALL.

Environmental Justice

The environmental justice analysis for the cumulative projects surrounding the Jim Bridger 22 site was conducted in accordance with the methodology described in Section 2.5. Thirty-eight block groups were identified within the 50-mile (80-kilometer) radius. Consistent with NRC guidance, the geographic area defined for comparative analysis was Wyoming. Table 9.3-6 present the results of the analysis. Five block groups were found to have significant Hispanic, Latino, or Spanish Origin ethnicity populations. Three block groups were found to have significant Aggregate Minority populations. Two block groups were found to have significant low-income households. All block groups having significant minority or low-income populations are located in or near Green River and Rock Springs (Figure 9.3-11, Figure 9.3-12, and Figure 9.3-13). There are no American Indian reservations within 50 miles (80 kilometers) of the Jim Bridger 22 site.

Seasonal agricultural (migrant) workers may make up a portion of the minority population within the 50-mile radius. U.S. Department of Agriculture has collected information on farms that employ migrant labor. Table 9.3-7 presents farms that employ migrant labor in the counties which fall wholly or partially within the 50-mile (80-kilometer) region.

Human Health and Environmental Impacts

There are three primary pathways for health and environmental impacts: soil, water, and air. The closest minority or low-income population block group is located near Rock Springs more than 23 miles (37 kilometers) from the Jim Bridger 22 site. At this distance, physical impacts attributable to the nuclear plant would have attenuated. Environmental emissions of construction and operation are presented above and would be in compliance with applicable regulatory and permit requirements and impacts would be SMALL. While the SMALL impacts due to air emissions and wastewater discharges could combine with other projects in the surrounding area, the distance to the closest minority or low-income populations would further diminish Jim Bridger 22's contribution to any cumulative impacts. Therefore, no cumulative disproportionately high and adverse human-health and environmental effects are anticipated.

Socioeconomic Impacts

Impacts caused by cumulative project employment and spending in the economic region would be SMALL to LARGE during construction, the phase of the project with the most potential for adverse impacts. The in-migration of 5,643 workers would represent a 31 percent increase in economic region employment in 2021 (Table 2.4-8). Unemployment would be reduced by 25 percent or more. The cumulative impact would be LARGE when considering the changes in employment and LARGE when considering the changes in unemployment. The gain of construction jobs, population, and wage income would cause LARGE beneficial impacts in Sweetwater County. Minority and low-income workers would also benefit from the gains in jobs and income. LARGE, adverse impacts could occur when the cumulative construction workforces would leave the economic region, eliminating the indirect jobs and economic stimulus they generated. Low-income populations would be disproportionately affected because they are naturally more sensitive to economic impacts.

As shown in Table 9.3-9, the nuclear plant workforce numbers would start to decline after 2027. The increase and gradual decline in the workforces after 2027 would help mitigate the impact to low-income populations from the destabilizing effects of a sudden decrease in workers and their families. Another mitigating factor would be the higher average annual wages and associated multiplier effects expected with the in-migrating operations workers.

As discussed above, due to the highway connection between the minority and low-income populations being an interstate highway and distance, no disproportionately high and adverse impacts due to traffic attributable to construction or operation at the Jim Bridger 22 site would be expected.

As discussed above, due to the distance to the closest minority and low-income populations no visual impacts are expected from construction and operation of a nuclear plant at the Jim Bridger 22 site. The conversion of the current coal-fired units at the existing Jim Bridger Plant to natural gas would result in no cumulative visual effects since the repowering would take place within an existing facility. The above ground facilities associated with the MountainWest natural gas pipeline would have no visual impacts at that distance. Therefore, the cumulative aesthetic impacts would be small and would not result in disproportionately high and adverse impacts to minority or low-income populations.

As discussed in Socioeconomics, there were 2,961 vacant and available housing units, including permanent and temporary housing, in the economic region in the 2020 to 2022 timeframe. This level of vacant and available housing would not be sufficient to accommodate the estimated 5,643 workers from the cumulative projects during construction. The increase in demand for permanent and temporary housing could cause the prices and rents of existing housing to rise. Some new housing construction could also result, but it is likely that some low-income populations would be priced out of their rental housing due to the upward pressure on permanent housing rents. Cumulative impacts to low-income populations in the economic region could be disproportionately LARGE and adverse, as low-income populations are more sensitive to housing price and rent increases.

Mitigation of these impacts would most likely be market-driven but may take some time. The nuclear plant construction period would be temporary. Mitigation measures similar to those described in Section 4.4.2 could also be implemented. Nonetheless, the possibility remains that low-income populations in Sweetwater County could experience disproportionately high and adverse impacts to their housing resources during project construction.

There is sufficient water and wastewater treatment capacity to accommodate the in-migrating project workforces and their family members. Impacts to these services from the cumulative projects would be SMALL for the general population, including minority and low-income populations.

Any impacts to police, fire, medical, and education resources would be mitigated by the ISC's impact assistance payments and the state's education equalization programs. Therefore, impacts to these services from the cumulative projects would be mitigated to SMALL for the general population, including minority and low-income populations.

Historic and Cultural Resources

Regarding cumulative effects at Jim Bridger 22, the conversion of the current coal-fired units at the existing Jim Bridger Plant to natural gas would result in no cumulative effects from this action since the repowering would take place within an existing facility, and no development of currently undeveloped land would be required. The natural gas pipeline that will be built in 2024 to connect MountainWest's existing natural gas distribution line to the Jim Bridger Plant was evaluated for potential impacts to cultural resources. BLM (Reference 9.3-8) concluded the pipeline project would have "No Effect on Historic Properties."

In sum, review of Jim Bridger 22 indicates that if it were selected, direct impacts would be SMALL, and indirect impacts would also be SMALL. Cumulative impacts on cultural resources are also judged to be SMALL. Overall, the impacts would therefore be generally comparable to those of Kemmerer Unit 1.

Air Resources

Air quality impacts expected at the Jim Bridger 22 site and reviewed past, present, and foreseeable future projects were considered in the cumulative impacts analysis. Air emissions of criteria pollutants would be above 100 tons per year for CO, $PM_{10,}$ and NOx. Hazardous air pollutants would be below 10 tons per year, individually, and 25 tons per year combined. Emissions would comply with Title V and any non-Title V permitting requirements. Standard control measures would be used to mitigate fugitive dust releases. It is, therefore, anticipated that the cumulative impacts to air quality from construction and operations would be MODERATE.

Climate Change

In Section 9.3.5.2.2, climate change is explained as having global implications that will not be changed by the construction, operation, and decommissioning of the proposed nuclear power plant at the Jim Bridger 22 site. However, climate change may result in an alteration in site conditions that could change the impact assessments made for the proposed plant and cumulative impact assessment for the projects reviewed in Table 7.1-1. Based on best available information about the state of climate change, it is anticipated that the cumulative impacts to climate change from construction and operations of the proposed plant and reviewed past, present, and foreseeable future projects would be SMALL.

Nonradiological Health

Construction and operations of the nuclear power plant would contribute to cumulative nonradiological human health impacts when combined with the other projects in Sweetwater County. Jim Bridger 22 building activities and operations would not contribute to cumulative nonradiological human health impacts for the residents in the area due to such effects as noise, dust, and gaseous emissions. Effects to workers at nearby industry would be managed through compliance with Occupational Safety and Health Administration standards and implementation of industry safety programs. Therefore, cumulative impacts due to physical effects and occupational injuries would be SMALL. The increased traffic at the I-80 ramps and along SR 377 would increase the potential for a vehicle crash. The WYDOT vehicle crash injury and fatality rates presented in Section 2.8.1 account for existing vehicle traffic such as the Jim Bridger Plant workforce commuting vehicles and the impacts discussed above for Jim Bridger 22 would be applicable to cumulative impacts. The cumulative impacts to human health from vehicle accidents based on rates calculated from WYDOT data for crashes, injuries, and fatalities would be dependent on the total mileage from all the projects. The combination of occupational and traffic injuries from the nuclear plant and the other projects along with the increase in population in Sweetwater County from the projects would put additional pressure on medical services in the County.

The generation of nonradiological waste is also expected to be similar to the nonradiological waste generated at Kemmerer Unit 1 for both building activities and plant operations, as described in Section 9.3.5.2.1. Construction and operations of the Jim Bridger 22 site would contribute to cumulative nonradiological waste impacts when combined with the other projects identified in Sweetwater County. It is expected that each industrial facility in the surrounding area identified in Table 7.1-1 would also comply with applicable Federal, State, and local regulations to ensure proper disposal of nonradiological waste. Nonradiological waste impacts from liquid, gaseous, and solid wastes would be SMALL, and mitigation would not be warranted for releases during normal activities. The implementation of adequate training and management practices are also expected to minimize the potential for accidental releases and the environmental impact of accidental releases.

Radiological Health

For the analysis of cumulative radiological impacts for the Jim Bridger 22 site (which is similar to the analysis for the proposed site), the geographic area of interest is considered to be the area that has the potential to increase radiological exposure at any location within a 50 mile (80 kilometer) radius of the plant. As described in Section 7.2.9, the NRC historically has used 50 miles (80 kilometers) as the radius bounding the geographic area for evaluating doses to the public from routine releases from nuclear power plants. Located approximately 50 miles from the Jim Bridger 22 site is the Sweetwater Uranium Recovery Facility, which has been in standby status since 1983 (Reference 9.3-36, Reference 9.3-37, Reference 9.3-38). The NRC, in its Safety Evaluation Report for the 2014 license renewal of the Sweetwater Uranium Recovery Project, concluded that the facility's environmental monitoring methodology is acceptable, and that the results are below the effluent concentrations and public dose limits as defined in 10 CFR 20 (Reference 9.3-35, pg. 42). Thus, radiological emissions and dose impacts at the Jim Bridger 22 site would comply with regulatory dose limits (e.g., offsite dose less than 100 mrem/yr) as they would for the Kemmerer Unit 1 site. Compliance at Jim Bridger 22 would not require mitigation above what would be required at the Kemmerer Unit 1 Site.

Therefore, the cumulative impacts to radiological health at any location within 50 miles of the Jim Bridger 22 site is anticipated to be SMALL.

Postulated Accidents

The cumulative analysis for the Jim Bridger 22 site considers DBAs and severe accidents at other existing and proposed nuclear facilities that have the potential to increase risks at any location within the geographic area of interest. The geographic area of interest for impacts is within a 50-mile (80-kilometer) radius of the Jim Bridger 22 site. The 50-mile (80-kilometer) radius was selected to cover any overlaps in potential risk from two or more nuclear facilities. Located approximately 50 miles (80 kilometers) from the Jim Bridger 22 site is the Sweetwater Uranium Recovery Facility, which has been in standby status since 1983 (Reference 9.3-36, Reference 9.3-37, Reference 9.3-38). Potential postulated accidents at this facility have been evaluated, most recently as part of a 2014 license renewal, where it was found that releases of radioactivity from potential accidents would have negligible effects on the nearest resident located approximately 17 miles (28 kilometers) east of the site (Reference 9.3-27, pg. 78). The NRC, in its Safety Evaluation Report, concluded that the facility's accident evaluation and response programs were acceptable, and the facility meets the requirements of 10 CFR 40.32(c) regarding the protection of public health and the minimization of danger to life or property in the event of an accident (Reference 9.3-35, pg. 72).

Therefore, the cumulative risks from postulated accidents at any location within 50 miles of the Jim Bridger 22 site are anticipated to be SMALL.

9.3.6 Summary and Conclusions

The decision to locate the nuclear power plant at the Kemmerer Unit 1 Site was based on a comparison of three candidate sites. The Kemmerer Unit 1 Site ranked higher than the two alternative sites based on the environmental criteria ratings (health and safety, environmental, and socioeconomic). A comparison of projected construction and operational impacts at the proposed and alternative sites demonstrates that there is no significant difference in environmental impact among the three candidate sites. For these reasons, there is no alternative site that is environmentally preferable to the Kemmerer Unit 1 Site.

Table 9.3-10 compares the environmental impacts from the building and operation of the proposed nuclear power plant at the proposed site and two alternative sites for each of the environmental resource areas. Table 9.3-11 summarizes the cumulative impacts for the proposed site and alternative sites. The site-by-site comparison did not result in the identification of a site environmentally preferable to the proposed Kemmerer Unit 1 Site. Therefore, no additional analysis is required.

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Table 9.3-1 Region of Interest Criteria - Identification of Candidate Areas (Sheet 1 of 2)

Criterion	Criterion Description	Data Source
Health & Safety Criteria		
Population Density	U.S. Census tract groups with more than 500 people per square mile out to 20 mi (32 km) are screened.	TIGER/Line Shapefiles. Source: U.S. Census Bureau. (Reference 9.3-60)
Capable Faults	Areas around capable faults are screened using a 25 mi (40 km) buffer distance.	Interactive Quaternary Fault Map; Source: U.S. Geological Survey. Wyoming Geologic Hazards Map; Source: Wyoming State Geological Survey. (Reference 9.3-73)
Peak Ground Acceleration	Areas with a 2 percent chance in a 50-year return period of peak ground acceleration (g) greater than 0.3g are screened.	2018 United States (lower 48) Seismic Hazard Long-Term Model. Source: U.S. Geological Survey. (Reference 9.3-72)
Landslides	Areas within 5 mi (8 km) of regions prone to landslides are screened.	U.S. Landslide Inventories across the United States. Source: United States Geological Survey. (Reference 9.3-74)
Tsunami Risk Areas	Areas within 20 mi (32 km) of tsunami prone areas are screened.	Tsunamis Risk Areas. Source: University of Southern California. (Reference 9.3-9)
Geohazards/ Volcanic Activity	Areas with active (and dormant) volcanic activity-extending 100 mi (160 km) from a Quaternary volcanic system are screened.	Geological Map of North America. Layers: Volcanoes and Calderas. Source: U.S. Geological Survey. (Reference 9.3-71)
Flooding/ Construction in Floodplain	Areas with identified 100-year floodplain areas are screened.	National Flood Hazard Layer. Source: U.S. Federal Emergency Management Agency. (Reference 9.3-21)
Nearby Hazards	Areas within 10 mi (16 km) of major airports and within 5 mi (8 km) of refineries are screened.	USA Airport Areas Map. Source: ESRI ArcGIS. (Reference 9.3-18) Petroleum Refineries in the U.S. Source: Energy Information Administration. (Reference 9.3-13)
Environmental Criteria		
Disruption of Important Species-Wetlands	Screen areas that contain identified major wetlands.	The National Wetland Inventory Wetlands layer includes data from the NWI; Source: FWS NWI. (Reference 9.3-66)
Critical habitat	Areas designated as critical habitats of endangered species are screened.	FWS Threatened and Endangered Species Active Critical Habitat Report. Source: FWS. (Reference 9.3-70)

Table 9.3-1 Region of Interest Criteria - Identification of Candidate Areas (Sheet 2 of 2)

Criterion	Criterion Description	Data Source
Socioeconomic and Land Use Criteria		
Protected lands	Areas adjacent to national parks, forests, historic areas, and American Indian lands are screened.	USA NPS Land Resources Division Boundary and Tract Data Service. Source: National Park Service. (Reference 9.3-33) USA Forest Service Lands. Source: National Forest Service. (Reference 9.3-65) National Park Service GIS Data Services - National Register of Historic Places. Source: National Park Service. (Reference 9.3-32) USA Hospitals. Source: USGS National Structures Dataset. (Reference 9.3-76) Colleges and Universities Defined by the Integrated Post-Secondary Education System. Source: HIFLD Database. (Reference 9.3-25) Prison Boundaries. Source: USGS National Structures Dataset. (Reference 9.3-76) Native Lands: Tribal Reservations and other Native Lands. Source: USGS National Structures Dataset. (Reference 9.3-76)

Table 9.3-2 Candidate Area Criteria - Identification of Potential Sites

Criterion	Criterion Description	Data Source
Health & Safety Criteria		
Distance to High Voltage Transmission (345 kV)	Screen areas greater than 5 mi (8 km) from a high voltage line (greater than 345 kV).	Electric Power Transmission Lines as defined by the Integrated Post Secondary Education System. Source: HIFLD Database.
Coal Replacement	Screen areas greater than 10 mi (16 km) from a retiring coal plant.	Bloomberg Global Coal Plant Tracker. Source: Bloomberg Global Coal Countdown Dashboard
Soil Stability	Screen areas with the potential for excessive deformation.	Soil Survey Geographic Database Dataset. Source: NRCS
Oil & Gas Wells	Screen areas within 0.5 mi (0.8 km) of oil and gas wells.	Oil and Natural Gas Wells as Defined by the Integrated Post Secondary Education System. Source: HIFLD Database.
Transportation Routes (Pipelines and Rail)	Screen areas within 0.5 mi (0.8 km) of major land (pipeline and rail) routes.	North American Rail Lines. Source: National Transportation Atlas Database. Wyoming Pipeline Infrastructure. Source: Enhanced Oil Recovery Institute.
Hazardous facilities	Screen areas within 5 mi (8 km) of hazardous facilities.	Geospatial Data Download. Source: Environmental Protection Agency.
Excessive Land Slope	Screen areas with slopes greater than 12 percent.	Soil Survey Geographic Database Dataset. Source: Natural Resources Conservation Service
Environmental Criteria		
Wetlands	Screen areas that contain identified wetlands at a more refined scale.	The NWI Wetlands layer includes data from the NWI; Source: FWS NWI. (Reference 9.3-66)
Groundwater pathway	Screen areas with designated sole-source aquifers.	Sole Source Aquifers. Source: EPA (Reference 9.3-15).

Table 9.3-3 Suitability Criteria for Screening Candidate Sites (Sheet 1 of 3)

Criterion	Criterion Description
Health and Safety	
Vibratory Ground Motion	NRC requires nuclear power plant structures, systems, and components (SSCs) important to safety be designed to withstand the effects of natural phenomena, such as earthquakes, without loss of capability to perform their safety function. The suitability of the potential sites is evaluated based on factors related to increased seismic design motion that could potentially impact the siting and design.
Seismic Fault Displacement	Nuclear power station SSCs important to safety must be designed to withstand the effects of natural phenomena, such as earthquakes, without loss of capability to perform their safety functions. The suitability of the potential sites is evaluated based on proximity of fault activity to each of the potential sites.
Geologic Hazards/ Volcanoes	Volcanic hazards can present a range of physical demands on nuclear SSCs that are important to safety.
Soil Stability	Soil stability can have a serious environmental impact on a site and the NRC requires suitable foundation conditions, including with respect to low potential for liquefaction, subsidence, landslide and seismically induced floods.
Cooling System Supply	This suitability criterion examines the adequacy of water as it relates to the safe operation of the Natrium Reactor Plant. Evaluations of the ability to supply the plant water requirements accounts for water right allocations along with intake structure regulations.
Nearby Hazards – Mining and Other Hazardous Facilities	The suitability of the potential sites is evaluated based on the number of and distance to hazardous facilities identified from the sources. The acceptability of a site depends on establishing that (1) an accident at a nearby industrial or transportation facility will not result in radiological consequences that exceed the dose guideline in 10 CFR 50.34(a)(1).
Nearby Hazards – Transportation Routes and Facilities – Airports	The suitability of the potential sites is evaluated based on the number of, and distance to, hazardous transport routes and airports identified from the sources. The acceptability of a site depends on establishing that (1) an accident at a nearby industrial or transportation facility will not result in radiological consequences that exceed the dose guideline in 10 CFR 50.34(a)(1).
Emergency Planning – EAB	NRC regulations require that nuclear power facility sites have characteristics such that adequate plans to protect members of the public in emergencies can be developed.

Table 9.3-3 Suitability Criteria for Screening Candidate Sites (Sheet 2 of 3)

Criterion	Criterion Description
Environmental	
Wetlands	The suitability of each potential sites is evaluated with respect to its impact to wetlands.
Critical Habitat	The suitability of each potential site is evaluated with respect to designated critical habitat areas of “important species.” The evaluation considers both federal and state designated areas.
Protected Lands	The purpose of this criterion is to assess site suitability with respect to compatibility of a nuclear power plant site with existing and planned land uses, in particular those lands protected by federal, state, or local laws where the use of a site or the presence of transmission lines close to special areas may cause unacceptable impacts regardless of design parameters.
Groundwater Pathway	This criterion evaluates the characteristics of the aquifers at each of the potential sites with respect to the potential for the movement of any contamination.
Socioeconomic	
Socioeconomics – Construction Related	The siting, construction and operation of a nuclear power station places stress on the local labor supply, transportation facilities, and community services. The evaluation of suitability of nuclear power sites, therefore, includes an assessment of impacts of construction and operation, including transmission and transportation corridors, and potential stresses relating to community services (e.g., schools, police, and fire, water and sewerage, and health facilities). For example, one of the construction-related triggers for adverse socioeconomic impacts is the need to relocate construction workers and their families into local communities.
Engineering and Cost Related	
Water Supply and Pumping Distance	NRC requires an evaluation of the suitability of nuclear power station sites include an assessment of impacts of construction and operation, including cooling water pipelines and other corridors. The suitability of each potential sites is evaluated with respect to proximity to cooling water sources, as well as constructability of cooling water piping from the plant to the cooling water source.
Flooding	The suitability of each potential sites is evaluated for their potential to flood and impact to the SSCs.
Brownfield Site Remediation	The purpose of this criterion is to capture potential costs and risks associated with any environmental cleanup activities that may be required at brownfield sites.

Table 9.3-3 Suitability Criteria for Screening Candidate Sites (Sheet 3 of 3)

Criterion	Criterion Description
Railroad Access – Construction	The potential sites are evaluated to assess their proximity to the nearest railroad spur. The Natrium Reactor Plant design may require the transport and delivery of large modular components to the potential sites requiring rail. The haul route from these access points is also evaluated to determine their viability for transport of these components.
Highway Access – Construction	Construction of nuclear power plants is associated with large construction modules and heavy shipments of construction materials. This criterion is to establish the relative feasibility and costs associated with construction or road improvements.
Transmission – Construction	This criterion is to establish the relative feasibility and costs associated with construction of transmission lines to support the construction of the Natrium Reactor Plant.
Transmission – Grid and Competition	The objective of this criterion is to provide consideration of the applicant's business objectives with respect to transmission accessibility, grid congestion, and projected growth.
Land Acquisition	The objective of this criterion is to provide a preliminary look at land ownership concerns that may impact the business objectives.
Topography – Site Preparation	The objective of this criterion is to establish a relative idea of the costs associated with any topographic features or subsurface condition that would require extensive site preparation costs. For example, extensive cut and fill, grading, and shear wave velocity of subsurface could be factors that will differentiate the potential sites.
Natrium Demonstration Project Objectives Criteria	
Ability to Meet ARDP and Natrium Demonstration Project Objectives	This criterion evaluates each Potential site's ability to meet the ARDP schedule along with Natrium Demonstration Project objectives.

Table 9.3-4 Refined Suitability Criteria for Screening of Candidate Sites

Criterion	Criterion Description
Soil Stability Refresh	The suitability of the potential sites is evaluated based on the suitability of the soil conditions for each of the candidate sites.
Land Availability and Acquisition	Required land acquisition practicality or viability for the site and linear facilities. Site allows for expansion.
Local Economic Sustainability	Evaluates job creation in a depressed area and ability of community to transition from coal to nuclear.

Table 9.3-5 Suitability Criteria for Screening of Candidate Sites

Site	Site Suitability Issues		
	Soil Stability – (Exploratory Boring Refresh)	**Land Availability / Acquisition**	**Local Economic Sustainability**
Naughton 12	Geotechnical characteristics assumed to be acceptable and similar to adjacent Naughton Power Plant. Site is expected to contain shallow bedrock (Hilliard Shale) with no evidence of karst or steeply dipping bedrock	Can accommodate the Natrium plant; site is the most land constrained and the availability of adjacent Parcel 11, not owned by PacifiCorp, would need to be investigated for potential expandability.	Site is nearby disadvantaged communities identified on the Climate and Economic Justice Screening Tool (Beta Version). One of the eight threshold criteria were exceeded (Climate Change-Greater than or equal to the 90th percentile for expected population loss rate, is low income, and has a low percent of higher education students for tract in Lincoln County)
Naughton 19/20	Geotechnical characteristics assumed to be acceptable based on exploratory borings. Borings drilled to 100 ft each disclosed shallow bedrock consisting of massive siltstone with few fractures and other discontinuities.	Can accommodate the Natrium plant; site is not land constrained and provides for potential expandability.	Site is nearby disadvantaged communities identified on the Climate and Economic Justice Screening Tool (Beta Version). One of the eight threshold criteria were exceeded (Climate Change-Greater than or equal to the 90th percentile for expected population loss rate, is low income, and has a low percent of higher education students for tract in Lincoln County)
Jim Bridger 22	Geotechnical characteristics assumed to be acceptable and similar to adjacent Jim Bridger Plant. Site is expected to contain shallow bedrock (Almond Formation), with a dip angle of about 5 degrees with no evidence of karst.	Can accommodate the Natrium plant; site is not land constrained and provides for potential expandability.	Site is nearby disadvantaged communities identified on the Climate and Economic Justice Screening Tool (Beta Version). One of the eight threshold criteria were exceeded (Training and Workforce-Greater than or equal to the 90th percentile for unemployment, has low HS attainment, and has a low percent of higher education students for tract in Sweetwater County)

Table 9.3-6 Number of Block Groups within 50 miles (80 kilometers) of Jim Bridger 22 Site with Significant Minority or Low-income Populations

County (State)	Number of Block Groups	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Other	Multiracial	Hispanic Ethnicity	Aggregate Minority	Low Income Households
Carbon (Wyoming)	1	0	0	0	0	0	0	0	0	0
Fremont (Wyoming)	1	0	0	0	0	0	0	0	0	0
Sublette (Wyoming)	2	0	0	0	0	0	0	0	0	0
Sweetwater (Wyoming)	34	0	0	0	0	0	0	5	3	2
Totals	38	0	0	0	0	0	0	5	3	2
State Percentages		**Black or African American**	**American Indian or Alaska Native**	**Asian**	**Native Hawaiian or Other Pacific Islander**	**Other**	**Multiracial**	**Hispanic, Latin, or Spanish Origin Ethnicity**	**Aggregate Minority**	**Low-Income Households**
Wyoming		0.9%	2.3%	0.8%	0.1%	1.7%	3.9%	10.1%	16.4%	10.9%

Sources: Reference 9.3-61 and Reference 9.3-62

Table 9.3-7 Migrant Workers in Counties Wholly or Partially within 50-mile (80 kilometer) Region of Jim Bridger 22 Site

County	State	Farms	Migrant Workers
Carbon	WY	17	56
Fremont	WY	18	35
Sublette	WY	6	16
Sweetwater	WY	3	D

Source: Reference 9.3-63

D - Withheld to avoid disclosing data for individual farms, per the USDA

Table 9.3-8 Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Analysis of Jim Bridger 22 Site (Sheet 1 of 3)

Project Name	Summary of Project	Location	Status
Nuclear Projects			
Sweetwater Uranium Recovery Facility	Uranium mill designed to process uranium ore mined at the adjacent Sweetwater Pit. Operated from February 1981 to April 1983, when it was placed into an extended period of standby. As a condition of its current standby status, no natural uranium is housed at the facility (Reference 9.3-27, pg. 10).	Approximately 50 miles (80 kilometers) ENE	In extended standby since 1983.
Other Energy Projects			
Jim Bridger Plant	Units 1 and 2 coal-to-natural gas conversion in 2024. Units 3 and 4 coal-to-natural gas conversion in 2030. Extended operations of the four units through 2037 (Reference 9.3-45).		
Natural Gas Projects			
Jim Bridger 24-inch Pipeline	Proposed 1.19 miles of 24-inch diameter pipeline and supporting facilities to supply the Jim Bridger Power Plant coal-to-natural gas conversion of Units 1 and 2. Project includes new metering and regulating facility, custody transfer station, powerline, access roads and temporary use areas (Reference 9.3-8).	Connects the existing MountainWest Overththrust Pipeline south of the Bridger Reservoir with the Bridger Power Plant (T20N, R101W, Section 10)	Constructed to support Unit 1 and 2 conversion in 2024
Transmission Projects			
Gateway West Transmission Project Segment 4-WY, Anticline to Wyoming/Idaho (aka Subsegment D3) (Reference 9.3-6)	Gateway West Segment D3 from Anticline substation in Wyoming to Populus substation in Idaho is in preconstruction activities to address requirements as defined in the permitting Record of Decision and right of way grants issued by BLM (Reference 9.3-45).	2.9 miles (4.7 kilometers) SE to Anticline Substation	Subsegment D3 scheduled to be placed in service in 2028 (Reference 9.3-45)

Table 9.3-8 Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Analysis of Jim Bridger 22 Site (Sheet 2 of 3)

Project Name	Summary of Project	Location	Status
Mining Projects			
None			
Transportation Projects			
US 30 realignment	2.72-mile realignment of US 30 from Sage Creek to Kemmerer planned for fiscal year 2025 (WYDOT 2023).		Planned for FY 2025 (July 1, 2024 to June 30, 2025)
I-80 bridge replacement	Bridge replacement along I-80 west of Lyman (WYDOT 2023).		Planned for FY 2028
Other Actions/Projects			
ExxonMobil LaBarge Carbon Capture Project	The Project includes 1) additions to the Shute Creek Gas Plant in Lincoln County (Section 14, T22N, R112W), 2) additions to the CO_2 Sales Facility in Sweetwater County (Section 18, T22N, R11W), 3) construction of a CO_2 disposal well (Section 18, T22N, R13W) and a 9-mile CO_2 pipeline in Lincoln County. The Shute Creek Gas Plant and CO_2 Sales Facility are on ExxonMobil property and the CO_2 disposal well and pipeline will be located on BLM owned property (Reference 9.3-19).	65.4 miles (105 kilometers) to Shute Creek Gas Plant	Construction: August 2022 through December 2024 Operations: July 2025 (Reference 9.3-20)

Table 9.3-8 Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Analysis of Jim Bridger 22 Site (Sheet 3 of 3)

Project Name	Summary of Project	Location	Status
Dry Creek Trona Mine Project (Reference 9.3-40 and Reference 9.3-41)	Construction and operation of mining facilities to employ solution mining technologies to mine trona beds 2,300 feet below the surface. The proposed project area is located south of I-80 and west of WY 530, approximately 20 miles southwest of the city of Green River in the KSLA, a geologic designation in the Green River Basin where developable trona deposits are known to occur. An ISP application is anticipated in the 4th quarter 2023.	58.6 miles (94.3 kilometers)	Construction to start after completion of BLM National Environmental Policy Act process (in progress) and other Federal, State, and local permits (estimated: 2024). Construction duration: 56 months. Refinery commissioning: 24 months after construction start. (Reference 9.3-41)
Ciner Unit 8 Expansion Project	Construction and operation of a new refinery unit (Unit 8), rail track loop, and associated facilities to produce 1.1M tons per year of additional soda ash. The project is located at the Big Island Mine and Refinery facility Sections 10, 11, 14 and 15;T20N, R109W (Reference 9.3-10).	44.7 miles (71.9 kilometers)	Planned 24-month construction schedule delayed by COVID and ownership changes. As of April 2023, project had not commenced construction. (Reference 9.3-10)
Chokecherry and Sierra Madre Wind Energy Project	Construction and operation of a 1,000 turbine wind farm in Carbon County, Wyoming. The area of site influence includes the Town of Wamsutter in Sweetwater Company (Reference 9.3-47, Reference 9.3-48).	Located beyond the range considered for cumulative impacts. Consideration given only to demands for housing and other infrastructure in Sweetwater County	Construction began September 2016 and is projected to be complete in 2028. (Reference 9.3-48)

Table 9.3-9 Estimated Cumulative In-Migrating Workforces for the Jim Bridger 22 Site

Project Name	2025	2026	2027	2028	2029	2030
Jim Bridger 22 Nuclear Plant	300	1,373	1,611	1,630	1,264	435
Jim Bridger Power Plant Units 3 and 4 Coal-to-Gas Conversion						428
ExxonMobil LaBarge Carbon Capture Project[a]	215	11	11	11	11	11
Ciner Unit 8 Expansion Project[b]	476	476	71	71	71	71
Gateway West Transmission - Subsegment D3[c]	-	-	313	313	0	0
Dry Creek Trona Mine[d]	2,633	2,633	2,633	540	540	540
Chokecherry and Sierra Madre Wind Energy Facility[e]	650	746	620	550	114	114
Total Non-Local Workers	**4,274**	**5,239**	**5,259**	**3,115**	**2,000**	**1,599**
Total Non-Local Construction Workers at Peak			**5,137**			
Total Non-Local Operations Workers at Peak			**122**			

a. Reference 9.3-19, Reference 9.3-20

b. Reference 9.3-10

c. Reference 9.3-6, Reference 9.3-49, Reference 9.3-50

d. Reference 9.3-40, Reference 9.3-41, Assumed 95 percent in-migration

e. Reference 9.3-47, Reference 9.3-48

Table 9.3-10 Summary of Comparative Impact Analysis from Building Activities and Operations for the Proposed and Alternative Sites (Sheet 1 of 2)

Resource Area	Kemmerer Unit 1	Naughton 12	Jim Bridger 22
Land Use Impacts	SMALL	SMALL	SMALL
Hydrology Impacts			
Water Use	SMALL	SMALL	SMALL
Water Quality	SMALL	SMALL	SMALL
Ecological Impacts			
Terrestrial Ecology	SMALL	SMALL	SMALL
Aquatic Ecology	SMALL	SMALL	SMALL
Socioeconomic Impacts			
Physical Impacts	SMALL	SMALL	SMALL
Economy	SMALL in the economic region (Beneficial) SMALL to MODERATE in Lincoln County (Beneficial)	SMALL in the economic region (Beneficial) SMALL to MODERATE in Lincoln County (Beneficial)	Construction: SMALL to MODERATE (Beneficial) Operations: SMALL (Beneficial)
Taxes	SMALL to LARGE (Beneficial)	SMALL to LARGE (Beneficial)	Construction: SMALL to MODERATE Operations: SMALL
Transportation	Construction: MODERATE Operations: SMALL to MODERATE	Construction: MODERATE Operations: SMALL to MODERATE	Construction: MODERATE to LARGE Operations: SMALL
Aesthetics	SMALL	SMALL	SMALL
Recreation	SMALL to MODERATE	SMALL to MODERATE	SMALL
Housing	Construction: LARGE in Lincoln and Uinta Counties; SMALL to MODERATE in Sweetwater County Operations: SMALL	Construction: LARGE in Lincoln and Uinta Counties; SMALL to MODERATE in Sweetwater County Operations: SMALL	Construction: MODERATE Operations: SMALL

Table 9.3-10 Summary of Comparative Impact Analysis from Building Activities and Operations for the Proposed and Alternative Sites
(Sheet 2 of 2)

Resource Area	Kemmerer Unit 1	Naughton 12	Jim Bridger 22
Public and Social Services	Construction: SMALL, except for Wastewater Treatment in Lincoln County which is SMALL to MODERATE Operations: SMALL	Construction: SMALL, except for Wastewater Treatment in Lincoln County which is SMALL to MODERATE Operations: SMALL	SMALL
Education	SMALL	SMALL	SMALL
Environmental Justice Impacts	No disproportionately high and adverse effects	No disproportionately high and adverse effects	No disproportionately high and adverse effects
Historic and Cultural Resource Impacts	SMALL	SMALL	SMALL
Air Resources Impacts	Construction: MODERATE Operations: SMALL	Construction: MODERATE Operations: SMALL	Construction: MODERATE Operations: SMALL
Nonradiological Health Impacts	SMALL	SMALL	SMALL
Radiological Health Impacts	SMALL	SMALL	SMALL
Postulated Accidents Impacts	SMALL	SMALL	SMALL

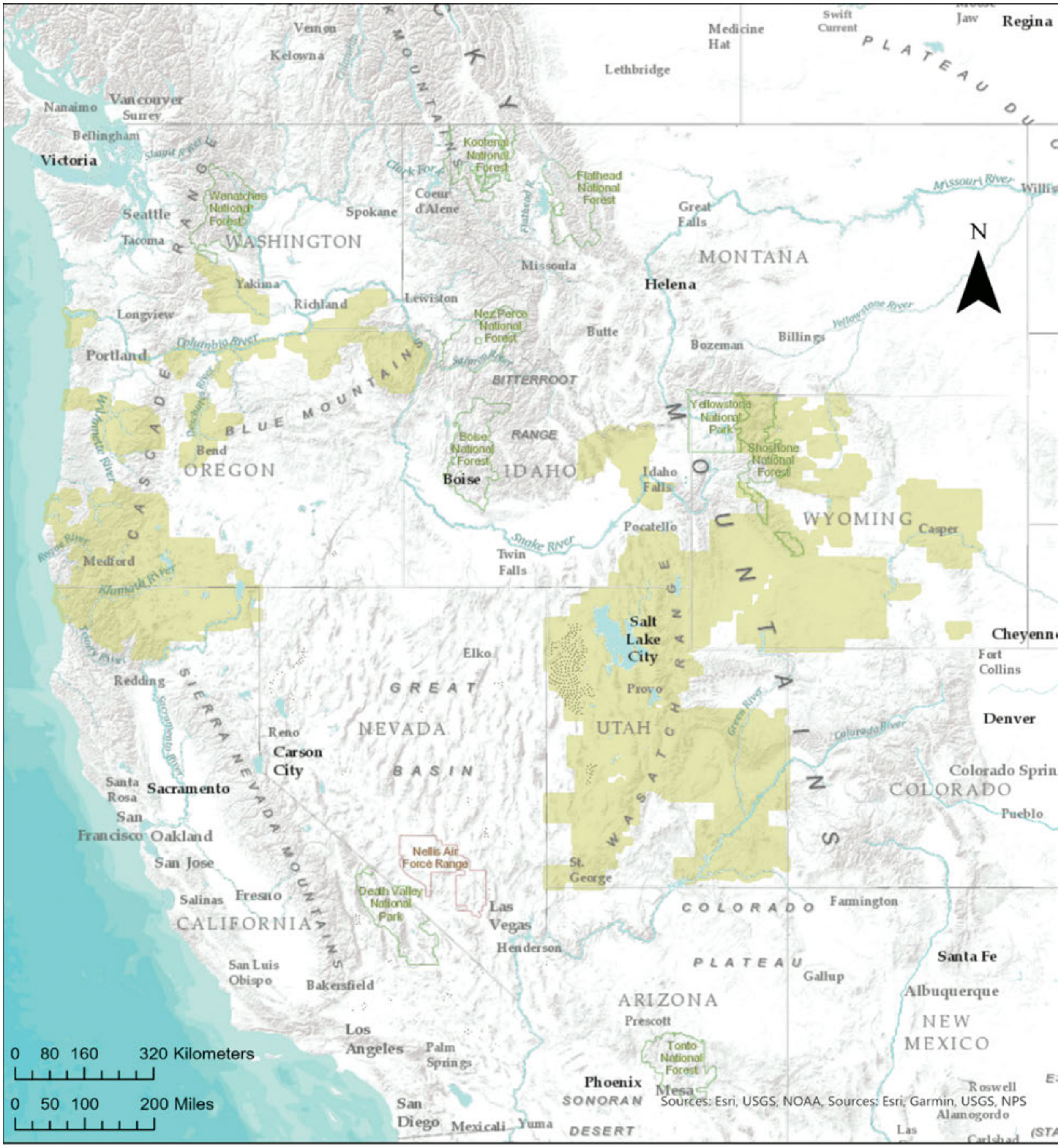
Table 9.3-11 Summary of Cumulative Impacts for the Proposed and Alternative Sites (Sheet 1 of 2)

Resource Area	Kemmerer Unit 1	Naughton 12	Jim Bridger 22
Land Use Impacts	SMALL	SMALL	SMALL
Hydrology Impacts			
Water Use	SMALL	SMALL	SMALL
Water Quality	SMALL	SMALL	SMALL
Ecological Impacts			
Terrestrial Ecology	SMALL	SMALL	SMALL
Aquatic Ecology	SMALL	SMALL	SMALL
Socioeconomic Impacts			
Physical Impacts	SMALL	SMALL	SMALL
Economy and Taxes	SMALL to LARGE (Beneficial or Adverse)	SMALL to LARGE (Beneficial or Adverse)	SMALL to LARGE (Beneficial or Adverse)
Transportation	MODERATE	MODERATE	MODERATE to LARGE
Aesthetics	SMALL	SMALL	SMALL
Housing	LARGE	LARGE	LARGE
Public and Social Services	SMALL, except for Wastewater Treatment in Lincoln County, where it is SMALL to MODERATE.	SMALL, except for Wastewater Treatment in Lincoln County, where it is SMALL to MODERATE.	SMALL
Education	SMALL	SMALL	SMALL
Environmental Justice Impacts	Disproportionately High and Adverse Impacts in Economy and Housing	Disproportionately High and Adverse Impacts in Economy and Housing	Disproportionately High and Adverse Impacts in Economy and Housing
Historic and Cultural Resource Impacts	SMALL	SMALL	SMALL
Air Resources Impacts	MODERATE	MODERATE	MODERATE

Table 9.3-11 Summary of Cumulative Impacts for the Proposed and Alternative Sites (Sheet 2 of 2)

Resource Area	Kemmerer Unit 1	Naughton 12	Jim Bridger 22
Nonradiological Health Impacts	SMALL (physical impacts) Dependent on miles driven (transportation)	SMALL (physical impacts) Dependent on miles driven (transportation)	SMALL (physical impacts) Dependent on miles driven (transportation)
Radiological Health Impacts	SMALL	SMALL	SMALL
Postulated Accidents Impacts	SMALL	SMALL	SMALL

Figure 9.3-1 PacifiCorp Service Territory (Inclusive of Pacific Power and Rocky Mountain Power service areas)



Legend

PacifiCorp Service Territory with 5 mi Buffer

Figure 9.3-2 ROI Aggregate Screening Results

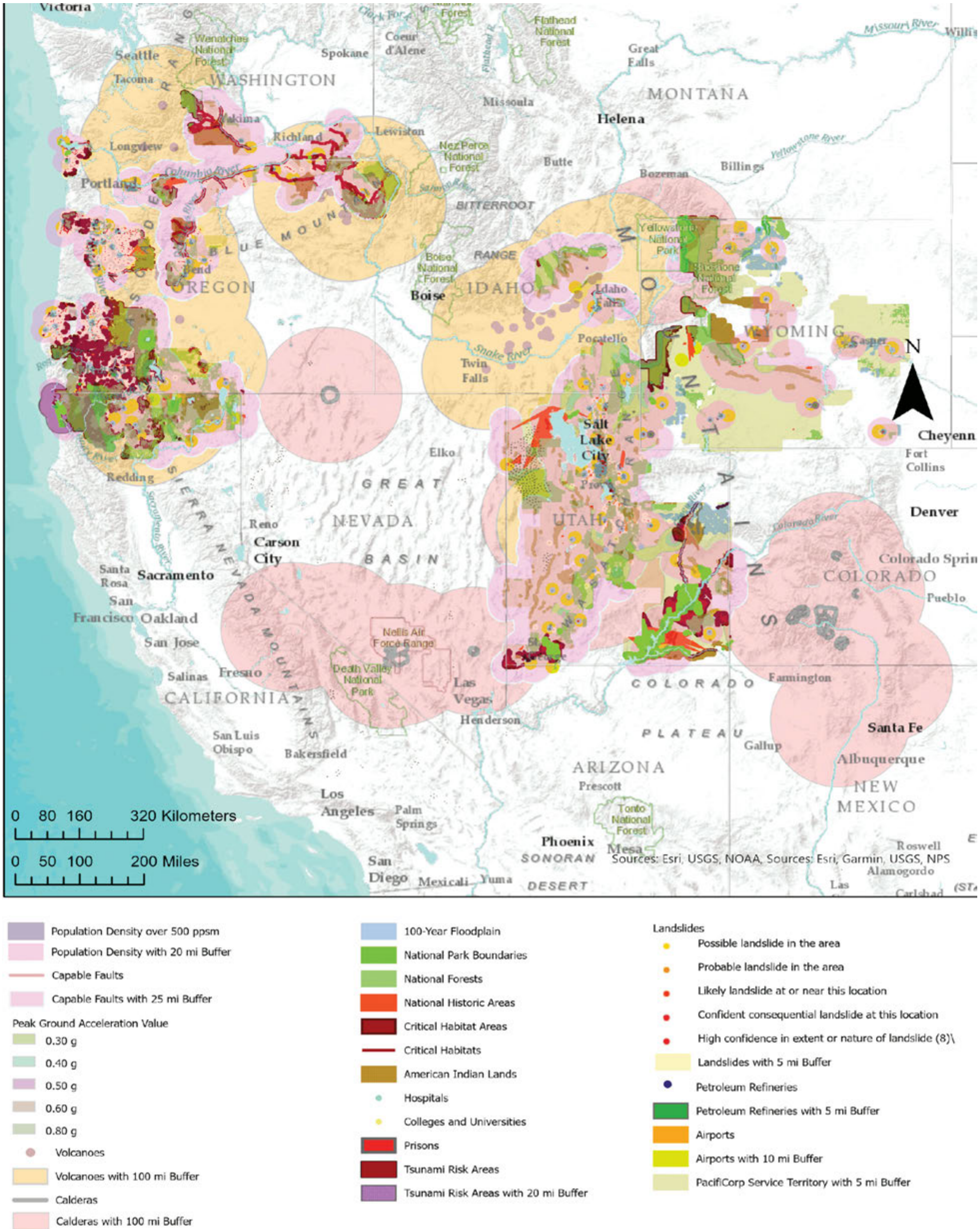
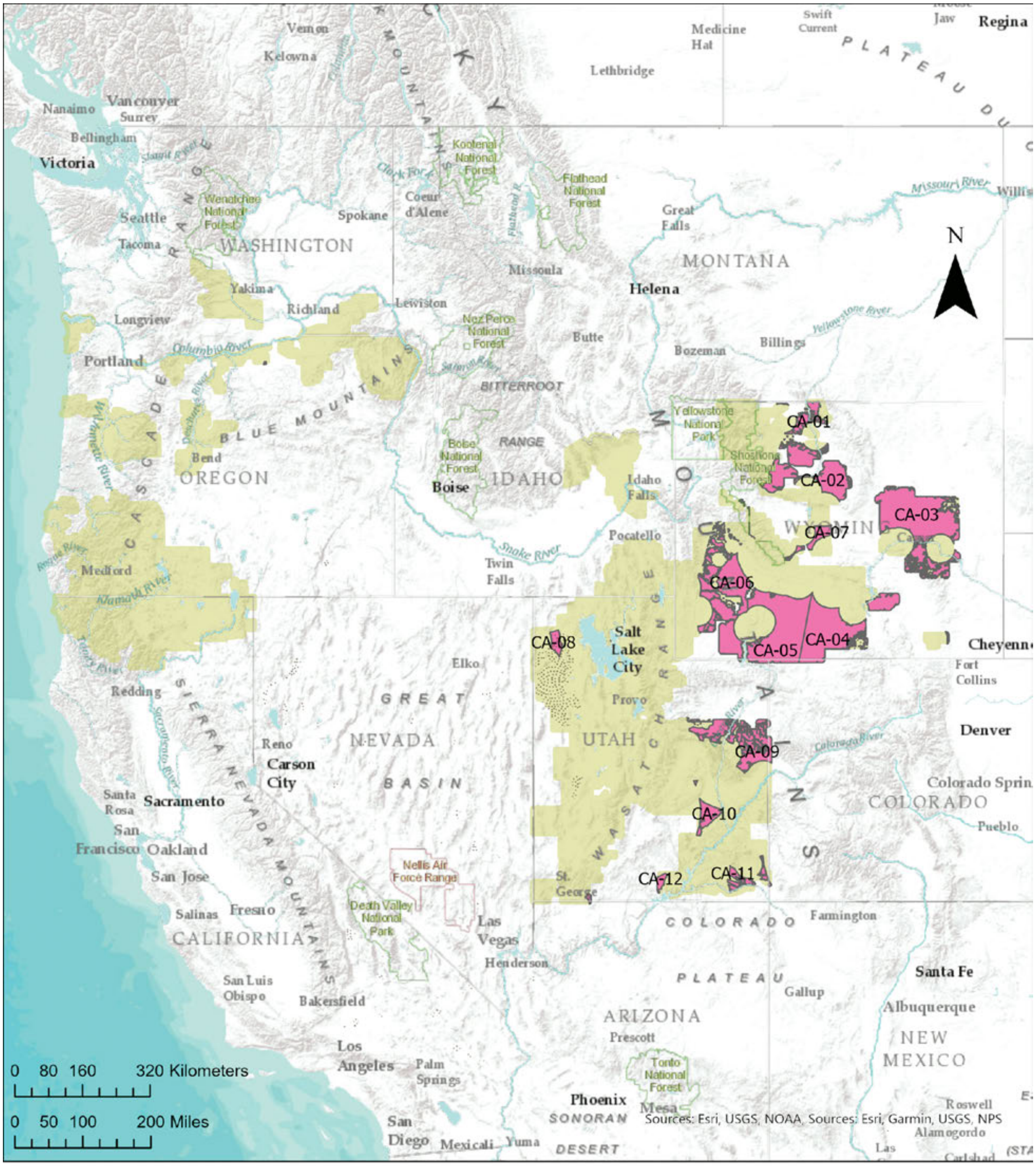


Figure 9.3-3 Identification of Candidate Areas



Legend

- Candidate Areas
- PacifiCorp Service Territory with 5 mi Buffer

Figure 9.3-4 Candidate Area Aggregate Screening Results

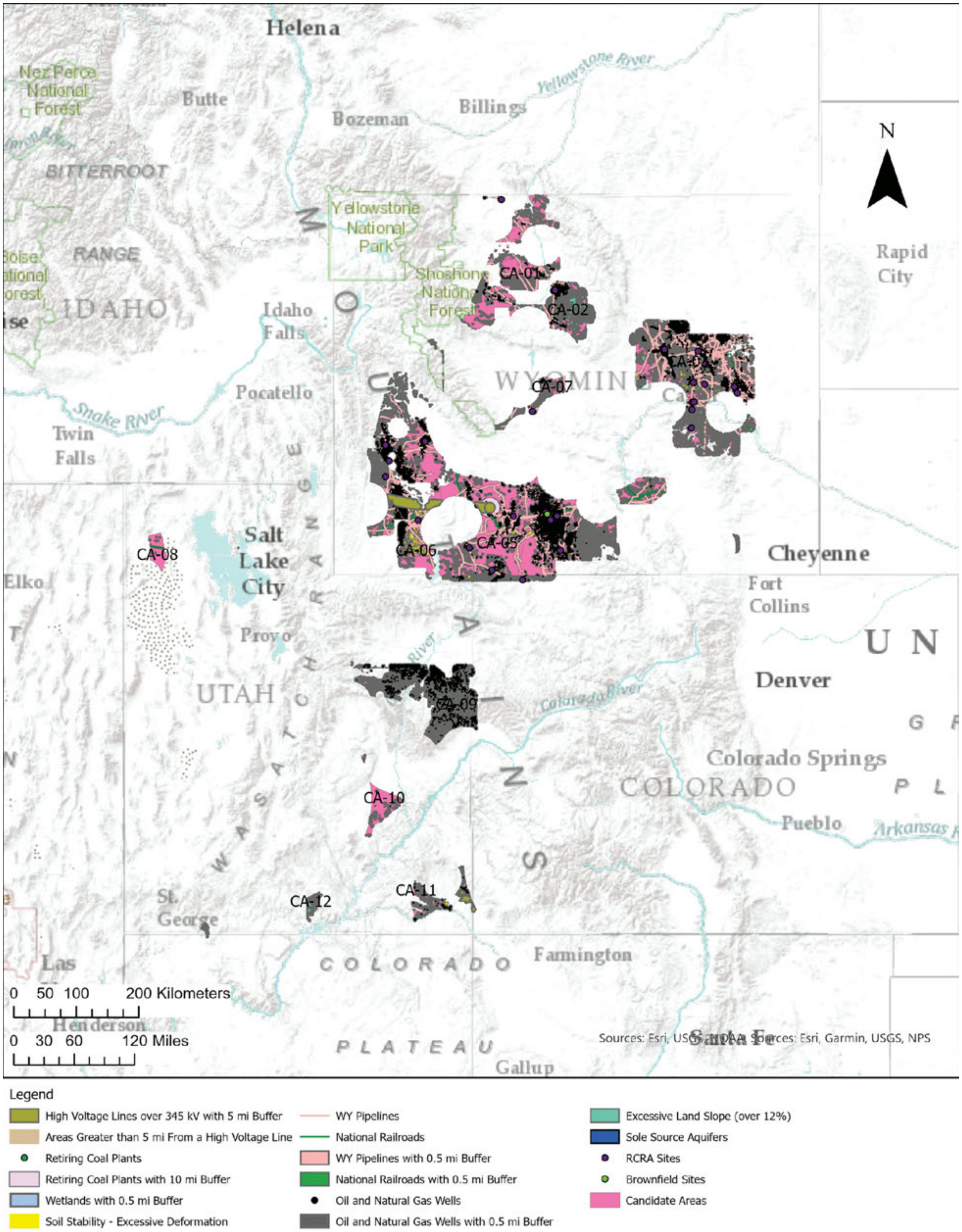


Figure 9.3-5 Weighted Scoring – Identification of Candidate Sites

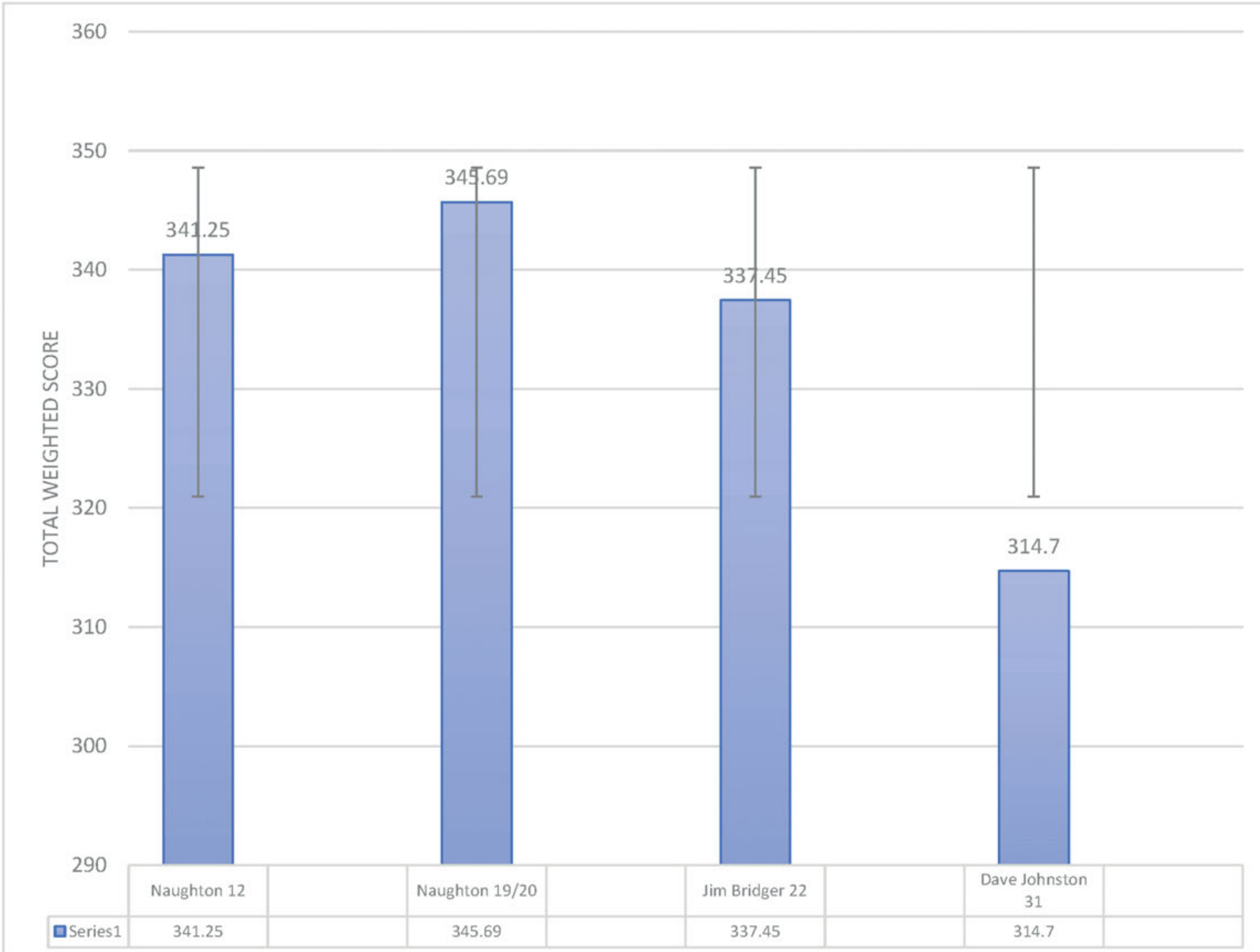


Figure 9.3-6 Naughton 12 Site

Figure 9.3-7 Preliminary Layout – Naughton 12 Site

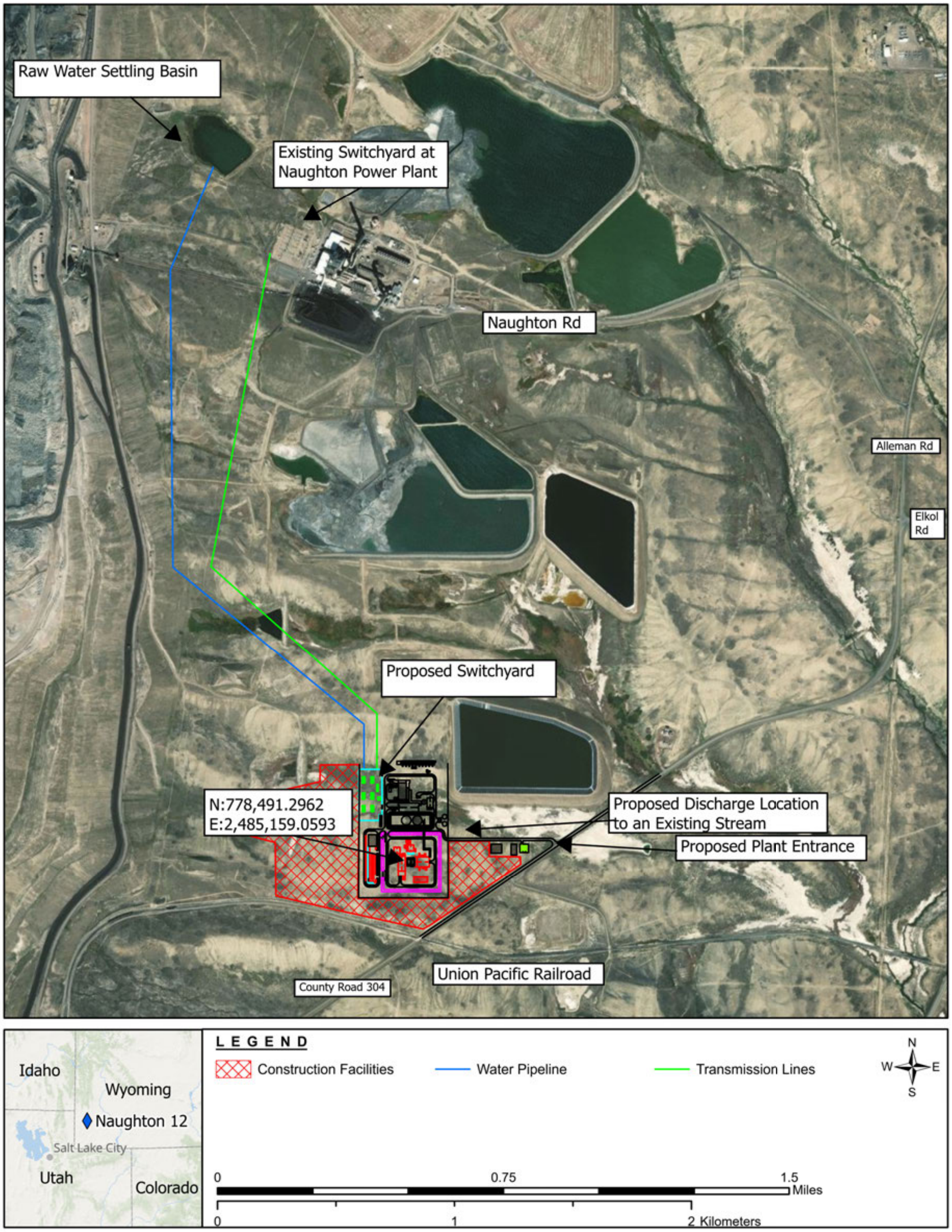


Figure 9.3-8 Ozone Nonattainment Area in Wyoming

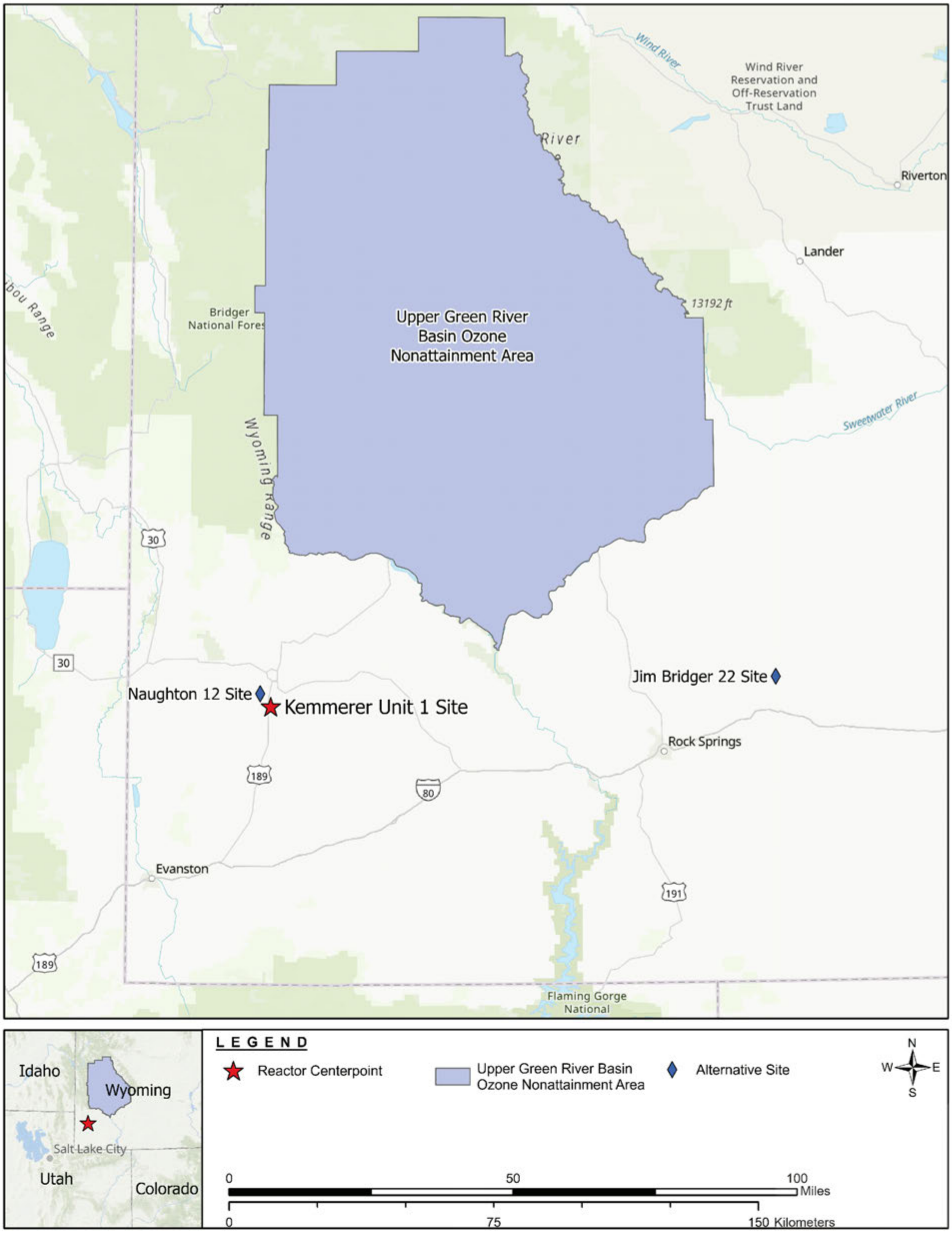


Figure 9.3-9 Jim Bridger 22 Site

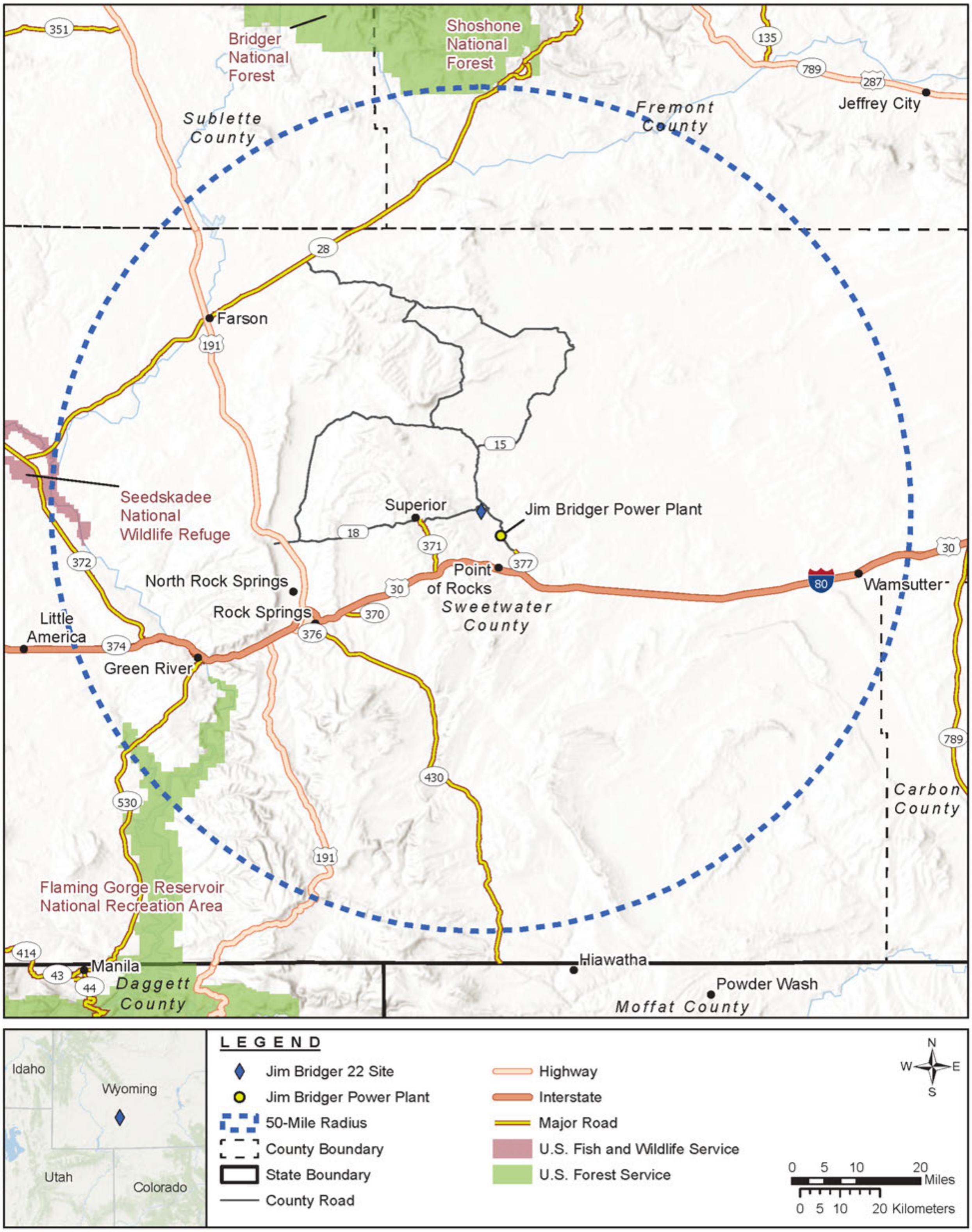


Figure 9.3-10 Preliminary Layout – Jim Bridger 22 Site

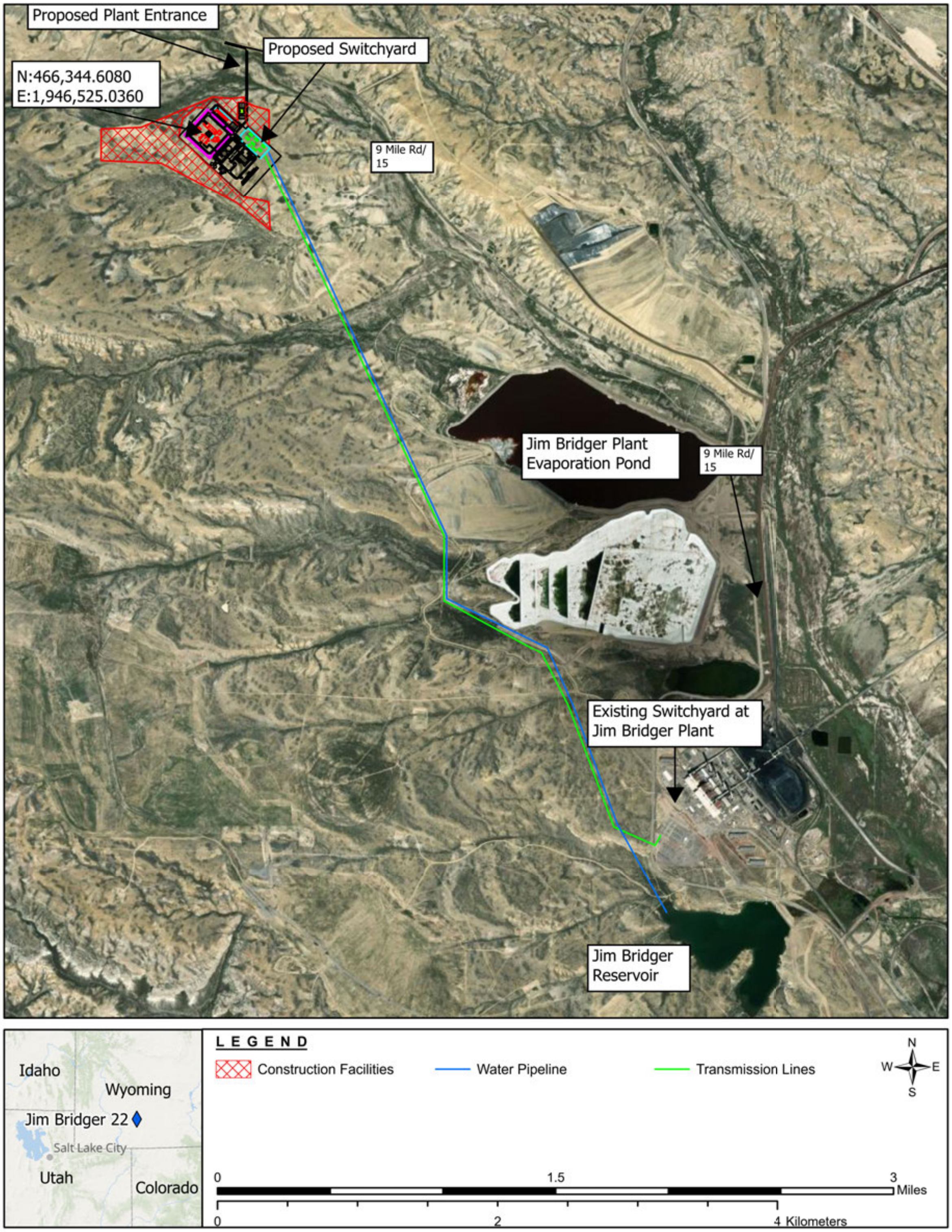


Figure 9.3-11 Significant Hispanic, Latino, or Spanish Origin Ethnicity Minority Populations

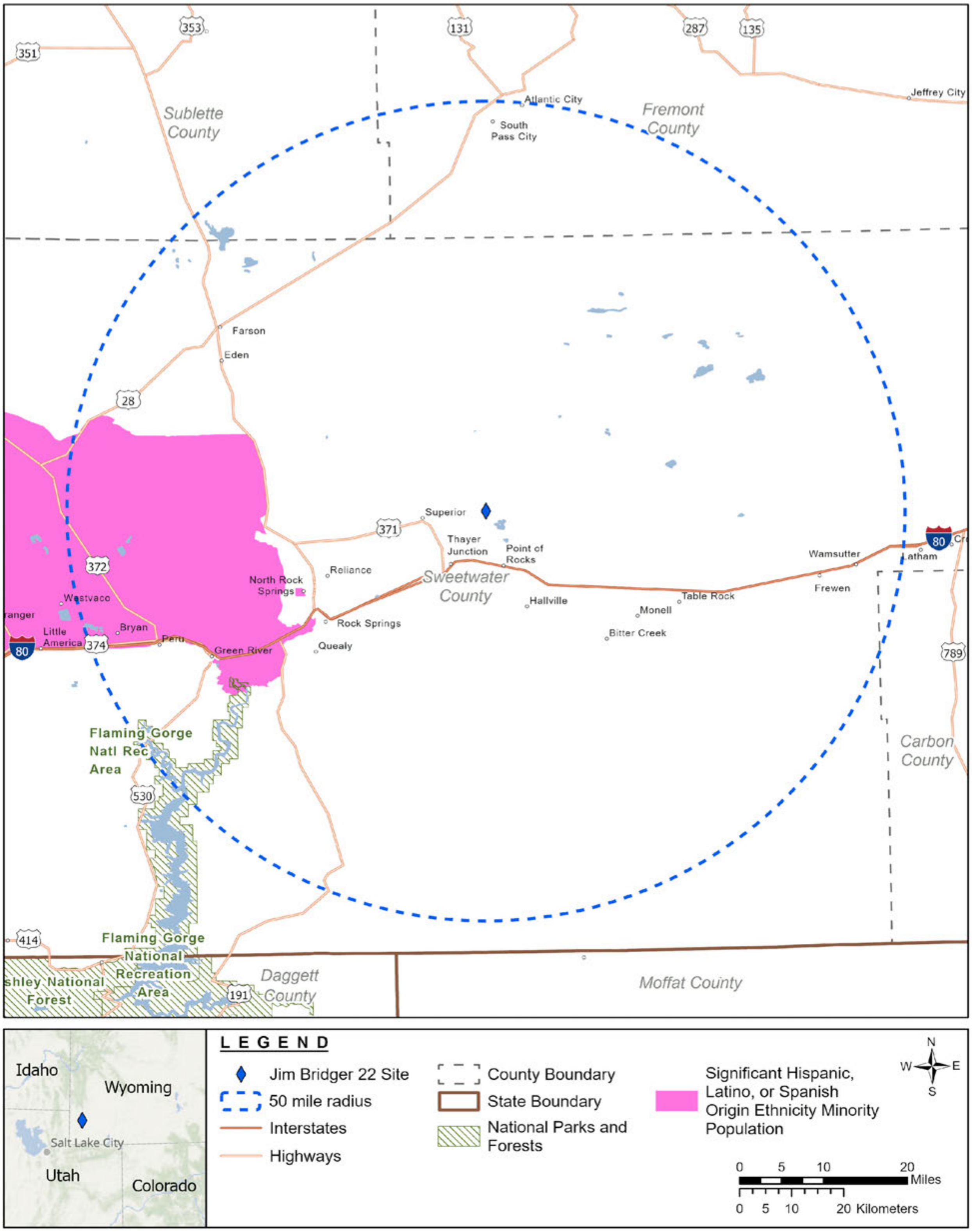


Figure 9.3-12 Significant Aggregate Minority Populations

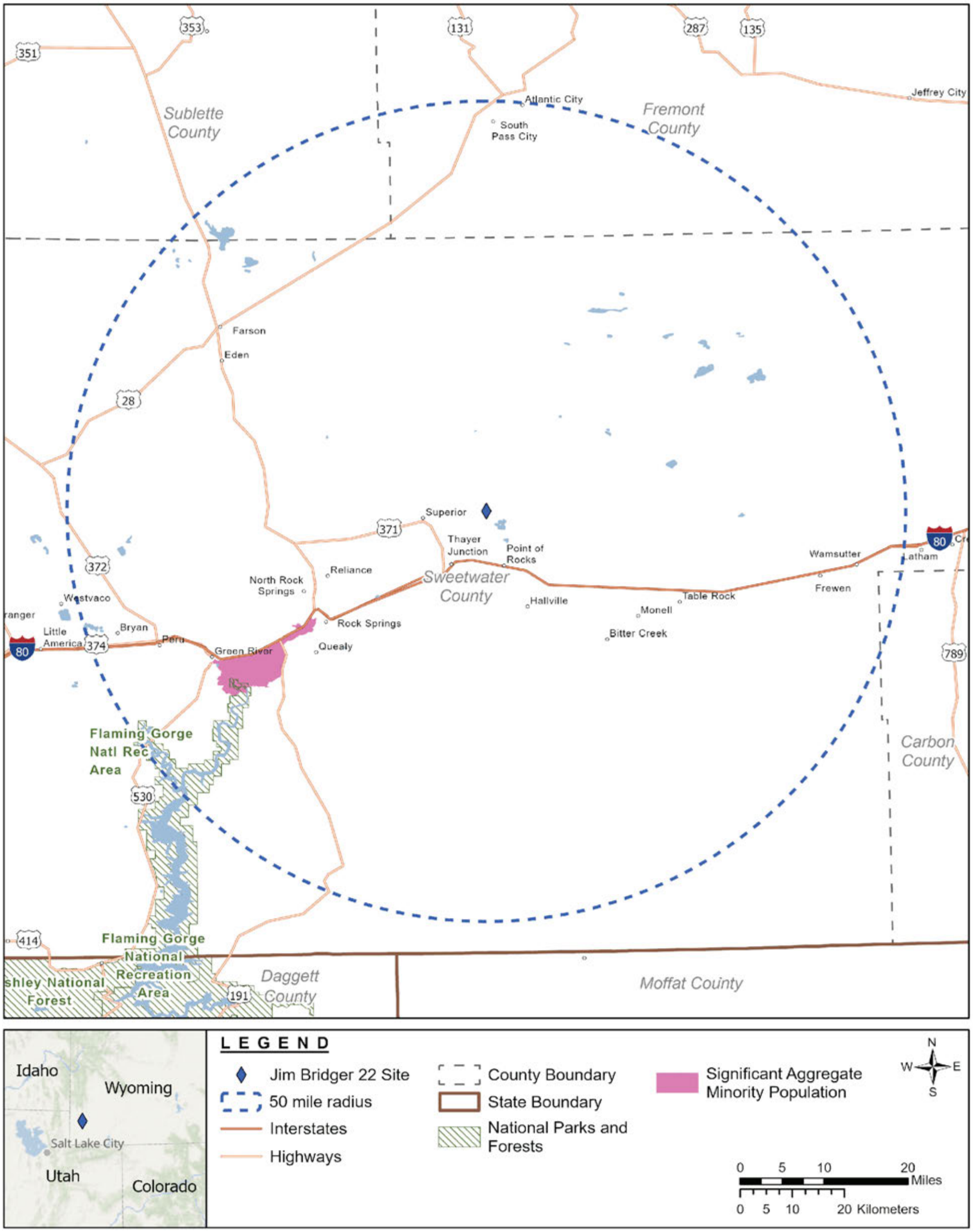


Figure 9.3-13 Significant Low-Income Households

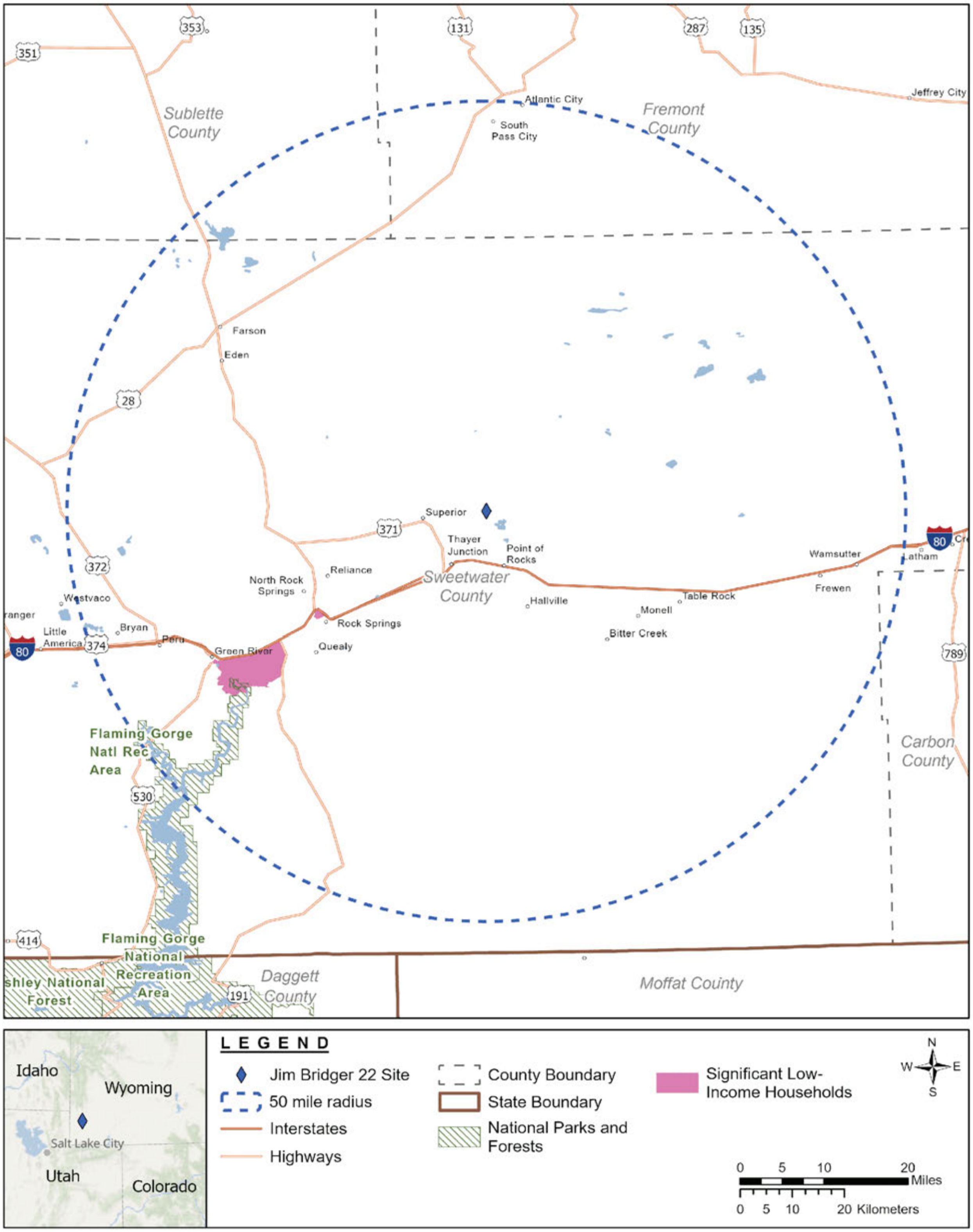
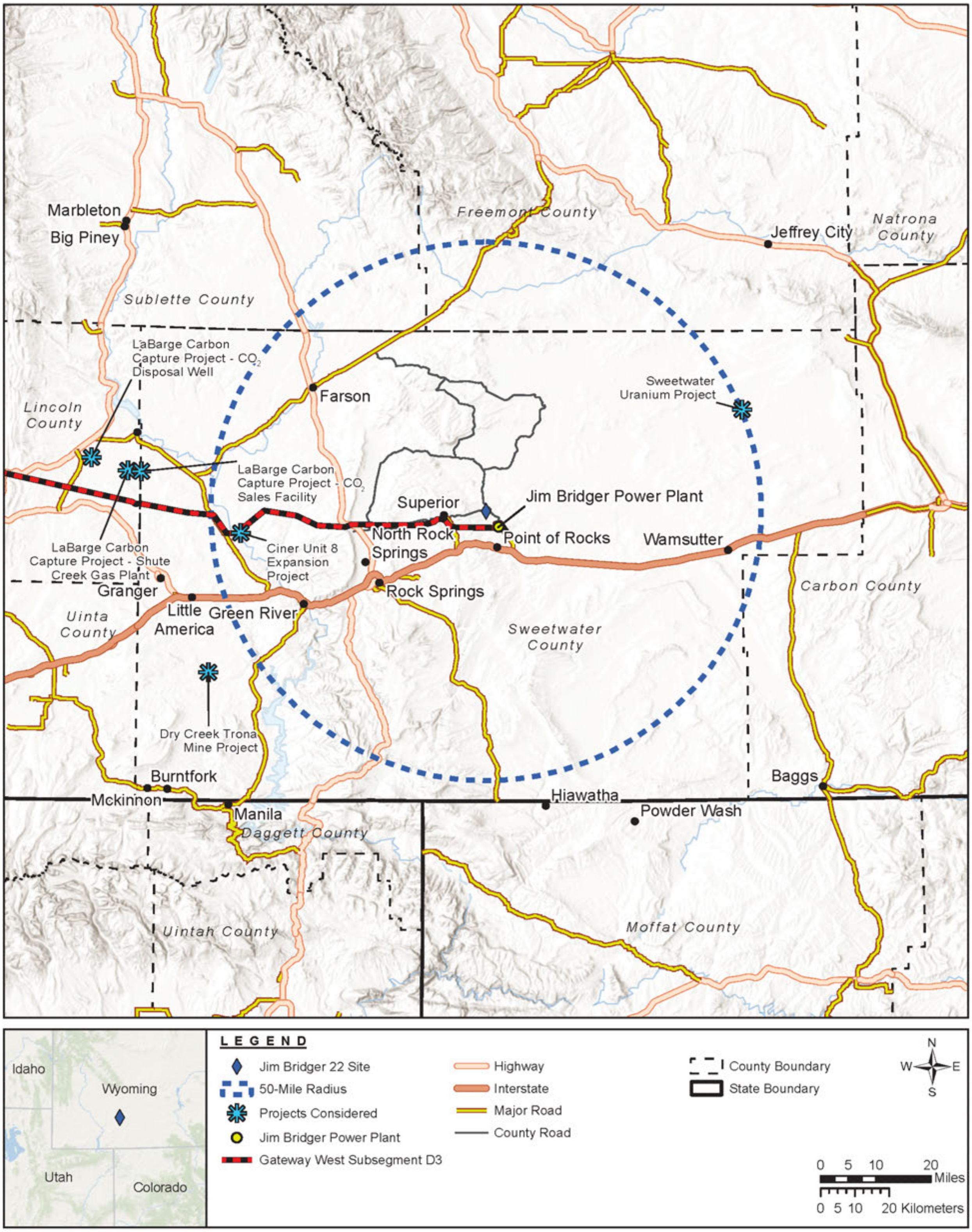


Figure 9.3-14 Projects Considered in Cumulative Impacts for Jim Bridger 22 Site



9.4 System Alternatives

9.4.1 Heat Dissipation

Various heat dissipation methods that could be used in the heat rejection system were reviewed to select the best option for the Kemmerer Unit 1 Site. Criteria for consideration in the initial screening review included: land use (e.g., site size and terrain), water use (e.g., availability of cooling water), cost, environmental impact, and heat dissipation rate. A mechanical draft cooling tower was determined to be the most viable option to support Kemmerer Unit 1.

Alternatives assessed were reviewed based on whether the alternative:

1. Is feasible and practical given conditions at the proposed site, and
2. Could meet the requirements of Section 316 of the Federal Water Pollution Control Act and associated Federal and State implementing regulations

For alternatives that satisfy the two criteria, the following comparisons were conducted:

1. Comparison of environmental impacts of the proposed heat-dissipation system with the alternative system
2. If an alternative system is found to be environmentally preferable to the proposed system, comparative information on the estimated capital and operating cost of the proposed system vs. the estimated capital and operating cost of the environmentally preferable system was reviewed

The reviewed alternative heat dissipation systems include the following:

- Once-through cooling
- Natural draft cooling tower
- Hybrid cooling tower
- Mechanical draft cooling tower
- Dry cooling tower (air-cooled condenser)
- Cooling ponds
- Spray ponds

9.4.1.1 Once-Through Cooling

Once-through cooling systems condense steam from the turbine in a shell-and-tube surface condenser. Cold water is withdrawn from a natural waterbody such as a lake, river, or the ocean and pumped through the tubes. Steam from the turbine is condensed on the outer surface of the tubes. The heat of condensation is transferred to the water flowing through the tubes, which warms the water. The water is then returned to the original source. There is no body of water near the proposed Kemmerer Unit 1 Site to provide adequate flow for a once-through cooling system, so this option was eliminated from further consideration.

9.4.1.2 Natural Draft Cooling Tower

Natural draft cooling towers operate on the chimney effect, by which the density difference between cool, dry ambient air and warm, moist air induces the flow of air into the tower and into contact with the water to be cooled in the tower. Natural draft cooling towers are a common option in the power industry. Favorable features include the absence of fans, which provides for very low operating cost, low auxiliary power requirements, and minimal noise impact. Natural draft cooling towers are very tall and may have negative public perception because the towers and plume are visible from a great distance. However, the height can be favorable in terms of environmental impact because the drift is dispersed at such a great height that the concentration that accumulates around the tower is lower than other tower designs. Natural draft cooling towers have a high initial cost and low heat dissipation efficiency compared to mechanical draft cooling towers. For these reasons, this option was eliminated from further consideration.

9.4.1.3 Hybrid Cooling Towers

Hybrid cooling systems have both dry and wet cooling elements that are used individually or together to achieve optimal cooling for the weather conditions. This system allows for wet cooling performance on the hottest days of the year and the water conservation capability of dry cooling during cooler periods. The wet and dry components can be arranged in series or parallel as separate structures or integrated into a single tower. The dry elements can be either direct or indirect types. The most common configuration utilized has been the parallel, separate structure with direct dry cooling. A drawback of hybrid cooling is that significant amounts of water may still be required, particularly during the summer. Therefore, it is most suitable for sites that have inadequate water availability for all-wet cooling at all times of the year. Hybrid cooling towers have been planned but have not been installed at a power plant the size of Kemmerer Unit 1. Hybrid cooling towers have added cost and complexity, and a poorly operated hybrid cooling tower system can have an even lower efficiency than that of dry cooling systems. Dry cooling systems are preferred to hybrid systems in areas with low ambient temperature and high humidity (Reference 9.4-3). This would add some uncertainty to the outcome of a hybrid cooling tower employed at Kemmerer Unit 1 because the climate at the site is cold and dry in the winter and hot and dry in the summer resulting in decreased efficiency of the system. In terms of energy and cost efficiency, an all-wet cooling system is preferable to a hybrid cooling tower system; therefore, the hybrid cooling tower system was eliminated from further consideration.

9.4.1.4 Mechanical Draft Cooling Tower

Mechanical draft towers include crossflow and counterflow designs. Hot water from the condenser is introduced at the top of the tower and flows down through the tower where it is brought into contact with ambient air flowing across, or counter to, the direction of the falling water flow. Both sensible and latent heat transfer to the air cools the bulk of the water, which is then collected in a basin and returned to the condenser. The air leaving the tower is heated and humidified to a near-saturated plume. There will be appreciable electrical loads for the fans in each of the tower’s cells. In a mechanical draft cooling tower, water loss is due to blowdown, evaporation, and drift. Water usage is limited to make-up, which is relatively low compared to once-through systems. Mechanical draft cooling towers are often the cooling tower design for power applications, and the relatively low profile makes them a good choice when aesthetics is a concern. This type of tower is in widespread use in industry, and there are many vendors. Induced versus forced draft towers are available for consideration. This is a well-understood and proven technology for nuclear power plant designs. Naughton Power Plant uses a mechanical draft cooling tower.

9.4.1.5 Dry Cooling Tower (Air-cooled Condenser)

Dry cooling systems reject the heat of condensation directly to the atmosphere with no consumptive use of cooling water. Systems are categorized as either direct or indirect dry cooling. In direct dry cooling, turbine exhaust steam is condensed in an air-cooled condenser. In indirect dry cooling, the steam is condensed in a conventional water-cooled condenser, and the heated condenser cooling water is then recirculated to, and cooled in, an air-cooled heat exchanger before being returned to the condenser. Direct dry cooling is the prevalent type of dry cooling in the United States. Dry cooling achieves significant water savings for the site; however, the capital and operating costs are higher, and the physical footprint is larger than for closed-cycle wet cooling systems. In addition, the plant efficiency and output are typically reduced compared to wet cooling because air-cooled condensers are limited more by the ambient temperature (Reference 9.4-1). Air-cooled condensers have a lower capacity per cell compared to wet systems, so there would need to be more cells than the mechanical draft cooling tower. For these reasons, this option was eliminated from further consideration.

9.4.1.6 Cooling Ponds

The amount of land required for a cooling pond to sufficiently dissipate heat is not available at the site. A cooling pond would have a large evaporation rate due to the arid site conditions. For this reason, cooling ponds were eliminated from further consideration.

9.4.1.7 Spray Ponds

Spray ponds are similar to cooling ponds in that they result in the creation of new surface water bodies. A large amount of land is required to achieve sufficient heat dissipation. Spray modules promote evaporative cooling in the pond that reduces the land requirement relative to cooling ponds; however, this advantage is offset by higher operating and maintenance costs. Since the significant amount of land required to accommodate spray ponds is not available at the Kemmerer Unit 1 Site, spray ponds were eliminated from further consideration.

9.4.1.8 Discussion of Proposed System

After evaluating the different heat dissipation systems, a mechanical draft cooling tower is the most viable option for the Kemmerer Unit 1 Site. Once-through cooling was eliminated because there is no body of water near the proposed Kemmerer Unit 1 Site to provide adequate flow. Natural draft cooling towers have a high initial cost and low heat dissipation efficiency compared to mechanical draft cooling towers. Hybrid cooling towers are feasible at the Kemmerer Unit 1 Site; however they incur a higher initial cost compared to mechanical draft cooling towers. Dry cooling towers have higher capital and operating cost compared to mechanical draft cooling towers. Both hybrid and air cooling towers depend on weather conditions, which will fluctuate throughout the year and therefore performance efficiency will also fluctuate. Cooling ponds and spray ponds were eliminated because of a significant evaporation rate and sufficient land not being available. The results of the evaluation indicate that the alternative designs are not an environmental, cost, or performance equivalent to the proposed mechanical draft cooling tower.

9.4.2 Circulating-Water System Alternatives

Alternatives to the plant circulating-water system were considered in order to identify systems that are feasible and practical given the site conditions and could meet Section 316 of the Federal Water Pollution Control Act and associated Federal and State implementing regulations. For alternatives that met both criteria, the alternatives were evaluated to identify any environmentally preferable or equivalent to the proposed system regarding anticipated environmental impacts. The review included an investigation of the following plant circulating water systems:

- Intake systems
- Discharge systems
- Water supply
- Water quality and water treatment

9.4.2.1 Intake Systems

9.4.2.1.1 Screening of Alternative Intake Systems

Alternative intake systems were screened based on location of the system and its potential configuration. Several factors were considered for feasibility of integrating the alternative intake system at the Kemmerer Unit 1 Site, including the following:

- Availability of water
- Water quality of water supply
- Intake hydraulics
- Constructability and cost
- Operation maintenance

9.4.2.1.2 Proposed Intake System

The proposed design calls for reuse of existing infrastructure to obtain raw water. No new intake structure is proposed for the construction of Kemmerer Unit 1, as described in Section 3.2 and Section 5.2. Raw water will be supplied from Naughton Power Plant Raw Water Settling Basin, which receives water from an existing 316(b) compliant cooling water intake structure on Hams Fork River.

9.4.2.1.3 Alternative Intake Systems

New Cooling Water Intake Structure

The installation of a new intake structure on Hams Fork River would require a surface water permit from the State Engineer's Office and compliance with Section 316(b) of the Clean Water Act. Diversions as recognized by the Wyoming State Engineer's Office for surface water use is categorized into five types of water supply:

- Original supply - applies to lands that do not have a valid Surface Water permit
- Secondary supply - water that is stored in a reservoir and appropriated for a beneficial use to specific points of use
- Supplemental supply - option is suitable if the original supply for an existing permit is being augmented by a different source. The total maximum appropriation for all sources cannot exceed 1 cubic feet per second per 70 acres
- Reservoir supply facility - diversion is used to supply a reservoir
- Surface water supply for a ground water permit - irrigation water is to be applied to lands covered by an existing groundwater irrigation permit

A new cooling water intake structure would require a surface water permit for a diversion pump at the point of diversion to provide an original supply at the Kemmerer Unit 1 Site (Reference 9.4-4).

Due to the significant anticipated legal and regulatory hurdles associated with obtaining a new water right as a new surface water user in the Green River Basin, this option is considered impractical.

Groundwater Wells

Use of groundwater via a well would require sufficient water supply and water quality. A subsurface investigation conducted for the project concluded that groundwater depth, water quality, and water quantity were not sufficient to supply Kemmerer Unit 1 (see Section 2.2). Therefore, this option is not feasible.

Wastewater from Existing Wastewater Treatment Facility

Use of water, either potable or wastewater, from Kemmerer-Diamondville Water and Wastewater Joint Powers Board at Kemmerer Unit 1 is not feasible because Kemmerer-Diamondville Water and Wastewater Joint Powers Board is not able to send water to Kemmerer Unit 1 due to a lack of existing pipe infrastructure. As described in Section 2.2, Kemmerer-Diamondville Water and Wastewater Joint Powers Board is currently searching for funding to address system-wide repairs, upgrades, and expansions that are needed. Since no significant grants or other forms of financing for system-wide changes have been secured, Kemmerer Unit 1 will not receive wastewater from Kemmerer-Diamondville Water and Wastewater Joint Powers Board Water Treatment Plant for operations or send wastewater to their Wastewater Treatment Plant to support building activities or for operations.

This alternative would be viable if funding for the water pipeline and plant upgrades at Kemmerer-Diamondville Water and Wastewater Joint Powers Board are identified. Significant land impacts would be expected to route the pipeline from the City of Kemmerer to the site. Since public funds cannot support these projects at this time, private capital would be used to fund the projects to support the schedule for the proposed facility. This would, therefore, increase the overall cost and scope of the project and make this option impractical.

9.4.2.1.4 Summary of Feasible Alternatives

The results of the initial environmental screening process indicate that alternate intake system options are not feasible or practical compared to the proposed system.

9.4.2.2 Discharge Systems

9.4.2.2.1 Screening of Alternative Discharge Systems

Alternatives for the discharge of waste water from the circulating water system were identified and compared to the proposed system. The potential receiving waterways were selected near the Kemmerer Unit 1 waste water treatment building on the east side of the site (Figure 3.1-4).

9.4.2.2.2 Proposed Discharge System

The proposed discharge system will release cooling tower blowdown from the circulating water system to the waste water treatment building for water treatment. Once the waste water meets the Wyoming Pollutant Discharge Elimination System permit end of pipe requirements, it will be released via an outfall into the nearest waterway to Kemmerer Unit 1, as described in Section 3.2 and Section 5.2, to minimize environmental disturbance. The nearest waterway to Kemmerer Unit 1 is North Fork Little Muddy Creek and is primarily composed of plant wastewater discharge from Naughton Power Plant. There are no other viable waterways in close proximity to the Kemmerer Unit 1 water treatment building. Installation of a discharge system outside of the site vicinity would result in significant environmental impacts. Additionally, discharge to North Fork Little Muddy Creek will return water to the Green River Basin, and will be beneficial for downstream surface water users and the wetlands surrounding North Fork Little Muddy Creek (see Section 2.2).

9.4.2.2.3 Alternative Discharge Systems

Send Wastewater to Kemmerer-Diamondville Water and Wastewater Joint Powers Board

One additional alternative discharge system was identified in the initial screening process. In lieu of a water pipeline, the alternative system would send untreated waste water to a holding tank to be hauled by truck to a water treatment facility such as Kemmerer-Diamondville Water and Wastewater Joint Powers Board. As explained in Section 2.4, though Kemmerer-Diamondville Water and Wastewater Joint Powers Board has excess production capacity, the plant requires infrastructure upgrades and the funding for those upgrades has not been identified. Additionally, hauling wastewater by truck daily for the operational life of the plant is not practical in terms of associated emissions.

For those reasons, hauling wastewater to Kemmerer-Diamondville Water and Wastewater Joint Powers Board is not practical and was eliminated from further consideration.

Evaporation Ponds

Use of evaporation ponds is a viable option for a zero-liquid discharge plant. Evaporation ponds can avoid direct discharge into waterways; however, they would require a large area for installation. For comparison, at the existing Jim Bridger Power Plant, the evaporation pond covers approximately 92 acres (37 hectares). Though this option offers benefits in terms of water quality impacts and would be comparable to other plant discharge systems in the region, the Kemmerer Unit 1 Site does not have sufficient open land area to accommodate a large pond. Therefore, evaporation ponds are not a feasible option.

Additionally, discharge to North Fork Little Muddy Creek is beneficial for downstream surface water users. Therefore, use of evaporation ponds is not considered to be environmentally preferable as it does not provide the ecological uplift to terrestrial and aquatic resources.

9.4.2.2.4 Summary

The results of the evaluation indicate that each alternate discharge system would either not be environmentally preferable to the proposed discharge system or are not feasible.

9.4.2.3 Water Supply

9.4.2.3.1 Screening of Alternative Water Supply

Alternative groundwater and surface water sources were screened for viability based on location of the source, existing water quality, and potential environmental impacts from use of that source.

9.4.2.3.2 Proposed Raw Water Supply

The proposed design uses raw water from Naughton Power Plant Raw Water Settling Basin, as described in Section 3.2 and Section 5.2. Minimal environmental impacts are anticipated to deliver water for use at Kemmerer Unit 1 due to reuse of existing water infrastructure at Naughton Power Plant. This design is environmentally preferable because re-use of existing infrastructure at Naughton Power Plant reduces impacts from building activities, and surface water supply within the region would not be significantly impacted by the additional water consumption from Kemmerer Unit 1. It is anticipated that no new water rights are needed to construct and operate the proposed plant at Kemmerer Unit 1.

9.4.2.3.3 Alternative Water Sources

Groundwater Supply

As described in Section 2.2, groundwater quantity, quality, and depth is not sufficient for use at the site. Therefore, this alternative is not feasible and was eliminated from further consideration.

Surface Water Supply

Availability of surface water for an industrial use of over 800 acre-feet per year in the State of Wyoming is dependent on a determination of water availability from the Wyoming State Engineer's Office via the Industrial Siting Permit process. Section 2.2 discusses the determination of surface water availability for industrial uses. There are no significant water bodies closer to Kemmerer Unit 1 than Naughton Power Plant Raw Water Settling Basin that are suitable for industrial water use (see Figure 2.2-2). The nearest body of water that could meet the plant water demand is Hams Fork River. Discussion of adding a new intake structure on the Hams Fork River is included in Section 9.4.2.1.3.

9.4.2.3.4 Summary

No other feasible alternatives were identified in the screening due to lack of availability and water quality to meet plant water demand in both average and maximum water use conditions. Thus, the results of the evaluation indicate that the identified alternative water supplies are not environmentally preferable to the proposed water supply or are not feasible.

9.4.2.4 Water Quality and Water Treatment

No alternatives for water quality and water treatment have been identified. It is assumed that the water quality in the Raw Water Settling Basin at Naughton Power Plant is sufficient to support operations at Kemmerer Unit 1 since a mechanical draft cooling tower is proposed and can operate in a similar manner to the one used at Naughton Power Plant.

However, intake water quality for plant systems can affect some aspects of a wet cooling design, such as:

- Cycles of concentration - water quality limitations for a constituent is a limiting parameter for cycles of concentration. The maximum cycles of concentration is a ratio of makeup water concentration of each constituent to the corresponding water quality limit for that constituent (Reference 9.4-2).
- Heat transfer capacity - scale inhibitors help to prevent decline of the cooling tower's heat transfer capacity. Scaling can often occur within the cooling system as a result of water hardness. As water circulates throughout the system, ions can be picked up that can cause corrosion and scaling of materials in the tower, lowering heat transfer capacity, and resulting in a less effective and less efficient system. Biological fouling can also result in loss of heat transfer and lead to structural failure if it is not managed during the water treatment process (Reference 9.4-2).

9.4.2.4.1 Proposed Water Quality and Water Treatment System Design

The proposed water quality and water treatment system design information will be based on water quality data for the Raw Water Settling Basin provided by Naughton Power Plant. Treatment for biofouling, scaling, and suspended matter with biocides and antiscalants will be performed at the onsite Water Treatment Building as needed for the circulating water system. This treatment normally occurs through injecting chemicals into the system piping during circulation of the water in the circulating water and service water systems. The cooling tower cycles of concentration will be adjusted to prevent scale formation or deposition from affecting tower performance. Sodium hypochlorite will be used to control biological growth in the circulating water system for Kemmerer Unit 1. The final choice of water treatment chemicals or combination of chemicals will be dictated by makeup water conditions, technical feasibility, economics, and discharge permit requirements.

9.4.2.4.2 Summary

The results of the evaluation did not identify any other alternative systems for heat dissipation and water circulation system designs.

References

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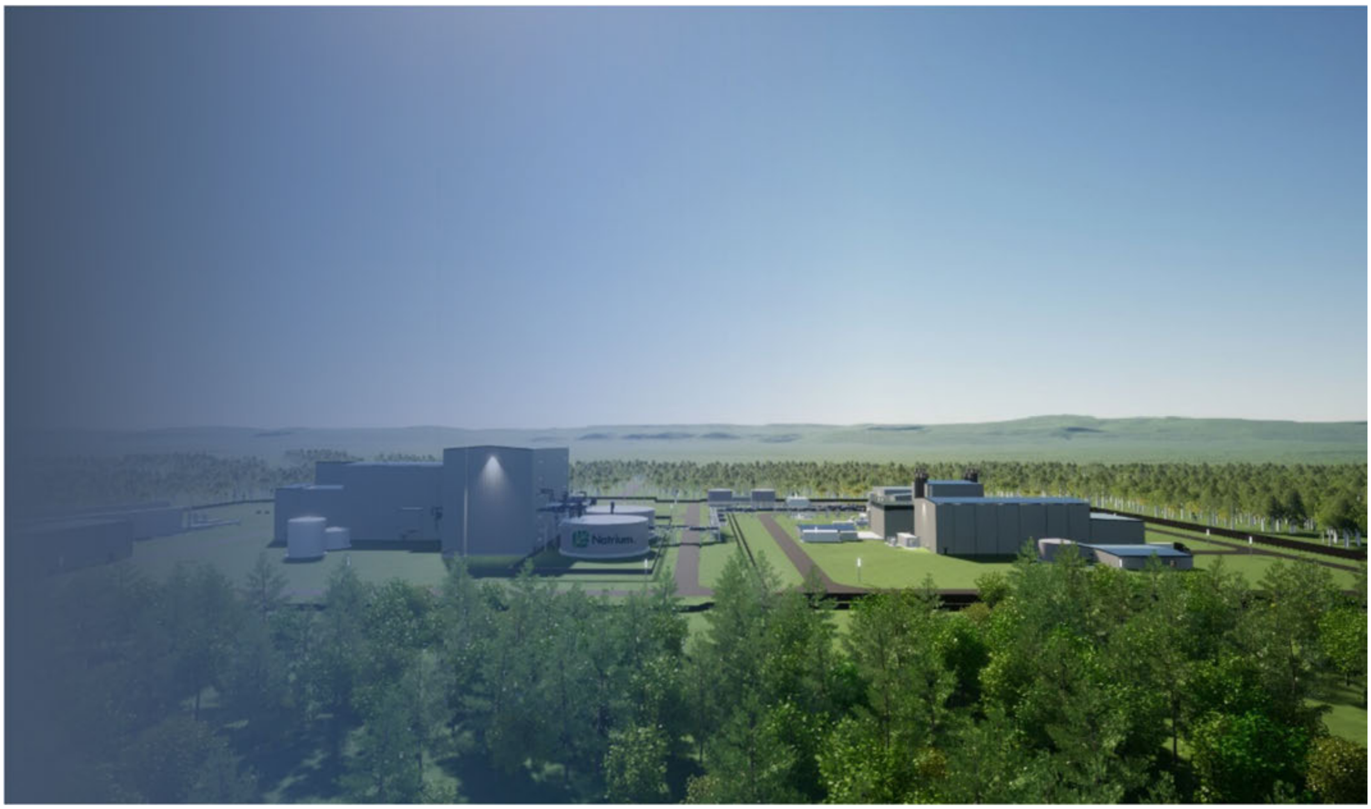

Kemmerer Power Station Unit 1
ER, Chapter 10

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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Chapter 10 Conclusions

The environmental consequences of construction and operation of Kemmerer Unit 1 are summarized in the following sections:

- Impacts of the Proposed Action – Section 10.1
- Unavoidable Adverse Environmental Effects – Section 10.2
- Relationship between Local Short-Term Use of the Environment and Long-Term Productivity – Section 10.3
- Irreversible and Irretrievable Commitments of Resources – Section 10.4
- Alternatives to the Proposed Action – Section 10.5
- Benefits and Costs – Section 10.6

Potential impacts are assigned a single significance level according to the criteria described in Section 1.0.

10.1 Impacts of the Proposed Action

The impacts of building activities, operation, and cumulative impacts of Kemmerer Unit 1 are discussed in Chapters 4, 5, and 7.

10.1.1 Land Use Impacts

The anticipated impacts to land use due to construction and operation are discussed in Sections 4.1 and 5.1.

A disturbance of 218 acres (88 hectares) is anticipated for site development. The disturbance will remain through the operation and decommissioning of Kemmerer Unit 1. The area is zoned as industrial; therefore, development of the site for industrial purposes is consistent with local zoning and land use goals. The site and vicinity are occasionally grazed by livestock. During construction, operation, and decommissioning, the area will be fenced off and unavailable for grazing. The development of the site represents a small change in the total open rangeland available for use in the vicinity.

Macro-corridors traversed by transmission lines and the water supply pipeline include a total of 511 acres (207 hectares). The disturbance due to the transmission lines will be limited to 187 acres (75.7 hectares), assuming a corridor width of 250 feet (76.2 meters) and an additional 7 acres (3 hectares) for laydown and pulling of the lines. The disturbance due to the water supply pipeline will be limited to 36 acres (15 hectares), assuming a corridor width of 50 feet (15 meters). Easements and land access for installation of the transmission lines and pipeline are being sought. The right of way will be compatible with certain land uses, such as grazing, and not compatible with others, such as mining. Construction is not expected to disrupt existing land uses or private land access, except for temporary disruption of grazing along portions of the route.

The construction and operation of the Sodium Test and Fill Facility presents a cumulative impact with the construction and operation of Kemmerer Unit 1. The cumulative impacts described in Section 7.2.1 and shown in Table 7.2-2 will result in the total conversion of 235 acres (95 hectares) of rangeland to industrial use.

The 235 acres (95 hectares) to be disturbed represents a small portion of the 32 million acres (13 million hectares) of shrubland and grassland in the Wyoming Basin. The impacts to land use are anticipated to be SMALL.

10.1.2 Water Resource Impacts

The impacts of construction to site hydrology are discussed in Section 4.2.

Surface water could be temporarily impacted by building activities such as site grading, erosion control, dewatering, and excavation. Building activities will be conducted in accordance with the permits, including the Wyoming Pollution Discharge Elimination System (WYPDES) permit and associated Stormwater Pollution Prevention Plan.

No significant alterations to groundwater resources are anticipated from site development and operation of Kemmerer Unit 1. Discharges will be monitored in accordance with the relevant permits.

Impacts to water resources during operation are discussed in Section 5.2. Surface water use will be similar to the use at Naughton Power Plant. Minimal impacts to wetlands and surface waters are anticipated from plant wastewater discharge to North Fork Little Muddy Creek.

Section 7.2.2 discusses cumulative impacts on the resource area. The wastewater discharge is a cumulative impact with the existing discharge from Naughton Power Plant. The discharge flow will meet WYPDES permit requirements. An analysis on the effect the plant discharge has on North Fork Little Muddy Creek has not been completed, as indicated in Section 5.2. Dewatering at the Test and Fill Facility will temporarily draw down ground water levels but will not be additive to dewatering impacts of Kemmerer Unit 1 construction.

Impacts to water resources as a result of construction and operation of Kemmerer Unit 1 are anticipated to be SMALL.

10.1.3 Ecological Resource Impacts

The anticipated impacts to ecological resources during construction and operation of Kemmerer Unit 1 are discussed in Sections 4.3 and 5.3. Impacts to ecological resources are anticipated to be SMALL.

10.1.3.1 Terrestrial Habitats

The site is primarily big sagebrush shrubland with minor components of other habitats. No listed, rare, or unusual plant species were observed by biologists who surveyed the site and utility macro-corridors.

Portions of the site will be cleared of vegetation and converted to industrial use for the duration of construction and operation. No impacts to plant communities outside the site are expected, with the exception of areas associated with the water supply pipeline and transmission system. Disturbance to vegetation communities from transmission line and pipeline installation will be temporary. Care will be taken to limit the area disturbed for linear utility construction. Disturbed areas will be replanted with native grasses, forbs, and shrubs soon after completion of installation of barriers to prevent erosion and the establishment of invasive species.

The construction and operation of the Test and Fill Facility presents a cumulative impact with the construction and operation of Kemmerer Unit 1. As discussed in Section 7.2.3.1.1, approximately 235 acres (95 hectares) of sagebrush shrubland and greasewood flat vegetation will be eliminated in the development of Kemmerer Unit 1 and the Test and Fill Facility.

10.1.3.2 Wetlands

There are no unique or high-quality wetlands identified in the site vicinity; however, palustrine emergent wetlands were identified outside of, and down-gradient to, the construction footprint along the floodplain of North Fork Little Muddy Creek. A number of other wetlands are crossed by the utility corridors but will not be directly impacted by utility installation. Best management practices will be employed to reduce the potential indirect impacts to wetlands.

10.1.3.3 Wildlife

Impacts to wildlife during construction are discussed in Sections 4.3.1.3 and 4.3.1.4. Construction and site preparation activities could have direct and indirect impacts to wildlife in the vicinity. There is also a potential for avian collisions with equipment and structures. No Federally listed plant or animal species or designated critical habitat has been identified in the site vicinity. There is one Federally protected species, the Ute Ladies' Tresses (an orchid), which may potentially exist, but it has not been identified in surveys of the area. Thirteen special-status species, 12 birds and 1 mammal, were observed on the site and macro-corridors. Four more special-status species were observed outside of the survey area but are assumed to use wetlands bordering the site or within the macro-corridors to feed, forage, and nest. Because resource agencies have concerns regarding raptors and other migratory birds, nest surveys will be conducted in advance of land-clearing and ground-disturbing activities during the avian breeding period so that active nests can be identified and avoided.

Three important big-game species are found in the site vicinity: pronghorn, mule deer, and elk. Agency-recommended mitigation measures, including wildlife-friendly fencing, will be employed to limit construction impacts to these populations.

Site development will affect wildlife abundance and distribution locally but is not expected to have a discernible regional impact.

Potential operation impacts on wildlife are discussed in Section 5.3.1. Industrial noise and lighting can disrupt normal feeding, resting, and breeding activities of wildlife. Occupational Safety and Health Administration noise controls and limits intended to safeguard worker hearing are also protective of wildlife and will limit noise impacts. Bright industrial lighting can disorient birds and other wildlife, but mitigationmeasures recommended by the Wyoming Game and Fish Department, such as shielding high-intensity lights, could limit these impacts. There will be minor disturbance impacts associated with periodic vegetation management in transmission line rights of way. Transmission lines and towers can, under certain circumstances, present a danger to birds from collisions and electric shock. Experience at operating nuclear plants suggests that these impacts will be SMALL.

Cooling tower drift contains salts and other impurities that can harm sensitive vegetation if makeup water contains high levels of dissolved solids. This is more of a concern for plants in coastal areas than inland areas. Based on computer modeling, salt deposition rates from the Kemmerer Unit 1 cooling tower will be below those known to cause harm to sensitive plants and a small fraction of the rate that causes leaf damage in most species. Impacts to vegetation from cooling tower drift are anticipated to be SMALL.

10.1.3.4 Aquatic Impacts

Construction impacts on aquatic communities will be limited to North Fork Little Muddy Creek and its tributaries. Construction will be conducted in accordance with a Stormwater Pollution Prevention Plan, which will identify best management practices to limit pollution in stormwater runoff, and will include sediment and erosion control measures. All site preparation, construction, and operation will be conducted in accordance with applicable Federal, State, and local regulations. Activities during construction and operation will be conducted within the constraints of the necessary permits and authorization, including stormwater management and erosion controls.

North Fork Little Muddy Creek supports a relatively diverse fish community, including one Species of Greatest Conservation Need, the roundtail chub. Adherence to Wyoming’s Surface Water Quality standards will minimize impacts to these fish populations.

The water supply pipeline will cross as many as six small streams. Horizontal directional drilling, rather than open-cut methods, will be employed to avoid direct impacts to wetlands and streams. Transmission towers will be erected on either side of wetlands and streams so that these sensitive areas are spanned, and impacts are avoided.

A substantial volume of soil will be displaced in the clearing and grading of pipeline rights of way and during trenching operation. Special attention will be paid to the placement and management of soil stockpiles. Soil stockpiles will be placed in locations that do not interfere with natural drainage patterns.

Kemmerer Unit 1 will share the existing Naughton Power Plant Cooling Water Intake Structure. The cooling water intake structure was previously assessed by the Wyoming Department of Environmental Quality (WYDEQ) and found to be the best available technology for reducing impacts to aquatic life in the area.

The Naughton Power Plant shutdown is a cumulative impact, as discussed in Section 7.2.3.2. Flows in the section of North Fork Little Muddy Creek above the Kemmerer Unit 1 discharge will be reduced. There will be a short-term adverse impact to aquatic biota, but it is anticipated to present minimal long-term impact on the downstream aquatic communities of North Fork Little Muddy Creek and Little Muddy Creek.

Discharges to North Fork Little Muddy Creek will comply with Wyoming water quality standards and are expected to have only minor long-term impacts on the downstream aquatic communities.Therefore, aquatic impacts are anticipated to be SMALL.

10.1.4 Socioeconomic

Socioeconomic impacts during construction and operation of Kemmerer Unit 1 are discussed in Sections 4.4 and 5.4.

The construction analysis is based on a three-county economic region: Lincoln, Uinta, and Sweetwater. At the peak month, approximately 1,700 construction and operation workers will be on the Kemmerer Unit 1 Site. Including in-migrating direct and indirect workers and their family members, an increase of approximately 3,900 people is anticipated for the economic region.

The operation analysis is based on a two-county economic region: Lincoln and Uinta. There will be a direct workforce of approximately 250 workers during operation. Including in-migrating direct workers and their family members, an increase of approximately 700 people is anticipated for the economic region.

The economic and social impacts resulting from Kemmerer Unit 1 construction and operation will range from SMALL to LARGE.

Construction and operation of Kemmerer Unit 1 will increase employment and stimulate local and regional economies through increases in wages and taxes. Most economic impacts will be SMALL to LARGE and beneficial. SMALL to MODERATE adverse impacts to local and regional economies will occur when the construction workforce will migrate back out of the economic region.

There will be increased traffic along US 189 resulting from construction traffic for Kemmerer Unit 1. Improvements to US 189 will be installed following the Wyoming Department of Transportation approved design. Therefore, traffic impacts to US 189 will be MODERATE during peak commuting hours and SMALL otherwise.

Construction activities will not be visible to recreational activities in the area. Distance and topography will attenuate noise. Potentially, construction noises and vibrations will adversely impact hunting on nearby properties by startling the prey, driving them to a new location, and thus altering the use of the land. The impact to land use are anticipated to be SMALL.

The existing inventory of vacant housing in the economic region is not sufficient for the in-migrating construction workforce, but demand could be met by the addition of new housing in Lincoln County and inclusion of housing resources in the Green River and Rock Springs area of Sweetwater County. Including the additional housing resources, SMALL to LARGE impacts are anticipated in Lincoln and Uinta Counties, and SMALL to MODERATE impacts are anticipated in Sweetwater County.

The current capacity of most existing public services will be burdened by the in-migrating workforces, but most impacts will be mitigated to SMALL by WYDEQ impact assistance payments. Only wastewater treatment in Lincoln County, during construction, will experience a SMALL to MODERATE impact and the impact will go unmitigated. The projected maximum student enrollment associated with the population increase during the construction peak represents 12.2 percent of the economic region’s excess seating capacity and a 6 percent increase in the economic region’s enrollment compared to 2022. It is anticipated education impacts will be mitigated by the State’s education equalization programs to SMALL.

Much of the additional housing that will be constructed, along with the medical, education, law enforcement, and fire protection personnel and equipment needed to support the in-migrating construction workforce will be used for the operation workforce and other future population growth in the economic region. In a boom-bust event, some housing and public service facilities and equipment could go unused, creating SMALL to LARGE adverse impacts.

10.1.5 Environmental Justice

Environmental Justice impacts from construction and operation are discussed in Sections 4.5 and 5.5. An assessment was made of the Kemmerer Unit 1 Site and its surrounding region to identify areas with concentrations of minority or low-income populations. The region includes the 50-mile (80-kilometer) radius and the Sweetwater County communities beyond the 50-mile (80-kilometer) radius that will be impacted by the project. Six block groups in Sweetwater County, Wyoming, and one block group in Summit County, Utah, have significant minority and low-income populations as described in Section 2.5. There are no known minority or low-income populations with special conditions, unique characteristics, or subsistence-living practices in the demographic and economic regions.

The nearest significant minority or low-income populations are approximately 27 miles (43 kilometers) from the Kemmerer Unit 1 Site in Sweetwater County and in and around the towns of Green River and Rock Springs. This distance is assessed to be great enough that there will be no disproportionately high or adverse impacts to these populations from activities occurring during construction and operation.

There are six block groups in Sweetwater County, Wyoming, and one block group in Summit County, Utah, with significant minority and low-income populations. The block group in Summit County falls outside of the economic region, and socioeconomic impacts caused by construction are not anticipated.

There were no impacts from construction or operation identified that will have disproportionately high and adverse effects on the socioeconomics of the minority or low-income populations in the six Sweetwater County block groups. Section 7.2.5 identifies that the cumulative impact of projects in the area may create housing shortages which are anticipated to represent a disproportionately high adverse effect to low-income populations.

10.1.6 Historic and Cultural Resources

Impacts on historic and cultural resources during construction and operation are discussed in Sections 4.6 and 5.6.

A Class III Cultural Resource Inventory Report was produced and identifies a cultural resource which is recommended eligible for inclusion in the National Register of Historic Places and will be affected by the construction of Kemmerer Unit 1. It is anticipated that all interested parties will accept the recommendations of this report. Field investigations and outreach to Indian tribes have not identified any additional historic or cultural resources.

The development of the site has the potential for adverse impact to two cultural resources. The water pipeline and transmission lines have the potential to impact three resources. A Memorandum of Agreement or other agreement will be developed to mitigate those impacts that cannot be avoided. The Unanticipated Discoveries Plan will provide a protocol to be followed if unanticipated cultural resources are encountered during preconstruction, construction, operation, or decommissioning activities, including but not limited to, human remains or funerary objects.

The impact to historic and cultural resources is anticipated to be SMALL.

10.1.7 Air Resources

Impacts to air quality during construction and operation of Kemmerer Unit 1 are discussed in Sections 4.7 and 5.7.

Construction of Kemmerer Unit 1 will result in emissions of pollutants of primary concern including particulate matter of 10 micrometers or less in diameter from: fugitive dust, carbon monoxide from commuter vehicles, and nitrous oxides from diesel combustion in construction equipment. Such emissions will be minimized by mitigation and compliance with Federal, State, and local regulations. The primary greenhouse gas of concern is carbon dioxide. The lifecycle emissions of Kemmerer Unit 1 will be lower than other means of generating a comparable amount of electrical power.

During operation of Kemmerer Unit 1, there will periodically be a visible plume from the cooling tower. The cooling tower plume will also cause ground-level fogging, salt deposition, cloud formation, cloud shadowing, and icing. These effects are anticipated to be SMALL.

The impact to air resources is anticipated to be SMALL.

10.1.8 Nonradiological Health

The impacts to nonradiological health during construction and operation are discussed in Sections 4.8 and 5.8.

10.1.8.1 Public and Occupational Health

During construction and operation of Kemmerer Unit 1, impacts are anticipated to involve risks to workers from accidents and occupational illness. Workers and onsite personnel will receive training and personal protective equipment to minimize the risk of potentially harmful exposures. Work will be conducted using industry best practices and will be in compliance with applicable Occupational Safety and Health Administration standards.

During operation, an industrial safety program will continue to mitigate occupational health risks.

Based on statistical analysis, the construction and operation of Kemmerer Unit 1 is not anticipated to result in more potential occupational injuries and fatalities than other similarly sized power plants or other heavy construction projects.

10.1.8.2 Noise

Noise will be generated by project construction activities. Noise levels will be managed in accordance with construction best practices and Occupational Safety and Health Administration standards. There are no noise-sensitive receptors in the immediate area surrounding the Kemmerer Unit 1 Site and noise will attenuate prior to reaching residents or noise-sensitive receptors. Although noise levels may briefly exceed 65 A-weighted decibels, the day-night average noise level at the Kemmerer Unit 1 Site boundary will be maintained lower than regulatory guidelines.

The cooling tower is the most significant source of noise during operation of Kemmerer Unit 1. Noise levels are anticipated to be less than 65 A-weighted decibels at the site boundary during operation. Noise during operation of Kemmerer Unit 1 is anticipated to attenuate to ambient levels prior to reaching the nearest resident.

The impacts due to noise are anticipated to be SMALL.

10.1.8.3 Transportation of Materials and Personnel

During construction, impacts to transportation are anticipated to result from the increase in traffic due to material shipments and workers commuting to the site. There are also anticipated impacts from changes in the type of traffic experienced. There will be a larger number of heavy-haul and oversized cargo deliveries and heavy traffic during shift changes and peak staffing times. During operation, similar types of impacts will occur and will be altered by the different workforce travel patterns and activities of operation.

10.1.8.4 Etiological Agents and Emerging Contaminants

During the operation of Kemmerer Unit 1, there is a concern for etiological hazards to develop. These are mitigated by water treatment protocols that will be dictated in the WYPDES permit. The impacts are anticipated to be SMALL.

10.1.8.5 Electric Shock and Electromagnetic Fields

There is an increased potential for electric shock from the transmission system at Kemmerer Unit 1 when it is in operation. This is mitigated by design to the National Electric Safety Code provisions. Electromagnetic fields generated by the transmission system are mitigated by the distance from the site to the nearest resident.

Impacts due to electric shock and electromagnetic fields are anticipated to be SMALL.

10.1.9 Radiological Health

Section 4.9 identifies that there are no onsite or adjacent existing operating nuclear facilities or closed facilities. Therefore, there is no expected radiological impact to workers from other nuclear facilities during building activities. Sealed sources will be brought onsite to support activities such as compaction testing and radiography, such sources will be used and maintained by trained and qualified vendors under their own licenses in accordance with procedures.

Section 5.9 discusses radiological impacts during normal operation. Radioactive gases may be released following processing. Liquid releases are limited to the potential for tritium to migrate to the steam generator and be released through cooling tower blowdown. Releases will be maintained within both U.S. Environmental Protection Agency and NRC limits. Occupational radiation exposures to workers and radiation exposures to members of the public are maintained as low as reasonably achievable.

Low level radioactive wastes produced onsite will be sent to an approved disposal facility.

The impact to radiological health are anticipated to be SMALL.

10.1.10 Nonradioactive Waste

Section 4.10 discusses the environmental impacts of nonradiological wastes and their management during construction. Nonradioactive wastes will be associated with site-preparation activities such as clearing and grubbing. There will also be general miscellaneous construction waste including paper, wood, metal, and shipping materials. Where practicable, solid waste will be recycled. Routine vehicle maintenance conducted at the onsite mechanic shop will generate waste which will be transferred to a licensed disposal unit for recycle or disposal. Wastes will be managed in accordance with site permits and best management practices.

Section 5.10 discusses the environmental impacts of nonradiological wastes and their management during operation.

Wastes will be managed in accordance with applicable Federal, State, and local regulations and permits and be disposed of at approved locations or by approved contractors. Nonradioactive solid wastes associated with operation will include industrial wastes, including trash, nonradioactive water treatment resins, and water and sanitary treatment residuals. Hazardous wastes and mixed wastes are expected to be generated in quantities that will allow classification as a Small Quantity Generatior of Hazardous Wastes. Hazardous and mixed wastes will be disposed of by licensed management facilities.

Nonradioactive wastewater will be discharged from routine plant operation. Wastewater and stormwater will be discharged from the wastewater basin to surface water resources. These discharges will comply with both Federal and State water quality standards and will be released in accordance with the WYPDES permit. There will be small amounts of gaseous emissions from equipment associated with plant auxiliary systems. Emissions will be regulated in accordance with the corresponding WYDEQ General Air Permit.

The impacts due to nonradioactive wastes and their management are anticipated to be SMALL.

10.2 Unavoidable Adverse Environmental Effects

This section considers unavoidable adverse impacts from building and operating Kemmerer Unit 1 and the associated transmission lines and water supply pipeline.

The following categories have been assessed for unavoidable adverse impacts:

- Land use
- Water Resources
- Ecology (terrestrial and aquatic)
- Socioeconomics
- Environmental justice
- Historic and cultural resources
- Air resources
- Nonradiological health
- Radiological health
- Nonradiological waste management

10.2.1 Unavoidable Adverse Environmental Effects of Construction

The potential adverse environmental impacts from building Kemmerer Unit 1, including the water pipeline and transmission corridor impacts, are described in Chapter 4. Section 4.11 discusses available mitigation measures. Table 4.11-1 summarizes adverse impacts and identifies the Construction-Related Measures and Controls (CMC) that may be implemented to reduce or eliminate them. Unavoidable adverse environmental impacts of construction are summarized in Table 10.2-1.

10.2.2 Unavoidable Adverse Environmental Effects of Operations

The potential environmental impacts from operation of Kemmerer Unit 1 are described in Chapter 5. Section 5.12 discusses applicable mitigation measures. Table 5.12-1 summarizes the identified impacts and provides Operations-Related Measures and Controls (OMC) that may be implemented to reduce or eliminate them. Unavoidable adverse environmental impacts of operation are summarized in Table 10.2-2.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 1 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Land Use Impacts			
Onsite Impacts	Clearing and grubbing of vegetation will occur.	CMC1, CMC2, CMC3, CMC5, CMC7, CMC11	Approximately 218 acres (88 hectares) of land on the Kemmerer Unit 1 Site will be converted to industrial use.
	Excavating, backfilling, and stockpiling soils will occur	CMC1, CMC2, CMC4, CMC7, CMC11	
	Temporary buildings, support facilities, and impervious surfaces will be constructed.	CMC1, CMC2, CMC5	
Offsite Impacts	Temporary impacts from ground-disturbing activities could occur during installation of the underground pipeline for water supply.	CMC1, CMC2, CMC3, CMC4, CMC7, CMC11, CMC15, CMC16	Additional offsite areas will be occupied by the transmission and water pipeline corridors. Land uses in the corridors (a total 223 acres [90 hectares]) will be limited during construction and to compatible uses such as grazing and hunting.
	Temporary impacts from ground-disturbing activities could occur during installation of transmission lines.	CMC1, CMC2, CMC3, CMC4, CMC11, CMC15, CMC16	
Water Resources			
	Temporary impacts from ground disturbing activities require erosion and sediment controls. Erosion and sediment control could capture and divert normal stormwater flows that will ordinarily contribute to base flow into water resources.	CMC3, CMC5, CMC12	Local and temporary increase in sediments in water from increased erosion and construction stormwater runoff and discharges from dewatering of excavations. There are no impacts from groundwater usage. Impacts to water resources are anticipated to be SMALL.
	Building the entrance road could result in alteration to waterbodies and impact flood level upstream.	CMC18	Each road crossing will result in less than 0.5 acres (0.2 hectares) of stream disturbance. Minimal increase in the flood level upstream of the stream crossings.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 2 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Ecological Impacts			
Terrestrial and Wetland Impacts			
Site Offsite	Clearing of 218 acres (88 hectares) of sagebrush shrubland and greasewood habitat will occur.	CMC1, CMC2	Loss of habitat until facility is decommissioned.
	Construction of underground pipeline and transmission lines will disturb soils and native plants. Invasive plants could colonize bare ground after construction has removed native vegetation.	CMC2, CMC10, CMC11, CMC15, CMC16	Disturbance of 223 acres (90 hectares) of offsite habitat within the pipeline and transmission corridors.
Wetlands - Onsite	Construction could impact downgradient streams and wetlands.	CM3, CMC4, CMC5	Some disturbance of wetlands for road construction and indirect effects to wetlands from construction activity.
Wetlands - Offsite	Wetlands and streams could be impacted by pipeline construction.	CMC1, CMC2, CMC3, CMC4, CMC11, CMC13, CMC15, CMC16	Direct impacts to wetlands and streams along the utility corridors will be avoided via horizontal dirrectional drilling for the water supply pipeline and spanning overhead transmission lines. During construction, wetlands and waterways could be indirectly impacted by runoff and sedimentation, but these impacts would be temporary and mitigated to the extent practicable by environmental best management practices.
	Wetlands and streams could be impacted by transmission line construction.	CMC1, CMC2, CMC3, CMC11, CMC14, CMC15, CMC16	

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 3 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Wildlife - Onsite	Less mobile animals could be harmed by heavy equipment.	None	Temporary displacement of wildlife and minor loss of habitat are expected.
	Construction noise will disturb wildlife.	CMC9	Temporary displacement of wildlife is expected. Noise attenuates over a relatively short distance and will typically drop below noise levels known to startle wildfowl and small mammals.
	Birds could be harmed by collisions with construction equipment (cranes).	CMC20	Minor losses of birds due to collisions with structures may occur.
	Birds could be harmed by collisions with fences; large mammals could be harmed by entanglement with fences	CMC8	
	Bright construction lighting can disorient wildlife.	CMC24	Direction and intensity of lighting during facility construction can alter the behavior of birds and mammals. Measures would be taken to limit lighting impacts during peak migration periods.
	Fugitive dust can create direct or indirect impacts.	CMC12	Dust control measures would prevent high levels of dust that can coat plant leaves. Impacts on wildlife can be direct (affecting respiration or vision) or indirect (rendering foraging, feeding, nesting, denning areas unusable).
Wildlife - Offsite	Noise and activity could displace wildlife.	CMC9	Temporary displacement of wildlife is expected. Noise attenuates over a relatively short distance and will typically drop below noise levels known to startle wildfowl and small mammals.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 4 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Important Species	Construction (erosion and sedimentation) could impact Ute Ladies' Tresses, if present.	CMC1, CM3, CMC5, CMC25	With mitigation, no adverse impacts are anticipated.
Migratory Birds	Construction could disturb nests of bald eagles, golden eagles, hawks, or burrowing owls.	CMC1, CMC9, CMC17	With mitigation, impacts will be experienced at the level of the individual or small groups of individuals. The likelihood that such losses on the site would influence population levels in the general area is negligible.
	Construction could disturb nests of birds protected under the Migratory Bird Treaty Act.	CMC1, CMC9, CMC17	
	Construction will eliminate sagebrush habitat on which migratory birds or greater sage-grouse are dependent.	None	Impact represents a small change to the overall availability of the resource.
Big Game	Noise and activity of site construction could stress pronghorn, elk, and mule deer and disrupt normal behavior patterns.	CMC1, CMC9	Large mammals are highly mobile and will generally avoid the noise, movement, and smells of active construction sites. There would be some physiological stress and minor energetic expenses associated with avoiding construction zones and locating alternative habitats in the vicinity.
	The potential exists for animal-vehicle collisions.	CMC8	Vehicle speeds will be limited on unsurfaced access roads period to reduce potential for collisions.
	The potential exists for entanglement with fences	CMC8	Wildlife-friendly fencing will be used to reduce likelihood of entanglement with fence.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 5 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Aquatic Ecology			
Kemmerer Unit 1 Site Construction	Building discharge structure will result in erosion and sedimentation impacting aquatic biota.	CMC1, CMC2, CMC3, CMC5, CMC11	Minor and localized impacts to aquatic biota are anticipated.
	Clearing and grading for the South Construction Laydown Area could result in erosion and sedimentation and potentially impact aquatic biota.	CMC1, CMC2, CMC3, CMC5, CMC11, CMC19, CMC23, CMC25.	
	Establishing a spoils stockpile in the South Construction Laydown Area could result in spoil material being washed into North Fork Little Muddy Creek with stormwater and impact aquatic biota.	CMC1, CMC2, CMC3, CMC4, CMC5, CMC7, CMC11, CMC19, CMC23, CMC25	
	Building the entrance road and culvert could result in erosion and sedimentation and impact aquatic biota.	CMC1, CMC2, CMC3, CMC5, CMC11, CMC23, CMC25	
	Accidental spills of fuels, lubricants, or hydraulic fluid could adversely impact surface waters and aquatic biota.	CMC6	
Offsite Construction	Pipeline construction could impact small, downgradient streams and their aquatic biota.	CMC1, CMC2, CMC3, CMC4, CMC5, CMC7, CMC11, CMC13, CMC15, CMC16, CMC23, CMC25	Minor and localized impacts to aquatic biota are anticipated.
	Transmission line construction could impact small, downgradient streams and their aquatic biota.	CMC1, CMC2, CMC3, CMC4, CMC5, CMC7, CMC11, CMC14, CMC15, CMC16, CMC23, CMC25	

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 6 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Socioeconomic Impacts			
Physical Impacts	Workers and transient populations could be exposed to temporary elevated noise levels from building activities.	CMC9, CMC26, CMC28	Increased levels of traffic throughout the construction phase. Increased levels of temporary and localized noise, exhaust emissions, and fugitive dust associated with building activities. Adverse physical impacts would be minor.
	Construction-related noise exposures to the public could occur.	CMC9	
	Potential exposure of construction workers to fugitive dust and exhaust emissions could occur.	CMC12, CMC28	
	Delivery of large components could require road closures and utility disconnections.	CMC31	
	US 189 could experience premature deterioration from increased traffic and require more maintenance from WYDOT than will be required otherwise.	None	
Demographic Impacts	A moderate, temporary increase in population in the three-county economic region due to in-migration of construction and indirect workers and families.	CMC29	The increase in population is assessed as social and economic impacts

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 7 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Social and Economic Impacts	A moderate, temporary increase in population in the three-county economic region due to in-migration of construction and indirect workers and families.	CMC29	Moderate to large impacts due to to population increase within the economic region. Increased demand for housing, public infrastructure and services, and education resources on a short-term basis from the influx of construction workers, family members, workers filling indirect jobs.
	As construction is completed, a loss of construction jobs, population, wage income, and indirect jobs and income is expected due to the out-migrating of the construction workforce as construction is completed.	CMC29	The loss of construction jobs, population, and wage income will result in a SMALL to MODERATE adverse impact to the economic region.
	Loss of sales tax collections is expected due to the out-migrating of the construction workforce as construction is completed.	CMC29	The loss of population will have SMALL adverse impacts on sales and use tax collections, depending on the residential distribution and spending habits of the departing workers. Also, sales and use tax collections on construction-related materials and services will come to an end, yielding SMALL to MODERATE adverse impacts on local and State sales and use tax revenues.
	A decline in the residential property tax base is expected due to the departure of worker families from the economic region as construction is completed.	CMC29	A decline in the residential property tax base is expected.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 8 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Social and Economic Impacts (continued)	Increased traffic is expected as a result of construction on the roads in the vicinity.	CMC29, CMC30	Increase in traffic on US 189 during peak commuting hours.
	Potentially, construction noises and vibrations will adversely impact hunting on nearby properties by startling the prey, driving them to a new location, and thus altering the use of the land.	CMC9	No adverse impacts are anticipated.
	Greater use of recreational facilities within a 10-mile (16-kilometer) radius could occur.	CMC29	In-migrating workers and family members could increase the use of recreation areas. Construction workforce use of accommodations will restrict use by recreators and tourists.
	A potential shortage in housing could occur due to the in-migrating population leading to rising prices and rental rates due to the project-related housing demand.	CMC29	Rental rates for housing units of all types, new and existing, housing prices, and short-term and long-term hotel and motel leasing rates could rise because of increased demand.
	Additional demand due to migrating workers and family members will slightly reduce the excess capacity in public water supply of the two water planning regions in the Region of Interest.	CMC29	No adverse impacts are anticipated.Water use by the in-migrants would represent less than 3 percent of available capacity in the economic region.
	Additional wastewater requiring treatment will reduce excess treatment capacity across the economic region by a small amount.	CMC29	Wastewater treatment requirements for in-migrants will consume a small amount of the available capacity.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 9 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Social and Economic Impacts (continued)	An increase in the residents-per-police office and residents-per-firefighter ratios could occur in the economic region.	CMC29	Most, if not all, impacts will be mitigated by the impact assistance payments, therefore no adverse impact to the affected communities is anticipated.
	An increased student enrollment could occur in school districts in the economic region that is within the cumulative capacity of the region’s schools.	CMC29	Any impacts will be mitigated by Wyoming’s education equalization programs.
	Increased demand for medical services, although not beyond capacity, could occur.	CMC29	Most, if not all, impacts will be mitigated by the impact assistance payments, therefore no adverse impact to the affected communities is anticipated.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 10 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Economic Impacts to the Community	As construction is completed, a loss of construction jobs, population, wage income, and indirect jobs and income is expected due to the out-migrating of the construction workforce.	CMC29	The loss of construction jobs, population, and wage income will be a SMALL to MODERATE adverse impact to the economic region.
	Loss of sales tax collections is expected due to the out-migrating construction workforce as construction is completed.	CMC29	The loss of population will have SMALL adverse impacts on sales and use tax collections, depending on the residential distribution and spending habits of the departing workers. Also, sales and use tax collections on construction-related materials and services will come to an end, yielding SMALL to MODERATE adverse impacts on local and State sales and use tax revenues
	A decline in the residential property tax base is expected due to the departure of worker families from the economic region as construction is completed.	CMC29	A decline in the residential property tax base is expected.
Community Infrastructure Impacts	Traffic congestion along US 189 could occur during peak commuting hours.	CMC30	Traffic near the site during construction could be substantially restricted during peak commuting hours. Effects will be mitigated by improvements to US 189. Impacts are assessed to be MODERATE.
Environmental Justice			
	None	N/A	No disproportionately high and adverse impacts are expected to low-income and minority populations. in the economic region.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 11 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Historic and Cultural Resources			
	Clearing, grubbing, and grading will result in disturbance to, or destruction of, identified archaeological sites and isolated resources.	CMC1, CMC21	Small impacts are expected on National Register-eligible resources in the direct area of potential effects.
	Ground disturbance could result in the disturbance of archaeological sites or isolated resources.	CMC1, CMC22	
	Unavoidable adverse effects to the historic property are expected.	CMC1, CMC21, CMC22	
	Concrete batch plant, construction cranes, and other construction equipment and structures will be visually intrusive within the Cumberland Flats.	None	No adverse indirect effects are anticipated.
Air Resources			
	Fugitive dust from construction activities will temporarily impact air quality.	CMC12	Air pollutant emissions from traffic, construction equipment, and fugitive dust will occur. State and Federal regulations will be met. With mitigation, the impact to air resources is assessed to be SMALL.
	Fugitive dust from construction activities will temporarily impact air quality.	None	

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 12 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Nonradiological Health			
	Temporary exposure to noise, odors, exhaust emissions, fugitive dust, and fine particulate matter emissions could occur for construction workers, people living or working adjacent to the construction area, and transient persons.	CMC9, CMC12, CMC26, CMC28	With mitigation, impact to public and occupational health is assessed to be SMALL. No significant public exposure to fugitive dust or emissions. Noises, with attenuation, will be below levels in Federal guidance. Worker exposure to noise will be within OSHA standards. The construction of Kemmerer Unit 1 is not anticipated to result in more potential occupational injuries and fatalities, based on statistical analysis, than other similarly sized power plant or other heavy construction projects.
	Potential for occupational injuries and illnesses exists.	CMC26, CMC27, CMC28	
	Construction workers will be exposed to construction-related noise.	CMC9, CMC26, CMC28	
	Construction workers could be exposed to fugitive dust.	CMC12	
	Delivery of construction materials to the site and workers commuting to the site will pose the risk of vehicle accidents involving injuries and fatalities.	CMC30	
Radiological Health			
	None	N/A	No dose to construction workers from direct radiation exposure, gaseous effluents and liquid effluents. No unavoidable adverse impacts are expected. Impacts on workers from radiation sources during construction will not require mitigation.

Table 10.2-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 13 of 13)

Resource Area	Adverse Impacts	Mitigation Measures	Unavoidable Adverse Impact
Nonradiological Waste Management			
Earthworks and Other Wastes	Erosion risk from clearing and grubbing of vegetation will exist.	CMC3, CMC4, CMC5	With mitigation, quantities of wastes will be minimized to the extent practical and disposed of in accordance with the applicable Federal, State, and local regulations.
General Waste Storage	Impacts to local municipal solid waste landfills and facilities from municipal waste storage and recycling will occur.	CMC32	
Metal Waste	Metal waste will be produced and storage and recycling will occur.	CMC33, CMC34	
Equipment Waste	Equipment waste will be generated and there will be a risk of spillage.	CMC6, CMC35	
Groundwater and Stormwater	Runoff risks associated with stormwater and snow melt removal will exist.	CMC5	
Sanitary Waste	Risk of environmental contamination associated with sanitary waste disposal will exist.	CMC36	
	Risk to water resources including sanitary waste, waste water, and dewatering will exist.	CMC37, CMC38	
Air Quality Impacts	Emissions impacts on local air quality	CMC39	

Table 10.2-2 Unavoidable Adverse Impacts of Operation (Sheet 1 of 8)

Resource Area	Impact	Mitigation Measures	Unavoidable Adverse Impact
Land Use			
Onsite	Approximately 218 acres (88 hectares) of land will be dedicated to plant use until the completion of decommissioning.	None	Continued commitment of onsite land over the operational life of Kemmerer Unit1. Land uses in the corridors will be limited to compatible uses.
Offsite	Operation in offsite corridors will be compatible with grazing, hunting, and existing industrial uses. Vegetation and land use beneath the high-voltage lines will be maintained and monitored for compatibility with reliable transmission of electricity.	OMC4, OMC15	Land uses in the corridors will be limited to compatible uses.
Water Resource Impacts			
Hydrologic Alterations			
Plant Water Supply	Water withdrawal from Hams Fork River via the Naughton Power Plant Cooling Water Intake Structure will occur in order to replace water lost to evaporation, drift, seepage, and blowdown.	OMC1	Hydrological alterations from building activities, such as clearing and grubbing, dewatering, grading, excavation, and stockpiling soils, will be temporary.
Discharge System	Water discharged from the plant adds additional water into North Fork Little Muddy Creek and its adjacent wetlands and 100-year floodplains.	OMC2	

Table 10.2-2 Unavoidable Adverse Impacts of Operation (Sheet 2 of 8)

Resource Area	Impact	Mitigation Measures	Unavoidable Adverse Impact
Water Use Impacts			
Plant Water Supply	Water withdrawal from Hams Fork River via the Naughton Power Plant Cooling Water Intake Structure will occur in order to replace water lost to evaporation, drift, seepage, and blowdown.	OMC1	After mitigation, impact to the resource area is SMALL. Minor consumptive use within Green River Basin will occur. No groundwater usage.
Discharge System (Cooling System)	Blowdown from the cooling tower will result in thermal, chemical, and physical impacts to North Fork Little Muddy Creek and its aquatic life.	OMC2	
Heat-Discharge System (Cooling System)	Potential chemical spill of Heat Rejection System chemical injection system.	OCM10	
Ecological Resources			
Terrestrial Resources	Transmission system operation could impact vegetation and wildlife habitat, which includes corridor maintenance and transmission line use, relative to terrestrial ecosystems.	OMC4, OMC11, OMC15, CMC16	Transmission lines and maintenance activities in the utility corridors could affect wildlife and habitat. Minor losses of birds due to collisions with structures may occur. Operation noise impacts to wildlife will be negligible.
	Avian mortality could occur as a result of collision with transmission lines.	OMC5	
	Wildlife could be impacted by noise from the mechanical draft cooling tower.	No practical measures of mitigation.	

Table 10.2-2 Unavoidable Adverse Impacts of Operation
(Sheet 3 of 8)

Resource Area	Impact	Mitigation Measures	Unavoidable Adverse Impact
Aquatic Resources	Discharges from the wastewater basin could create water quality impacts to North Fork Little Muddy Creek.	OMC2	Minor and localized impacts to aquatic biota are anticipated from plant operation. Minor, infrequent and short-term exposure of aquatic biota to decreases in water quality may occur during maintenance activities.
	Spills of chemicals or petroleum products could create water quality impacts to surface water and groundwater.	OM3, OMC9, OMC18	
	Maintenance of transmission lines that lie at or near water bodies and wetlands could create water quality impacts and subsequent impacts to aquatic populations.	OM4, OMC11, OMC16	
Socioeconomics			
Physical Impacts	Visual impacts to landscape from buildings and structures, cooling tower plumes, nighttime lighting, and offsite transmission lines will occur.	OMC6	Minor impacts to viewscape may occur.
Demographic Impacts	A small operation-related population increase of the economic region could occur.	OMC13	The increase in population is assessed as community infrastructure impacts.
Community Infrastructure Impacts	Use of recreation facilities and events by project employees and family members could exceed capacity	None	In-migrating workers and family members could increase the use of recreation areas. Increased workforce use of accommodations will restrict use by recreators and tourists.
	An impact to the housing market could occur and affect prices and rents.	OMC13	Rental rates for housing units of all types and new and existing housing prices could rise because of increased demand.

Table 10.2-2 Unavoidable Adverse Impacts of Operation (Sheet 4 of 8)

Resource Area	Impact	Mitigation Measures	Unavoidable Adverse Impact
Community Infrastructure Impacts (continued)	Additional water demand due to operation-related population will reduce the excess capacity of the public water systems in the economic region.	OMC13	Water use by the operation-related population would represent a small change in the of available capacity in the economic region.
	Impacts to local wastewater treatment systems could occur as the population will increase due to the in-migration of the operation-related workers and their families.	OMC13	Wastewater use by operation-related population will consume a small amount of the available capacity.
	An impact to police and fire department services in the economic region could occur due to small increases in the ratio of persons-to-police and firefighters over preconstruction levels.	OMC13	Most, if not all, impacts will be mitigated by the impact assistance payments. No adverse impact to the affected communities is anticipated.
	Medical services in Lincoln County could be impacted due to medical service needs of operation-related population but within hospital capacity.	None	Most, if not all, impacts will be mitigated by the impact assistance payments, therefore no adverse impact to the affected communities is anticipated.
	Schools will be impacted due to operation workforce increasing the student population.	OMC13	Any impacts will be mitigated by Wyoming’s education equalization programs and are assessed to be SMALL.
	Commuting operation and outage workforces and truck deliveries will increase traffic on local roads.	OMC19	With mitigation, impact are assessed to be SMALL to MODERATE.
	Potentially, noises and vibrations and nighttime lighting could adversely impact hunting and other recreation activities on nearby properties.	None	No impacts requiring mitigation.

Table 10.2-2 Unavoidable Adverse Impacts of Operation
(Sheet 5 of 8)

Resource Area	Impact	Mitigation Measures	Unavoidable Adverse Impact
Environmental Justice			
	None	N/A	No disproportionately high and adverse impacts to low-income and minority populations are anticipated.
Historic and Cultural Resources			
	Ground disturbances could occur during operation.	OMC6, OMC 14	After mitigation, impact to the historic and cultural resources is SMALL.
	Visual impacts to offsite historic resources could occur from the ability to see the structures and cooling tower plumes of Kemmerer Unit 1	OMC16	No adverse effects are anticipated.
Air Quality			
	Standby diesel generator emissions will impact local air quality.	OMC20	Minimal or no unavoidable adverse impacts.

Table 10.2-2 Unavoidable Adverse Impacts of Operation
(Sheet 6 of 8)

Resource Area	Impact	Mitigation Measures	Unavoidable Adverse Impact
Nonradiological Health Impacts			
Etiological Agents and Emerging Contaminants	Health impacts to members of the public and workers could result from contact with human disease-causing microorganisms in the cooling basin and at North Fork Little Muddy Creek from the blowdown and operation of the cooling tower.	OMC2, OMC8	With mitigation, no significant public exposure to fugitive dust, etiological agents, electric shock, or emissions. Noise will attenuate to ambient before reaching nearest critical receptor. The operation of Kemmerer Unit1 is not anticipated to result in more potential occupational injuries and fatalities, based on statistical analysis, than other similarly sized power plants.
Electric Shock and Transmission Lines	Impacts to members of the public resulting from the operation and maintenance of the transmission system may occur as an electric shock hazard.	OMC21	
Occupational Health	Impact to worker health could occur due to occupational injuries and illnesses.	OCM7, OCM8	
Transportation	Delivery of materials to the site and workers commuting to the site will pose the risk of vehicle accidents involving injuries and fatalities.	OMC19	

Table 10.2-2 Unavoidable Adverse Impacts of Operation (Sheet 7 of 8)

Resource Area	Impact	Mitigation Measures	Unavoidable Adverse Impact
Radiological Impacts of Normal Operation			
	Release of radionuclides in gaseous effluents and exposure of humans to direct radiation.	OMC12, OMC22	Radioactive releases comply with regulatory limits. Releases and exposures are limited to the extent reasonably achievable. Generation of radioactive waste is minimized, and wastes are manged in accordance with regulatory criteria. With mitigation, impacts are minimized.
	Health impacts to members of the public could occur from exposure to radiological releases. Modeling using the design and operational parameters of Kemmerer Unit1 results in estimated doses to the public that are within the design objectives of 10 CFR 50 Appendix I and within the regulatory limits of 40 CFR 190.	OMC22, OMC23	
Impacts to Biota Other than Members of the Public	Potential impacts will occur to terrestrial and aquatic ecosystems from chronic radiation exposure of less than 100 mrad/day caused by the small discharges of radioactive liquids and gases from the operation of Kemmerer Unit 1.	OMC22	
Occupational Radiation Doses	Health impacts to workers could occur from radiation exposure of the annual maximum collective dose.	OMC22	
Solid Waste Management and Onsite Spent Fuel Storage	Generation of low-level radioactive wastes that will require disposal in a licensed radioactive waste disposal facility.	OMC17	

Table 10.2-2 Unavoidable Adverse Impacts of Operation
(Sheet 8 of 8)

Resource Area	Impact	Mitigation Measures	Unavoidable Adverse Impact
Nonradioactive Waste Impacts			
	Generation of small amounts of mixed waste.	OMC10	With mitigation, quantities of wastes will be minimized to the extent practical and disposed of in accordance with the applicable Federal, State, and local regulations.
	Nonradioactive wastes that will require disposal in permitted landfills.	OMC17	
	Impacts to the water quality of North Fork Little Muddy Creek could occur due to discharges from the wastewater basin.	OMC2	
	Impacts to surface water quality could occur due to an increased volume of storm water resulting from new impervious surfaces.	OMC9, OMC18	
	Impacts to air quality could occur from emissions of auxiliary systems operated on an intermittent basis.	OMC20	

10.3 Relationship between Local Short-Term Use of the Environment and Long-Term Productivity

10.3.1 Construction of Kemmerer Unit 1 and Long-Term Productivity

Section 10.1 and Table 10.2-1 summarize the potential unavoidable adverse environmental impacts during construction of Kemmerer Unit 1 and the measures proposed to reduce those impacts. There are adverse environmental impacts that will remain after all practical measures to avoid or mitigate the impacts have been taken. None of these impacts represent a long-term effect that will preclude any options for future use of the Kemmerer Unit 1 Site.

Kemmerer Unit 1 will be located on an approximately 290-acre (120-hectare) site in Lincoln County, Wyoming. Approximately 218 acres (88 hectares) of the 290 acres (120 hectares), disturbed during the preconstruction and construction periods, will be dedicated to the new power plant and supporting facilities. Activities currently associated with the site are occasional livestock grazing and vehicle traffic over dirt roads. There is an abandoned segment of the former rail line to the Cumberland Mine to the south that crosses the site. Otherwise, it has not been previously disturbed. During construction and operation of Kemmerer Unit 1, the land will not be available for livestock grazing; however, the land represents only a small portion of the open rangeland used for such activities in the region. Decommissioning of Kemmerer Unit 1 is expected to result in release of the area for unrestricted use. In accordance with NRC regulations, the end result of decommissioning will not necessarily achieve a greenfield condition.

Some construction activities will increase the ambient noise levels in the vicinity of the Kemmerer Unit 1 Site. Upon completion of these activities, the ambient noise levels will be reduced to the levels associated with the operation of Kemmerer Unit 1 and will be further reduced after plant decommissioning is completed. The workforce will be protected by adherence to the Occupational Safety and Health Administration requirements for noise levels. Distance will attenuate noise levels experienced at the nearest residences. There will be no effects on the long-term productivity of the site as a result of noise-related impacts.

Construction-related traffic has the potential to cause congestion in the immediate area of the site and potentially cause deterioration to some of the local roads. Potential mitigation measures, including construction of a new US 189 intersection and staggering work shifts, are anticipated to reduce construction-related traffic congestion.

Construction of Kemmerer Unit 1 will be beneficial to the local area through the generation of new construction-related jobs, local spending by the construction workforce, and payment of taxes. Construction activities will cease once construction is complete and the workforce leaves the area. The adverse socioeconomic impacts that occur as a result of increased population in the economic region, are discussed in Section 4.2.2. Benefits from increased tax revenues will continue into the foreseeable future.

The out-migration will occur gradually at the end of the construction phase, and the loss of construction workers will be partially offset by the in-migrating operation workers. The gradual nature of the decline in the construction workforce will help mitigate the impact to communities in the economic region from the destabilizing effects of a sudden decrease in workers and their families.

The construction of Kemmerer Unit 1 will not affect long-term productivity of the environment.

10.3.2 Operation of Kemmerer Unit 1 and Long-Term Productivity

Section 10.1 and Table 10.2-2 summarize the potential unavoidable adverse environmental impacts during operation of Kemmerer Unit 1 and the measures proposed to reduce those impacts. There are adverse environmental impacts that will remain after all practical measures to avoid or mitigate the impacts have been taken. None of these impacts represent a long-term effect that will preclude any options for future use of the Kemmerer Unit 1 Site.

At the end of operational life, Kemmerer Unit 1 will be decommissioned using an approved method, as required by the NRC. The site will be available for future industrial or nonindustrial use. The offsite land that will be used for the water pipeline and transmission lines will also be available for future industrial or nonindustrial use. Other offsite land used for PacifiCorp's raw water conveyance system could continue to be used to support other water needs in the future. The maximum long-term impact to productivity would result if the power station and its support structures are not dismantled at the end of the period of station operation, and consequently, the land occupied by these structures would not be available for other uses.

Operation of Kemmerer Unit 1 will require surface water resources. The water used in plant operation will be supplied via pipeline from Naughton Power Plant. The makeup water will be withdrawn from the Hams Fork River via PacifiCorp's Naughton Power Plant intake structure. The supporting infrastructure at Naughton Power Plant and the structures conveying makeup water from the Hams Fork River to Naughton Power Plant could remain after Kemmerer Unit 1 ceases operation. Short-term impacts to water resources as a result of the operation of Kemmerer Unit 1 will be SMALL. Upon decommissioning of the site, use of local water resources for the purposes of supporting Kemmerer Unit 1 will cease. Therefore, the use of water resources supporting operation of Kemmerer Unit 1 will not impact the long-term productivity of the site.

Operation of Kemmerer Unit 1 will consume nonrenewable resources, as described in Section 10.4.2. Consumption of these materials will cease upon decommissioning and does not affect the future productivity of the Kemmerer Unit 1 Site.

The operation of fossil fuel-fired combustion equipment, such as diesel generators, will result in infrequent air emissions during the operation of Kemmerer Unit 1. As discussed in Section 5.7.1.1, the operation of the mechanical draft cooling tower will produce impacts such as salt deposition and shadowing. Once Kemmerer Unit 1 ceases to operate and is decommissioned, impacts to air will cease. No future issues for the long-term uses of the site will result from the impacts of increased air emissions.

Chemical effluents will be released to North Fork Little Muddy Creek in compliance with a WYPDES industrial wastewater discharge permit. As described in Section 5.2.3, the water quality in North Fork Little Muddy Creek will be maintained with the added discharge from Kemmerer Unit 1. After decommissioning, releases to surface waters will cease.

The operation of Kemmerer Unit 1 will be in accordance with NRC regulations, which restrict liquid and gaseous effluent releases. After Kemmerer Unit 1 ceases to operate and is decommissioned, releases will cease. Activities associated with decommissioning will reduce contamination to levels that meet NRC release criteria. No issues associated with the radiological emissions from operation of Kemmerer Unit 1 will affect the long-term uses of the site.

Socioeconomic changes brought about by the operation of Kemmerer Unit 1, such as additional local infrastructure, will persist after decommissioning. Property taxes paid to Lincoln County will provide significant revenues that will benefit the county for the foreseeable future and could support infrastructure and social service improvements. The population of the economic region described in Section 5.4.2 could increase during the life of the Kemmerer Unit 1 and will use the services provided as a result of related tax revenues. Taxes paid to Lincoln County will have a long-term positive effect on the productivity of the county.

The operation of Kemmerer Unit 1 will not affect long-term productivity of the environment.

10.3.3 Summary of Relationship Between Short-Term Uses and Long-Term Productivity

The negative impacts of local use of the human environment by the construction, operation, and decommissioning of Kemmerer Unit 1 are summarized in Section 10.2 in terms of the unavoidable adverse environmental impacts of construction and operation. The irreversible and irretrievable commitments of environmental resources associated with Kemmerer Unit 1 are summarized in Section 10.4. Except for the consumption of nonrenewable resources during the construction and operation of Kemmerer Unit 1, and the land committed for waste burial, these impacts may be classified as short-term. Impacts resulting from land-use preemption by station structures can be eliminated by removing these structures or by converting them to other productive uses.

The principal short-term benefit resulting from the construction and operation of Kemmerer Unit 1 is production of electricity and associated enhancement in regional economic productivity. The regional productivity resulting from the additional electricity produced by Kemmerer Unit 1 will be expected to result in a corresponding increase in regional long-term productivity that will not be equaled by any other long-term use of the site.

The impacts of Kemmerer Unit 1 construction and operation, as they affect the environment, are outweighed by the positive long-term enhancement of regional productivity through generation of electricity.

10.4 Irreversible and Irretrievable Commitments of Resources

The predicted irreversible and irretrievable commitment of resources that will be involved with the construction and operation of Kemmerer Unit 1 are described in this section. The term “irreversible commitment of resources” applies to environmental resources that could not be altered at some later time by practical means to restore the resource’s present state before construction of the station. The “irretrievable commitment of resources” applies to material resources that, when used by construction or operation of Kemmerer Unit 1, cannot by practical means be recycled or restored for other uses.

10.4.1 Irreversible Commitments of Environmental Resources

In the construction and operation of any electric generating station, few environmental resources are irreversibly committed to the facility beyond its operational life. The irreversible commitments of resources resulting from the construction and operation of Kemmerer Unit 1 are in the areas of land use, water resources, terrestrial and aquatic ecological resources, socioeconomics, historic and cultural resources, radiological releases, atmospheric releases, and meteorological changes.

10.4.1.1 Land Use Commitments

Kemmerer Unit 1 will be located on the approximately 290 acre (120 hectare) site in Lincoln County, Wyoming (Figure 2.1-1). The land is currently classified as shrub/scrub rangeland (Table 2.2-1). Construction will occur on land that has not been previously disturbed except for occasional livestock grazing, traffic on dirt roads, and an abandoned rail bed. Approximately 218 acres (88 hectares) of the 290 acres (120 hectares) will be dedicated to Kemmerer Unit 1 and its supporting facilities.

After Kemmerer Unit 1 ceases operation and the station is decommissioned in accordance with NRC requirements, the land that was utilizedby the power plant and its supporting facilities could be used for future industrial or nonindustrial use. The water supply pipeline and transmission lines could be removed, restoring offsite land for uses precluded by the pipeline and transmission easements. The wastewater discharge structure near North Fork Little Muddy Creek could also be removed and the area restored. The Naughton Power Plant Cooling Water Intake Structure at Hams Fork River and pipeline to the Raw Water Settling Basin and structures and facilities that convey water from Hams Fork River may still be used to support uses which are not related to Kemmerer Unit 1. Offsite water conveyance facilities and structures are only partially dedicated to supporting Kemmerer Unit 1 operation. These facilities and structures could continue to be used for water conveyance to serve other users.

The land committed to the disposal of radioactive and nonradioactive wastes generated as a result of construction and operation of Kemmerer Unit 1 will be governed by the applicable regulations and permits and could not be used for other purposes. The land used for disposal, while not available for other uses, is not considered irreversible since it could be reclaimed for future use.

10.4.1.2 Water Resource Commitments

As discussed in Chapter 3, the closed-cycle cooling system will require makeup water to replace water lost to evaporation, drift, and blowdown. The source of this makeup water will be Hams Fork River via the Naughton Power Plant Raw Water Settling Basin. The portion of the water pumped to the cooling tower that will be lost to evaporation or drift will be made unavailable as a water resource; however, the portion of the water pumped to the cooling tower and subsequently released as blowdown will be discharged to North Fork Little Muddy Creek.

Groundwater will be extracted to dewater excavations during construction. No other groundwater use is proposed. Once the groundwater is extracted, it will be used for dust control during construction making it unavailable as a future groundwater resource. Water resources consumed during normal operation of Kemmerer Unit 1 are not anticipated to affect the overall availability of water resources for the area.

10.4.1.3 Ecological Commitments (Terrestrial and Aquatic)

There will be impacts to vegetation and temporary displacement of terrestrial wildlife due to construction and operation of Kemmerer Unit 1.

Approximately 218 acres (88 hectares) of the 290-acre (120-hectare) site will be disturbed during construction activities. The decommissioning of Kemmerer Unit 1 will result in restoration of the area to a condition that will allow for unrestricted use. This could include restoration of habitat within the site.

10.4.1.4 Socioeconomics

The effect of the construction and operation of Kemmerer Unit 1 will be to increase employment and to provide positive input to the local community in the form of taxes. The social and economic impacts resulting from Kemmerer Unit 1 construction and operation are anticipated to be SMALL to LARGE. The existing inventory of vacant housing in the economic region is not sufficient for the in-migrating construction workforce, but demand could be met by the addition of new housing and inclusion of resources in the Green River and Rock Springs area of Sweetwater County. The current capacity of most existing public services will be burdened by the in-migrating workforces, but the impacts will likely be mitigated by the Wyoming Department of Environmental Quality's impact assistance payments. Education impacts will be mitigated by the State's education equalization programs. Much of the additional housing that will be constructed, and medical, education, law enforcement, and fire protection personnel and equipment needed to support the in-migrating construction workforce will be used for the operation workforce and other future population growth in the economic region. In a boom-bust event, some housing and public service facilities and equipment could go unused.

10.4.1.5 Historical and Cultural Resources

The Kemmerer Unit 1 Site contains a single historic property that will be affected by building the station. Building activities within the area of the National Register of Historic Places eligible site will result in an adverse effect to a historic property. If the impacts to the site cannot be avoided, a Memorandum of Agreement or other agreement will be developed to mitigate those impacts that cannot be avoided. In addition best management practices for cultural resources provide for an Unanticipated Discoveries Plan to be developed and included as part of the construction documentation for the project. The Unanticipated Discoveries Plan will provide a protocol to be followed if unanticipated cultural resources are encountered during building activities including, but not limited to, human remains or funerary objects.

10.4.1.6 Radiological Releases

Kemmerer Unit 1 will operate under the limitations imposed by the NRC with respect to radioactive releases. Decommissioning will be performed according to the requirements of the NRC, which ultimately is expected to result in the unrestricted use of the site. Therefore, the operation of Kemmerer Unit 1 will not result in irreversible environmental changes to the area due to radiological releases.

10.4.1.7 Air Emissions and Meteorological Changes

There will be no major releases of pollutants to the atmosphere. Use of equipment utilizing diesel fuel that will generate such pollutants is intermittent and limited (e.g., for testing, startup and shutdown, or actuation during a loss of offsite power). Upon decommissioning of the plant, these potential impacts will cease. Therefore, the operation of ancillary equipment associated with Kemmerer Unit 1 will result in negligible irreversible air emissions.

10.4.2 Irretrievable Commitments of Resources

Construction of Kemmerer Unit 1 requires use of building materials that will be considered irretrievable commitments of resources unless they are recycled when the plant is decommissioned. Construction materials used for the plant will be similar to previous nuclear projects and are also expected to be similar to those for any major, multi-year construction project. Materials used in construction include, but are not limited to, concrete, rebar, cable, and piping. Unlike the earlier generation of nuclear plants, asbestos and other materials considered hazardous will not be used in order to comply with safety regulations and practices.

Use of construction materials in the quantities associated with those expected for a nuclear power plant, while irretrievable unless they are recycled at decommissioning, are anticipated to have a SMALL impact with respect to the availability of such resources.

Chapter 6 provides information regarding the fuel cycle for Kemmerer Unit 1. The Natrium reactor will use High-Assay Low-Enriched Uranium, with enrichment up to [redacted] weight percent. Its consumption will be greater than currently supported by the US nuclear industry and its supply chains. Work is being performed to stand up U.S. manufacturing capabilities. Purchases of uranium by owners and operators of U.S. civilian nuclear power reactors have been relatively constant for at least 20 years (Reference 10.4-1). Overall, the use of uranium by Kemmerer Unit 1 is anticipated to have a SMALL impact on the availability of the resource.

Kemmerer Unit 1 will use nitrate salt as a working fluid in the energy island. Because of the superior capacity factor, about one sixth of the thermal salt of a comparable size solar plant will be used. The resource is abundant, and the use will have a SMALL impact on the availability of the resource.

References

10.4-1 (USEIA 2023). United States Energy Information Administration. “Uranium Marketing Annual Report.” June 2013

10.5 Alternatives to the Proposed Action

Chapter 9 describes the range of alternatives considered in the building and operation of Kemmerer Unit 1, including alternative plant systems.

The No-Action Alternative, whereby the construction permit is not granted by the NRC, is discussed in Section 9.1. The No-Action Alternative would not result in the environmental impacts identified for Kemmerer Unit 1. Different environmental impacts would result should PacifiCorp replace the power through other means. The economic, and environmental benefits from the construction and operation of an advanced sodium reactor would also not be realized under this alternative. The construction and operation of Kemmerer Unit 1 is preferable to the No-Action Alternative.

The energy sources that would be feasible to install instead of the proposed technology are evaluated in Section 9.2. A specific purpose and need of the project is to demonstrate the use of an advanced reactor technology to supply power. A second specific purpose and need is the furtherance of the goal for achieving carbon net-zero emissions. A third specific purpose and need is to replace electricity generation from the planned retirement of coal-fired facilities in the service area. There is no other energy source that meets all criteria. The construction and operation of an advanced nuclear facility is the only means of meeting the purpose and need statement for Kemmerer Unit 1.

Alternative sites considered are discussed in Section 9.3. The PacifiCorp service territory was designated as the Region of Interest. Screening using exclusionary and avoidance criteria narrowed the potential 12 sites to a smaller subset of candidate sites. Each candidate site was evaluated against a set of suitability criteria by a panel of subject matter experts. Following this screening, Naughton 19/20 was identified as the proposed site for Kemmerer Unit 1. Two alternative sites, Naughton 12 and Jim Bridger 22, remain feasible, but neither was found to be environmentally preferable or obviously superior to the proposed site.

The alternatives for supporting systems of Kemmerer Unit 1 are evaluated in Section 9.4. A variety of heat dissipation methods, including once-through cooling, various cooling tower designs, and various cooling pond designs were evaluated. The mechanical draft cooling tower is the most viable technology for use, considering the lack of large bodies of water near the site, and the maturity and costs of cooling tower technologies. A variety of water intake options were evaluated. The reuse of existing water intake infrastructure associated with the nearby Naughton Power Plant Raw Water Settling Basin is the most feasible and of the lowest environmental impact. Several discharge systems were evaluated. The release of cooling tower blowdown to the nearest waterway after treatment is the most viable method. The assessment of raw water supplies concluded there were no feasible alternatives to the use of raw water from the Naughton Power Plant Raw Water Settling Basin.

10.6 Benefits and Costs

This section provides a description of the costs, including environmental costs, against the anticipated benefits of Kemmerer Unit 1 as required by 10 CFR 51.45(c). Inputs for this section were compiled from the Kemmerer Unit 1 purpose and need (Chapter 1); preconstruction, construction, and operation impacts (Chapters 4 and 5); analysis of the need for power (Chapter 8); and alternatives analysis (Chapter 9).

10.6.1 Benefits

10.6.1.1 Supports Need for Power

The need for power, a description of the power market, and power demand and supply in the region served by PacifiCorp are described in Chapter 8. The region is projected to be capacity deficient beginning in 2026. PacifiCorp's 2023 Integrated Resource Plan identifies Kemmerer Unit 1 as a preferred method to address this deficiency. Kemmerer Unit 1 is anticipated to provide carbon-free baseload power and is assumed to enter commercial service by 2031. Kemmerer Unit 1 supports the need to provide additional power to its region of service.

10.6.1.2 Emissions Reduction

Nuclear energy generation contributes considerable air quality benefits to the United States when compared to electricity generated from coal and natural gas. Nuclear energy does not produce air pollutant emissions associated with climate change during operation. Kemmerer Unit 1 supports the efforts of the United States to achieve carbon net-zero emissions goals.

The operation of Kemmerer Unit 1 presents reduced emissions compared to a similar-sized fossil-fuel powered unit.

10.6.1.3 Increase in the American Advanced Nuclear Economy

Kemmerer Unit 1 supports the efforts of the Department of Energy to maintain the Nation's technological leadership in the global nuclear industry and ensure national energy security.

Deployment of the Natrium Reactor Plant at the Kemmerer Unit 1 Site will provide commercial demonstration of an advanced reactor technology which utilizes a fast neutron spectrum and sodium coolant.

10.6.1.4 Flexible Operation

The integration of thermal energy storage into the design of Kemmerer Unit 1 provides the capability for flexible operation. The Nuclear Island provides constant heat input to the thermal energy storage tanks within the Energy Island. Through use of its Gigawatt hour-scale molten salt energy storage system, the output can increase from 319 MWe to 500 MWe. It provides not only baseload power to replace retiring coal units but also supports the use of other renewable energy sources on the grid by reacting to their fluctuations in supply. The Energy Island can vary the power produced by the site from approximately 30 percent to 150 percent of its nameplate value without requiring a corresponding change in the Nuclear Island output.

This operational flexibility couples well with renewable energy sources, such as wind and solar. When wind or solar power generation falls off, the stored thermal energy can be leveraged to meet energy demand. The storage system is sized to provide more than 5 hours of power at 500 MWe. This flexibility supports reduced carbon or net-zero carbon energy distribution systems because lower-carbon intensity energy sources can be supported without a corresponding loss of reliable baseload power. It also supports replacing units which must be brought online for short bursts when energy demand is high, typically fueled by natural gas.

10.6.1.5 Increased Tax Payments

Section 4.4.3.2 provides an analysis of the estimated tax payments during the construction of Kemmerer Unit 1. Sales and use tax payments generated by the project, including its employed staff, are estimated to provide between $350,000 and $4.2 million annually. Over a 6-year period, these payments could total to $12 million. Increased revenues will also come from increased property taxes due to the development of the site. Project-related property taxes are anticipated to rise from approximately $4,000 in the first year of construction to more than $12 million by the final year of construction.

Section 5.4.3.2 provides an analysis of the estimated tax payments during the operation of Kemmerer Unit 1. Sales and use taxes generated by the project, including its employed staff, are anticipated to be approximately $1 million annually. Property taxes are anticipated to be approximately $7.5 million annually.

The construction and operation of Kemmerer Unit 1 increases the amount of taxes paid in the economic region; therefore, the regional economy will benefit from increased development.

10.6.1.6 Increase to the Local Economy

Kemmerer Unit 1 is anticipated to have approximately 1,700 workers on site during the peak month of construction. Through the multiplier effect, these workers will create approximately 780 indirect jobs in the economic region. The economic impacts are described in Section 4.4.3 and Section 5.4.3.

Spending by the construction workforces will increase economic activity in the region though purchasing goods and services. Every dollar spent by the construction workforce is anticipated to result in the circulation of between 0.32 and 0.91 additional dollars in the region. Kemmerer Unit 1 construction wages are anticipated to exceed $370 million over the construction period and could generate more than $500 million across the economic region.

Kemmerer Unit 1 is anticipated to require a workforce of 250 people. Through the multiplier effect, this workforce is anticipated to create more than 400 indirect jobs in the economic region. Both the permanent and indirect jobs will be retained for the operating period of the plant.

Spending by the workforce will increase economic activity in the region through purchasing goods and services. Each dollar spent by the operation workforce is anticipated to result in the circulation of an additional 0.88 dollars in the regional economy. Kemmerer Unit 1 wages are anticipated to be approximately $34 million annually and will generate $64 million in total earnings across all industries in the economic region.

10.6.2 Costs

In evaluating costs, published literature and site-specific information were reviewed. The monetary cost of constructing a nuclear plant is referred to as overnight capital cost. The capital costs are those incurred during construction when the actual outlays for equipment, construction, and engineering are expended. Overnight costs are exclusive of interest on borrowed funds and include engineering, procurement, and construction costs; owner costs; and contingencies.

10.6.2.1 Economic Cost

The estimated overnight capital cost for construction of Kemmerer Unit 1 is contained in Enclosure 1 of the construction permit application, “General and Financial Information.”

Estimates of annual operating expenses for operation and maintenance will be provided at the operating license stage.

10.6.2.2 Land Use Impacts

The anticipated impacts to land use during construction and operation are discussed in Sections 4.1 and 5.1. The impacts and mitigation measures are summarized in Sections 10.1.1 and 10.2. Approximately 218 acres (88 hectares) will be disturbed for the construction of Kemmerer Unit 1. The disturbed area will remain through the decommissioning of the site. An additional 216 acres (87 hectares) will be disturbed for the construction of the transmission lines and water supply lines. The cost of the identified land use is anticipated to be SMALL.

10.6.2.3 Impacts to Water Resources

The anticipated impacts to water resources during construction and operation are discussed in Sections 4.2 and 5.2. Construction activities require three road crossings over ephemeral streams, 0.5 acres (0.2 hectares) of impact to 100-year flood plains, and less than 0.5 acres (0.2 hectares) of waterway impact. Building activities will use 25.3 million gallons per day (95.8 million liters per day) of water. During operation, surface water will be used to supply plant water needs. Water demand is anticipated to average 3,689 gallons per minute (13,964 liters per minute) (Table 5.2-1). The majority of the surface water consumption is the result of evaporative cooling and drift losses, which are expected to average 2,881 gallons per minute (10,906 liters per minute) (Table 3.2-1). The discharge to North Fork Little Muddy Creek during operation is expected to average 787 gallons per minute (2,979 liters per minute). Except for the use of excavation dewatering byproduct for dust suppression and compaction, no groundwater use is planned during construction or operation. The mitigation measures and impacts after mitigation are discussed in Section 10.2. Collectively, the identified costs to water resources are anticipated to be SMALL.

10.6.2.4 Ecological Resource Impacts

The anticipated impacts to ecological resources during construction and operation are discussed in Sections 4.3 and 5.3. The mitigation measures and impacts after mitigation are summarized in Sections 10.1.3 and 10.2. Construction of Kemmerer Unit 1 will result in the clearing of 218 acres (88 hectares) of land and destruction of the associated habitat. The area will remain unavailable as habitat during the operation of the facility. There are additional, temporary disturbances to 223 acres (90 hectares) associated with the transmission lines and water pipeline construction. The site represents a small fraction of the overall availability of the habitat in the region. There are no direct and only limited indirect impacts to wetlands. Construction and operation could result in some mortality of birds, small mammals, or reptiles, and disturbance to or displacement of larger animals.

With best management practices in use, there is no cost to aquatic resources from building activities since the resulting small increases to sediment loads and stream turbidity are within the variation caused by local weather extremes and variations in natural flows. Kemmerer Unit 1 uses a closed-cycle cooling system consistent with U.S. Environmental Protection Agency requirements. Cooling water make-up requirements are small, and the Naughton Power Plant intake is designed to minimize aquatic biota losses due to entrainment and impingement. The losses are minor and are not expected to have a long-term impact on population levels of the affected species. Overall, the costs to ecological resources are anticipated to be SMALL.

10.6.2.5 Socioeconomic Impacts

The socioeconomic impacts during construction and operation are discussed in Sections 4.4 and 5.4. The impacts and mitigation measures are summarized in Sections 10.1.4 and 10.2.

There will be a large in-migration associated with the construction workforce. Together with in-migrating operation workers, this is anticipated to represent an 8.6 percent increase in Lincoln County employment. The in-migrating workers and their family members are anticipated to represent a temporary 41.2 percent increase in the combined populations of Kemmerer, Diamondville, Cokeville, and LaBarge. Following the completion of construction, most of the in-migrating construction workers are anticipated to leave the economic area.

The in-migrating construction workforce and their families are anticipated to increase school district enrollments in the economic region by 768 pupils. There is a cost associated with placing a strain on educational resources, especially when some schools are already near or over capacity. There is a cost in additional usage of recreational facilities in the region.

There is a cost associated with the unavailability of housing in the economic area due to project construction. Of an assumed 3,282 available units, the in-migrating construction workforce will require an estimated peak total of 1,689 units. There is a cost to regional economies when the departing construction workers leave behind a large number of vacant housing units, possibly 1,000 or more in Lincoln County alone. This represents a 53 percent increase in total housing and a 354 percent increase in vacant housing.

There is a cost associated with increased usage of municipal water supplies. For example, in Lincoln County, the in-migrating workers and their families will consume 129,560 gallons per day (490,438 liters per day) of municipal water. This represents about 3.3 percent of the excess capacity of the water system. There is a cost associated with increased demand on wastewater treatment facilities. The in-migrating population to Kemmerer and Diamondville associated with the construction of Kemmerer Unit 1 will require 21.6 to 8.6 percent of the current and 9.6 to 5.8 percent of the future capacity of the municipal wastewater treatment facilities. There are also costs to public safety and health associated with a reduction in the ratio between residents and police, firefighter, and medical personnel. Thirteen additional police officers will need to be hired to maintain the current residents-per-police officer ratio. Thirteen additional active firefighters will need to be hired to maintain current resident-per-active firefighter ratios. The in-migration may also stress overburdened primary care and mental health resources. For example, considering Sweetwater County, with the in-migrating workforce, 2.7 additional full-time equivalent primary care providers would be required to maintain the current ratio.

The in-migrating operation workforce and their families are anticipated to represent a 14 percent increase in the combined 2020 populations of Kemmerer, Diamondville, Cokeville, and LaBarge and a less than one percent increase in the 2020 population of Uinta County. There is a cost to the strain on educational resources. The children of the in-migrating operation workers are expected to increase enrollment in Lincoln County by 148 pupils. The elementary school has only 66 available classroom seats. Forty-six children of operation workers would increase enrollment in Uinta County. There is an impact associated with increased traffic. Site workers add 125 vehicles, or an increase of 8 percent in daily traffic. There will be costs associated with recreational facilities, public water and wastewater supplies, and public safety and health. The cost to these areas during operation is less than the cost during construction due to the smaller population increase represented by the operation workforce.

The costs to socioeconomic resources identified above are anticipated to be SMALL to LARGE.

10.6.2.6 Environmental Justice Impacts

Environmental justice impacts during construction and operation are discussed in Sections 4.5 and 5.5 and are summarized in Sections 10.1.5 and 10.2. There were no construction-related or operation-related impacts identified that will have disproportionately high and adverse impacts to low-income or minority groups.

10.6.2.7 Historic and Cultural Resource Impacts

The impacts to historic and cultural resources during construction and operation are discussed in Sections 4.6 and 5.6. The site contains a single historic property that could be adversely affected. The macro-corridor contains an additional, single historic property that could be adversely affected by construction of the water supply pipeline or transmission lines. The impacts and mitigation measures are summarized in Sections 10.1.6 and 10.2. The costs associated with historic and cultural resources is anticipated to be SMALL.

10.6.2.8 Air Resource Impacts

The impacts to air resources during construction and operation are discussed in Sections 4.7 and 5.7. The industry assessment for construction of a 1,000 MWe nuclear plant is the release of 82,000 metric tons of carbon dioxide. The construction of Kemmerer Unit 1 will be bounded by this assessment. Kemmerer Unit 1 will be above the 100 tons per year U.S. Environmental Protection Agency Title V impact for particulate matter of 10 micrometer diameter or less, carbon monoxide, and nitrogen oxide. During operation, it is anticipated to be below the identified thresholds for all criteria pollutants. During operation, a visible plume will sometimes be produced by the cooling tower. Salt deposition is anticipated to be below the threshold to damage sensitive vegetation. Other effects of the plume (e.g., fogging, ground level humidity increases, icing, cloud shadowing), will be experienced beyond the site boundary but will have SMALL effects. The impacts and mitigation measures are summarized in Sections 10.1.7 and 10.2. The cost associated with air resources are anticipated to be SMALL.

10.6.2.9 Nonradiological Health Impacts

The impacts to nonradiological health resources during construction and operation are discussed in Sections 4.8 and 5.8. Impacts to the public from noise, fugitive dust, or emissions is not anticipated. Noise levels to the nearest resident during construction will have attenuated below 65 A-weighted decibels. During operation, noise levels will have attenuated to ambient levels before reaching the nearest resident. The industry average incident rate during construction is 2.1 per 100 full-time workers, and the fatality rate is 9.4 per 100,000 full-time workers. During operation, the industry average incident rate is 0.2 per 100 full-time workers, and the fatality rate is 2.6 per 100,000 full-time workers. The project is not anticipated to result in more potential occupational injuries and fatalities, based on statistical analysis, than other similarly sized power plant or other heavy construction projects. Shipments to the site for construction will result in 3 million shipped miles (4.8 million shipped kilometers). The construction workforce is anticipated to drive 46.5 million miles (74.8 million kilometers) annually. The operation workforce is anticipated to drive 5.2 million miles (8.4 million kilometers) annually. Outage workers will commute 531,000 miles (855,000 kilometers). The mitigation measures and impacts after mitigation are summarized in Section 10.1.8 and Section 10.2. Collectively, the cost to nonradiological health are anticipated to be SMALL.

10.6.2.10 Radiological Health Impacts

The impacts to radiological health during construction and operation are discussed in Sections 4.9 and 5.9. There are no exposures expected during the construction of Kemmerer Unit 1 from nearby facilities. Workers at the Test and Fill Facility are anticipated to receive 0.102 mrem per year total body dose from the operation of Kemmerer Unit 1. Gamma, beta, skin, and organ doses were also a fraction of the regulatory guidelines (Table 5.9-10). Doses due to liquid releases during normal operation will be indistinguishable from background sources. The maximally exposed individual member of the public would receive 0.796 mrem per year total body dose. Gamma, beta, skin, and organ doses are also anticipated to be significantly below the regulatory criteria as shown in Table 5.9-6. The impacts and mitigation measures are summarized in Sections 10.1.8 and 10.2. The doses are below regulatory criteria established for keeping doses as low as reasonably achievable. The costs to radiological health are anticipated to be SMALL.

10.6.2.11 Nonradiological Waste Management Impacts

The impacts to nonradiological waste management during construction and operation are discussed in Sections 4.10 and 5.10. Construction wastes will be approximately nine dumpsters per week. Sanitary wastes are anticipated to require 80 portable toilets, exchanged every other working day. Wastewater and groundwater from dewatering operation will be reused for construction activities. During operation, Kemmerer Unit 1 is anticipated to be consistent with industry averages for non-radioactive, non-hazardous wastes, which will be approximately

3,500 tons for a facility of its size. The mitigation measures and impacts after mitigation are summarized in Sections 10.1.8 and 10.2. The costs associated with nonradiological waste management are anticipated to be SMALL.

10.6.3 Benefit-Cost Balance

This analysis highlights the significance and value of generating reliable electricity to meet national demand without generating emissions that contribute to climate change and adversely impacting the environment. The benefits from construction and operation of Kemmerer Unit 1 are generation of carbon-free electricity, demonstration of an advanced reactor technology, tax payments, job creation, and employment opportunities. A tabulation of the benefits and costs considered is presented in Table 10.6-1. The benefits resulting from the construction and operation of Kemmerer Unit 1 outweigh the costs.

Table 10.6-1 Tabulation of Benefits and Costs
(Sheet 1 of 3)

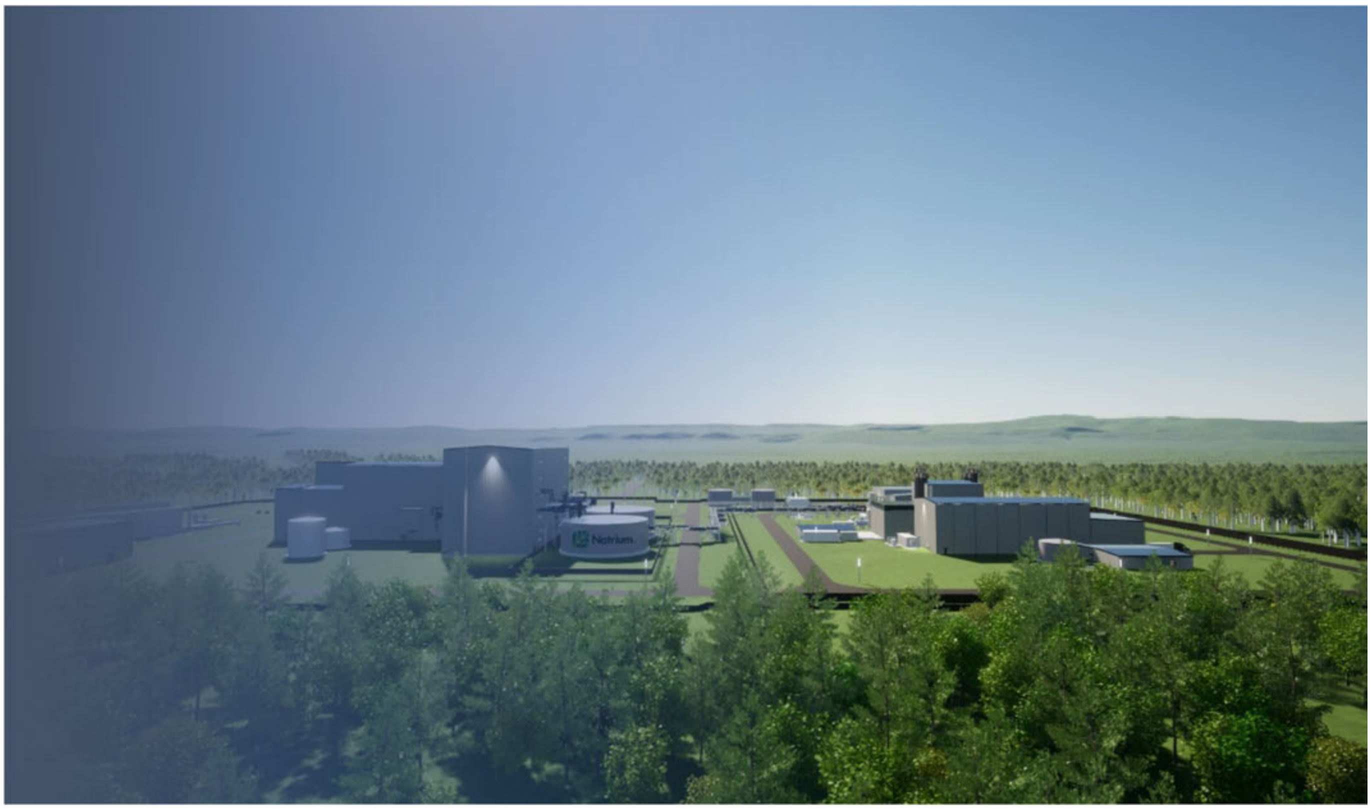
Category	Benefit	Cost
Need for Power	A power plant generating 319 MWe of baseload power will be constructed, which is a benefit to the region of service.	
Reduced Emissions	A carbon-free baseload energy source will be constructed to replace retiring fossil-fuel sources. This is a benefit to the United States and its efforts to achieve carbon net-zero emissions goals.	
Advanced Nuclear Reactor Development	An advanced reactor will increase the competitiveness of the American nuclear industry and revitalize the supply chain.	
Flexible Operation	The constructed plant will be able to ramp up to 500 MWe during times of peak demand. This is a benefit both to the local grid, and to further efforts to reduce emisisons.	
Land Use		Approximately 218 acres (88 hectares) will be disturbed for Kemmerer Unit 1. An additional 223 acres (90 hectares) will be disturbed for the transmission and water supply pipeline construction. Costs to this resource area are anticipated to be small.
Water Resources		Minor consumptive use of water from Green River Basin. There are no impacts from groundwater use. This is described in Section 10.6.2.3. Collectively, the cost to water resources is anticipated to be small.

Table 10.6-1 Tabulation of Benefits and Costs
(Sheet 2 of 3)

Category	Benefit	Cost
Ecology		As discussed in Section 10.6.2.4, the clearing of the areas of construction will result in the destruction of the associated habitat, and impacts to animals in the area. Best management practices limit these impacts. The constructed area represents a small fraction of the overall availability of the habitat. The costs to ecology are anticipated to be small.
Socioeconomic	Spending by construction and operation workforces will increase economic activity in the region though purchasing goods and services. Wages are anticipated to exceed $370 million over the construction period, and could generate more than $500 million across the economic region. Operation wages are anticipated to be approximately $34 million annually, and will generate $64 million in total earnings across all industries in the economic region. Project-related property taxes are anticipated to rise from approximately $4,000 in the first year of construction to more than $12 million by the final year of construction. The increase in tax revenues is beneficial to local taxing jurisdictions.	As discussed in Section 10.6.2.5, there are socioeconomic costs associated with construction related in-migration. This includes unavailability of housing, and potential strain on education resources. Strain on water and wastewater capacities. Reduced staffing ratios for police, fire, and medical professionals. These costs are assessed to be small to large.
Environmental Justice		Impacts are not expected from construction or operation.

Table 10.6-1 Tabulation of Benefits and Costs
(Sheet 3 of 3)

Category	Benefit	Cost
Historic and Cultural Resources		As discussed in Section 10.6.2.7, there is one historic property on the site, and one historic property in the area of the transmission and water line corridor. Mitigation measures will limit impacts. Cost to historical resources is anticipated to be small.
Air Resources		As discussed in Section 10.6.2.8, emissions and other changes to air resources are anticipated to be a small cost to the resource.
Nonradiological Health		As discussed in Section 10.6.2.9, costs from noise, fugitive dust and emissions are not anticipated for the public. The project is not anticipated to result in more potential occupational injuries and fatalities, based on statistical analysis, than other similarly sized power plant or other heavy construction projects.
Radiological Health		As discussed in Section 10.6.2.10, releases and doses will be as low as reasonably achievable and below the applicable Federal limits. Therefore, the cost to health due to radiation is anticipated to be small.
Nonradioactive wastes		As discussed in Section 10.6.2.11, nonradioactive wastes generated will be consistent with industry averages on a per-megawatt basis. Wastes will be managed in accordance with Federal, State, and local requirements. Therefore the cost to this resource area is small.



Kemmerer Power Station Unit 1
ER, Appendix A

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

TABLE OF CONTENTS

APPENDIX A CONSULTATION LETTERS

A.1 U.S. Fish and Wildlife Service Correspondence

TerraPower.

March 16, 2023

TP-LIC-LET-0062
Project Number 99902100

Mr. Tyler Abbott
Wyoming Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services Field Office
334 Parsley Blvd
Cheyenne, WY 82007
tyler_abbott@fws.gov

Subject: Kemmerer Power Station Unit 1 Introduction

Dear Mr. Abbott:

TerraPower is preparing a Construction Permit Application to the U.S. Nuclear Regulatory Commission (NRC) for a 345 MWe sodium-cooled Natrium™ Reactor Plant to be built at a site in southwestern Wyoming. The Natrium Reactor Plant is a TerraPower & GE-Hitachi technology. The proposed generating facility (Kemmerer Power Station Unit 1) would be located approximately three miles south of the city limit of Kemmerer, Wyoming, and a short distance southeast of the existing Naughton Power Plant (Figure 1). Kemmerer Power Station Unit 1 (Kemmerer Unit 1) is intended to replace the Naughton Power Plant's three aging fossil-fired units, scheduled for retirement in 2025 (Units 1 and 2) and 2029 (Unit 3).

As part of the licensing process, the NRC requires applicants to assess the impacts of proposed actions on threatened and endangered species in accordance with the Endangered Species Act. The NRC will request a formal consultation with your office, at a later date, under Section 7 of the Endangered Species Act. By contacting you early in the application process, TerraPower hopes to identify any issues that need to be addressed and provide any information your office may need to expedite the NRC consultation.

Two transmission lines and a water supply pipeline that would be approximately six miles long would connect Kemmerer Unit 1 to existing Naughton Power Plant infrastructure (switchyard and raw water pond). Final routes for the transmission lines and water pipeline have not been determined at this time. A survey corridor was defined to capture the potential range of feasible options for the routes as well as to capture an area large enough to

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encompass the extent of potential impacts that could occur during construction of the transmission and water lines (Figure 2). Kemmerer Unit 1 and the associated transmission lines and water supply pipeline would be located entirely on privately owned land.

The Naughton Power Plant uses a closed-cycle, recirculating cooling water system with mechanical draft cooling towers. Water for cooling tower makeup is withdrawn from a cooling water intake structure (CWIS) standing on the west bank of Hams Fork, approximately seven miles north of the Naughton Power Plant. Water is pumped from the CWIS to the Naughton Power Plant via two underground pipes. Both pipes discharge into the Naughton Power Plant's raw water storage pond. Water is then pumped out of the raw water storage pond to the individual generating units for cooling. The raw water storage pond holds several days' supply of makeup water.

Kemmerer Unit 1 would use the existing Naughton Power Plant's CWIS after the fossil units have been retired. Makeup water would be pumped from Hams Fork to the raw water storage pond as before, but when Kemmerer Unit 1 is operational, water from the raw water storage pond would be piped there for cooling tower makeup. The Naughton Power Plant's CWIS was deemed Best Available Technology by the Wyoming Department of Environmental Quality when the last National Pollutant Discharge Elimination System permit was issued in 2018, due to low overall water demand.

The NRC requires that the Construction Permit Application include an Environmental Report that assesses potential impacts from plant construction and operation on a range of resources, including "important species." Important species in this context include state and federally listed species, species proposed for federal listing, species that are candidates for federal listing, the two species protected under the Bald and Golden Eagle Protection Act, and commercially or recreationally valuable species.

The Information for Planning and Consultation (IPaC) report for the Project area indicated that the following federally listed and candidate species could be "potentially affected by activities at this location:"

- Bonytail (*Gila elegans*); endangered
- Colorado pikeminnow (*Ptychocheilus lucius*); endangered
- Humpback chub (*Gila cypha*); threatened
- Razorback sucker (*Xyrauchen texanus*); endangered
- Yellow-billed cuckoo (*Coccyzus americanus*); threatened
- Monarch butterfly (*Danaus plexippus*); candidate species
- Ute ladies'-tresses (*Spiranthes diluvial is*); threatened.

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Our desktop review of the scientific literature and information on resource agency websites [e.g., the Wyoming Natural Diversity Database (WYNDD)] in conjunction with reconnaissance visits our biologists took in October and December 2021 suggested that only two of these species, the Monarch butterfly and Ute ladies'-tresses, are likely to be present.

Four federally listed fish species (bonytail, Colorado pikeminnow, humpback chub, and razorback sucker) were identified by IPaC as potentially occurring in the area. However, the bonytail, Colorado pikeminnow, and razorback sucker are considered extirpated from Wyoming according to the Wyoming Game and Fish Department's 2017 State Wildlife Action Plan. The humpback chub once occurred in the Green River (WY) as far upstream as Blacks Fork but is no longer found in the state of Wyoming, according to the Species Status Assessment prepared by USFWS in 2018. None of these big-river fish species are believed to survive in Wyoming.

There is no habitat in the Survey Area that would support yellow-billed cuckoos. Yellow-billed cuckoos in Wyoming are associated with cottonwood and willow-dominated riparian areas with densely vegetated understories. There are no riparian woodlands in the Project vicinity. A small stream, North Fork Little Muddy Creek, flows in a southerly direction by the Kemmerer Unit 1 site (Figure 2) but there are no trees growing along the stream that would provide nesting habitat for the yellow-billed cuckoo. The nearest stream with a wooded riparian zone is Hams Fork, which flows north and east of the site but comes no closer than three miles (see Figure 1). The WYNDD Data Explorer shows no observations, recent or historic, of yellow-billed cuckoos along Hams Fork.

In addition to the federally listed and candidate species, the IPaC report indicated that six Birds of Conservation Concern (BCCs) could be present: black rosy-finch (*Leucosticte atrata*), Cassin's finch (*Carpodacus cassinii*), golden eagle (*Aquila chrysaetos*), rufous hummingbird (*Selasphorus rufus*), Western grebe (*Aechmophorus occidentalis*), and willet (*Tringa semipalmata*).

Having completed the desktop review in the spring of 2022, field surveys were commissioned to support the environmental impact assessment. A team of biologists with extensive experience conducting wildlife surveys and habitat assessments in the Intermountain West carried out Terrestrial Visual Encounter Surveys (TVES) of the Survey Area (see Figure 2) in June 2022.

No federally listed species, species proposed for listing, or candidate species for listing were observed in June 2022. An adult golden eagle, one of the six BCCs the IPaC report indicated could be present, was observed on site, and a sub-adult bald eagle was observed offsite, north of the Survey Area. Western grebes, another BCC, were observed on one of the Naughton Power Plant ponds, outside of the Survey Area.

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Because the IPaC project review indicated that Ute ladies'-tresses (ULT) could be present, a consulting wetland scientist/botanist surveyed wetlands within the site area in early September 2022 to determine if any contained ULT or suitable habitat for the species. No ULT were observed and no high quality ULT habitat was found. Areas judged to provide marginally suitable habitat for ULT will be re-surveyed during the July 20-August 31 blooming period in 2023 and 2024, in accordance with USFWS's "Interim Survey Requirements for Ute Ladies-tresses Orchid (*Spiranthes diluvialis*)."

Finally, aquatic biologists under contract to TerraPower conducted baseline fish and benthic macroinvertebrate surveys of two streams that could be affected, Hams Fork and North Fork Little Muddy Creek, in October 2022. A total of 153 fish representing six species were collected from segments of North Fork Little Muddy Creek upstream of, adjacent to, and downstream of the Kemmerer Unit 1 site. Two common species, redside shiner (*Richardsonius balteatus*) and speckled dace (*Rhinichthys osculus)*, dominated North Fork Little Muddy Creek collections. A total of 1,246 fish representing eight species were collected from three segments of Hams Fork, a much larger stream: one adjacent to the Naughton Power Plant CWIS and two upstream of the CWIS. Redside shiners and white suckers (*Catostomus commersonii*) were the species most often collected. Most fish collected from both streams were hardy cyprinids and catostomids found across the Intermountain West. No rare, unusual, or special-status fish species were collected from either stream. These streams will be surveyed again in spring and summer 2023.

This letter is intended to provide your office with background information regarding the proposed Kemmerer Unit 1 plant and share some preliminary findings. Please respond with a letter that details any concerns regarding potential impacts to species and habitats under your jurisdiction. The Wyoming Department of Game and Fish has also been contacted to solicit their concerns about other "important" species, including those they have designated Species of Greatest Conservation Need and recreationally important game species such as pronghorn and mule deer. TerraPower will include a copy of this letter and your response in the Environmental Report that will be submitted to the NRC as part of the Construction Permit Application.

Ms. Lisa Matis is the point of contact with our consultant, Tetra Tech, Inc., for environmental issues regarding Kemmerer Unit 1. Ms. Matis can be reached at (803) 295-2113 or lisa.matis@tetratech.com if you have any questions.

If you have questions generally regarding Kemmerer Unit 1, please contact Ryan Sprengel at rsprengel@terrapower.com or (425) 324-2888.

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Sincerely,

Ryan Sprengel
Director of Licensing
TerraPower, LLC

Enclosures:

1. Kemmerer Power Station Unit 1 Figures
2. Kemmerer Power Station Unit 1 IPaC Resource List

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ENCLOSURE 1

Kemmerer Power Station Unit 1 Figures

Figure 1 - Kemmerer Power Station Unit 1 Location

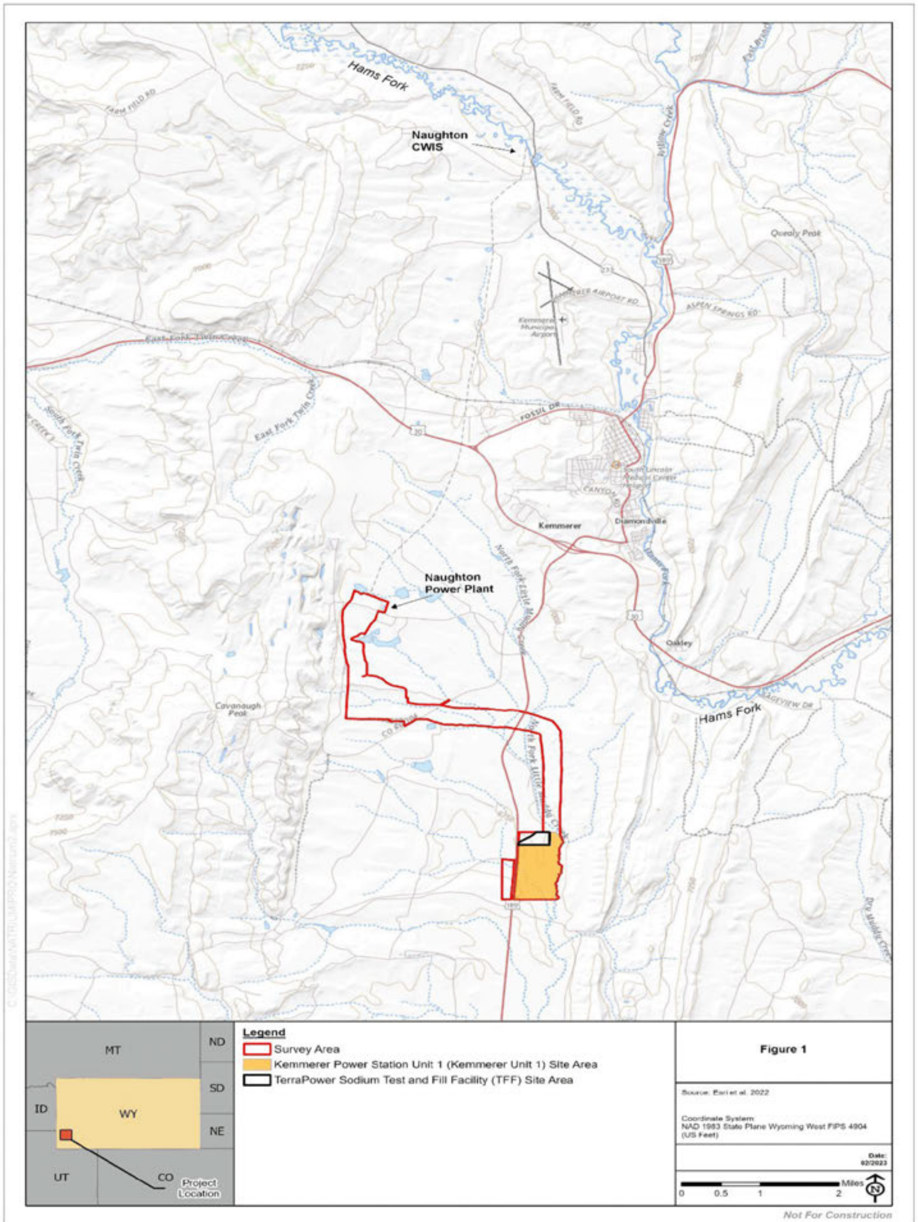

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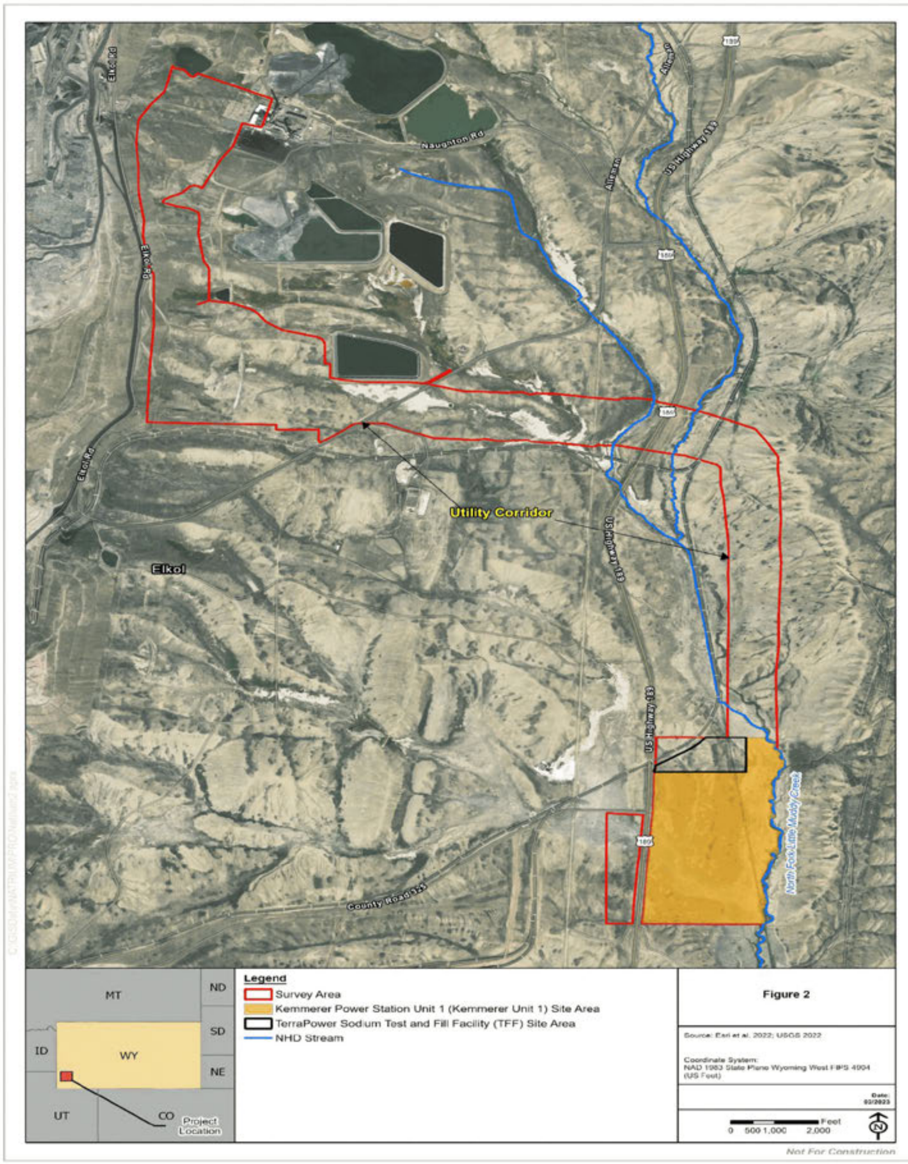
Figure 2 - Kemmerer Power Station Unit 1 Utility Corridor



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ENCLOSURE 2

Kemmerer Power Station Unit 1 IPaC Resource List

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Lincoln County, Wyoming

Local office

Wyoming Ecological Services Field Office

- (307) 772-2374
- (307) 772-2358
- wyominges@fws.gov

334 Parsley Boulevard
Cheyenne, WY 82007-4178

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Yellow-billed Cuckoo Coccyzus americanus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bonytail Gila elegans Wherever found This species only needs to be considered if the following condition applies: • Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1377	Endangered
Colorado Pikeminnow Ptychocheilus lucius There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3531	Endangered
Humpback Chub Gila cypha Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3930	Threatened

NAME	STATUS
Razorback Sucker Xyrauchen texanus Wherever found This species only needs to be considered if the following condition applies: • Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/530	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Ute Ladies'-tresses Spiranthes diluvialis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2159	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Cassin's Finch Carpodacus cassinii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	**Breeds May 15 to Jul 15**

Golden Eagle Aquila chrysaetos — **Breeds Jan 1 to Aug 31**

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Rufous Hummingbird selasphorus rufus — **Breeds Apr 15 to Jul 15**

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Western Grebe aechmophorus occidentalis — **Breeds Jun 1 to Aug 31**

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/6743

Willet Tringa semipalmata — **Breeds Apr 20 to Aug 5**

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

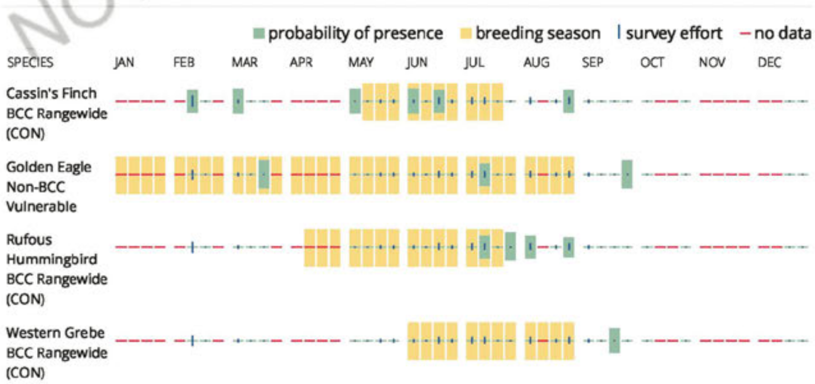
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

Willet
BCC Rangewide
(CON)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location did not intersect any wetlands mapped by NWI.

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
334 Parsley Blvd
Cheyenne, Wyoming 82007

In Reply Refer to:
2023-0061139

May 1, 2023

Mr. Ryan Sprengel
Director of Licensing
TerraPower, LLC
15800 Northup Way
Bellevue, Washington 98008

Dear Mr. Sprengel:

Thank you for your March 16, 2023, letter of introduction, received in our office on March 20, 2023, regarding the Kemmerer Power Station Unit 1 Project (Project) located in Kemmerer, Wyoming in Lincoln County. Per the U.S. Nuclear Regulatory Commission (NRC), TerraPower, LLC (TerraPower) is preparing a Construction Permit Application for the Project and requires applicants to assess potential impacts of the proposed action on threatened and endangered species listed under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq).* The letter of introduction provides an overview of the Project as well as preliminary results from field surveys and desktop analysis of the Project area. TerraPower is requesting the U.S. Fish and Wildlife Service (Service) provide comments on the proposed project. The NRC will request formal consultation with the Service at a later date.

You have requested information regarding species listed under the ESA. In response to your request, the Service is providing recommendations for protective measures for threatened and endangered species in accordance with the ESA. We are also providing recommendations concerning migratory birds in accordance with the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, and the Bald and Golden Eagle Protection Act (Eagle Act), 16 U.S.C. 668. Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 *et seq.*, and the Fish and Wildlife Act of 1956, as amended, 16 U.S.C. 742a-742j.

The Service has transitioned to a new online program to deliver species lists: the Information, Planning, and Consultation (IPaC) system. To obtain a current list of endangered, threatened, proposed, and candidate species and their designated and proposed critical habitat that occur in or may be affected by actions associated with your proposed project, please visit our website at https://ipac.ecosphere.fws.gov/. This website will provide you with an immediate response to your species list request. The response will also include information regarding other Service trust authorities. When entering a project location in IPaC, be sure to define the action area, not just the project footprint. The action area includes all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action (50 CFR 402.02).

Project Summary

The Project is a 345 megawatt-electric (MWe) sodium-cooled Natrium Reactor Plant located approximately 3 miles south of Kemmerer, Wyoming, and southeast of the Naughton Power Plant (NPP). Three aging fossil-fossil units will be retired from the NPP in 2025 and 2029, and the Project will replace the three units, using some of the existing facilities and infrastructure. In addition, two transmission lines and a water supply pipeline approximately 6 miles long would be built to connect the Project to the NPP. The Project would use the NPP's cooling water intake structure to pump water from the Hams Fork River. Due to historic water use at the NPP, the Project is not expected to result in new water depletions. The final layout of the transmission lines and water supply pipelines are not yet determined. Construction of the Project would occur entirely on private land.

Service Review and Comments

The National Environmental Policy Act (NEPA) analysis should disclose the full extent of proposed development, as well as the direct and indirect effects of all aspects of the project and the cumulative impacts of past, present, and reasonably foreseeable future actions regardless of who is responsible for those actions.

In accordance with section 7(c) of the ESA, we have determined that the following species or their designated habitat may be present in or may be affected by actions in the proposed Project area. We would appreciate receiving information as to the current status of each of these species within the proposed Project area.

Species/Critical Habitat	Scientific Name	Status	Habitat
Canada Lynx	*Lynx canadensis*	Threatened	Montane forests
Canada Lynx Critical Habitat	Designated areas include boreal forest landscapes within Fremont, Lincoln, Park, Sublette, and Teton Counties of Wyoming (see 50 CFR 17.95(a))		
Colorado River Fish • Bonytail • Colorado Pikeminnow • Humpback Chub • Razorback Sucker	 *Gila elegans* *Ptychocheilus lucius* *Gila cypha* *Xyrauchen texanus*	 Endangered Endangered Threatened Endangered	Riverine habitat downstream of Wyoming in the Yampa, Green, and Colorado River systems
Colorado River Fish Critical Habitat	Designated for Colorado River Fish in riverine habitat downstream of Wyoming in the Yampa, Green, and Colorado River systems (see 50 CFR 17.95(e))		
Monarch Butterfly	*Danaus plexippus*	Candidate	Milkweed and flowering plants

Species/Critical Habitat	Scientific Name	Status	Habitat
North American Wolverine	*Gulo gulo luscus*	Proposed	Alpine habitat, boreal and montane forests
Ute Ladies'-tresses	*Spiranthes diluvialis*	Threatened	Seasonally moist soils and wet meadows of drainages below 7,000 ft. elevation
Yellow-billed Cuckoo (Western)	*Coccyzus americanus*	Threatened	Riparian areas west of Continental Divide
Whitebark Pine	*Pinus albicaulis*	Threatened	Cold and windy subalpine to alpine sites above 8,000 ft. elevation

Canada Lynx and Canada Lynx Critical Habitat

Canada lynx (*Lynx canadensis*) (74 FR 8615; February 25, 2009) is a federally threatened species under the ESA. The lynx is a medium-sized cat with reddish to gray fur, long legs, large, well-furred paws, long tufts on the ears, and a short, black-tipped tail. Historically, lynx were observed in every mountain range in Wyoming. The majority of lynx observations presently occur in western Wyoming in subalpine/coniferous forests of mixed age and structural classes. Early to mid-successional forests with high stem densities of conifer saplings provide optimal habitat for the lynx's primary prey, the snowshoe hare (*Lepus americanus*). Mature forests with downed logs and windfalls provide cover for denning sites, escape, and protection from severe weather.

Habitat fragmentation through climate change, vegetation management, and wildfires affects snowshoe hare and lynx population dynamics. Snow track surveys, lynx rub pads, scat detection dogs, and horizontal cover surveys to determine snowshoe habitat suitability have all been used to detect the presence of lynx. Critical habitat for the Canada lynx (50 CFR 17.95(a)) has been designated for portions of Fremont, Lincoln, Park, Sublette, and Teton Counties, including parts of Yellowstone National Park and the Bridger-Teton and Shoshone National Forests.

In the Yellowstone ecosystem is called Unit 5, is defined as boreal forest landscapes supporting a mosaic of differing succession forest stages and containing the following Primary Constituent Elements (PCE):

a) Presence of snowshoe hares and their preferred habitat conditions, including dense understories of young trees of shrubs tall enough to protrude above the snow;
b) Winter snow conditions that are generally deep and fluffy for extended periods of time;
c) Sites for denning having abundant coarse, woody debris, such as downed trees and root wads;
d) Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range. The important aspect of matrix habitat for lynx is that these habitats retain the ability to allow unimpeded movement of lynx through them as lynx travel between patches of boreal forest.

Colorado River Fish and Critical Habitat

Formal interagency consultation under section 7 of the ESA is required for projects that may lead to depletions of water from any system that is a tributary to the Colorado River. Federal agency actions resulting in water depletions to the Colorado River system may affect the threatened humpback chub (*Gila cypha*), endangered bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), and razorback sucker (*Xyrauchen texanus*), and their designated critical habitats. Critical habitat is designated for Colorado River Fish in Colorado and Utah in downstream riverine habitat in the Yampa, Green, and Colorado River systems (see 50 CFR 17.95(e)). For additional information, see Federal Register notice (59 FR 13374; March 21, 1994).

Water depletions include evaporative losses and consumptive use of surface or groundwater within the affected basin, often characterized as diversions minus return flows. Project elements that could be associated with depletions include, but are not limited to: ponds, lakes, and reservoirs (e.g., detention, recreation, irrigation, storage, stock watering, municipal storage, and power generation); drilling, hydraulic fracturing and completion of oil and gas wells; hydrostatic testing of pipelines; water wells; dust abatement; diversion structures; and water treatment facilities. Any actions that may result in water depletions should be identified. An analysis of the water depletion should include: an estimate of the amount and timing of the average annual water use (both historic and new uses) and methods of arriving at such estimates; location of water use or where diversion occurs, as specifically as possible; if and when the water will be returned to the system; and the intended use of the water. Depending on Project details, the Service may have more specific questions regarding the potential consumptive use of the water.

The Service, in accordance with the Upper Colorado River Endangered Fish Recovery Program (https://coloradoriverrecovery.org/uc/), adopted a *de minimis* policy, which states that water-related activities in the Upper Colorado River Basin that result in less than 0.1 acre-foot per year of depletions in flow have no effect on the Colorado River endangered fish species and their critical habitat, and thus do not require consultation for potential effects on those species and critical habitat. Similarly, detention basins designed to detain runoff for less than 72 hours, and temporary withdrawals of water outside of critical habitat (e.g., for hydrostatic pipeline testing) that return all the water to the same drainage basin within 30 days, are considered to have no effect and do not require consultation.

Monarch Butterfly

In December 2020, after an extensive assessment of the Monarch Butterfly (*Danaus plexippus plexippus*) the Service determined that the monarch was warranted for listing under the ESA but is precluded at this time by higher priority listing actions. With this finding, the monarch butterfly becomes a candidate for listing, and we will review its status each year until we are able to begin developing a proposal to list the monarch. Conservation measures for candidate species are voluntary, but protection provided to candidate species now may preclude possible listing in the future.

The monarch is a large butterfly that lives in a variety of habitats throughout North America and various additional locations across the globe. The monarch needs milkweed (*Asclepias* spp.) for breeding. Through simple conservation actions like planting native milkweed and nectar sources everyone can help provide a future filled with monarchs. Adults use a wide variety of flowering plants throughout migration and breeding. Important nectar sources during the spring migration typically include *Coreopsis* spp., *Viburnum* spp., *Phlox* spp., and early blooming milkweeds. Important nectar sources during fall migration include goldenrods (*Solidago* spp.), asters (*Symphyotrichum* spp. and *Eurybia* spp.), gayfeathers (*Liatris* spp.), and coneflowers (*Echinacea* spp.). Other important nectar sources include willow (*Salix* sp.), sunflower (*Helianthus* spp.), thistle (*Cirsium* spp.) and sage (*Salvia* spp.). Lists of preferred nectar plants by region specific to monarchs can be found at http://www.xerces.org/monarch-nectar-plants/.

The Service encourages cooperative conservation efforts for candidate species because they are, by definition, species that may warrant future protection under the ESA. Because the Project is scheduled to be built after November of 2023, we recommend mapping of potential monarch habitat in the Project area. Specifically, documenting incidentally observed monarchs and locations where milkweed (*Asclepias spp.*) occurs, as well as other areas attractive to pollinators may be beneficial for future consultation if the monarch is listed under the ESA.

Although construction and operation of the Project is not scheduled to begin for some years, Projects such as this have a unique opportunity to provide habitat for the monarch as the Project areas are reclaimed, by planting regionally appropriate native milkweed and flowering plants that provide nectar. For a regional and season specific plant list, see Xerces Society Recommendations at Monarch Nectar Plant Guides | Xerces Society. In addition, incorporating all or some of the following Best Management Practices (BMPs) may benefit a variety of pollinators including the monarch butterfly by helping to retain existing seed sources and create new sources for monarch within the Project area during and after Project completion.

- Adjust timing of vegetation management in areas containing plants used by monarchs to not interfere with monarch breeding or nectaring along the migration route. (MowingForMonarchs.pdf (monarchjointventure.org)).
- Eliminate or reduce the use of pesticides. Insecticides can result in direct mortality to monarchs and herbicides can eliminate needed host and nectar plants.
- If pesticides are used, select pesticides that are specific to the pest; time applications to avoid monarch activity periods; establish buffers; and minimize drift to non-target areas by direct ground application. These measures can help retain existing seed sources and create new sources for monarch to continue to be present within the Project area after Project completion.

North American Wolverine

On May 26, 2022, the Service's Federal District Court of Montana reinstated the proposed rule to list the North American wolverine (*Gulo gulo luscus*) in the contiguous United States as a threatened species under the ESA. The Service encourages project proponents to consider their project's impacts to the wolverine. The wolverine is the largest member of the Mustelidae (weasel) family and resembles a small bear with a bushy tail. It has a broad, rounded head; short, rounded ears; and small eyes. Each foot has five toes with curved, semi-retractile claws used for digging and climbing. Persistent, stable snow greater than 5 feet deep appears to be a requirement for natal denning as it provides security for offspring and buffers cold winter temperatures. Wolverines occur within a wide variety of alpine, boreal, and arctic habitats, including boreal forests, tundra, and western mountains. The North American wolverine occurs in habitats in Alaska, western Canada, and the western contiguous United States. South of the Canadian border, wolverines are restricted to high mountain environments near the treeline, where conditions are cold year-round and snow cover persists well into the month of May. Wolverines primarily scavenge carrion, but also consume small animals, birds, fruits, berries, and insects. Potential threats to the wolverine include climate change, dispersed recreation, transportation corridors, and land management activities.

Ute Ladies'-tresses

Ute ladies'-tresses (*Spiranthes diluvialis*) is a federally threatened perennial orchid listed under the ESA (57 FR 2048; January 17, 1992). Ute ladies'-tresses is eight to 20 inches tall, with white or ivory flowers clustered into a spike arrangement at the top of the stem. Ute ladies'-tresses typically blooms from late July through August. However, it may bloom in early July or still be in flower as late as October, depending on location and climatic conditions. Ute ladies'-tresses is endemic to moist soils near wet meadows, springs, lakes, and perennial streams where it colonizes early successional point bars or sandy edges. The elevation range of known occurrences is 4,200 to 7,000 feet (although no known populations in Wyoming occur above 5,750 feet). Soils where Ute ladies'-tresses have been found typically range from fine silt and sand to gravels and cobbles, as well as to highly organic and peaty soil types. Ute ladies'-tresses is not found in heavy or tight clay soils or in extremely saline or alkaline soils. Ute ladies'-tresses typically occurs in small, scattered groups found primarily in areas where vegetation is relatively open. Ute ladies'-tresses do not flower every year, and therefore, three years of surveys are necessary to determine presence or absence of Ute ladies'-tresses. Surveys should be conducted by knowledgeable botanists trained in conducting rare plant surveys. TerraPower identified limited Ute ladies'-tresses habitat in the Project area, which will be resurveyed in 2023 and 2024 during the blooming period. Ute ladies'-tresses do not flower every year; therefore, we recommend at least 3 years of surveys (2023, 2024, and 2025) during the blooming period for the species in all potential habitat within the Project area.

Threats include modification of riparian habitat, such as stream channelization and stabilization, or projects that effect downstream hydrology or hydrograph. The orchid is highly palatable, and grazing can be detrimental if it occurs during the flowering season. Protective measures for Ute ladies'-tresses include: (1) avoid surface disturbance within 500 feet of surface water and/or riparian areas, (2) prior to any onsite activities in or near riparian areas conduct surveys or inventories in accordance with Service guidelines to verify the presence or absence of Ute ladies'-tresses, (3) limit application of herbicides to on closer than 0.25 mile from known populations. (4) avoid grazing habitats containing Ute ladies'-tresses populations during the flowering period (July through September).

Yellow-billed Cuckoo

The distinct population segment (DPS) of the yellow-billed cuckoo (*Coccyzus americanus*) west of the Continental Divide is listed under the ESA as a threatened species (79 FR 59992; October 3, 2014). On September 16, 2020, the Service re-proposed critical habitat for the DPS, but critical habitat was not proposed in Wyoming (85 FR 57816). In Wyoming, the yellow-billed cuckoo is dependent on large areas of woody, riparian vegetation that combine a dense shrubby understory for nesting and a cottonwood overstory for foraging. Destruction, degradation, and fragmentation of wooded, riparian habitats are continuing threats to yellow-billed cuckoos in Wyoming. Additionally, project actions to control outbreaks of caterpillars, cicadas, or grasshoppers and the general use of insecticides in or adjacent to riparian areas may negatively affect yellow-billed cuckoos. Surveys to determine the presence of yellow-billed cuckoos are difficult due to the secretive nature of the species and the variability in the timing of nesting. We recommend that projects avoid impacting large, woody riparian areas from late May to September, during the period when yellow-billed cuckoos seasonally occur in Wyoming. However, TerraPower has identified no yellow-billed cuckoo habitat occurring in the survey area. To help us better understand the distribution and status of the species in Wyoming, we request that all sightings of yellow-billed cuckoos west of the Continental Divide be reported to our office.

Whitebark Pine

On December 15, 2022, the Service published a final rule (87 FR 76882) to list the whitebark pine *(Pinus albicaulis*) as a threatened species under the ESA. We also published a special rule pursuant to section 4(d) of the ESA that identifies actions necessary to conserve and recover the whitebark pine, as well as a limited number of prohibited acts and exceptions to the prohibited acts (87 FR76882). The rules followed a proposal to list the species on December 2, 2020 (85 FR 77408), with a subsequent public comment period, and is based on a rigorous Species Status Assessment using the best available science conducted by the Service in 2018 and updated in 2021. The 4(d) rule does not relieve federal agencies of their obligations under section 7 of the ESA. The Service is not designating critical habitat for this species, because habitat loss is not a threat to the species' continued survival; mortality from disease from non-native white pine blister rust is the primary threat. Other major threats include predation by the native mountain pine beetle, impacts from altered fire regimes, climate change, and the combined negative effects of these individual threats.

In Wyoming, whitebark pine usually occurs above 8,000 feet on cold and windy subalpine to alpine sites. Whitebark pine is a five-needle pine that is typically 16 to 66 feet tall with a rounded or irregularly spreading crown shape. When located in relatively dense stands of conifers, whitebark pines tend to grow as tall, single-stemmed trees. In open, more exposed sites, trees frequently have multiple stems. Above tree line, the species grows in a krummholz form (stunted, shrub-like growth). Dark brown to purple seed cones grow at the outer ends of upper branches and are 2 to 3 inches long. The scales of the cones are thick and do not open on their own. Whitebark pine is almost exclusively dependent upon Clark's nutcracker (*Nucifraga*

columbiana), a bird in the family Corvidae (whose members include ravens, crows, and jays), to open its cones and disperse the seeds.
The presence of whitebark pine promotes increased biodiversity and contributes to critical ecosystem functions. Whitebark pine is frequently the first conifer to establish after disturbances such as wildfires. Snow drifts form around whitebark pine trees, thereby increasing soil moisture, modifying soil temperatures, and holding soil moisture longer. The shade from whitebark pine trees slows the progression of snowmelt, reducing spring flooding at lower elevations. Whitebark pine also provides highly nutritious seeds for numerous species of birds and mammals.

Eagles and Migratory Birds

Under the MBTA, the Eagle Act, and Executive Order 13186 (66 FR 3853; January 17, 2001), federal agencies have an obligation to protect all species of migratory birds, including eagles and other raptors, on lands under their jurisdiction. The Service has identified bird species of highest conservation priority in the 2021 Birds of Conservation Concern Report (https://www.fws.gov/sites/default/files/documents/birds-of-conservation-concern-2021.pdf). In accordance with the Fish and Wildlife Conservation Act (16 USC 2912 (a)(3)), this report identifies "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing" under the ESA. This report is intended to stimulate coordinated and proactive conservation actions among federal, state, and private partners.

The MBTA, enacted in 1918, protects migratory birds, eggs and nests from possession, sale, purchase, barter, transport, import, export, and take. The regulatory definition of take, defined in 50 CFR 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to hunt, shoot, wound, kill, trap, capture, or collect a migratory bird. Activities that result in the intentional, unpermitted take or incidental take of migratory birds or their eggs are illegal and fully prosecutable under the MBTA (https://www.fws.gov/regulations/mbta/). Removing or destroying active nests (i.e., nests that contain eggs or young) or causing abandonment of an active nest could constitute a violation of the MBTA, the Eagle Act, or both statutes. Therefore, if nesting migratory birds are present on or near the Project area, timing is an important consideration during Project planning. As discussed below, the Eagle Act provides additional protections for bald and golden eagles and their nests.

The Service's Wyoming Ecological Services Field Office works to raise public awareness about the possible occurrence of birds in proposed project areas and the risk of killing or injuring birds or destroying active nests. Our office provides recommendations to minimize the likelihood that injury or death will occur. We encourage coordination with our office before conducting actions that could lead to the death or injury of a migratory bird, their young, eggs, or the abandonment or destruction of active nests (e.g., construction or other activity in the vicinity of an active nest). If nest manipulation is proposed for the Project in Wyoming, the Project proponent should contact the Service's Migratory Bird Management Office in Lakewood, Colorado at 303-236-8171 to see if a permit can be issued. Permits generally are not issued for an active nest of any migratory bird species, unless removal of the nest is necessary to address human health and safety. If a permit cannot be issued, the Project may need to be modified to avoid impacting migratory birds, their young or eggs.

For infrastructure or facilities that have potential to cause direct avian mortality (e.g., wind turbines, guyed towers, airports, wastewater disposal facilities, transmission lines), we recommend locating structures away from high avian-use areas such as those used for nesting, foraging, roosting, or migrating, and the movement zones between high-use areas. If the wildlife survey data available for the proposed Project area and vicinity do not provide the detail needed to identify normal bird habitat use and movements, we recommend collecting that information prior to determining locations for any infrastructure that may create an increased potential for avian mortalities. Please contact our office for Project-specific recommendations.

The Eagle Act protections include provisions not included in the MBTA, such as the protection of unoccupied nests and a prohibition on disturbing eagles. Specifically, the Eagle Act prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagle or their body parts, nests, chicks, or eggs, which includes collection, possession, molestation, disturbance, destruction, or killing. The term "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.3 and see also 72 FR 31132).

The Eagle Act includes limited exceptions to its prohibitions through a permitting process. The Service has issued regulations concerning the permit procedures for exceptions to the Eagle Act's prohibitions (81 FR 91494; December 16, 2016), including permits to take golden eagle nests which interfere with resource development or recovery operations (50 CFR 22.25). The regulations identify the conditions under which a permit may be issued (i.e., status of eagles, need for action), application requirements, and other issues (e.g., mitigation, monitoring) necessary in order for a permit to be issued. In Wyoming we recommend a 1.0-mile buffer for bald eagles due to the sparse tree cover and the limited number of bald eagles in the state. For additional recommendations specific to Bald Eagles please see our national Eagle Management web page (https://www.fws.gov/library/collections/bald-and-golden-eagle-management)

One adult golden eagle and a sub adult bald eagle were observed in or around the Project area during field surveys. Although not described in the report, it is likely that other non-eagle raptors also occur in or around the Project area. Because TerraPower is early in the development process, we recommend conducting eagle and raptor nest surveys for 2 miles around the Project area, with 1 year of seasonal nest surveys occurring the year before construction begins. These surveys will better inform agency recommendations and facilitate permitting processes, if needed. In addition, the IPaC identified black rosy-finch (*Leucosticte atrata*), Cassin's finch (*Carpodacus cassinii*), rufous hummingbird (*Selasphorus rufus*), western grebe (*Aechmophorus occidentalis*), and willet (*Tringa semipalmata*) as BCCs that may occur in the Project area. During June 2022 surveys, only western grebes were observed in an NPP pond. Given that western grebes use facilities around the Project area, and surveys of the Project area occurred only in June 2022, we recommend TerraPower conduct additional avian surveys, with 1 year of seasonal surveys occurring the year before construction begins.

Closing Remarks

For our internal tracking purposes, we would appreciate notification of any decision made (such as issuance of a permit or signing of a Record of Decision or Decision Memo) and any additional surveys and analysis conducted for the Project be sent by electronic mail to WyomingES@fws.gov.

We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If you have questions regarding this letter or your responsibilities under the ESA and/or other authorities or resources described above, please contact Kevin Salgado of my office by email at kevin_salgado@fws.gov or by phone at (307) 757-3717.

Sincerely,

NATHAN DARNALL Digitally signed by NATHAN DARNALL Date: 2023.05.01 14:14:22 -06'00'

for Tyler A. Abbott
Field Supervisor
Wyoming Field Office

cc: WGFD, Statewide Habitat Protection Program, Cheyenne, WY (wgfd.hpp@wyo.gov)

A.2 Wyoming Game and Fish Department Correspondence

TerraPower.

March 16, 2023

TP-LIC-LET-0063
Project Number 99902100

Ms. Angi Bruce
Deputy Director, External Operations
Wyoming Game & Fish
Department Headquarters
5400 Bishop Blvd.
Cheyenne, WY 82006
Angela.bruce@wyo.gov

Subject: Kemmerer Power Station Unit 1 Introduction

Dear Mr. Abbott:

TerraPower is preparing a Construction Permit Application to the U.S. Nuclear Regulatory Commission (NRC) for a 345 MWe sodium-cooled Natrium™ Reactor Plant to be built at a site in southwestern Wyoming. The Natrium Reactor Plant is a TerraPower & GE-Hitachi technology. The proposed generating facility (Kemmerer Power Station Unit 1) would be located approximately three miles south of the city limit of Kemmerer, Wyoming, and a short distance southeast of the existing Naughton Power Plant (Figure 1). Kemmerer Power Station Unit 1 (Kemmerer Unit 1) is intended to replace the Naughton Power Plant's three aging fossil-fired units, scheduled for retirement in 2025 (Units 1 and 2) and 2029 (Unit 3).

Two transmission lines and a water supply pipeline that would be approximately six miles long would connect Kemmerer Unit 1 to existing Naughton Power Plant infrastructure (switchyard and raw water pond). Final routes for the transmission lines and water pipeline have not been determined at this time. A survey corridor was defined to capture the potential range of feasible options for the routes as well as to capture an area large enough to encompass the extent of potential impacts that could occur during construction of the transmission and water lines (Figure 2). Kemmerer Unit 1 and the associated transmission lines and water supply pipeline would be located entirely on privately owned land.

The Naughton Power Plant uses a closed-cycle, recirculating cooling water system with mechanical draft cooling towers. Water for cooling tower makeup is withdrawn from a cooling water intake structure (CWIS) standing on the west bank of Hams Fork, approximately

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seven miles north of the Naughton Power Plant. Water is pumped from the CWIS to the Naughton Power Plant via two underground pipes. Both pipes discharge into the Naughton Power Plant's raw water storage pond. Water is then pumped out of the raw water storage pond to the individual generating units for cooling. The raw water storage pond holds several days' supply of makeup water.

Kemmerer Unit 1 would use the existing Naughton Power Plant's CWIS after the fossil units have been retired. Makeup water would be pumped from Hams Fork to the raw water storage pond as before, but when Kemmerer Unit 1 is operational, water from the raw water storage pond would be piped there for cooling tower makeup. The Naughton Power Plant's CWIS was deemed Best Available Technology by the Wyoming Department of Environmental Quality when the last National Pollutant Discharge Elimination System permit was issued in 2018, due to low overall water demand.

The NRC requires that the Construction Permit Application include an Environmental Report that assesses potential impacts from plant construction and operation on a range of resources, including "important species." Important species in this context include state and federally listed species, species proposed for federal listing, species that are candidates for federal listing, the two species protected under the Bald and Golden Eagle Protection Act, and commercially or recreationally valuable species.

The U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC) report for the Project area indicated that the following federally listed and candidate species could be "potentially affected by activities at this location:"

- Bonytail (*Gila elegans*); endangered
- Colorado pikeminnow (*Ptychocheilus lucius*); endangered
- Humpback chub (*Gila cypha*); threatened
- Razorback sucker (*Xyrauchen texanus*); endangered
- Yellow-billed cuckoo (*Coccyzus americanus*); threatened
- Monarch butterfly (*Danaus plexippus*); candidate species
- Ute ladies'-tresses (*Spiranthes diluvial is*); threatened.

Our desktop review of the scientific literature and information on resource agency websites [e.g., the Wyoming Natural Diversity Database (WYNDD)] in conjunction with reconnaissance visits our biologists took in October and December 2021 suggested that only two of these species, the Monarch butterfly and Ute ladies'-tresses, are likely to be present.

Given the emphasis the 2017 Wyoming State Wildlife Action Plan placed on management and conservation of species designated "Species of Greatest Conservation Need" (SGCN) by the

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Wyoming Game and Fish Department (WGFD), it was determined by TerraPower these species are also "important" and should be considered in TerraPower's evaluation. A Wyoming Natural Diversity Database (WYNDD) query revealed that 59 SGCN could potentially occur in the vicinity of the Kemmerer Unit 1 site (within five miles).

Having completed the desktop review in the spring of 2022, field surveys were commissioned to support the environmental impact assessment. A team of biologists with extensive experience conducting wildlife surveys and habitat assessments in the Intermountain West carried out Terrestrial Visual Encounter Surveys (TVES) of the Survey Area (see Figure 2) in June 2022.

Eight Wyoming SGCN were observed within the Survey Area, including seven birds and one mammal. The SGCN recorded on site during the wildlife survey were the American white pelican (*Pelecanus erythrorhynchos*), ferruginous hawk (*Buteo regalis*), Swainson's hawk (*B. swainsoni*), golden eagle (*Aquila chrysaetos*), sage thrasher (*Oreoscoptes montanus*), common yellowthroat (*Geothlypis trichas*), Brewer's sparrow (*Spizella breweri*), and white-tailed prairie dog (*Cynomys leucurus*). In addition to being a Wyoming SGCN, golden eagles are fully protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d).

In addition, two waterbird species on the WGFD list of SGCN, the Clark's grebe (*Aechmophorus clarkii*) and western grebe (*A. occidentalis*), were observed on one of the Naughton Power Plant ponds a short distance outside of the Survey Area and may use wetlands in, or adjacent to, the area seasonally. A single bald eagle (*Haliaeetus leucocephalus*; a sub-adult) was also observed offsite, perching on a transmission line.

Because the IPaC project review indicated that Ute ladies'-tresses (ULT) could be present, a consulting wetland scientist/botanist surveyed wetlands within the site area in early September 2022 to determine if any contained ULT or suitable habitat for the species. No ULT were observed and no high quality ULT habitat was found. Areas judged to provide marginally suitable habitat for ULT will be re-surveyed during the July 20-August 31 blooming period in 2023 and 2024, in accordance with U.S. Fish and Wildlife Service's "Interim Survey Requirements for Ute Ladies-tresses Orchid (*Spiranthes diluvialis*)."

Finally, aquatic biologists under contract to TerraPower conducted baseline fish and benthic macroinvertebrate surveys of two streams that could be affected, Hams Fork and North Fork Little Muddy Creek, in October 2022. A total of 153 fish representing six species were collected from segments of North Fork Little Muddy Creek upstream of, adjacent to, and downstream of the Kemmerer Unit 1 site. Two common species, redside shiner (*Richardsonius balteatus*) and speckled dace (*Rhinichthys osculus)*, dominated North Fork Little Muddy Creek collections. A total of 1,246 fish representing eight species were collected from three

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segments of Hams Fork, a much-larger stream: one adjacent to the Naughton Power Plant CWIS and two upstream of the CWIS. Redside shiners and white suckers (*Catostomus commersonii*) were the species most often collected. Most fish collected from both streams were hardy cyprinids and catostomids found across the Intermountain West. No rare, unusual, or special-status fish species were collected from either stream. These streams will be surveyed again in spring and summer 2023.

This letter is intended to provide your office with background information regarding the proposed Kemmerer Unit 1 plant and share some preliminary findings. Please respond with a letter that details any concerns regarding potential impacts to "important" species, including those designated SGCN by Wyoming Department of Game and Fish and recreationally important game species such as pronghorn and mule deer. TerraPower will include a copy of this letter and your response in the Environmental Report that will be submitted to the NRC as part of the Construction Permit Application.

Ms. Lisa Matis is the point of contact with our consultant, Tetra Tech, Inc., for environmental issues regarding Kemmerer Unit 1. Ms. Matis can be reached at (803) 295-2113 or lisa.matis@tetratech.com if you have any questions.

If you have questions generally regarding Kemmerer Unit 1, please contact Ryan Sprengel at rsprengel@terrapower.com or (425) 324-2888.

Sincerely,

Ryan Sprengel
Director of Licensing
TerraPower, LLC

Enclosure:

1. Kemmerer Power Station Unit 1 Figures

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ENCLOSURE 1

Kemmerer Power Station Unit 1 Figures

Figure 1 - Kemmerer Power Station Unit 1 Location

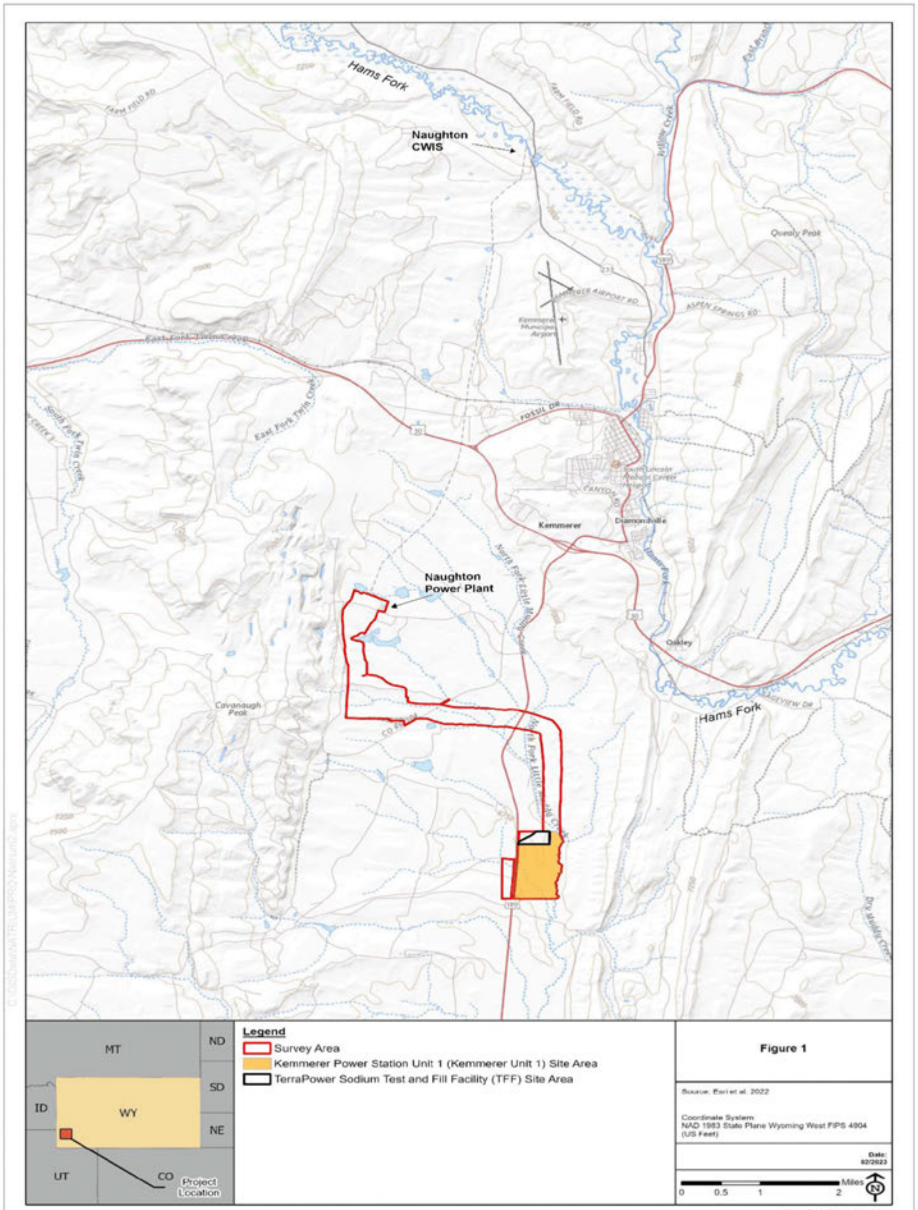

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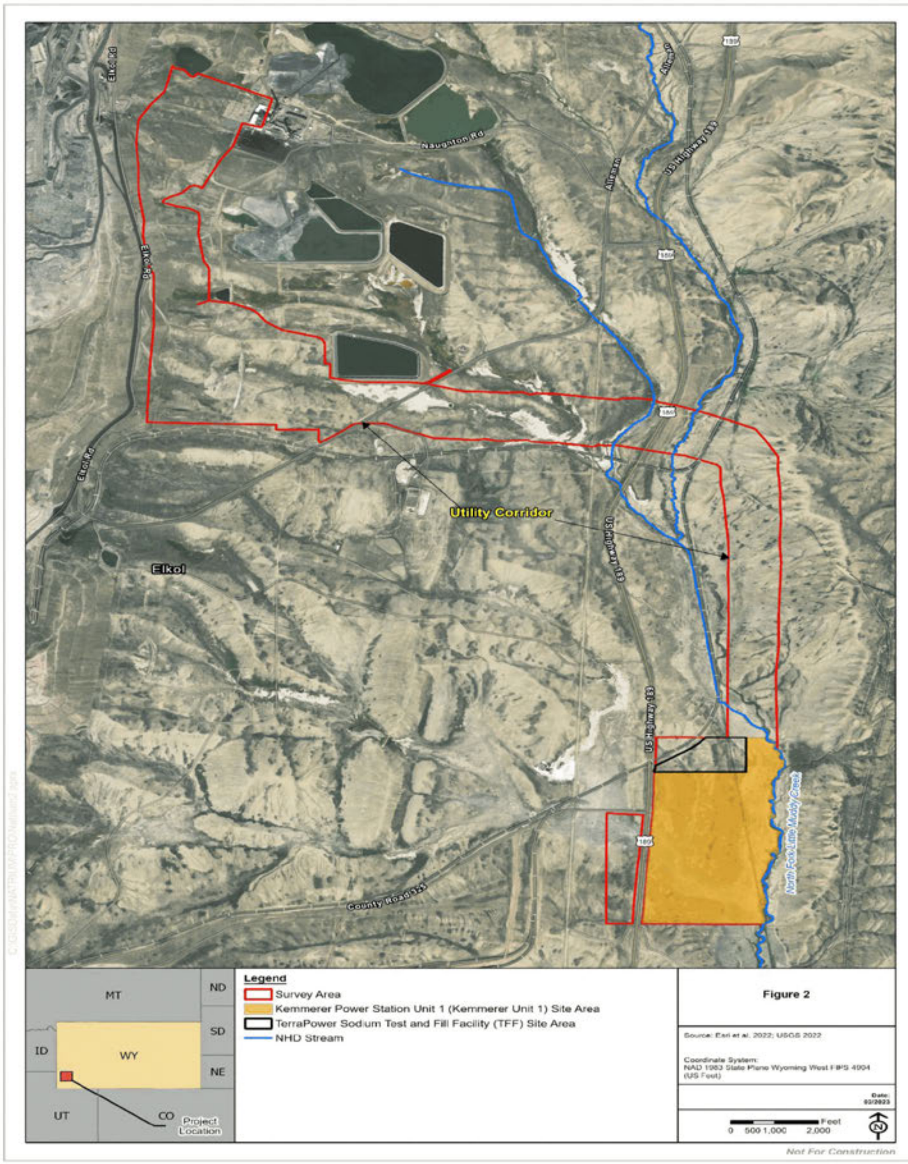
Figure 2 - Kemmerer Power Station Unit 1 Utility Corridor



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WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006
Phone: (307) 777-4600 Fax: (307) 777-4699
wgfd.wyo.gov

April 27, 2023

WER 15017.00
TerraPower, LLC
Kemmerer Power Station Unit 1
Natrium Reactor Plant
Lincoln County

Ryan Sprengel
TerraPower, LLC
15800 Northup Way
Bellevue, WA 98008
rsprengel@terrapower.com

Dear Mr. Sprengel,

The staff of the Wyoming Game and Fish Department (Department) has reviewed the introduction letter to the proposed Kemmerer Power Station Unit 1 for a Natrium Reactor Plant located in T20N R116W Section 19 and 20. The Department is statutorily charged with managing and protecting all Wyoming wildlife (W.S. 23-1-103). Pursuant to our mission, we offer the following comments for your consideration.

The proposed project includes the development of a 345 MWe nuclear power plant and the supporting infrastructure including transmission lines and a water supply pipeline. The footprint of the facility is approximately 340 acres and the transmission lines and water pipeline would extend for approximately 6 miles. The plant and all infrastructure is located on private lands.

To date, the proponent has conducted a desktop assessment to identify potential wildlife species and habitats of concern, and initial site visits for wildlife surveys and habitat assessments. We look forward to receiving a more detailed report of the survey methods used and to working with you to minimize impacts to wildlife and their habitats. Terrestrial wildlife surveys were conducted in June and aquatic surveys were conducted in October. Nine avian Species of Greatest Conservation Need (SGCN) were observed including: American white pelican, ferruginous hawk, Swainson's hawk, golden eagle, sage thrasher, common yellowthroat, Brewer's sparrow, Clark's grebe, and western grebe. White-tailed prairie dogs were the only SGCN mammal observed. No SGCN aquatic species were reported.

The area proposed for development is within antelope crucial winter/yearlong range and is within the distribution of 68 SGCN, including 11 priority species (Attachment A). There are documented raptor nests within one mile of the proposed project including golden eagle, prairie falcon, and

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red-tailed hawk. The proposed project also overlaps National Wetland Inventory-designated wetlands.

Terrestrial Recommendations:

Protect Big Game Crucial Range - The proposed project is within antelope crucial winter/yearlong range. The Department defines crucial range as the habitat component which has been documented as the determining factor in a population's ability to maintain itself over the long term. As such, minimizing project-related impacts to antelope will be important to promote population stability and to minimize impacts to hunting opportunity. The Department recommends the following to conserve, protect, and maintain function of antelope crucial winter/yearlong range at the proposed project site:

- Avoid ground-disturbing activities from November 15-April 30.
- After construction, minimize human presence to the extent possible from November 15-April 30.
- Minimize the use the fencing to the extent possible. Where appropriate, install fencing that meets wildlife-friendly specifications. Provide adequate gates for egress in areas where big game may become entrapped.
- Bury pipelines to avoid movement barriers to big game.
- Minimize habitat conversion and fragmentation in big game crucial range whenever possible.

Protect Species of Greatest Conservation Need – As previously mentioned, the proposed project area overlaps the distribution of 68 SGCN, including 11 priority species. Given that many SGCN require specialized and targeted surveys to accurately document suitable habitat and presence, we recommend the following surveys to avoid and minimize impacts to SGCN.

Nesting Raptors –Raptors are protected under federal law and nests are present in the vicinity of the proposed project. Disturbances which affect nesting success can impact local population numbers.

- Perform surveys for nesting raptors within 1 mile of the project area prior to any vegetation clearing or ground-disturbing activities. Special attention should be given to probable nesting habitat such as stands of cottonwood trees, stands of conifers, lone trees, cliffs, rock outcrops, and prairie dog colonies.
- If any raptor nests or bald eagle winter roosts are detected, follow U.S. Fish and Wildlife Service (Service) seasonal and spatial timing stipulations, available at https://www.fws.gov/media/wyoming-ecological-services-field-office-raptor-guidelines-2022.
- Burrowing owls nest underground and require specialized surveys to ensure an adequate likelihood of detection. Burrowing owls have been documented near the project site and

surveys to avoid impacts to burrowing owls will be necessary. The Department can provide detailed survey protocols upon request.

Mountain plover – During the breeding season, mountain plover use shortgrass and mixed-grass prairie, shrub-steppe landscapes, prairie dog colonies, and agricultural lands. They typically nest on sites with sparse vegetation that is less than 4 inches (10 cm) tall, slope less than 5 degrees, and a significant bare ground component.

- Conduct surveys in suitable habitat within 0.25 miles of the project area during the breeding season between April 17 and May 15. Sites should be surveyed three times with a minimum of 5-7 days between visits.
- Conduct surveys between local sunrise and 1000, or from 1730 to sunset (periods of horizontal light to facilitate spotting the white breast of adult plovers).
- Use vehicles or all-terrain vehicles to conduct surveys if at all possible. Mountain plover cannot be effectively surveyed by a walking observer.
- Use call-back devices to increase detection rates.
- Surveys should be conducted by qualified biologists with experience identifying birds by sound and sight.
- If occupied breeding habitat is detected, time any ground-disturbing activity in or within 0.25 miles of occupied habitat after July 31 or after nesting is complete.

Pygmy rabbit – Pygmy rabbit are limited to areas of taller, denser sagebrush habitat in southwestern Wyoming and have been documented near the proposed project site.

- Conduct surveys for presence in areas of suitable habitat within 0.25 miles of the project area. Presence can be confirmed though detection of individuals, as well as sign (e.g., scat, burrows, runways, etc.). Surveys are most effective when conducted following snow fall during the winter months.
- Minimize surface occupancy or habitat conversion of tall, dense stands of Wyoming big sagebrush (*Artemisia tridentata*). Maintain corridors between dense sagebrush stands when possible to allow for dispersal.
- To the extent possible, offset development of roads, pads, and infrastructure >0.25 miles from areas occupied by pygmy rabbits, and avoid activities that compact soils within occupied habitat, which may limit burrow development and maintenance.

White-tailed prairie dog – White-tailed prairie dogs are a Wyoming SGCN, and their colonies provide habitat for a number of other SGCN. White-tailed prairie dogs were documented within the survey area during the initial site visits.

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- Conducting surveys during summer months, preferably during the green-up period from May to July. To map colonies, circumnavigate the colony by walking from active burrow to active burrow along the outer periphery of each colony.
- Develop outside the mapped boundaries of prairie dog colonies to the extent possible.

Migratory Bird Clearance Surveys – Other Wyoming SGCN migratory bird species may be present along the development corridor.

- Conduct nest searches within 72 hours prior to disturbance from April 10 to July 15. A migratory bird nest clearance survey in late February as suggested in the provided documentation will not be effective at minimizing impacts to migratory birds.
- Nest searches should be conducted by biologists with ample nest searching experience.
- If a migratory bird nest is found, cease operations in proximity to the nest until the birds have fledged and can leave the area. Development of an approved mitigation plan in coordination with the Service may allow for sooner initiation of operations.

Great Basin Spadefoot - Great Basin spadefoot have specific breeding habitat requirements in Wyoming. To minimize impacts to this species, avoid disturbance to ephemeral wetlands, including playas, dune ponds, and shallow oxbows/backwaters, when possible. If disturbance is necessary, avoid disturbing sites until they are completely dry.

Northern Leopard Frog - Northern leopard frogs are associated with permanent water features (e.g., lakes, ponds, backwater/oxbows, rivers, and creeks in plains and basins). Populations in various locations throughout Wyoming have declined significantly or been extirpated and populations throughout the western United States in general are in decline.

- When working in breeding habitats, avoid construction and habitat alteration during months when amphibians are concentrated and vulnerable (April to September). If disturbance is necessary, minimize destruction of critical habitat features (e.g., willows, portions of wetlands and shorelines with shallow stagnant or slow-moving water and emergent vegetation).

Greater Short-horned Lizard - Minimize disturbance to native grasslands and to open sandy areas and sandy blow-outs within grasslands and mixed grass shrublands whenever possible.

Minimize Spread of Noxious Weeds and Invasive Annual Grasses (IGAs) - Noxious weeds and IAGs can cause significant harm to the ecosystem when introduced. Ground disturbing activities can create an environment that facilitates establishment by unwanted plants. They significantly reduce the quality of wildlife habitat and their presence increases the probability of catastrophic wildfire. The potential economic impacts to the State of Wyoming are severe, and once these species become established, eradication is difficult and costly. Prevention of establishment remains the best way to keep Wyoming's habitats free of noxious weeds and IAGs.

The most significant known threat to Wyoming is from cheatgrass, medusahead, and ventenata. To prevent the spread of noxious weeds and IAGs, we recommend the following:

- Prevent introduction and establishment by cleaning vehicles and equipment prior to movement to a new location in order to minimize the potential for transporting seeds.
- Develop and implement a plan to assess, treat, and monitor for noxious weeds and invasive plants at the project scale through reclamation.

Minimize Excessive Artificial Lighting - Artificial lighting can have negative impacts to wildlife, including changing behavior and land use, disorienting wildlife, and potential increased mortality risk. The best approach to mitigate impacts from artificial lighting is to avoid its use whenever possible. Facilities should minimize light pollution whenever feasible and use the best available technologies.

- Use only fully shielded, dark-sky friendly fixtures, so lights shine down towards the ground.
- Use only the amount of light needed.
- Install timers, motion sensors, or dimmer switches. Turn off lights when not in use.
- Limit the use of artificial lighting during peak migration periods. Use warmer-colored lights (<2200 Kelvin) versus cooler-colored light on the white-blue end of the spectrum (≥2200 Kelvin).
- Reduce lighting intensity and timing during periods of bird and bat migration. Efforts should be made to limit light pollution in sensitive habitats (e.g., bat roosting areas, migratory corridors, bird nesting areas, areas of SGCN concentration, or areas where large congregations of wildlife occur), and around aquatic features.

Minimize Fence Collision Risk – Many species of birds, including sage-grouse, raptors, and waterfowl, are at risk of death by collision with fences. Bird diverters are low-cost and highly effective markers that make fences in high-risk areas more visible to birds and thereby reduce deaths. The Department recommends 3-inch vinyl markers along the top wire at 3-foot intervals, with fence posts serving as markers.

Minimize Impacts from Industrial Surface Water and Evaporation Ponds – The Department acknowledges ponds to support the project are already present and will be used. If pond designs change or additional ponds are needed, we recommend consideration of wildlife-friendly methods to minimize risk. Wildlife are attracted to open water, particularly in Wyoming's arid environments, which can result in accidental drowning or poisoning due to poor water quality. To mitigate impacts to wildlife:

- Place escape ramps in steep-sided or lined tanks and ponds to prevent entrapped wildlife from drowning.

- Monitor ponds for wildlife mortality and have a contingency plan for wildlife entrapment or mortality incidents (i.e., if a waterfowl or amphibian die-off is observed contact the Department and the Service immediately). If repeated strandings or deaths occur, develop a Deterrence and Rehabilitation Program in coordination with the Service and the Department.
- Monitor the toxicity of the ponds over time, and develop a mitigation plan to exclude wildlife from the water, as needed.
- Construct ponds in areas undesirable to wildlife, such as those with high human use or with high levels of disturbance.

Minimize Impacts from Electrical Power Lines – Above-ground power lines can result in increased bird deaths due to electrocution and collisions. The proposed corridor may overlap high-use areas for birds. To reduce electrocution and collision risk to birds:

- Bury power lines. If burying lines is not feasible,
  - Route above-ground lines away from high-use areas for birds, including riparian corridors.
  - Follow the Avian Power Line Interaction Committee's guidelines for mitigating electrocution and collision risk for birds, available at: https://www.aplic.org/.
  - Coordinate with the Service to develop an Avian Protection Plan.

Aquatic Recommendations:

The introduction letter did not include detailed information regarding development and activities near the North Fork Little Muddy Creek and water use from the Hams Fork. Details were not provided regarding specific quantities of water use, potential impacts to flow, or the potential contaminants which may be intentionally or unintentionally released. The Department requests additional consultation as project details develop to ensure adequate efforts occur to account for and minimize impacts to aquatic resources, including but not limited to SGCN fishes, and the downstream sport fishery.

Based on the location of the proposed project, primary SGCN fishes that may be impacted include roundtail chub and flannelmouth sucker. Neither species were observed during initial surveys, however the Department has documented juvenile roundtail chub in the North Fork Little Muddy Creek and believe the creek may be used by spawning roundtail chub. The Department is also interested in potential impacts resulting from development and operations of the facility on populations of roundtail chub, flannelmouth sucker, and bluehead sucker downstream in Muddy Creek and the Blacks Fork River. Continued discussion on project specifics will help the Department further assess the potential for impacts.

Sediment and pollutant runoff from construction and operations can enter nearby waterways and negatively impact water quality and aquatic habitat. The Department recommends Best

Management Practices be used to control erosion and prevent sediment and other pollutants from reaching wetlands and other water sources, including:

- Avoid construction-related activities and development within 500 feet of the North Fork of Muddy Creek.
- Avoid habitat conversion and project activity within 500 feet of riparian and wetland habitat
- Preserve existing vegetation throughout the site wherever possible.
- Stabilize all exposed surfaces with vegetation, mulch, and/or soil binders.
- Utilize rolled erosion control products, temporary slope drains, fiber rolls, compost socks, and/or silt fences where appropriate.
- Clean, fuel, and maintain vehicles and equipment a minimum of 500 feet from aquatic habitats or preferably at designated off-site areas.
- Properly containing stockpiles of materials and locating them away from waterways or areas of potential storm water concentrated flow.
- Bore pipelines under all large ephemeral drainages and all perennial drainages including but not limited to the North Fork Little Muddy Creek.

Prevent Spread of AIS

Aquatic invasive species (AIS) are organisms that are not native to Wyoming and can cause significant harm to an ecosystem when introduced. Harmful impacts can occur to municipal water supplies, fishing and boating-related recreation, agriculture, aquaculture, and other commercial activities. The potential economic impacts to the State of Wyoming could be severe if these non-native species are introduced into our water systems. Once these organisms become established in a waterbody, there is very little that can be done to remove them. Prevention is the best way to keep a water body safe from AIS.

The most significant known threat to Wyoming is from zebra and quagga mussels based on their proximity and demonstrated impacts in neighboring states. Other AIS include New Zealand mudsnail, Asian carp, rusty crayfish, and several species of aquatic plants.

The spread of AIS from one body of water to another is a violation of Wyoming state statute (WS § 23-1-102 & §§ 23-4-201 through 205) and Wyoming Game and Fish Commission Regulation. To prevent the spread of AIS, the following is required:

- Equipment that was in contact with a water positive for zebra/quagga mussels (currently none in Wyoming) within the last 30 days, is required to undergo inspection by an authorized inspector prior to contacting a Wyoming water.
- From March through November, all water hauling equipment and watercraft entering the state by land must be inspected before contacting a water of the state.

- Equipment used in any Wyoming water that contains AIS, must be Cleaned, Drained and Dried before use in another water. Wyoming waters with AIS can be found at: https://wgfd.wyo.gov/Fishing-and-Boating/Aquatic-Invasive-Species-Prevention/AIS-Boating-Information.

When equipment that has been in contact with any Wyoming water is moved from one 4th level watershed (8-digit Hydrological Unit Code) to another within Wyoming, it must be Cleaned, Drained and Dried. Specific guidance is available at: https://wgfd.wyo.gov/Fishing-and-Boating/Aquatic-Invasive-Species-Prevention/AIS-Construction-and-Fire

Thank you for the opportunity to comment. If you have any questions or concerns please contact Ross Crandall, Habitat Protection Biologist, at (307) 367-5615.

Sincerely,

Will Schultz
Habitat Protection Supervisor

WS/rc/ch

cc: U.S. Fish and Wildlife Service
Chris Wichmann, Wyoming Department of Agriculture

Conserving Wildlife - Serving People

Attachment A. Species of Greatest Conservation Need with distributions that overlap the proposed project.

Conserving Wildlife - Serving People

Name	Taxa	SGCN	Tier	Priority Species
Great Basin Spadefoot	Amphibians	SGCN	II	Yes
Northern Leopard Frog	Amphibians	SGCN	II	Yes
Western Tiger Salamander	Amphibians	SGCN	III	
Western Toad	Amphibians	SGCN	I	
American Bittern	Birds	SGCN	II	
American Kestrel	Birds	SGCN	III	
American Pipit	Birds	SGCN	III	
American White Pelican	Birds	SGCN	II	
Ash-throated Flycatcher	Birds	SGCN	II	
Bald Eagle	Birds	SGCN	II	
Bewick's Wren	Birds	SGCN	III	
Black Tern	Birds	SGCN	II	
Black-crowned Night-Heron	Birds	SGCN	II	
Black-throated Gray Warbler	Birds	SGCN	II	
Boreal Owl	Birds	SGCN	II	
Brewer's Sparrow	Birds	SGCN	II	
Burrowing Owl	Birds	SGCN	I	Yes
Bushtit	Birds	SGCN	II	
Calliope Hummingbird	Birds	SGCN	II	
Canyon Wren	Birds	SGCN	III	
Clark's Nutcracker	Birds	SGCN	II	
Common Loon	Birds	SGCN	I	Yes
Common Nighthawk	Birds	SGCN	III	
Common Yellowthroat	Birds	SGCN	III	
Ferruginous Hawk	Birds	SGCN	II	Yes
Forster's Tern	Birds	SGCN	II	
Franklin's Gull	Birds	SGCN	II	
Golden Eagle	Birds	SGCN	II	
Great Blue Heron	Birds	SGCN	II	
Greater Sage-Grouse	Birds	SGCN	II	
Juniper Titmouse	Birds	SGCN	II	
Loggerhead Shrike	Birds	SGCN	II	
MacGillivray's Warbler	Birds	SGCN	II	
Mountain Plover	Birds	SGCN	I	Yes
Northern Goshawk	Birds	SGCN	I	
Peregrine Falcon	Birds	SGCN	II	Yes
Red Crossbill	Birds	SGCN	II	
Rufous Hummingbird	Birds	SGCN	II	
Sage Thrasher	Birds	SGCN	II	
Sagebrush Sparrow	Birds	SGCN	II	
Short-eared Owl	Birds	SGCN	II	

Conserving Wildlife - Serving People

Snowy Egret	Birds	SGCN	II	
Swainson's Hawk	Birds	SGCN	II	
Virginia Rail	Birds	SGCN	III	
Virginia's Warbler	Birds	SGCN	II	
Western Grebe	Birds	SGCN	II	
White-faced Ibis	Birds	SGCN	II	
Williamson's Sapsucker	Birds	SGCN	II	
Willow Flycatcher	Birds	SGCN	III	
Flannelmouth Sucker	Fishes	SGCN	I	
Roundtail Chub	Fishes	SGCN	I	
Forest Disc Snail	Gastropoda	SGCN	III	
Dwarf Shrew	Mammals	SGCN	II	
Great Basin Pocket Mouse	Mammals	SGCN	III	
Idaho Pocket Gopher	Mammals	SGCN	II	
Long-eared Myotis	Mammals	SGCN	III	
Long-legged Myotis	Mammals	SGCN	III	
Moose	Mammals	SGCN	II	
Northern River Otter	Mammals	SGCN	II	Yes
Preble's Shrew	Mammals	SGCN	III	
Pygmy Rabbit	Mammals	SGCN	II	Yes
Sagebrush Vole	Mammals	SGCN	II	
Uinta Chipmunk	Mammals	SGCN	III	
Western Little Brown Myotis	Mammals	SGCN	II	
Western Small-footed Myotis	Mammals	SGCN	II	
Western Spotted Skunk	Mammals	SGCN	III	
White-tailed Prairie Dog	Mammals	SGCN	II	
Greater Short-horned Lizard	Reptiles	SGCN	II	Yes

Conserving Wildlife - Serving People

A.3 State Historic Preservation Office Correspondence

TerraPower

January 26, 2022

Ms. Sara Needles
State Historic Preservation Officer
Wyoming State Historic Preservation Office
2301 Central Avenue
Barrett Building, Third Floor
Cheyenne, WY 82002

Re: Natrium™ Demonstration Reactor

Dear Ms. Needles,

I am a Senior Vice President at TerraPower, which is a nuclear innovation company delivering technologies to provide safe, affordable, and abundant carbon free energy. In meeting the U.S. growing carbon-free energy needs, TerraPower is developing a power generating technology known as the Natrium Advanced Reactor Demonstration Project (the Natrium Demo Reactor) which features a 345 MWe sodium-cooled fast reactor with a molten salt-based energy storage system. The U.S. Department of Energy (DOE) entered into a jointly funded cooperative agreement with TerraPower to support development of the Natrium Demo Reactor to demonstrate this new technology as part of the DOE's Advanced Reactor Demonstration Program. Once constructed and operational, the Natrium Plant will be commercially owned and operated by PacifiCorp, a power generation and transmission company that operates throughout the intermountain West.

As part of the early evaluative phase of the Natrium Demo Reactor, site characterization studies are being conducted for planning efforts associated with the siting, design, licensing, and construction of the project. The Natrium Demo Reactor will be located in southwest Wyoming approximately 5 miles south of Kemmerer, WY, nearby the existing Naughton Coal Power Plant.

The Natrium Demo Reactor is subject to applicable permitting and licensing requirements in order to construct and operate its facility. The regulatory licensing authority for the project is the Nuclear Regulatory Commission (NRC). The Natrium Demo Reactor's approximate timeline for cultural resources engagement and consultation consists of:

- Naughton Site Characterization – December 2021 to June 2022
- Cultural Resources Survey – Spring 2022
- Construction Permit Application to NRC – August 2023
- NRC environmental compliance process under the National Environmental Policy Act (NEPA), 40 CFR Parts 1500 – 1508 Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA, and 10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions – initiate in Fall 2023
- Compliance process under Section 106 of the National Historic Preservation Act and 36 CFR Part 800, Protection of Historic Properties – initiate in Fall 2023

TerraPower is reaching out to you to introduce the Natrium Demo Reactor and to request engagement with your office regarding the project at your convenience in the near future. We would like to keep you apprised of early site characterization (this includes installation of a meteorological tower and soil borings which are not considered construction activities by the NRC) at the project area prior to a cultural resources survey and subsequent cultural resources survey follow-up activities to be conducted in Spring 2022 with Tribal Nation participation. TerraPower has become aware through its research that a previously recorded National Register-eligible archaeological site is located partially within the project area. TerraPower is taking steps to ensure that this site is protected during the site characterization activities.

NRC's Regulatory Guide 4.2 states, and TerraPower recognizes, that engagement with the Wyoming State Historic Preservation Officer (SHPO), Tribes, and other parties for information gathering is not considered consultation pursuant to 36 CFR Part 800 and that such consultation is the responsibility of the NRC when it accepts the construction permit application and starts the Section 106 compliance process (Fall 2023). The NRC will initiate formal Section 106 consultation with your office at this later date for the Natrium Demo Reactor.

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As indicated previously, cultural survey efforts are expected to occur in late Spring 2022. TerraPower plans to collaborate with Tribes to be included on cultural resource survey field crews to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. The draft cultural survey report will be provided to the Wyoming SHPO and Tribes for review and comment. TerraPower plans to continue its engagement with your office and Tribes in determining and planning appropriate methods to avoid, minimize, or mitigate potential adverse effects to significant cultural resources. Tribes with whom TerraPower has initiated engagement include:

Northwestern Band of the Shoshone Nation
Shoshone-Bannock Tribes
Eastern Shoshone Tribe
Skull Valley Band of Goshute Indians
Confederated Tribes of the Goshute Reservation
Ute Indian Tribe of the Uintah and Ouray Reservation Northern Arapaho Tribe
Cheyenne and Arapaho Tribes of Oklahoma
Apache Tribe of Oklahoma
Comanche Nation of Oklahoma
Fort Belknap Indian Community

When convenient, TerraPower would like to meet with you, either at your office or virtually through Microsoft Teams or another virtual meeting platform, to discuss the project and start our working relationship. We would like to take that opportunity to provide more detailed information about the Natrium Demo Reactor, answer questions you might have, and discuss cultural resource surveys that are scheduled to occur in Spring 2022 after the snow has melted from the project area.

TerraPower hopes to collaborate and build a working relationship with you on this important project. Our cultural resources specialist point of contact for this project is Ms. Kathy Roxlau with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Roxlau can be reached at (505) 250-7363 or kathy.roxlau@tetratech.com. If you have questions regarding the NRC's application process, please contact Mr. George Wilson at (717) 377-8033 or gwilson@terrapower.com. We are planning to conduct engagement through written correspondence, emails, telephone calls, conference calls, and, when appropriate, in-person meetings. During this time when our society is still addressing the threat of the coronavirus, TerraPower understands the need to find creative ways to continue working that is comfortable for all parties. We will work with

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you to learn the best way to communicate with and contact you and/or your representative so we can ensure you receive all project-related communications.

Thank you in advance for your assistance and willingness to collaborate on the Natrium Demo Reactor. We look forward to working with you.

Sincerely,

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc: Mr. Richard Currit, Senior Archaeologist

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WYOMING
STATE Historic Preservation OFFICE

February 15, 2022

Tara Neider, Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower
15800 Northrup Way
Bellevue, WA 98008

Re: Natrium™ Demonstration Reactor (DBPR_WY_2022_101)

Dear Ms. Neider,

Richard L. Currit of our staff has received information concerning the aforementioned undertaking. Thank you for allowing us the opportunity to comment.

Management of cultural resources on Department of Energy/Nuclear Regulatory Commission (DOE/NRC) projects is conducted in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulations 36 CFR Part 800. These regulations call for survey, evaluation and protection of significant historic and archeological sites prior to any disturbance. Provided the DOE/NRC follows the procedures established in the regulations, we have no objections to the project. Specific comments on the project's effect on cultural resource sites will be provided to the DOE/NRC when we review the cultural resource documentation (per your letter, scheduled for Spring 2022) called for in 36 CFR Part 800. This will need to be submitted to our office through our WyoTrack system.

Please refer to DBPR_WY_2022_101 on any future correspondence dealing with this project. If you have any questions/or wish to discuss the undertaking, feel free to contact me at 307-777-5497, or at richard.currit@wyo.gov.

Sincerely,

Richard L. Currit
Senior Archaeologist

Mark Gordon | Governor
Darin J. Westby, P.E. | Director
Sara Needles | SHPO Officer

ARTS. PARKS. HISTORY.

2301 Central Avenue · Barrett Building, 3rd Floor · Cheyenne, WY 82002 · 307.777.7697 · wyoshpo.state.us
Improving Communities and Enriching Lives

A.4 Tribal Correspondence / Invitation to Virtual Meetings and Surveys

March 21, 2022

Dennis Alex
Chairman
Northwestern Band of the Shoshone Nation
707 North Main Street
Brigham City, UT 84302

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Alex,

I hope this correspondence finds you and the Northwestern Band of the Shoshone Nation well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

TerraPower plans to collaborate with Tribes on the upcoming cultural resource field surveys to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. From our December 2021 correspondence, the cultural survey efforts are expected to occur in Spring 2022. We will be reaching out to your Tribe to learn if you are interested in participating in these activities and how TerraPower can facilitate your participation. Our cultural resource specialist point of contact is Ms. Kathy Roxlau with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Roxlau can be reached at (505) 250-7363 or kathy.roxlau@tetratech.com.

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March 21, 2022
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In addition, in collaboration with interested Tribal Nations, TerraPower will plan a tribal summit after the surveys are completed to discuss the findings and conduct a field visit to the project area to see the resources recorded. The draft cultural survey report will be provided to the Tribes for review and comment. TerraPower plans to continue its engagement with Tribes in determining and planning appropriate methods to avoid, minimize, or mitigate potential adverse effects to significant cultural resources.

I would like to take this opportunity to invite you to a virtual meeting where TerraPower will provide a presentation on the Natrium Project and address questions you may have. Topics to be discussed include a description of the project itself, the licensing process, and the upcoming opportunities for Tribes to participate in identification of cultural resources in the project area. The virtual meeting will be held via WebEx on Tuesday, April 12, 2022, at 10:00 a.m. MDT. A link to the meeting will be provided to you via email a couple of days prior to the meeting. The email will also provide a telephone number and passcode for those who prefer to attend the meeting via telephone.

Thank you in advance for your assistance on the Natrium Project. We look forward to speaking with you on April 12th and to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Michael Gross, Vice Chairman
George Gover, Tribal Executive Director
Patty Timbimboo-Madsen, Cultural Resources Director

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March 21, 2022

Devon Boyer
Chairman
Shoshone-Bannock Tribes
PO Box 306
Fort Hall, ID 83203

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Boyer,

I hope this correspondence finds you and the Shoshone-Bannock Tribes well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

TerraPower plans to collaborate with Tribes on the upcoming cultural resource field surveys to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. From our December 2021 correspondence, the cultural survey efforts are expected to occur in Spring 2022. We will be reaching out to your Tribe to learn if you are interested in participating in these activities and how TerraPower can facilitate your participation. Our cultural resource specialist point of contact is Ms. Kathy Roxlau with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Roxlau can be reached at (505) 250-7363 or kathy.roxlau@tetratech.com.

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Thank you in advance for your assistance on the Natrium Project. We look forward to speaking with you on April 12th and to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Marlene Skunkcap, Vice Chairman
Ladd Edmo, Secretary
Louise Dixey, Cultural Resources Director
Carolyn Smith, Cultural Resources Coordinator

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March 21, 2022

Shaun Chapoose
Chairman
Ute Indian Tribe of the Uintah & Ouray Reservation
PO Box 190
Ft. Duchesne, UT 84026

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Chapoose,

I hope this correspondence finds you and the Ute Indian Tribe of the Uintah & Ouray Reservation well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

TerraPower plans to collaborate with Tribes on the upcoming cultural resource field surveys to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. From our December 2021 correspondence, the cultural survey efforts are expected to occur in Spring 2022. We will be reaching out to your Tribe to learn if you are interested in participating in these activities and how TerraPower can facilitate your participation. Our cultural resource specialist point of contact is Ms. Kathy Roxlau with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Roxlau can be reached at (505) 250-7363 or kathy.roxlau@tetratech.com.

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I would like to take this opportunity to invite you to a virtual meeting where TerraPower will provide a presentation on the Natrium Project and address questions you may have. Topics to be discussed include a description of the project itself, the licensing process, and the upcoming opportunities for Tribes to participate in identification of cultural resources in the project area. The virtual meeting will be held via WebEx on Tuesday, April 12, 2022, at 10:00 a.m. MDT. A link to the meeting will be provided to you via email a couple of days prior to the meeting. The email will also provide a telephone number and passcode for those who prefer to attend the meeting via telephone.

Thank you in advance for your assistance on the Natrium Project. We look forward to speaking with you on April 12th and to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Tony Small, Vice Chairman
Betsy Chapoose, THPO

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March 21, 2022

Durell Cooper, Chairman & THPO
Apache Tribe of Oklahoma
PO Box 1330
Anadarko, OK 73005

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Cooper,

I hope this correspondence finds you and the Apache Tribe of Oklahoma well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

TerraPower plans to collaborate with Tribes on the upcoming cultural resource field surveys to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. From our December 2021 correspondence, the cultural survey efforts are expected to occur in Spring 2022. We will be reaching out to your Tribe to learn if you are interested in participating in these activities and how TerraPower can facilitate your participation. Our cultural resource specialist point of contact is Ms. Kathy Roxlau with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Roxlau can be reached at (505) 250-7363 or kathy.roxlau@tetratech.com.

In addition, in collaboration with interested Tribal Nations, TerraPower will plan a tribal summit after the surveys are completed to discuss the findings and conduct a field visit to the

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Thank you in advance for your assistance on the Natrium Project. We look forward to speaking with you on April 12th and to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Crystal Lightfoot, Culture Program Coordinator
Wamblee Smith, Environmental Director

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March 21, 2022

Jordan Dresser
Chairman
Northern Arapaho Tribe
PO Box 396
Fort Washakie, WY 82514

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Dresser,

I hope this correspondence finds you and the Northern Arapaho Tribe well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

TerraPower plans to collaborate with Tribes on the upcoming cultural resource field surveys to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. From our December 2021 correspondence, the cultural survey efforts are expected to occur in Spring 2022. We will be reaching out to your Tribe to learn if you are interested in participating in these activities and how TerraPower can facilitate your participation. Our cultural resource specialist point of contact is Ms. Kathy Roxlau with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Roxlau can be reached at (505) 250-7363 or kathy.roxlau@tetratech.com.

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Thank you in advance for your assistance on the Natrium Project. We look forward to speaking with you on April 12th and to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Lee Spoonhunter, Co-Chairman
Ben Ridgley, THPO Director
Crystal C'Bearing, THPO Deputy Director
Crystal Reynolds, Tribal Archaeologist
Travis Shakespeare, Sr., THPO Office

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March 21, 2022

John St. Clair, Jr.
Chairman
Eastern Shoshone Tribe
PO Box 538
Fort Washakie, WY 82514

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman St. Clair,

I hope this correspondence finds you and the Eastern Shoshone Tribe well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

TerraPower plans to collaborate with Tribes on the upcoming cultural resource field surveys to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. From our December 2021 correspondence, the cultural survey efforts are expected to occur in Spring 2022. We will be reaching out to your Tribe to learn if you are interested in participating in these activities and how TerraPower can facilitate your participation. Our cultural resource specialist point of contact is Ms. Kathy Roxlau with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Roxlau can be reached at (505) 250-7363 or kathy.roxlau@tetratech.com.

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March 21, 2022
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Thank you in advance for your assistance on the Natrium Project. We look forward to speaking with you on April 12th and to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Karen Snyder, Co-Chair
Joshua Mann, THPO
Wilford Ferris, Director of Cultural Preservation
Phoebe Wilson, Secretary

15800 Northup Way, Bellevue, WA 98008 www.TerraPower.com P. +1 (425) 324-2888 F. +1 (425) 324-2889

TerraPower

March 21, 2022

Mark Woommavovah
Chairman
Comanche Nation of Oklahoma
PO Box 908
Lawton, OK 73502

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Woommavovah,

I hope this correspondence finds you and the Comanche Nation of Oklahoma well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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March 21, 2022
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Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Martina M. Minthorn, THPO
Theodore Villicana, Historic Preservation
Margaret Murrow, NAGPRA Director

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TerraPower

March 21, 2022

Candace Bear
Chairwoman
Skull Valley Band of Goshute Indians
PO Box 448
Grantsville, UT 84029

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairwoman Bear,

I hope this correspondence finds you and the Skull Valley Band of Goshute Indians well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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March 21, 2022
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Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Sheila Urias, Secretary

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TerraPower

March 21, 2022

Reggie Wassana, Governor
Cheyenne and Arapaho Tribes of Oklahoma
PO Box 38
Concho, OK 73022

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Governor Wassana,

I hope this correspondence finds you and Cheyenne and Arapaho Tribes of Oklahoma well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Tammy Rios, Secretary
Max Bear, Director, Cultural, Acting THPO
Christopher Rednose, THPO Technical Assistant

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March 21, 2022

Federico Mosqueda, Sr.
Arapaho representative for NAGPRA
Cheyenne and Arapaho Tribes of Oklahoma
PO Box 167
Concho, OK 73022

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Mr. Mosqueda Sr.,

I hope this correspondence finds you and Cheyenne and Arapaho Tribes of Oklahoma well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Karen Little Coyote, Cultural Heritage Program Director
Joe Big Medicine, NHPA and NAGPRA Representative

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TerraPower

March 21, 2022

Chester Whiteman
Cheyenne's representative for NAGPRA
Cheyenne and Arapaho Tribes of Oklahoma
PO Box 167
Concho, OK 73022

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Mr. Whiteman,

I hope this correspondence finds you and Cheyenne and Arapaho Tribes of Oklahoma well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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TerraPower

March 21, 2022

Andrew Werk, Jr.
President
Fort Belknap Indian Community
656 Agency Main Street
Harlem, MT 59526

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear President Werk,

I hope this correspondence finds you and Fort Belknap Indian Community well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

Cc:
Gerald Healy, Vice President
Michael J. Black Wolf, THPO
Emma Filesteel, GIS/Database Coordinator

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TerraPower

March 21, 2022

Rupert Steele
Tribal Chairman
Confederated Tribes of the Goshute Reservation
PO Box 6104
Ibapah, UT 83034

Subject: Invitation to Virtual Meeting to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Steele,

I hope this correspondence finds you and the Confederated Tribes of the Goshute Reservation well as Spring arrives. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

Cc:
Phyllis Naranjo, Secretary
Genevieve Fields, THPO
Ozzy Escarate, Tribal Administrator

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A.5 Tribal Correspondence / Class III Report Review

August 23, 2022

TP-LIC-LET-0026

Project Number 99902100

Durell Cooper, Chairman & THPO
Apache Tribe of Oklahoma
PO Box 1330
Anadarko, OK 73005

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear Chairman Cooper,

I hope this correspondence finds you and the Apache Tribe of Oklahoma well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

In March 2022, we invited you to participate in a meeting that was held on April 12, 2022, to discuss the Natrium Demonstration Project, the licensing process, and the opportunities for Tribes to participate in identification of cultural resources in the plant area. Following that meeting, our cultural resource specialists at Tetra Tech, Inc. contacted you to inquire if you were interested in having your Tribal Cultural Specialists (TCSs) participate in the cultural resource field surveys. Several TCSs were able to participate and provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance.

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TerraPower

Date: August 23, 2022
Page 2 of 2

We have prepared a draft report to present the results of the cultural resource inventory and provide National Register of Historic Places (NRHP) evaluations for cultural resources located within the study area for your review and comment. You will receive an email from Tetra Tech's Managed File Transfer, a secure file sharing application, containing a link to download the report. We ask that you provide comments by September 23, 2022.

TerraPower is working to identify the area within the broader study area that would be required for use during the construction and operation of the proposed nuclear power plant. In November 2022, a second report will be provided to identify the area of potential effects and potential impacts to cultural resources. TerraPower plans to continue its engagement with Tribes in determining and planning appropriate methods to avoid, minimize, or mitigate potential adverse effects to significant cultural resources.

Please respond with any questions or comments via email to our cultural resource specialist point of contact, Ms. Kathy Turney with Tetra Tech, Inc. Ms. Turney can be reached at kathy.turney@tetratech.com or (520) 343-4510.

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Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Crystal Lightfoot, Culture Program Coordinator
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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TerraPower

August 23, 2022

TP-LIC-LET-0036

Project Number 99902100

Betsy Chapoose, THPO
Ute Indian Tribe of the Uintah & Ouray Reservation
PO Box 190
Ft. Duchesne, UT 84026

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear THPO Chapoose,

I hope this correspondence finds you and the Ute Indian Tribe of the Uintah & Ouray Reservation well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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cc:
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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TerraPower

August 23, 2022

TP-LIC-LET-0031

Project Number 99902100

Michael J. Black Wolf, THPO
Fort Belknap Indian Community
656 Agency Main Street
Harlem, MT 59526

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear THPO Black Wolf,

I hope this correspondence finds you and the Fort Belknap Indian Community well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Mallecia Sutton, U.S. Nuclear Regulatory Commission

15800 Northrup Way, Bellevue, WA 98008 www.TerraPower.com P. +1 (425) 324-2888 F. +1 (425) 324-2889

August 23, 2022

TP-LIC-LET-0027

Project Number 99902100

Max Bear, Director, Cultural, Acting THPO
Cheyenne and Arapaho Tribes of Oklahoma
PO Box 167
Concho, OK 73022

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear Director Bear,

I hope this correspondence finds you and the Cheyenne and Arapaho Tribes of Oklahoma well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

In March 2022, we invited you to participate in a meeting that was held on April 12, 2022, to discuss the Natrium Demonstration Project, the licensing process, and the opportunities for Tribes to participate in identification of cultural resources in the plant area. Following that meeting, our cultural resource specialists at Tetra Tech, Inc. contacted you to inquire if you were interested in having your Tribal Cultural Specialists (TCSs) participate in the cultural resource field surveys. Several TCSs were able to participate and provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance.

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Date: August 23, 2022
Page 2 of 2

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Please respond with any questions or comments via email to our cultural resource specialist point of contact, Ms. Kathy Turney with Tetra Tech, Inc. Ms. Turney can be reached at kathy.turney@tetratech.com or (520) 343-4510.

Thank you in advance for your assistance on the Natrium Project. We look forward to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Christopher Rednose, THPO Technical Assistant
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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August 23, 2022

TP-LIC-LET-0035

Project Number 99902100

Sheila Urais, Tribal Secretary
Skull Valley Band of Goshute Indians
407 Skull Valley Road
Skull Valley Reservation, UT 84029

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear Tribal Secretary, Urais,

I hope this correspondence finds you and the Skull Valley Band of Goshute Indians well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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August 23, 2022

TP-LIC-LET-0033

Project Number 99902100

Patty Timbimboo-Madsen, Cultural Resources Director
Northwestern Band of the Shoshone Nation
707 North Main Street
Brigham City, UT 84302

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear Cultural Resources Director Timbimboo-Madsen,

I hope this correspondence finds you and the Northwestern Band of the Shoshone Nation well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
George Gover, Tribal Executive Director
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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August 23, 2022

TP-LIC-LET-0034

Project Number 99902100

Louise Dixey, Cultural Resources Director
Shoshone-Bannock Tribes
PO Box 306
Fort Hall, ID 83203

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear Cultural Resources Director Dixey,

I hope this correspondence finds you and the Shoshone-Bannock Tribes well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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Thank you in advance for your assistance on the Natrium Project. We look forward to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Carolyn Smith, Cultural Resources Coordinator
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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September 22, 2022

Chairman Frank White Clay
Crow Tribe of Montana
PO Box 159
Crow Agency, MT 59022

Subject: Natrium™ Advanced Reactor Demonstration Project

Dear Chairman White Clay,

I hope this correspondence finds you and the Crow Nation well. I am the Senior Vice President and Project Director, Natrium Demonstration Reactor at TerraPower, which is a nuclear innovation company delivering technologies to provide safe, affordable, and abundant carbon free energy.

In meeting the U.S. growing carbon-free energy needs, TerraPower is developing a power generating technology known as the Natrium[1] Advanced Reactor Demonstration Project (the Natrium Demo Reactor) which features a 345 MW sodium-cooled fast reactor with a molten salt-based energy storage system. As part of the early evaluative phase of the Natrium Demo Reactor, site characterization studies are being conducted for planning efforts associated with the siting, design, licensing, and construction of the reactor. The Natrium Demo Reactor will be located in southwest Wyoming approximately 5 miles south of Kemmerer, WY, nearby the existing Naughton Coal Power Plant. The U.S. Department of Energy (DOE) entered into a jointly funded

[1] **a TerraPower and GE-Hitachi technology**

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cooperative agreement with TerraPower to support development of the Natrium Demo Reactor to demonstrate this new technology as part of the DOE's Advanced Reactor Demonstration Program. Once constructed and operational, the Natrium Plant will be commercially owned and operated by PacifiCorp, a power generation and transmission company that operates throughout the intermountain West. I understand TerraPower's Vice President, Regulatory Affairs G&A, George Wilson has engaged in conversations with CJ Stewart, Director of Energy Commission regarding the potential for the project to affect the Crow Nation.

The Natrium Demo Reactor is subject to applicable permitting and licensing requirements in order to construct and operate its facility. The regulatory licensing authority for the Natrium Demo Reactor is the Nuclear Regulatory Commission (NRC). The Natrium Demo Reactor's approximate timeline for cultural resources engagement and consultation consists of:

- Naughton Site Characterization – December 2021 to June 2022
- Cultural Resources Survey – Spring/Summer/Fall 2022
- Construction Permit Application to NRC – August 2023
- NRC environmental compliance process under the National Environmental Policy Act (NEPA), 40 CFR Parts 1500 – 1508 Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA, and 10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions – initiate in Fall 2023
- Compliance process under Section 106 of the National Historic Preservation Act and 36 CFR Part 800, Protection of Historic Properties – initiate in Fall 2023

The NRC regulatory guide, RG 4.2 states, and TerraPower recognizes, that engagement with the Wyoming State Historic Preservation Officer (SHPO), Tribes, and other parties for information gathering is not considered consultation pursuant to 36 CFR Part 800 and that such consultation is the responsibility of the NRC when it accepts the construction permit application and starts the Section 106 compliance process (Fall 2023). The NRC will initiate and conduct government-to-government consultation with Tribes at this later date for the Natrium Demo Reactor. Federally recognized Tribes are not obligated to engage with an applicant such as TerraPower or share information about properties of religious and cultural significance with an applicant. A federally recognized Tribe may elect to wait and communicate directly with the NRC at the government-to-government level when it starts the Section 106 compliance process.

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TerraPower included Tribal representatives on cultural resource survey field crews to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. We have prepared a draft report to present the results of the cultural resource inventory and provide National Register of Historic Places (NRHP) evaluations for cultural resources located within the study area for your review and comment. You will receive an email from Tetra Tech's Managed File Transfer, a secure file sharing application, containing a link to download the report. I would like to take this opportunity to invite you to a Tribal summit at the Natrium site near Kemmerer, Wyoming on October 18th to discuss the survey findings and conduct a field visit to the project area to see the resources recorded. TerraPower is working to identify the area within the broader study area that would be required for use during the construction and operation of the proposed nuclear power plant. Our representatives will be available to discuss those efforts and address questions during the Tribal summit. TerraPower plans to continue its engagement with Tribes in determining and planning appropriate methods to avoid, minimize, or mitigate potential adverse effects to significant cultural resources.

When convenient, TerraPower would like to meet with you, either at your reservation or virtually through Microsoft Teams or another virtual meeting platform, to discuss the project and start our working relationship. We would like to take that opportunity to provide more detailed information about the Natrium Demo Reactor and answer questions you might have.

TerraPower hopes to collaborate and build a working relationship with you on this important project. Our cultural resources specialist point of contact for this project is Ms. Kathy Turney with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Turney can be reached at (520)343-4510 or kathy.turney@tetratech.com. We will be reaching out to your Tribe to learn if you are interested in participating in the Tribal summit and how TerraPower can facilitate your participation. If you have questions regarding the NRC's application process, please contact Mr. George Wilson at gwilson@terrapower.com. We are planning to conduct engagement through written correspondence, emails, telephone calls, conference calls, and, when appropriate, in-person meetings.

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Thank you in advance for your assistance in the Natrium Project. We look forward to working with you.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
1. Aaron O'Brien, Tribal Historic Preservation Officer, aaron.brien@crow-nsn.gov
2. CJ Stewart, Director of Energy Commission, CJ.Stewart@crow-nsn.gov

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August 23, 2022

TP-LIC-LET-0029
Project Number 99902100

Genevieve Fields, THPO
Confederated Tribes of the Goshute Reservation
PO Box 6104
Ibapah, UT 83034

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear THPO Fields,

I hope this correspondence finds you and the Confederated Tribes of the Goshute Reservation well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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Date: August 23, 2022
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Thank you in advance for your assistance on the Natrium Project. We look forward to working with you in the future.

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Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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TerraPower

August 23, 2022

TP-LIC-LET-0030

Project Number 99902100

Joshua Mann, THPO
Eastern Shoshone Tribe
PO Box 538
Fort Washakie, WY 82514

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear THPO Mann,

I hope this correspondence finds you and the Eastern Shoshone Tribe well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Wilford Ferris, Director of Cultural Preservation
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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August 23, 2022

TP-LIC-LET-0032

Project Number 99902100

Ben Ridgley, THPO Director
Northern Arapaho Tribe
PO Box 67
St. Stevens, WY 82524

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear THPO Director Ridgley,

I hope this correspondence finds you and the Northern Arapaho Tribe well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Crystal C'Bearing, THPO Deputy Director
Crystal Reynolds, Tribal Archaeologist
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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August 23, 2022

TP-LIC-LET-0028

Project Number 99902100

Martina M. Minthorn, THPO
Comanche Nation Historical Preservation Office
#6 SW D Avenue, Suite C
Lawton, OK 73507

Subject: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear THPO Minthorn,

I hope this correspondence finds you and the Comanche Nation of Oklahoma well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, TerraPower has continued its efforts to conduct site characterization studies at the plant site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the plant site.

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Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Theodore Villicana, Historic Preservation
Mallecia Sutton, U.S. Nuclear Regulatory Commission

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COMANCHE NATION

Terra Power,LLC.
Attn: Ms. Kathy Turney
15800 Northrup Way
Washington 98008

September 27, 2022

Re: Cultural Resources Inventory Report for the Natrium Advanced Reactor Demonstration Project

Dear Ms.Turney:

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of ***"No Properties"*** have been identified. (IAW 36 CFR 800.4(d)(1)).

Please contact this office at (580) 492-1153) if you require additional information on this project.

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office.

Regards

Comanche Nation Historic Preservation Office
Theodore E. Villicana , Technician
#6 SW "D" Avenue, Suite C
Lawton, OK. 73502

Consult Response delayed due to Covid-19 work conditions.

COMANCHE NATION P.O. BOX 908 / LAWTON, OK 73502
PHONE: 580-492-4988 TOLL FREE:1-877-492-4988

A.6 Tribal Correspondence / Invitation to Tribal Summit

TerraPower

September 19, 2022

Dennis Alex, Chairman
Northwestern Band of the Shoshone Nation
707 North Main Street
Brigham City, UT 84302

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Alex,

I hope this correspondence finds you and the Northwestern Band of the Shoshone Nation well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Thank you in advance for your assistance on the Natrium Project. We look forward to meeting with you on October 18th and to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Michael Gross, Vice Chairman
George Gover, Tribal Executive Director
Patty Timbimboo-Madsen, Cultural Resources Director
Shane Warner
Brian Parry

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September 19, 2022

Tino Batt, Chairman
Shoshone - Bannock Tribes
PO Box 306
Fort Hall, ID 83203

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Batt,

I hope this correspondence finds you and the Shoshone – Bannock Tribes well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Louise Dixey, Cultural Resources Director
Randy L'Teton, Public Affairs
Carolyn Smith, Cultural Resources Coordinator

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September 19, 2022

Shaun Chapoose, Chairman
Ute Indian Tribe of the Uintah & Ouray Reservation
PO Box 190
Ft. Duchesne, UT 84026

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Chapoose,

I hope this correspondence finds you and the Ute Indian Tribe of the Uintah & Ouray Reservation well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Betsy Chapoose, THPO

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TerraPower

September 19, 2022

Durell Cooper, Chairman & THPO
Apache Tribe of Oklahoma
PO Box 1330
Anadarko, OK 73005

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman & THPO Cooper,

I hope this correspondence finds you and the Apache Tribe of Oklahoma well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Crystal Lightfoot, Culture Program Coordinator
Wamblee Smith, Environmental Director

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September 19, 2022

Jordan Dresser, Chairman
Northern Arapaho Tribe
PO Box 396
Fort Washakie, WY 82514

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Dresser,

I hope this correspondence finds you and the Northern Arapaho Tribe well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Lee Spoonhunter, Co-Chairman
Ben Ridgley, THPO Director
Crystal C'Bearing, THPO Deputy Director
Crystal Reynolds, Tribal Archaeologist
Travis Shakespeare Sr., THPO Office

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September 19, 2022

John St. Clair Jr., Chairman
Eastern Shoshone Tribe
PO Box 538
Fort Washakie, WY 82514

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman St. Clair,

I hope this correspondence finds you and the Eastern Shoshone tribe well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
John Washakie, Co-Chair
Joshua Mann, THPO
Phoebe Wilson, Sectretary

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September 19, 2022

Mark Woommavovah, Chairman
Comanche Nation of Oklahoma
PO Box 908
Lawton, OK 73502

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairman Woommavovah,

I hope this correspondence finds you and the Comanche Nation of Oklahoma well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Martina M. Minthorn, THPO
Theodore Villicana, Historic Preservation
Margaret Murrow, NAGPRA Director

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September 22, 2022

Candace Bear, Chairperson
Skull Valley Band of Goshute Indians
407 Skull Valley Road
Skull Valley Reservation, UT 84029

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Chairperson Bear,

I hope this correspondence finds you and the Skull Valley Band of Goshute Indians well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:

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TerraPower

September 19, 2022

Lori Bear, Chairperson
Skull Valley Band of Goshute Indians
407 Skull Valley Road
Skull Valley Reservation, UT 84029

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

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Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:

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September 19, 2022

Reggie Wassana, Governor
Cheyenne and Arapaho Tribes of Oklahoma
PO Box 38
Concho, OK 73002

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Governor Wassana,

I hope this correspondence finds you and the Cheyenne and Arapaho Tribes of Oklahoma well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Tammy Rios, Secretary
Max Bear, Director, Cultural, Acting THPO
Lee Tendore, Governor's Eastern Shoshone Tribal Liaison
Cy Lee, Governor's Northern Arapaho Tribal Liaison
Christopher Rednose, THPO Technical Assistant
Federico Mosqueda Sr., NAGPRA Contact
Chester Whiteman, NAGPRA Contact/Cheyenne Coordinator

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TerraPower

September 19, 2022

Jeffrey Stiffarm, President
Fort Belknap Indian Community
656 Agency Main Street
Harlem, MT 59526

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear President Stiffarm,

I hope this correspondence finds you and the Fort Belknap Indian Community well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

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Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Judith King, Vice President
Michael J. Black Wolf, THPO

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TerraPower

September 19, 2022

Rupert Steele, Tribal Chairman
Confederated Tribes of the Goshute Reservation
PO Box 6104
Ibapah, UT 83034

Subject: Invitation to Tribal Summit to Discuss the Natrium Advanced Reactor Demonstration Project

Dear Tribal Chairman Steele,

I hope this correspondence finds you and the Confederated Tribes of the Goshute Reservation well. As you may recall, I reached out to you by letter and email in December 2021 to introduce the Natrium Advanced Reactor Demonstration Project. Since that time, as described in that letter, TerraPower has continued its efforts to conduct site characterization studies at the project site, located south of Kemmerer, Wyoming. We have conducted all activities to avoid introducing any impacts to known cultural resources in and near the project area.

We have prepared a draft report to present the results of the cultural resource inventory and provide National Register of Historic Places evaluations for cultural resources located within the project study area. The draft report was provided for your review and comment on August 23rd. A copy of the report will also be made available on site the day of the summit.

I would like to take this opportunity to invite you to a Tribal summit at the Natrium site near Kemmerer, Wyoming on October 18th. As discussed at the virtual meeting in April, TerraPower plans to hold a tribal summit to collaborate with interested Tribal Nations to discuss the findings of the cultural surveys and conduct a field visit to the project area to see the resources recorded. TerraPower is working to identify the area within the broader study area that would be required for use during the construction and operation of the proposed nuclear power plant.

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September 19, 2022
Page 2 of 2

Our representatives will be available to discuss those efforts and address questions during the tribal summit. TerraPower plans to continue its engagement with Tribes in determining and planning appropriate methods to avoid, minimize, or mitigate potential adverse effects to significant cultural resources.

We will be reaching out to your Tribe to learn if you are interested in participating in the tribal summit and how TerraPower can facilitate your participation. Please respond with any questions or comments via email to our cultural resource specialist point of contact, Ms. Kathy Turney with Tetra Tech, Inc. Ms. Turney can be reached at kathy.turney@tetratech.com or (520) 343-4510.

Thank you in advance for your assistance on the Natrium Project. We look forward to meeting with you on October 18th and to working with you in the future.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
Phyllis Naranjo, Secretary
Genevieve Fields, THPO

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TerraPower.

September 22, 2022

Chairman Frank White Clay
Crow Tribe of Montana
PO Box 159
Crow Agency, MT 59022

Subject: Natrium™ Advanced Reactor Demonstration Project

Dear Chairman White Clay,

I hope this correspondence finds you and the Crow Nation well. I am the Senior Vice President and Project Director, Natrium Demonstration Reactor at TerraPower, which is a nuclear innovation company delivering technologies to provide safe, affordable, and abundant carbon free energy.

In meeting the U.S. growing carbon-free energy needs, TerraPower is developing a power generating technology known as the Natrium[1] Advanced Reactor Demonstration Project (the Natrium Demo Reactor) which features a 345 MW sodium-cooled fast reactor with a molten salt-based energy storage system. As part of the early evaluative phase of the Natrium Demo Reactor, site characterization studies are being conducted for planning efforts associated with the siting, design, licensing, and construction of the reactor. The Natrium Demo Reactor will be located in southwest Wyoming approximately 5 miles south of Kemmerer, WY, nearby the existing Naughton Coal Power Plant. The U.S. Department of Energy (DOE) entered into a jointly funded

[1] **a TerraPower and GE-Hitachi technology**

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cooperative agreement with TerraPower to support development of the Natrium Demo Reactor to demonstrate this new technology as part of the DOE's Advanced Reactor Demonstration Program. Once constructed and operational, the Natrium Plant will be commercially owned and operated by PacifiCorp, a power generation and transmission company that operates throughout the intermountain West. I understand TerraPower's Vice President, Regulatory Affairs G&A, George Wilson has engaged in conversations with CJ Stewart, Director of Energy Commission regarding the potential for the project to affect the Crow Nation.

The Natrium Demo Reactor is subject to applicable permitting and licensing requirements in order to construct and operate its facility. The regulatory licensing authority for the Natrium Demo Reactor is the Nuclear Regulatory Commission (NRC). The Natrium Demo Reactor's approximate timeline for cultural resources engagement and consultation consists of:

- Naughton Site Characterization – December 2021 to June 2022
- Cultural Resources Survey – Spring/Summer/Fall 2022
- Construction Permit Application to NRC – August 2023
- NRC environmental compliance process under the National Environmental Policy Act (NEPA), 40 CFR Parts 1500 – 1508 Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA, and 10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions – initiate in Fall 2023
- Compliance process under Section 106 of the National Historic Preservation Act and 36 CFR Part 800, Protection of Historic Properties – initiate in Fall 2023

The NRC regulatory guide, RG 4.2 states, and TerraPower recognizes, that engagement with the Wyoming State Historic Preservation Officer (SHPO), Tribes, and other parties for information gathering is not considered consultation pursuant to 36 CFR Part 800 and that such consultation is the responsibility of the NRC when it accepts the construction permit application and starts the Section 106 compliance process (Fall 2023). The NRC will initiate and conduct government-to-government consultation with Tribes at this later date for the Natrium Demo Reactor. Federally recognized Tribes are not obligated to engage with an applicant such as TerraPower or share information about properties of religious and cultural significance with an applicant. A federally recognized Tribe may elect to wait and communicate directly with the NRC at the government-to-government level when it starts the Section 106 compliance process.

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TerraPower included Tribal representatives on cultural resource survey field crews to provide their unique tribal perspective on the identification and evaluation of historic properties that have religious, traditional, and cultural significance. We have prepared a draft report to present the results of the cultural resource inventory and provide National Register of Historic Places (NRHP) evaluations for cultural resources located within the study area for your review and comment. You will receive an email from Tetra Tech's Managed File Transfer, a secure file sharing application, containing a link to download the report. I would like to take this opportunity to invite you to a Tribal summit at the Natrium site near Kemmerer, Wyoming on October 18th to discuss the survey findings and conduct a field visit to the project area to see the resources recorded. TerraPower is working to identify the area within the broader study area that would be required for use during the construction and operation of the proposed nuclear power plant. Our representatives will be available to discuss those efforts and address questions during the Tribal summit. TerraPower plans to continue its engagement with Tribes in determining and planning appropriate methods to avoid, minimize, or mitigate potential adverse effects to significant cultural resources.

When convenient, TerraPower would like to meet with you, either at your reservation or virtually through Microsoft Teams or another virtual meeting platform, to discuss the project and start our working relationship. We would like to take that opportunity to provide more detailed information about the Natrium Demo Reactor and answer questions you might have.

TerraPower hopes to collaborate and build a working relationship with you on this important project. Our cultural resources specialist point of contact for this project is Ms. Kathy Turney with Tetra Tech, Inc., who will provide outreach to you by telephone and email. Ms. Turney can be reached at (520)343-4510 or kathy.turney@tetratech.com. We will be reaching out to your Tribe to learn if you are interested in participating in the Tribal summit and how TerraPower can facilitate your participation. If you have questions regarding the NRC's application process, please contact Mr. George Wilson at gwilson@terrapower.com. We are planning to conduct engagement through written correspondence, emails, telephone calls, conference calls, and, when appropriate, in-person meetings.

TerraPower

Thank you in advance for your assistance in the Natrium Project. We look forward to working with you.

Sincerely,

Tara Neider

Tara Neider
Senior Vice President
Project Director, Natrium Demonstration Reactor
TerraPower, LLC

cc:
1. Aaron O'Brien, Tribal Historic Preservation Officer, aaron.brien@crow-nsn.gov
2. CJ Stewart, Director of Energy Commission, CJ.Stewart@crow-nsn.gov

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March 15, 2023

Sara Needles
Wyoming State Historic Preservation Officer
2301 Central Avenue
Barrett Building, Third Floor
Cheyenne, Wyoming 82002

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Sara Needles,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Wyoming State Historic Preservation Office under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP).

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

The DOE's Office of Clean Energy Demonstrations (OCED) role in this project is a cost-share partnership with TerraPower, LLC in the development of the Natrium Reactor and associated facilities. The Nuclear Regulatory Commissions (NRC) role in this project is to regulate the nuclear power plant through licensing, inspection, and enforcement of NRC's requirements.

The DOE and NRC are preparing a programmatic memorandum of understanding outlining their respective roles and responsibilities for this project. However, per 800.2(a)(2), DOE retains the role of Lead Federal Agency for the current project phase. DOE OCED are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA).

Although, it is not our intention to utilize the section of the Council's regulation which permit the substitution of a NEPA document for the 106 process, we are planning to consult the public per 800.3(e), which entails the public meetings and web-based information can serve both efforts. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified a preliminary Area of Potential Effect (APE) for the project (enclosed). The preliminary APE separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. At this early stage, it seems reasonable to include the larger project area covering all potential project phases for consideration. In this initiation of consultation, DOE seeks your comment on the APE. DOE looks forward to consultation with the Wyoming State Historic Preservation Office on further steps in the process.

Thank you for your assistance. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

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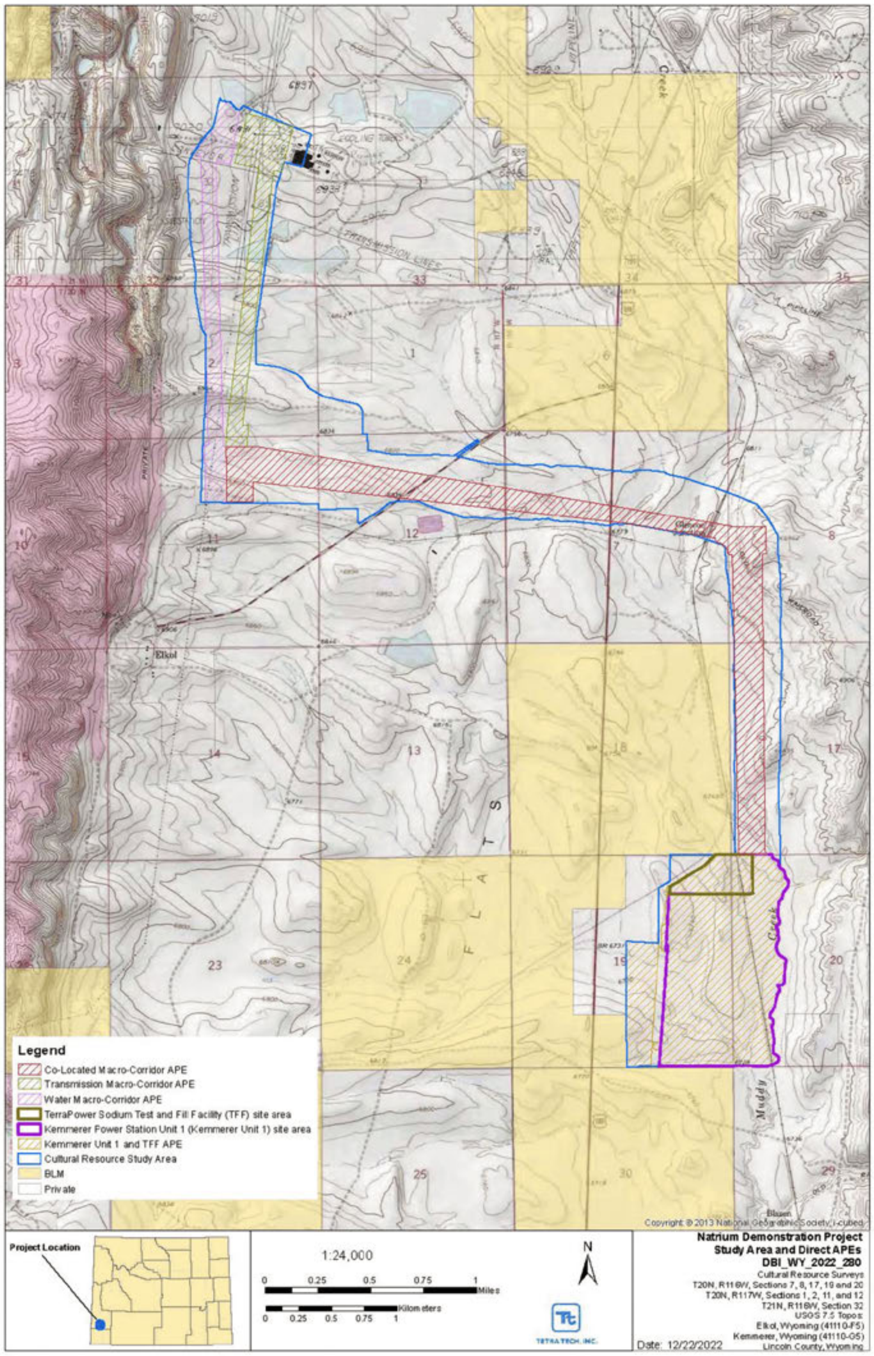
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USGS 7.5 Topos:
Elkol, Wyoming (41110-F5)
Kemmerer, Wyoming (41110-G5)
Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Louise Dixey, Cultural Resources Director
Shoshone-Bannock Tribes of the Fort Hall Reservation
PO Box 306
Fort Hall, ID 83203

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Louise Dixey,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Shoshone-Bannock Tribes of the Fort Hall Reservation under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Shoshone-Bannock Tribes of the Fort Hall Reservation has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

The DOE's Office of Clean Energy Demonstrations (OCED) role in this project is a cost-share partnership with TerraPower, LLC in the development of the Natrium Reactor and associated facilities. The Nuclear Regulatory Commissions (NRC) role in this project is to regulate the nuclear power plant through licensing, inspection, and enforcement of NRC's requirements. The DOE and NRC are preparing a programmatic memorandum of understanding outlining their respective roles and responsibilities for this project.

We are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA). The DOE plans to consult with the public per 36 CFR 800.3(e) by providing public meetings and web-based information. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process. DOE will contact the Shoshone-Bannock Tribes of the Fort Hall Reservation separately regarding the upcoming NEPA process and to initiate government-to-government consultation.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the

Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Shoshone-Bannock Tribes of the Fort Hall Reservation on next steps in the project.

Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

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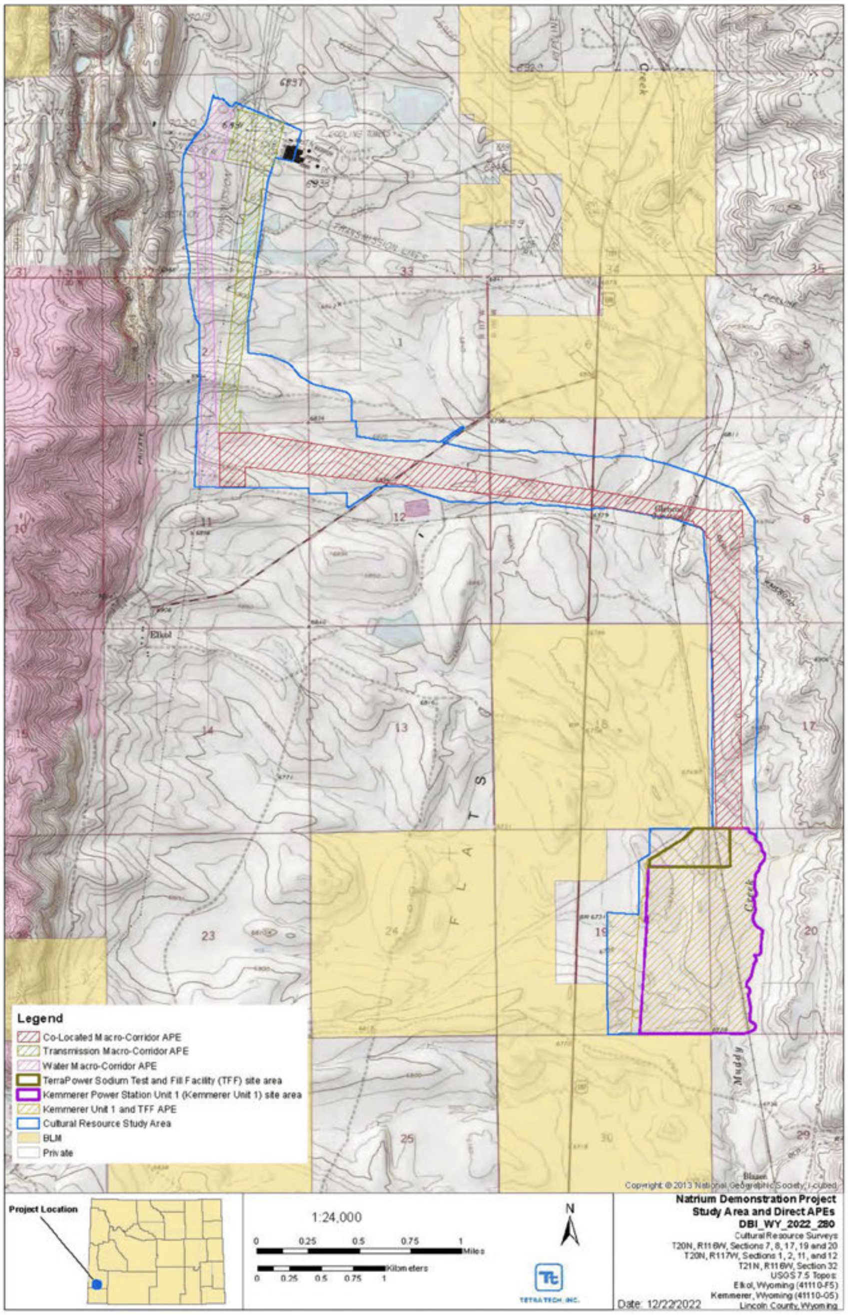
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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Chairman Nathan Small
Shoshone-Bannock Tribes of the Fort Hall Reservation
PO Box 306
Fort Hall, ID 83203

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman Nathan Small,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Shoshone-Bannock Tribes of the Fort Hall Reservation under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Shoshone-Bannock Tribes of the Fort Hall Reservation has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

The DOE's Office of Clean Energy Demonstrations (OCED) role in this project is a cost-share partnership with TerraPower, LLC in the development of the Natrium Reactor and associated facilities. The Nuclear Regulatory Commissions (NRC) role in this project is to regulate the nuclear power plant through licensing, inspection, and enforcement of NRC's requirements. The DOE and NRC are preparing a programmatic memorandum of understanding outlining their respective roles and responsibilities for this project.

We are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA). The DOE plans to consult with the public per 36 CFR 800.3(e) by providing public meetings and web-based information. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process. DOE will contact the Shoshone-Bannock Tribes of the Fort Hall Reservation separately regarding the upcoming NEPA process and to initiate government-to-government consultation.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the

Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Shoshone-Bannock Tribes of the Fort Hall Reservation on next steps in the project.

Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

CC Louise Dixey, Cultural Resources Director

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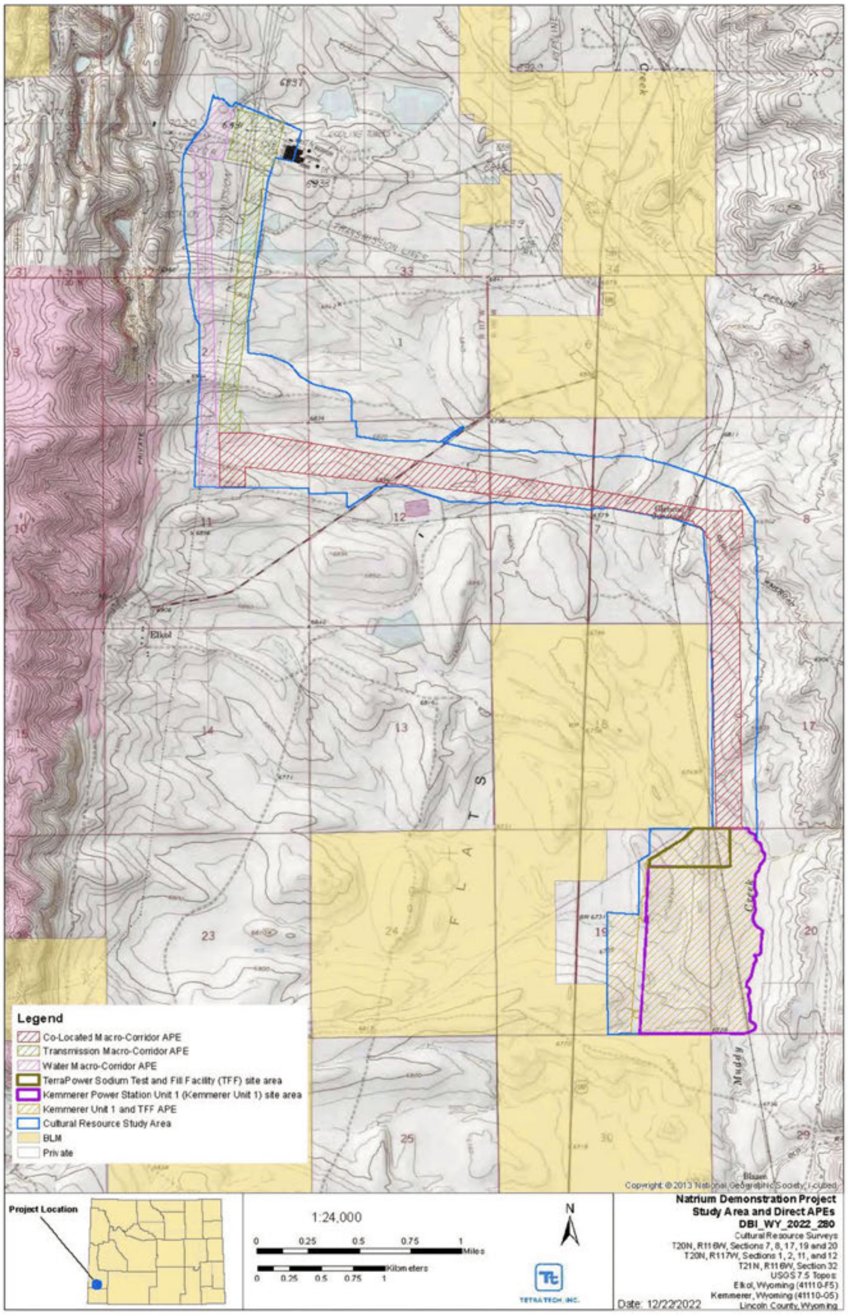
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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Martina Minthorn (Callahan), THPO
Comanche Nation of Oklahoma
Comanche Nation Historical Preservation Office
#6 SW D Avenue, Suite C
Lawton, OK 73507

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Martina Minthorn (Callahan),

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Comanche Nation of Oklahoma under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Comanche Nation of Oklahoma has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

The DOE's Office of Clean Energy Demonstrations (OCED) role in this project is a cost-share partnership with TerraPower, LLC in the development of the Natrium Reactor and associated facilities. The Nuclear Regulatory Commissions (NRC) role in this project is to regulate the nuclear power plant through licensing, inspection, and enforcement of NRC's requirements. The DOE and NRC are preparing a programmatic memorandum of understanding outlining their respective roles and responsibilities for this project.

We are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA). The DOE plans to consult with the public per 36 CFR 800.3(e) by providing public meetings and web-based information. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process. DOE will contact the Comanche Nation of Oklahoma separately regarding the upcoming NEPA process and to initiate government-to-government consultation.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the

Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Comanche Nation of Oklahoma on next steps in the project.

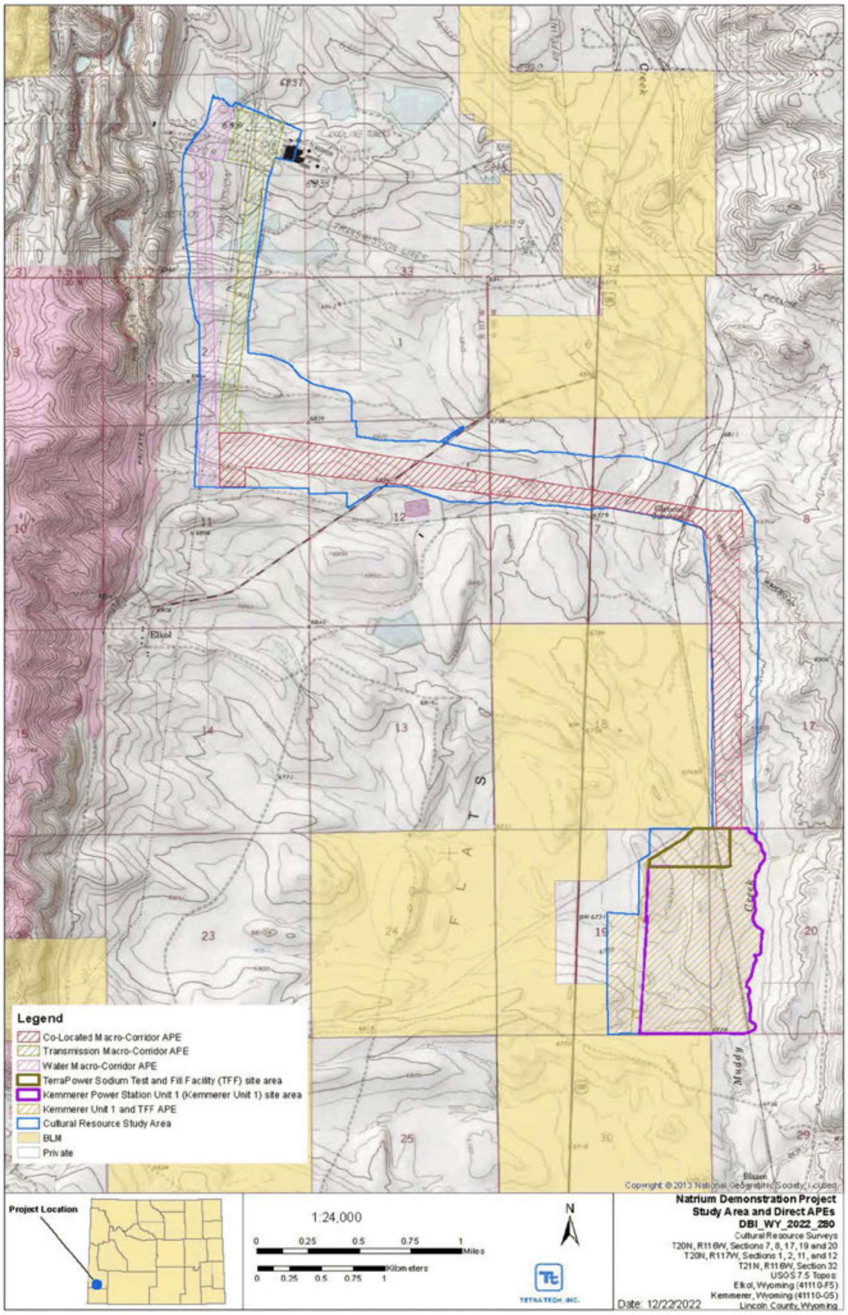
Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure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Lincoln County, Wyoming
Date: 12/22/2022
Muddy Creek

March 15, 2023

Chairman Mark Woommavovah
Comanche Nation of Oklahoma
P.O. Box 908
Lawton, OK 73502

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman Mark Woommavovah,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Comanche Nation of Oklahoma under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Comanche Nation of Oklahoma has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

The DOE's Office of Clean Energy Demonstrations (OCED) role in this project is a cost-share partnership with TerraPower, LLC in the development of the Natrium Reactor and associated facilities. The Nuclear Regulatory Commissions (NRC) role in this project is to regulate the nuclear power plant through licensing, inspection, and enforcement of NRC's requirements. The DOE and NRC are preparing a programmatic memorandum of understanding outlining their respective roles and responsibilities for this project.

We are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA). The DOE plans to consult with the public per 36 CFR 800.3(e) by providing public meetings and web-based information. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process. DOE will contact the Comanche Nation of Oklahoma separately regarding the upcoming NEPA process and to initiate government-to-government consultation.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone

Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Comanche Nation of Oklahoma on next steps in the project.

Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

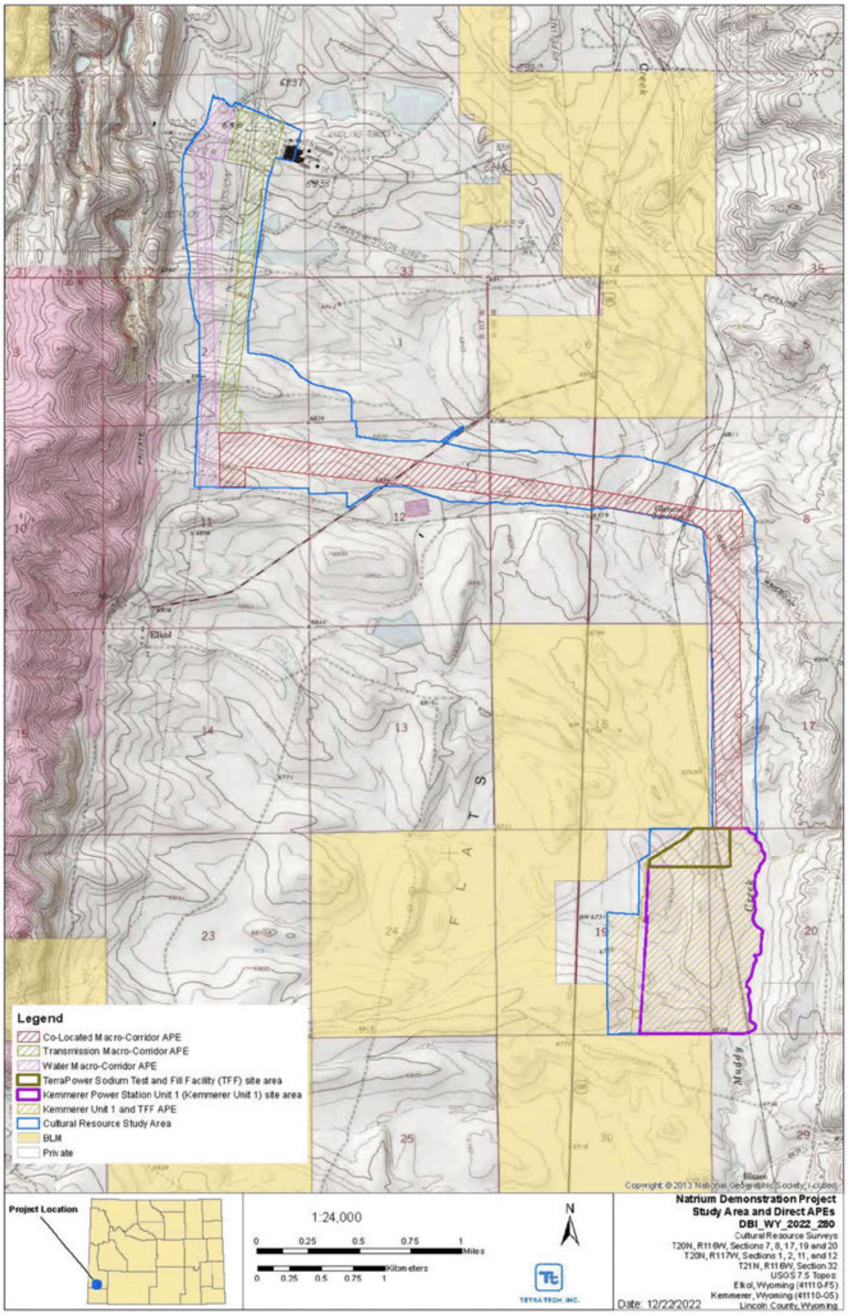
Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

CC Martina Minthorn, THPO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Kemmerer, Wyoming (41110-G5)
Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

President Jeffrey Stiffarm
Fort Belknap Reservation
158 Tribal Way
Harlem, MT 59526

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear President Jeffrey Stiffarm,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Fort Belknap Reservation under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Fort Belknap Reservation has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

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We are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA). The DOE plans to consult with the public per 36 CFR 800.3(e) by providing public meetings and web-based information. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process. DOE will contact the Fort Belknap Reservation separately regarding the upcoming NEPA process and to initiate government-to-government consultation.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone

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The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Fort Belknap Reservation on next steps in the project.

Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

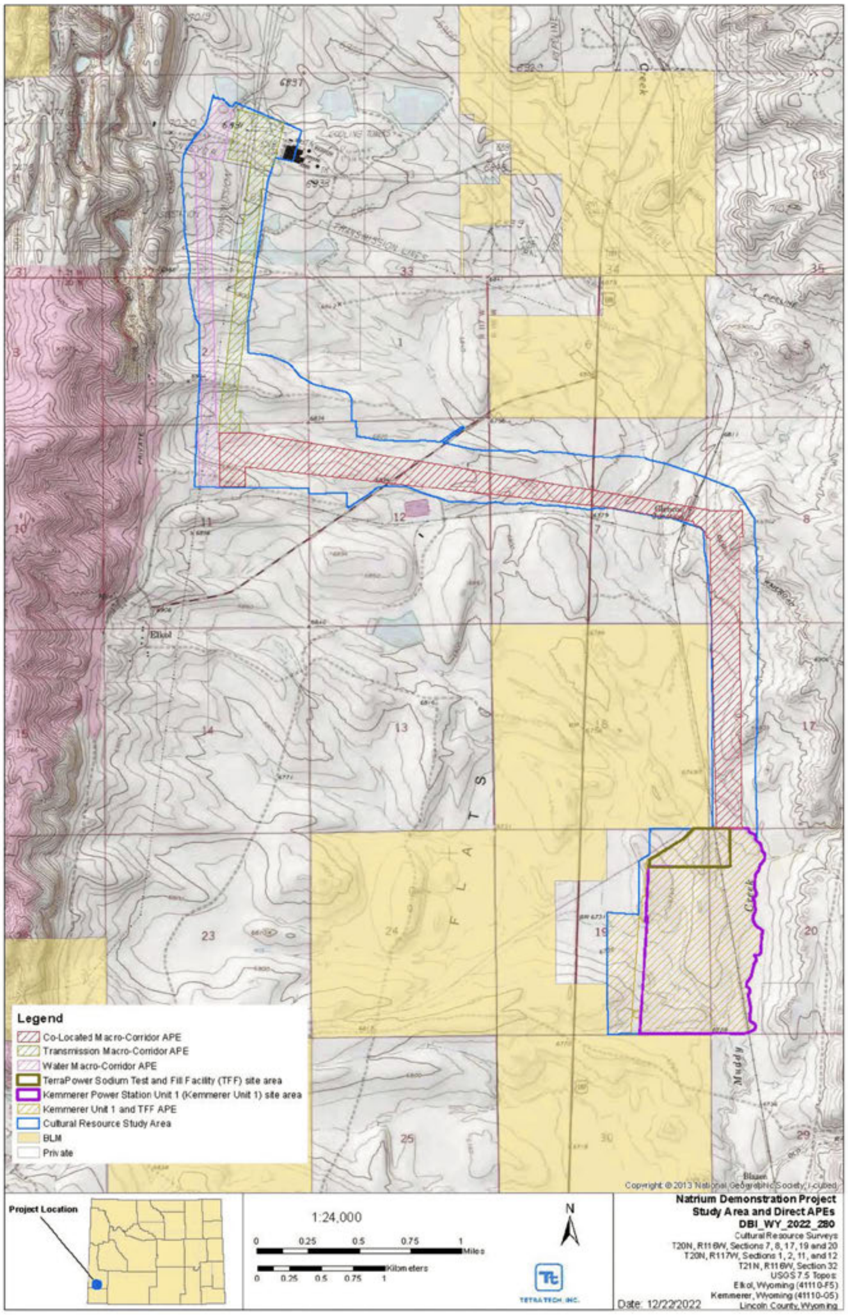
Gretchen Applegate

Gretchen Applegate

Enclosure

CC Michael Blackwolf, THPO

3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Kemmerer, Wyoming (41110-G5)
Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Michael Blackwolf, THPO
Fort Belknap Reservation
158 Tribal Way
Harlem, MT 59526

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Michael Blackwolf,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Fort Belknap Reservation under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Fort Belknap Reservation has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone

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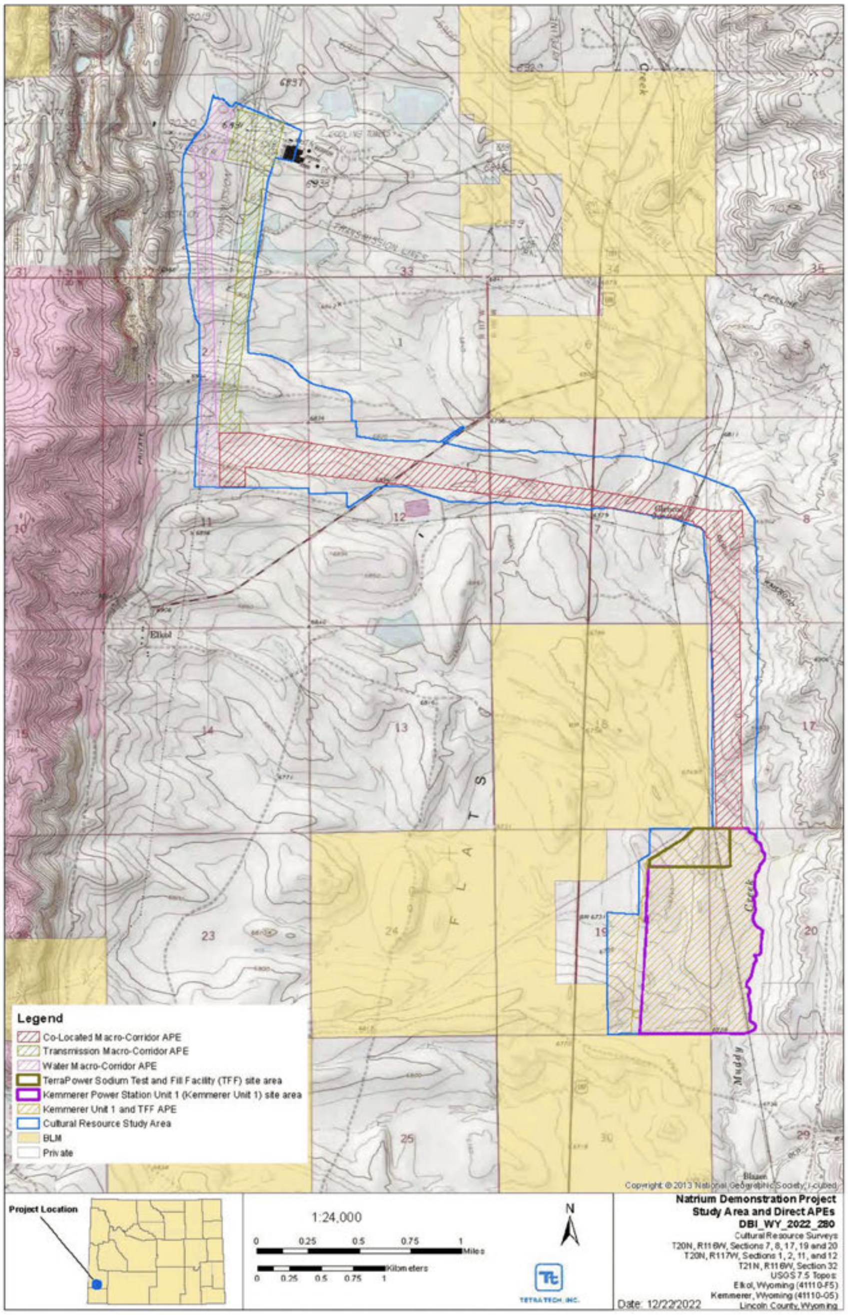
Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure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Lincoln County, Wyoming
Date: 12/22/2022
Muddy Creek
Elkol

March 15, 2023

Chairman Frank White Clay
Crow Tribe of Indians
PO Box 159
43 Heritage Ln
Crow Agency, MT 59022

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman Frank White Clay,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Crow Tribe of Indians under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Crow Tribe of Indians has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the

Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Crow Tribe of Indians on next steps in the project.

Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

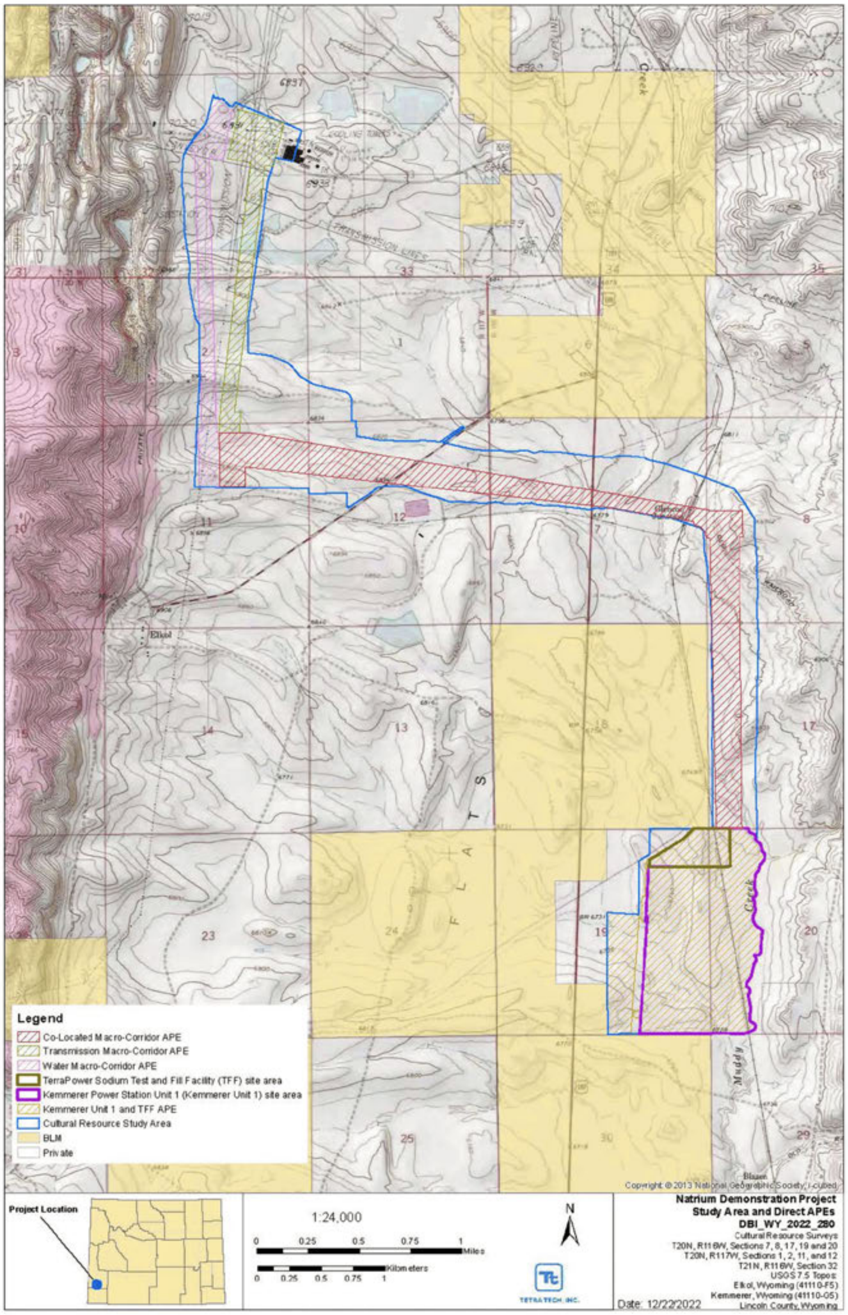
Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

CC Aaron Brien, CTHPO Director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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Aaron Brien, CTHPO Director
Crow Tribe of Indians
Crow Tribal Historic Preservation Office (CTHPO)
PO Box 159
43 Heritage Ln
Crow Agency, MT 59022

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Aaron Brien,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Crow Tribe of Indians under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Crow Tribe of Indians has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort

Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

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Sincerely,

Gretchen Applegate

Gretchen Applegate

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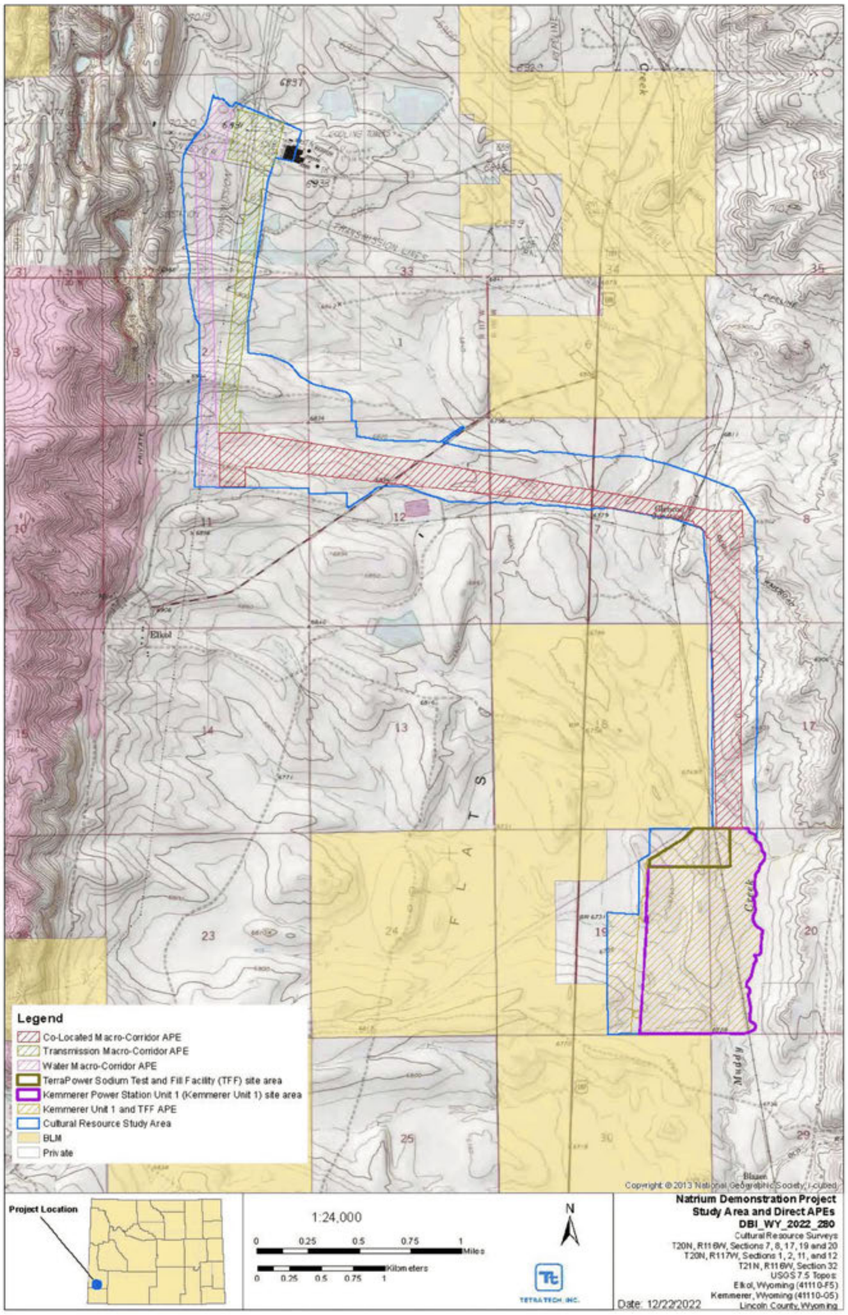
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Date: 12/22/2022

March 15, 2023

Chairman Peter Lengkeek
Crow Creek Sioux
PO Box 50
100 Drifting Goose St
Fort Thompson, SD 0

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman Peter Lengkeek,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Crow Creek Sioux under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Crow Creek Sioux has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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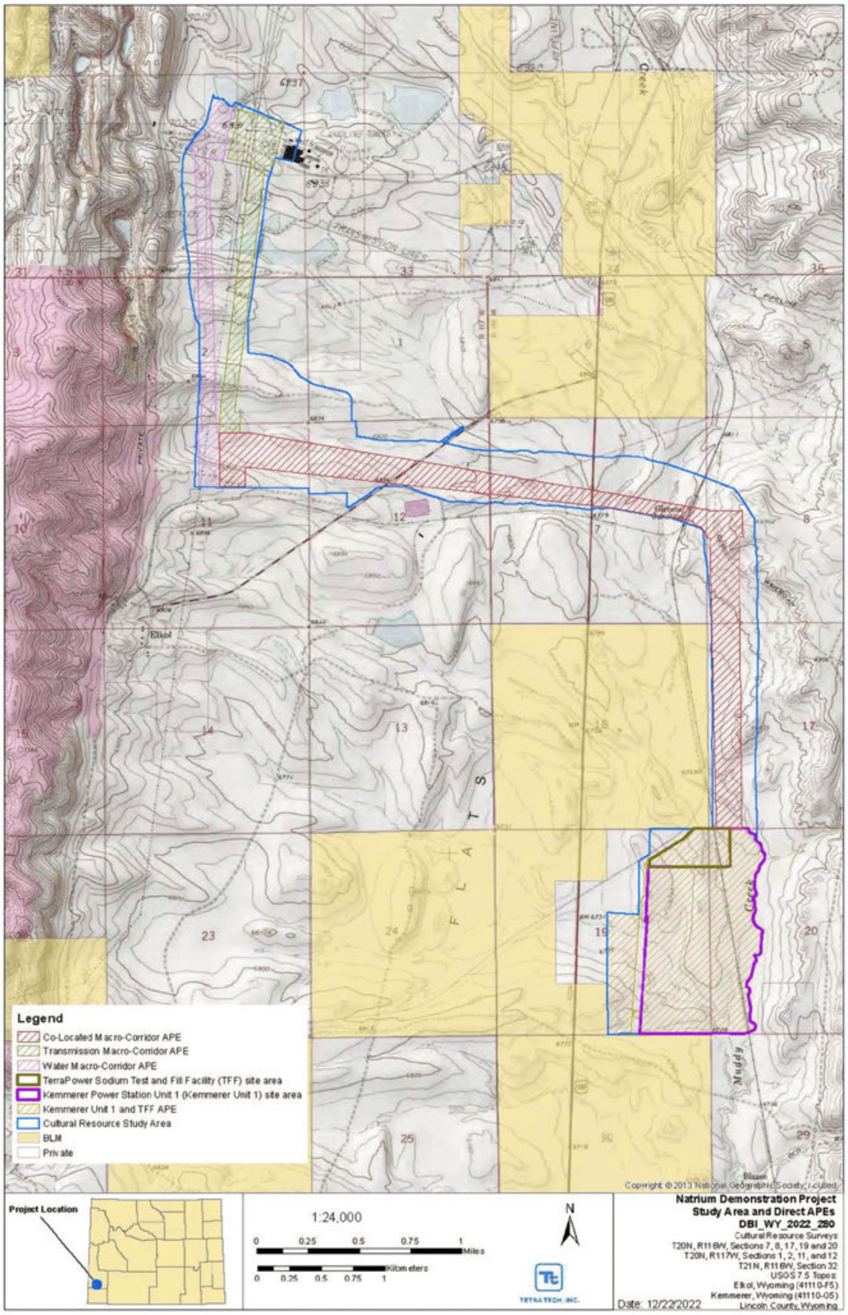
Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

CC Merle Marks, THPO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Natrium Demonstration Project
Study Area and Direct APEs
DBI_WY_2022_280
Cultural Resource Surveys
T20N, R116W, Sections 7, 8, 17, 19 and 20
T20N, R117W, Sections 1, 2, 11, and 12
T21N, R116W, Section 32
USGS 7.5 Topos:
Elkol, Wyoming (41110-F5)
Kemmerer, Wyoming (41110-G5)
Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Merle Marks, THPO
Crow Creek Sioux
PO Box 50
100 Drifting Goose St
Fort Thompson, SD 0

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Merle Marks,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Crow Creek Sioux under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Crow Creek Sioux has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

The DOE's Office of Clean Energy Demonstrations (OCED) role in this project is a cost-share partnership with TerraPower, LLC in the development of the Natrium Reactor and associated facilities. The Nuclear Regulatory Commissions (NRC) role in this project is to regulate the nuclear power plant through licensing, inspection, and enforcement of NRC's requirements. The DOE and NRC are preparing a programmatic memorandum of understanding outlining their respective roles and responsibilities for this project.

We are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA). The DOE plans to consult with the public per 36 CFR 800.3(e) by providing public meetings and web-based information. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process. DOE will contact the Crow Creek Sioux separately regarding the upcoming NEPA process and to initiate government-to-government consultation.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the

Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Crow Creek Sioux on next steps in the project.

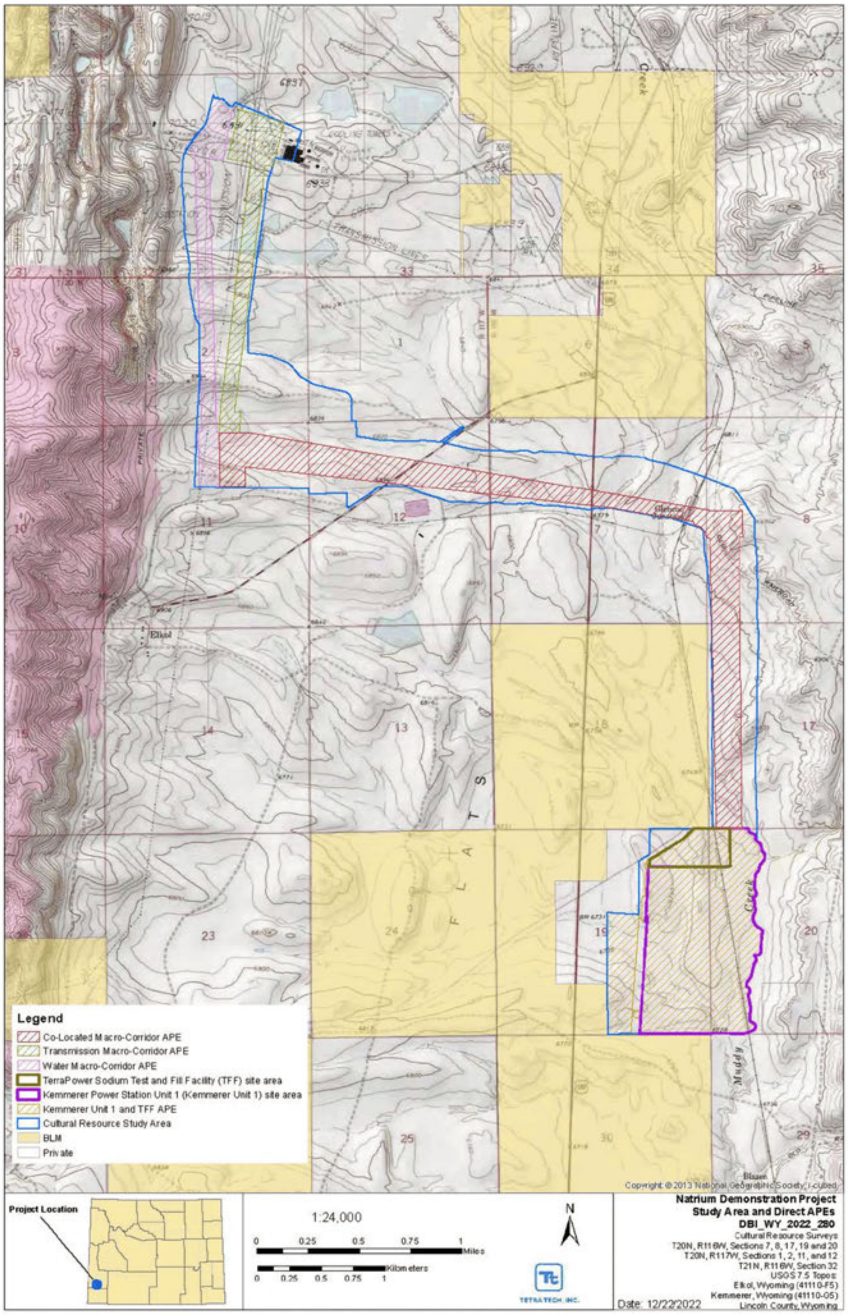
Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Luke Duncan, Whiteriver Band Representative
Northern Ute
PO Box 190
Fort Duchesne, UT

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Representative Luke Duncan,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Northern Ute under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Northern Ute has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

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Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone

Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

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Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

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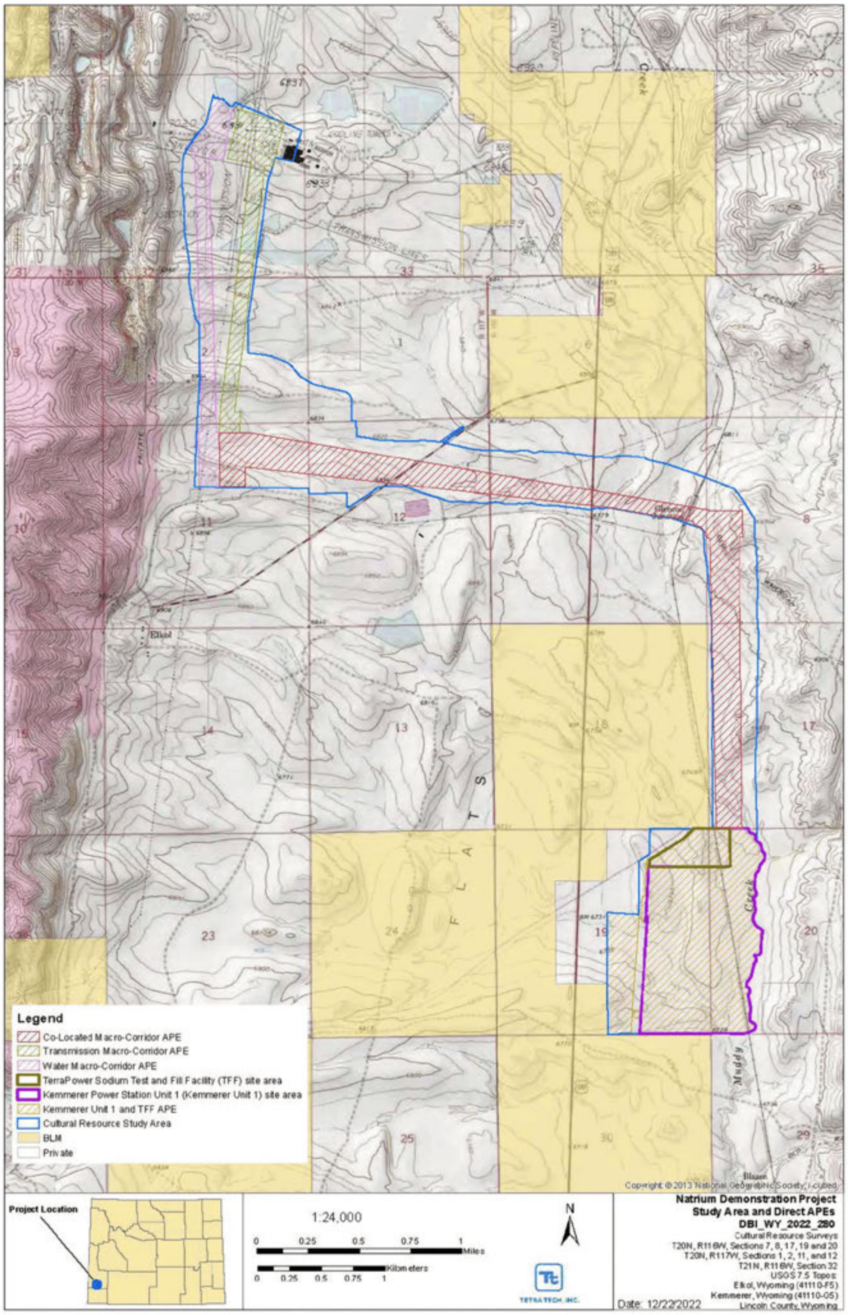
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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Chairman John St. Clair
Eastern Shoshone Tribe
Shoshone Business Council
P.O.Box 538
Fort Washakie, WY 82514

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman John St. Clair,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Eastern Shoshone Tribe under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Eastern Shoshone Tribe has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the

Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

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Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

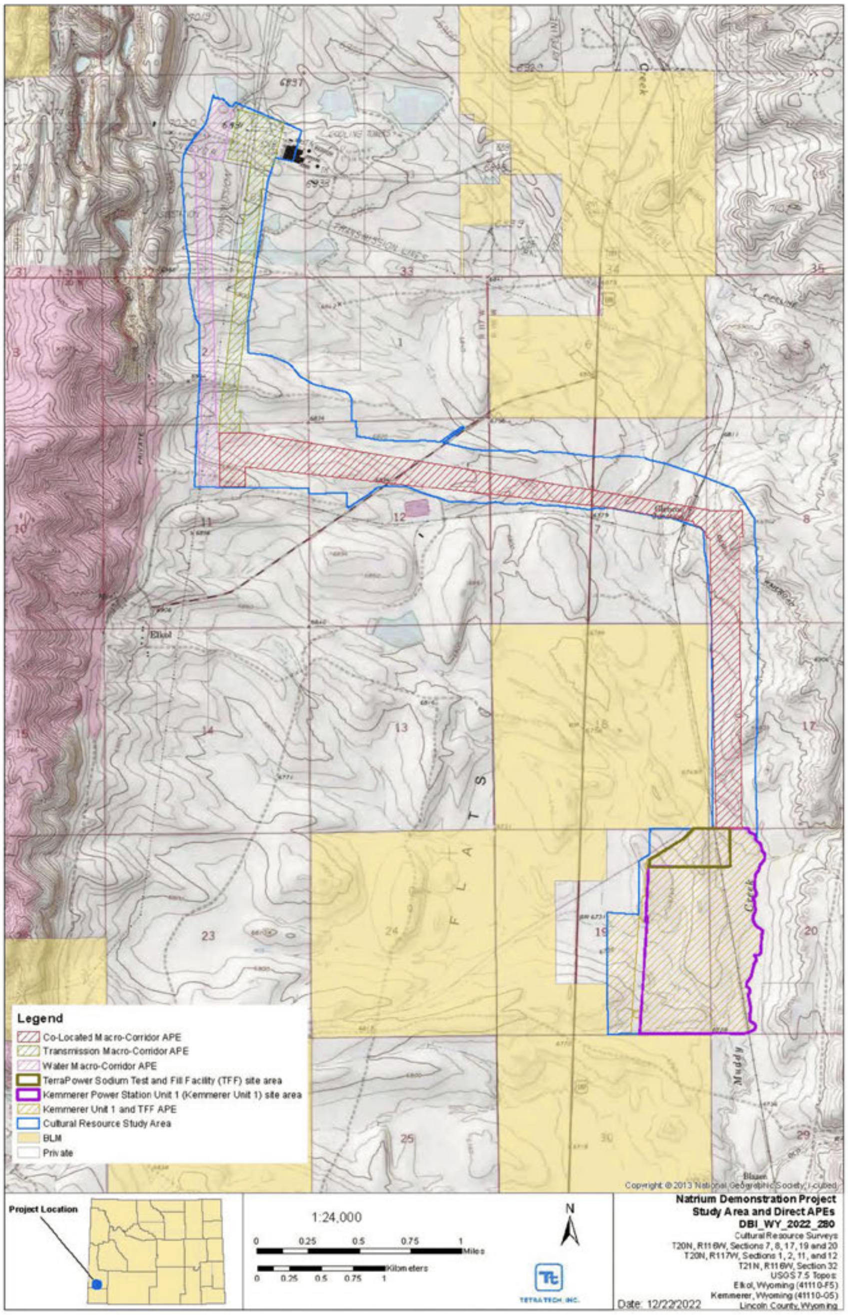
Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

CC Joshua Mann, THPO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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Joshua Mann, THPO
Eastern Shoshone Tribe
P.O. Box 538
Fort Washakie, WY 82514

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Joshua Mann,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Eastern Shoshone Tribe under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Eastern Shoshone Tribe has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

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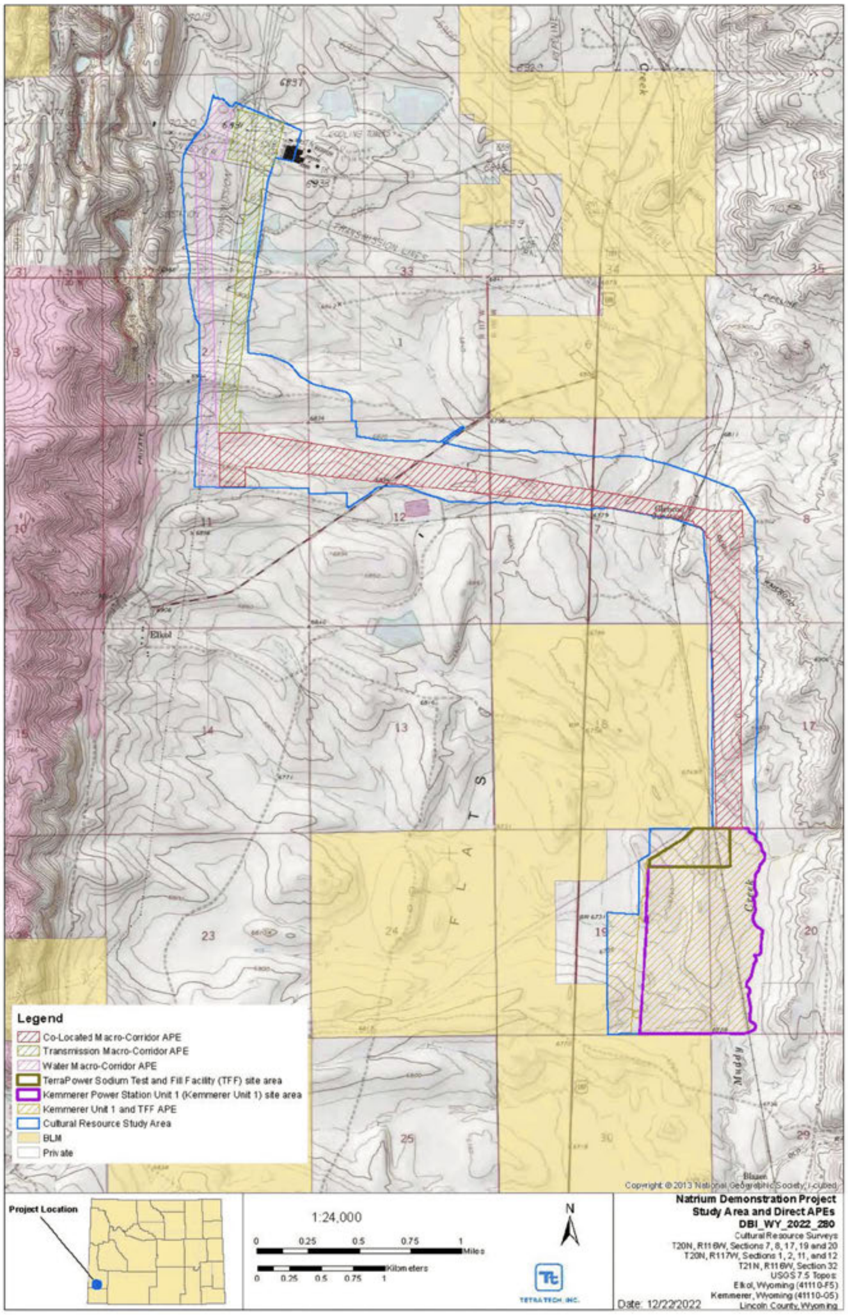
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Muddy Creek

March 15, 2023

Chairman Lloyd Goggles
Northern Arapaho
Northern Arapaho Business Council
P.O. Box 396
Fort Washakie, WY 82514

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman Lloyd Goggles,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Northern Arapaho under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Northern Arapaho has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Gretchen Applegate

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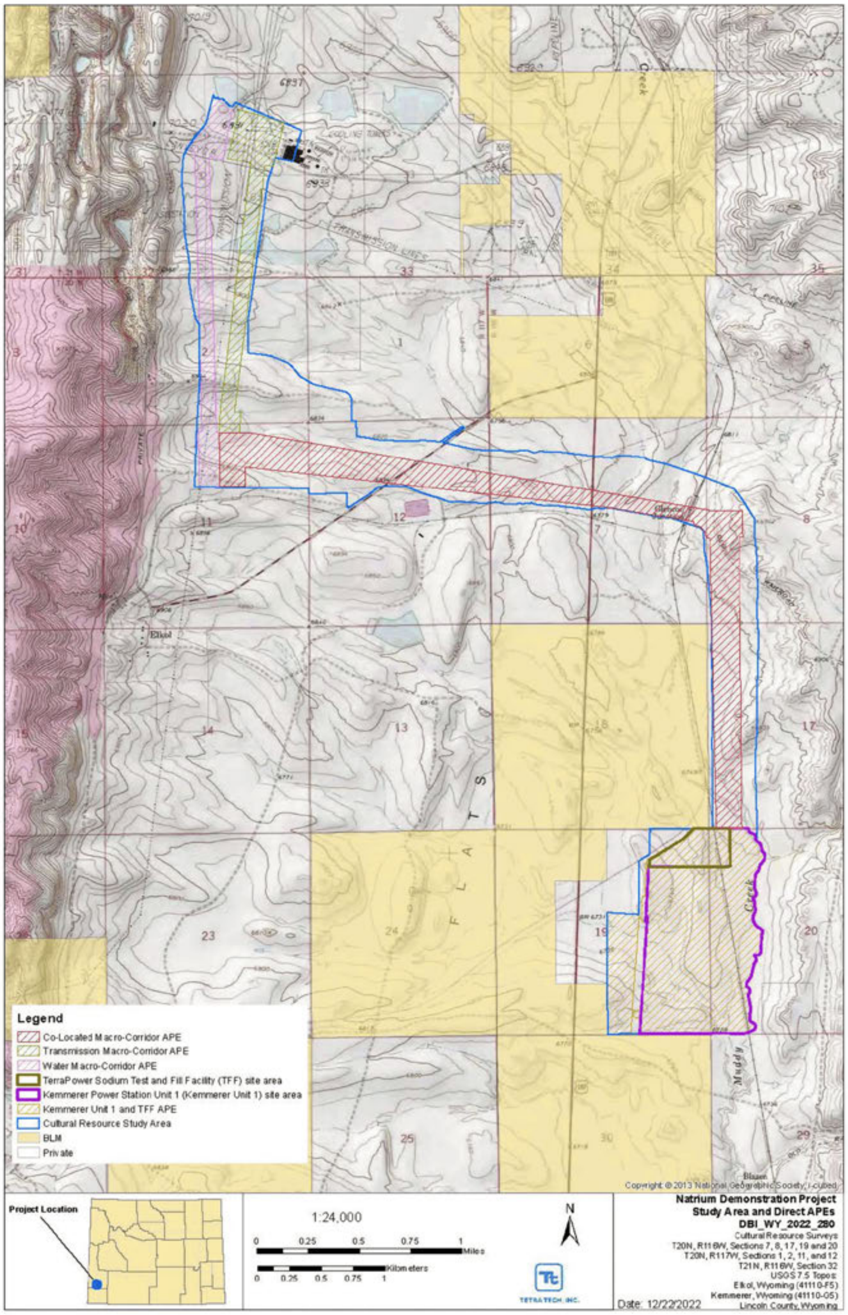
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Ben Ridgely, NATHPO Director
Northern Arapaho
Northern Arapaho Tribal Historic Preservation Office
P.O. Box 396
Fort Washakie, WY 82514

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

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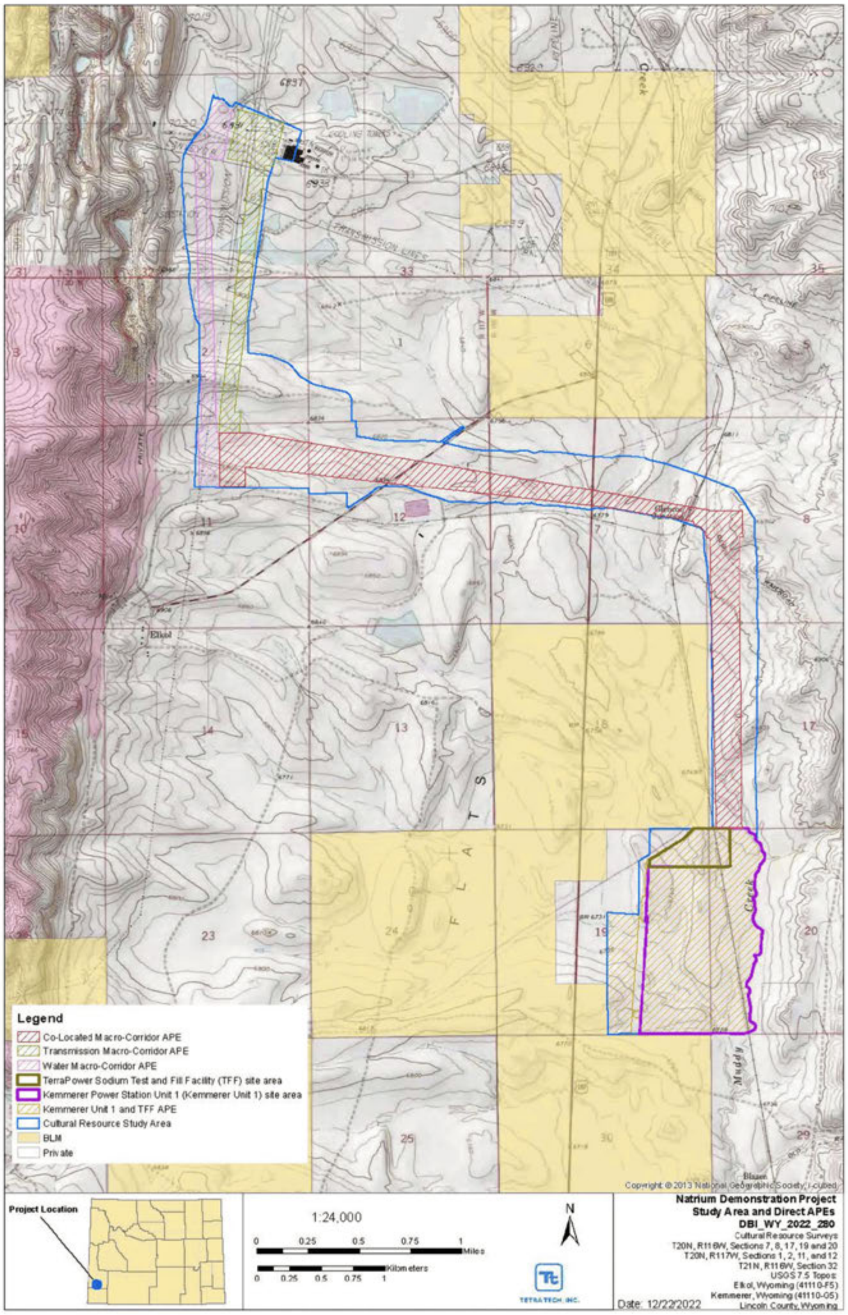
Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure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Natrium Demonstration Project
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USGS 7.5 Topos:
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Kemmerer, Wyoming (41110-G5)
Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Chairman & THPO, Durell Cooper
Apache Tribe of Oklahoma
PO Box 1330
Anadarko, OK 73005

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman & THPO Durell Cooper,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Apache Tribe of Oklahoma under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Apache Tribe of Oklahoma has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

The DOE's Office of Clean Energy Demonstrations (OCED) role in this project is a cost-share partnership with TerraPower, LLC in the development of the Natrium Reactor and associated facilities. The Nuclear Regulatory Commissions (NRC) role in this project is to regulate the nuclear power plant through licensing, inspection, and enforcement of NRC's requirements. The DOE and NRC are preparing a programmatic memorandum of understanding outlining their respective roles and responsibilities for this project.

We are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA). The DOE plans to consult with the public per 36 CFR 800.3(e) by providing public meetings and web-based information. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process. DOE will contact the Apache Tribe of Oklahoma separately regarding the upcoming NEPA process and to initiate government-to-government consultation.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone

Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Apache Tribe of Oklahoma on next steps in the project.

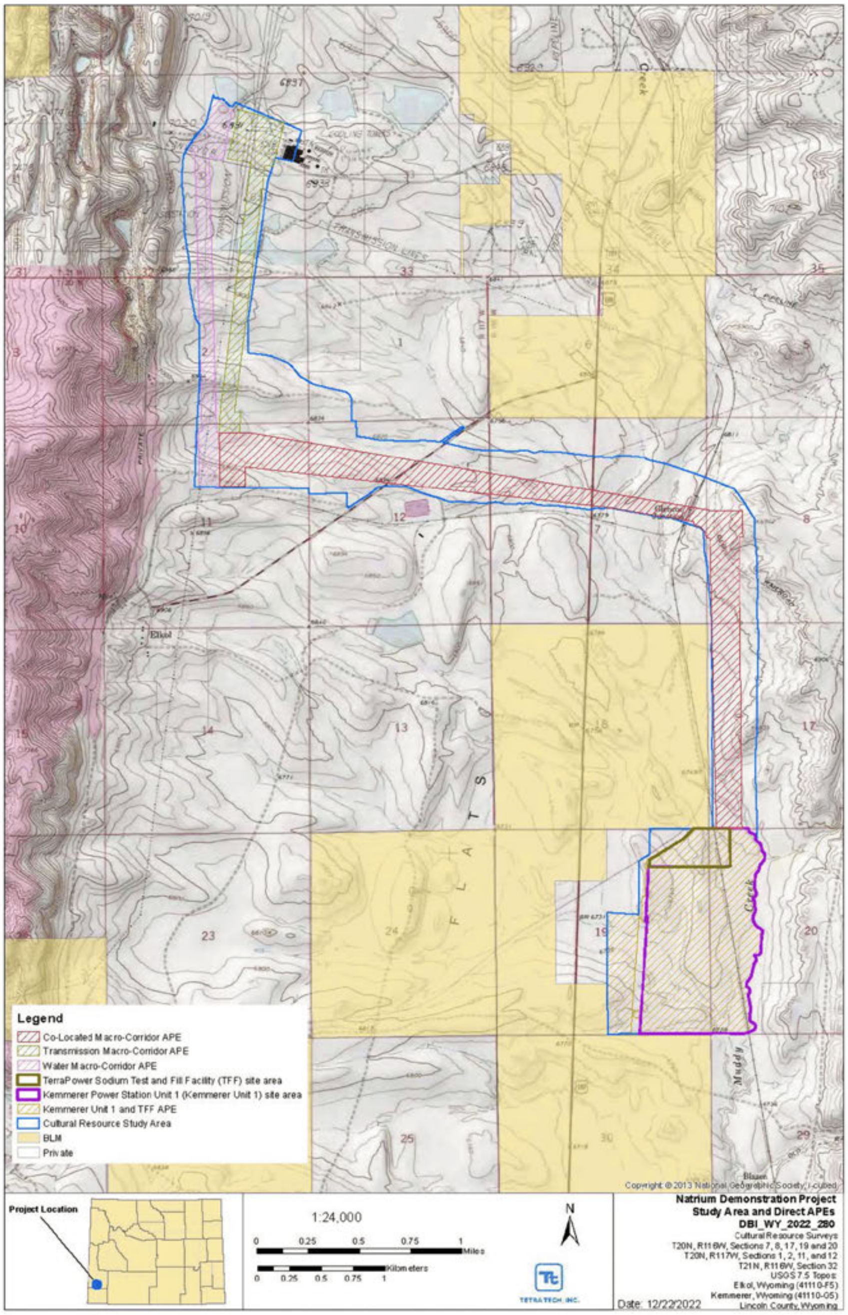
Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure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Lincoln County, Wyoming
Date: 12/22/2022
Muddy Creek

March 15, 2023

Patty Timbimboo-Madsen, Cultural Resources Director
Northwestern Band of the Shoshone Nation
707 North Main Street
Brigham City, UT 84302

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Patty Timbimboo-Madsen,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Northwestern Band of the Shoshone Nation under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Northwestern Band of the Shoshone Nation has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

The TerraPower Natrium Reactor project would construct and operate an advanced reactor near the existing Naughton Power Plant south of the community of Kemmerer in Lincoln County, Wyoming. The project's reactor, energy storage system, transmission line, water pipeline, sodium test and fill facility, and other associated facilities would be constructed on private land in Township 30 North, Range 116 West. Due to the complexity of this project, it will be completed in phases by the DOE and the Nuclear Regulatory Commission (NRC). The detailed activities to be undertaken under each phase will be provided soon.

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We are also beginning a parallel process to develop an Environmental Assessment (EA) for the project under the National Environmental Policy Act (NEPA). The DOE plans to consult with the public per 36 CFR 800.3(e) by providing public meetings and web-based information. The DOE anticipates that these outreach efforts will accommodate the requirements of both NEPA and the Section 106 process. DOE will contact the Northwestern Band of the Shoshone Nation separately regarding the upcoming NEPA process and to initiate government-to-government consultation.

Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the

Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

DOE has identified an Area of Potential Effect (APE) for the project (enclosed). The APE map separates the potential activities (i.e., transmission line) into distinct APEs to help facilitate future consultation on project phases. For the purposes of this initiation of consultation, DOE would ask you to consider all the project areas shown. DOE looks forward to consultation with the Northwestern Band of the Shoshone Nation on next steps in the project.

Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

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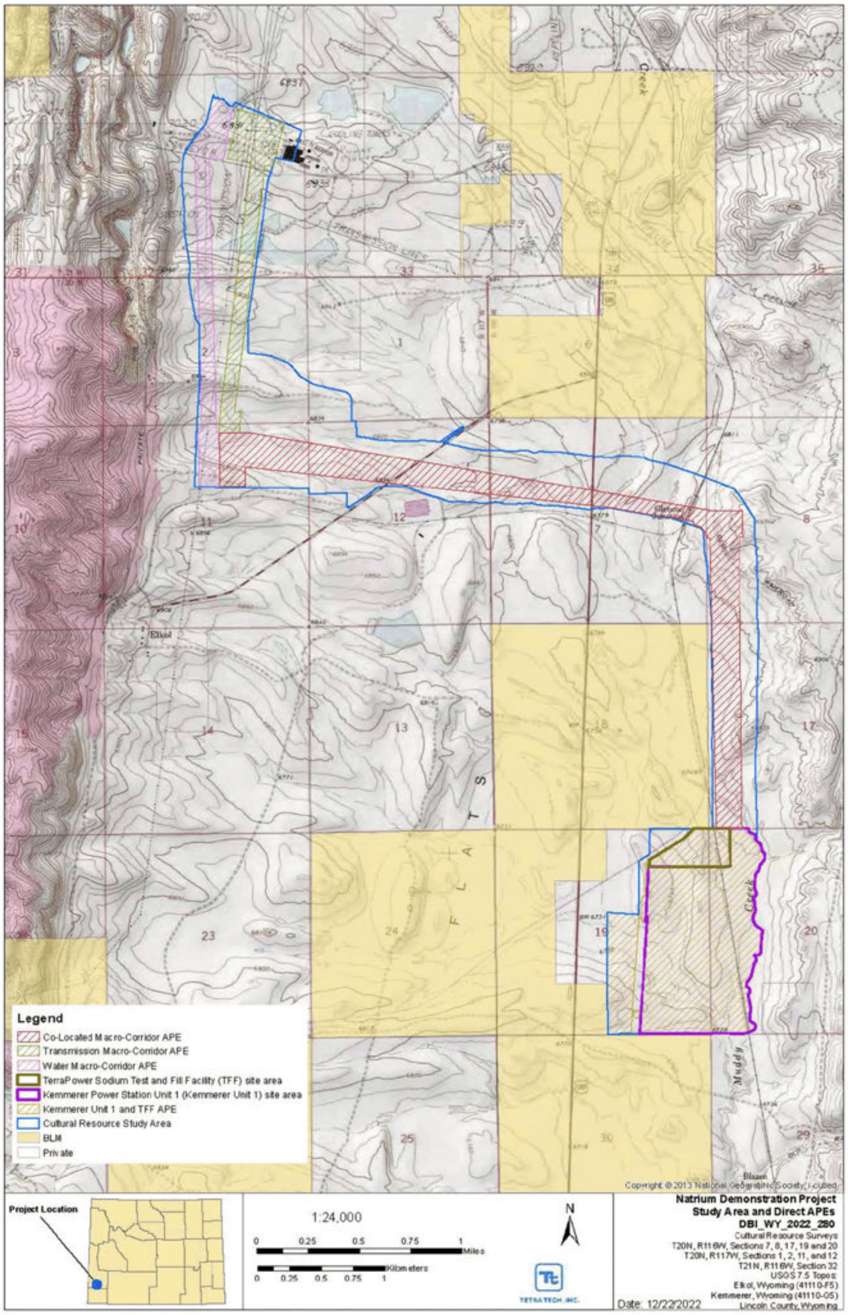
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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Chairman Dennis Alex
Northwestern Band of the Shoshone Nation
2575 Commerce Way
Ogden, UT 84401

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman Dennis Alex,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Northwestern Band of the Shoshone Nation under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Northwestern Band of the Shoshone Nation has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the

Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

The DOE is aware that TerraPower reached out to various entities regarding this project and that some participated in fieldwork with archaeologists contracted by TerraPower. DOE appreciates the good intent of TerraPower in engaging with these entities; however, DOE wishes to make clear that it does not consider this outreach part of its Section 106 consultation obligations, and while it may draw from the information acquired, all consulting parties will be afforded a full and equal opportunity to participate in this process. If you have any questions regarding this previous outreach, please do not hesitate to contact me by phone or email, provided below.

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Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

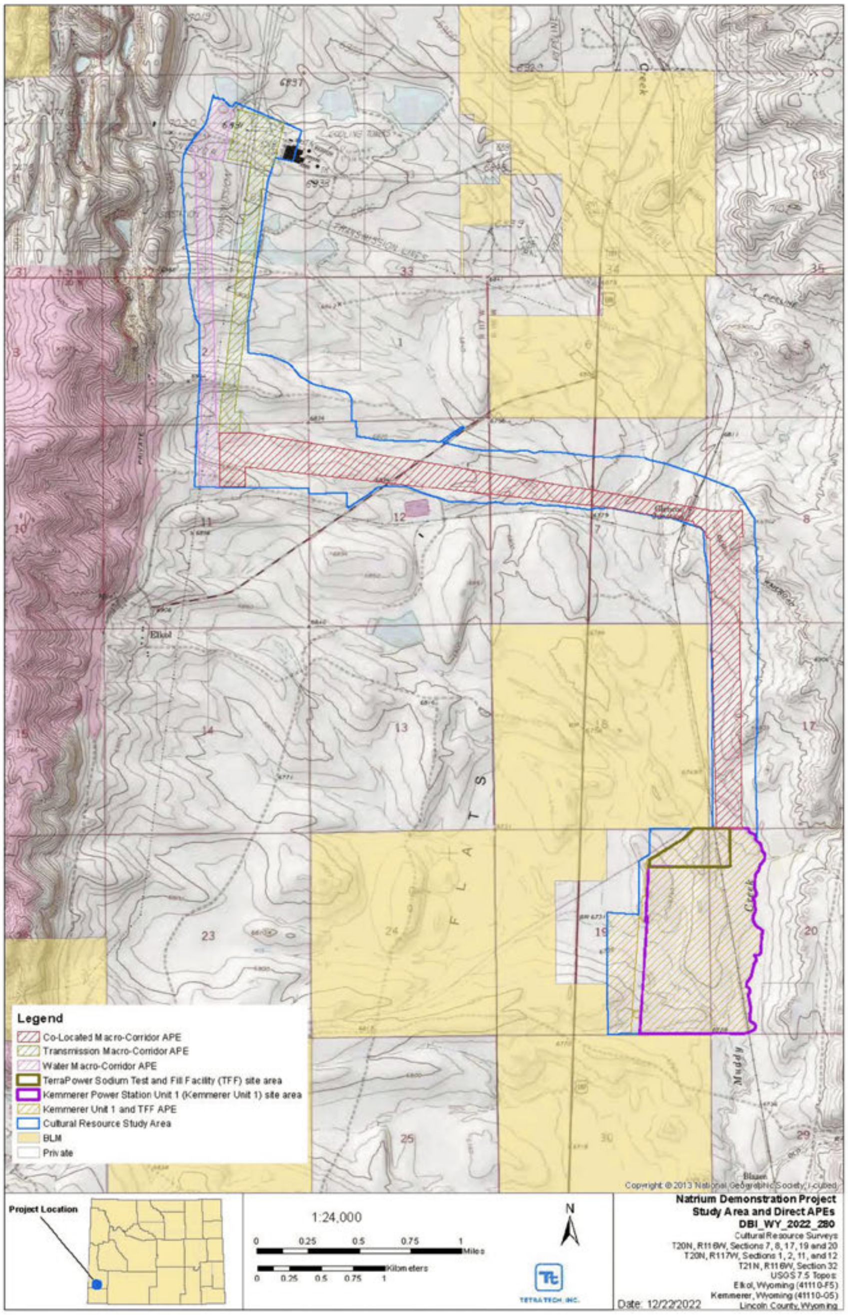
Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

CC Patty Timbimboo-Madsen, Cultural Resources Director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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Max Bear, Director, Cultural, Acting THPO
Cheyenne and Arapaho Tribes of Oklahoma
100 Red Moon Circle
PO Box 167
Concho, OK 73022

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Max Bear,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Cheyenne and Arapaho Tribes of Oklahoma under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Cheyenne and Arapaho Tribes of Oklahoma has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Pursuant to 36 CFR 800.2(c) the consulting parties for this project includes: the Wyoming State Historic Preservation Office, the Shoshone-Bannock Tribes of the Fort

Hall Reservation, the Comanche Nation of Oklahoma, the Fort Belknap Reservation, the Crow Tribe of Indians, the Crow Creek Sioux, the Northern Ute, the Eastern Shoshone Tribe, Apache Tribe of Oklahoma, Northwestern Band of the Shoshone Nation, Cheyenne and Arapaho Tribes of Oklahoma, Skull Valley Band of Goshute Indians, Ute Indian Tribe of the Uintah & Ouray Reservation, Confederated Tribes of the Goshute Reservation, and the Northern Arapaho.

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Enclosed find the APE for your review. If you have any questions, please do not hesitate to call me at (240) 252-0399 or email at gretchen.applegate@hq.doe.gov.

Sincerely,

Gretchen Applegate

Gretchen Applegate

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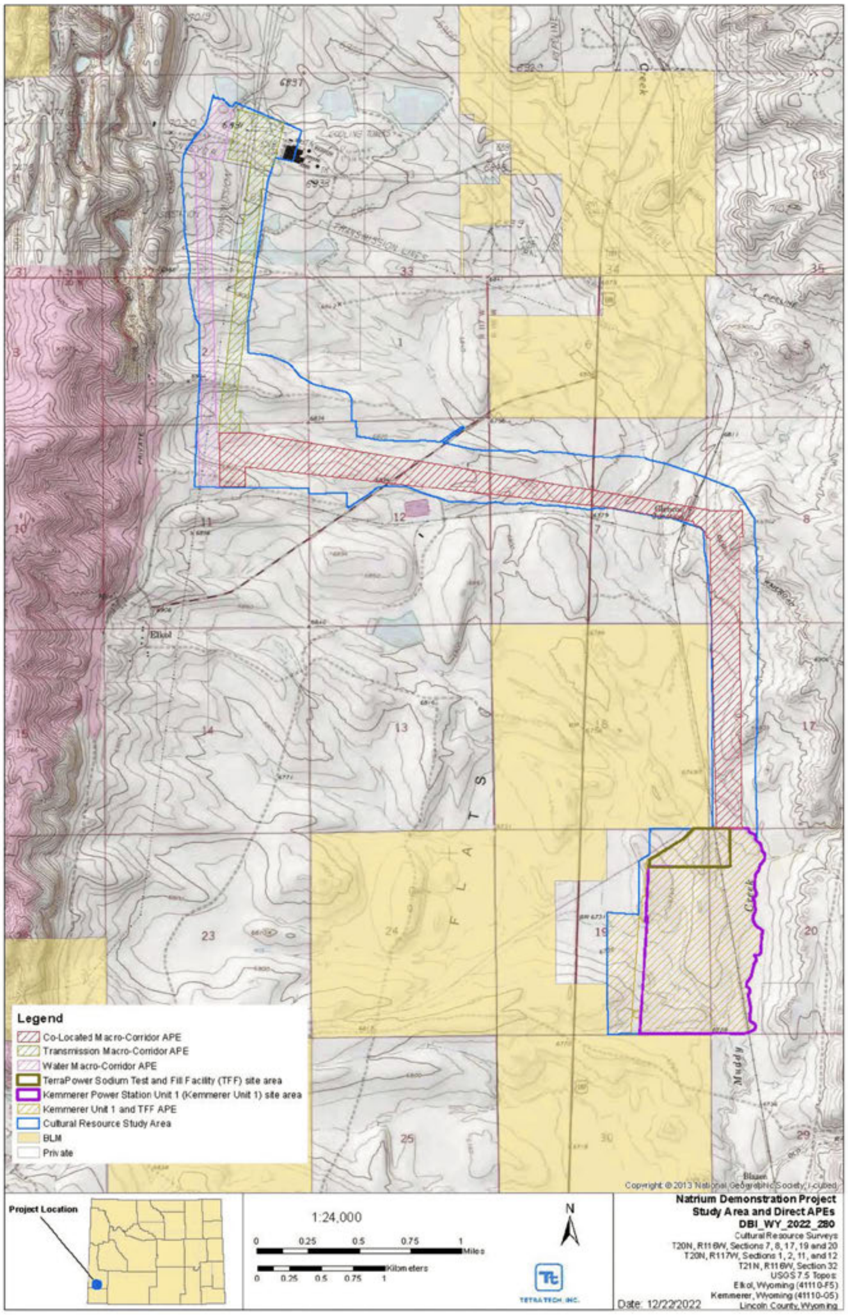
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March 15, 2023

Governor Reggie Wassana
Cheyenne and Arapaho Tribes of Oklahoma
100 Red Moon Circle
PO Box 38
Concho, OK 73022

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Governor Reggie Wassana,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Cheyenne and Arapaho Tribes of Oklahoma under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Cheyenne and Arapaho Tribes of Oklahoma has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

CC Max Bear, Director, Cultural, Acting THPO

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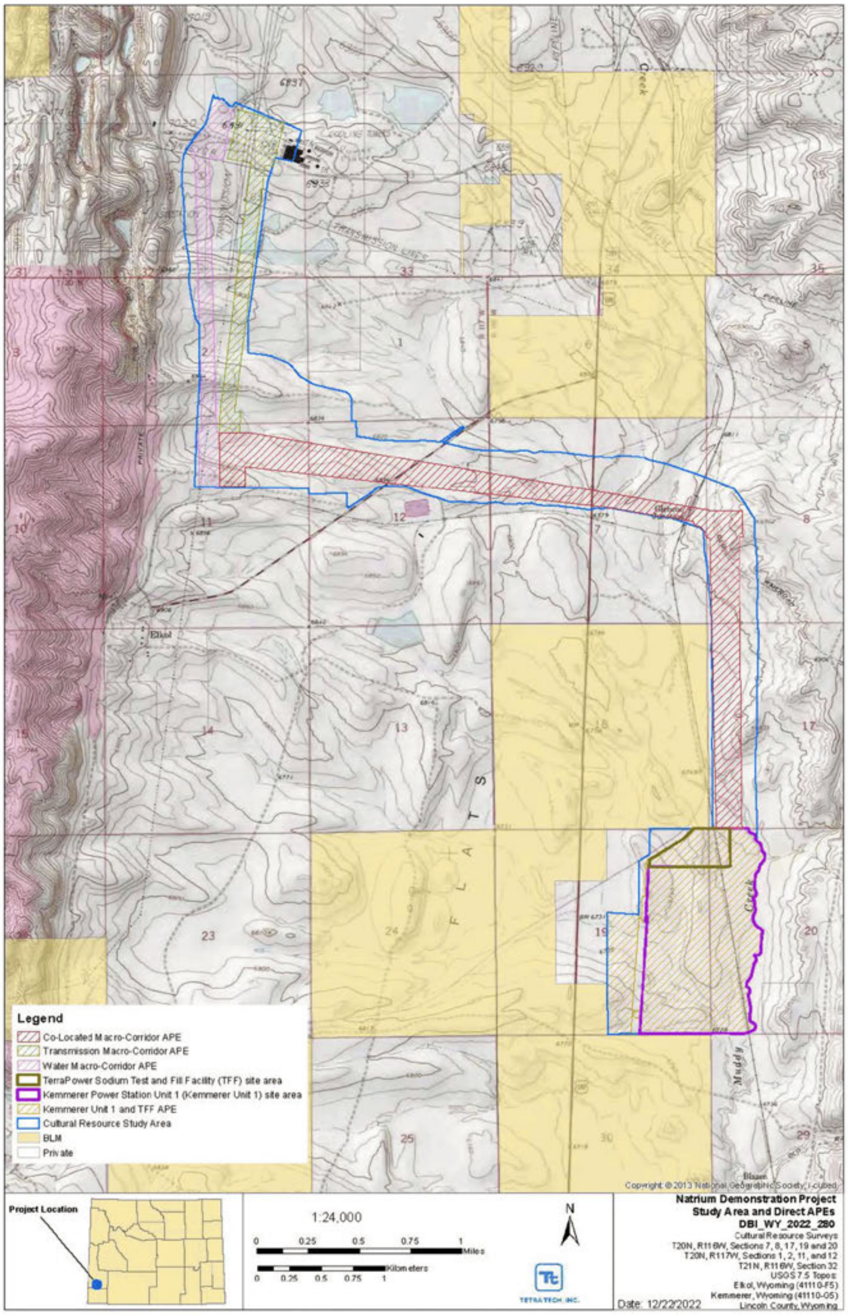
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Date: 12/22/2022
Muddy Creek

March 15, 2023

Sheila Urais, Tribal Secretary
Skull Valley Band of Goshute Indians
407 Skull Valley Road
Skull Valley Reservation, UT 84029

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Sheila Urais,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Skull Valley Band of Goshute Indians under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Skull Valley Band of Goshute Indians has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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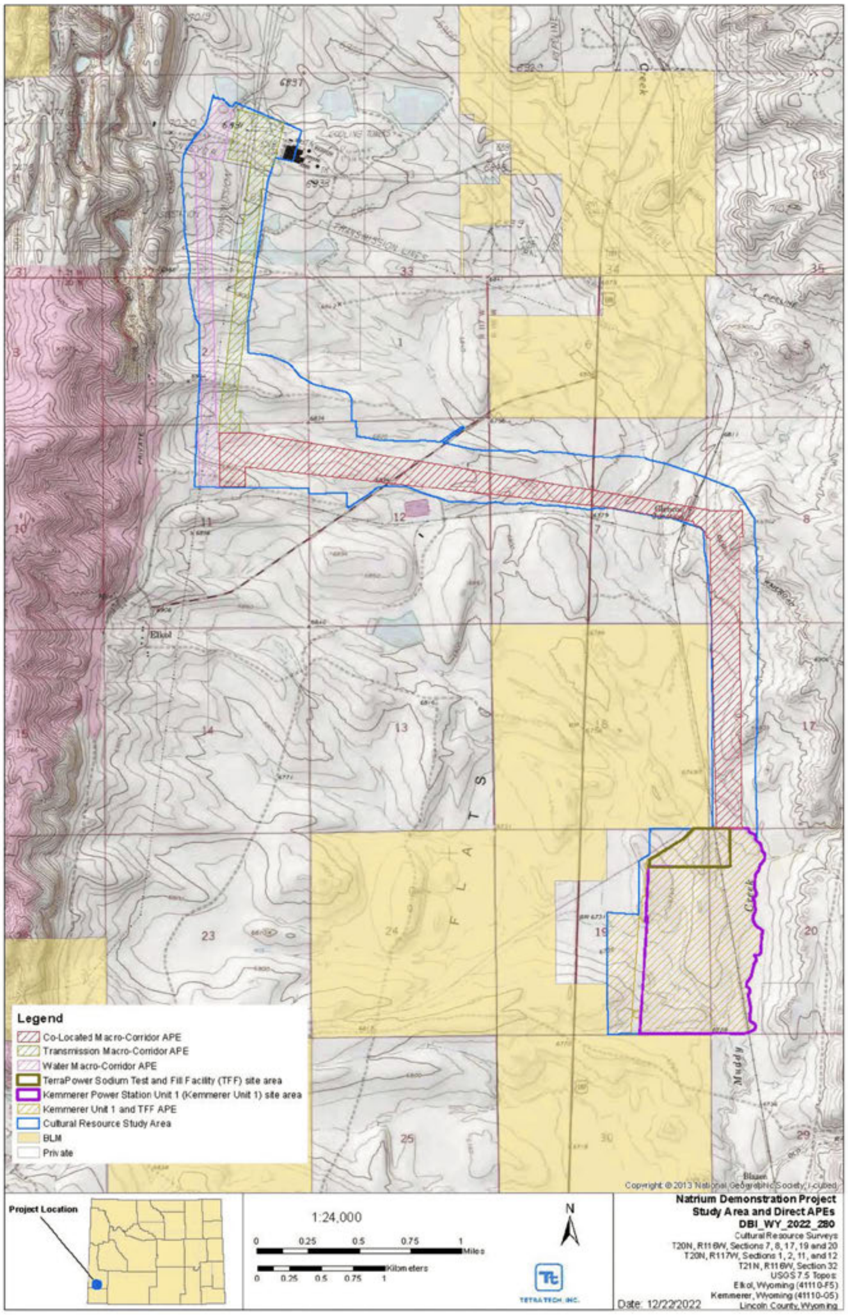
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Lincoln County, Wyoming
Date: 12/22/2022

March 15, 2023

Betsy Chapoose, THPO
Ute Indian Tribe of the Uintah & Ouray Reservation
PO Box 190
Ft. Duchesne, UT 84026

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Betsy Chapoose,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Ute Indian Tribe of the Uintah & Ouray Reservation under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Ute Indian Tribe of the Uintah & Ouray Reservation has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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Sincerely,

Gretchen Applegate

Gretchen Applegate

Enclosure

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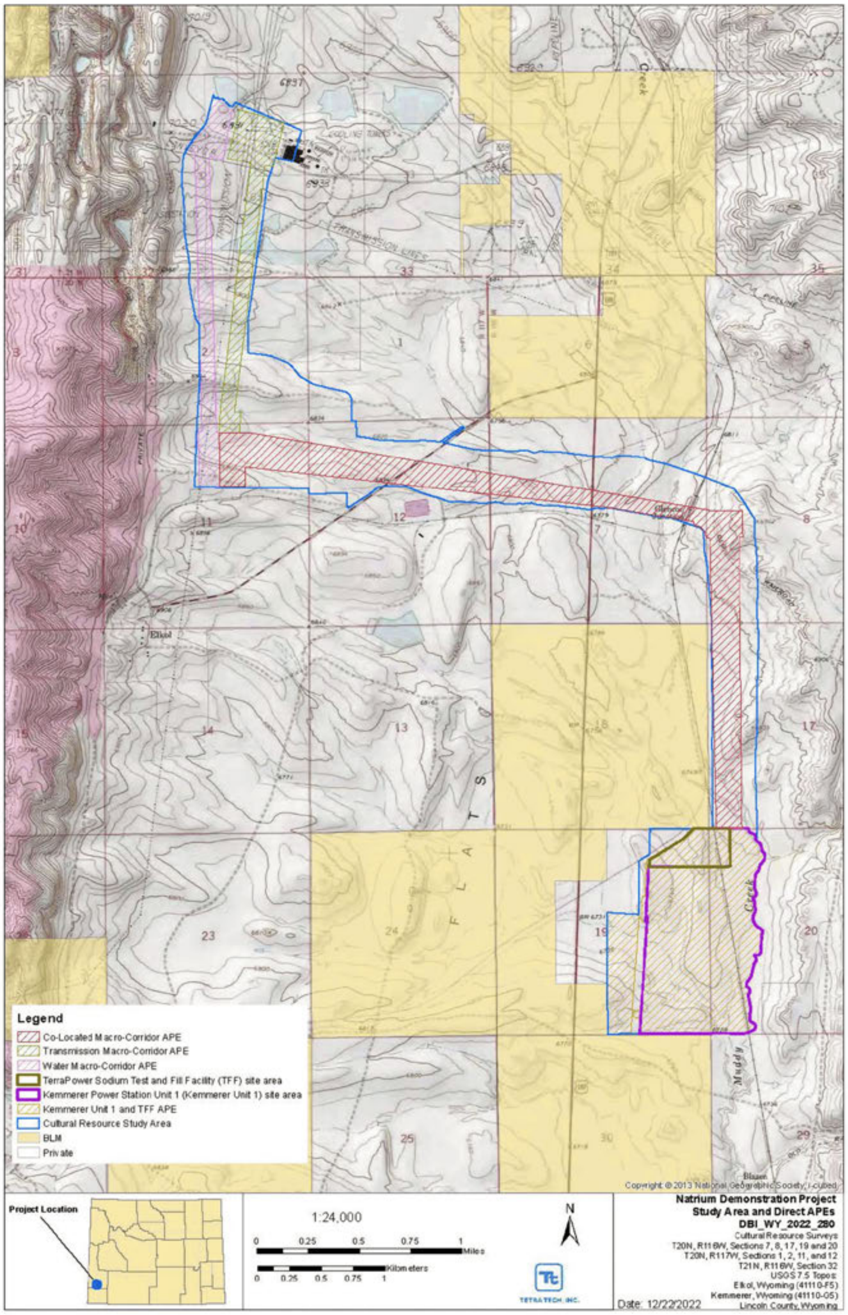
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March 15, 2023

Chairman Shaun Chapoose
Ute Indian Tribe of the Uintah & Ouray Reservation
PO Box 190
Ft. Duchesne, UT 84026

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Chairman Shaun Chapoose,

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Sincerely,

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Enclosure

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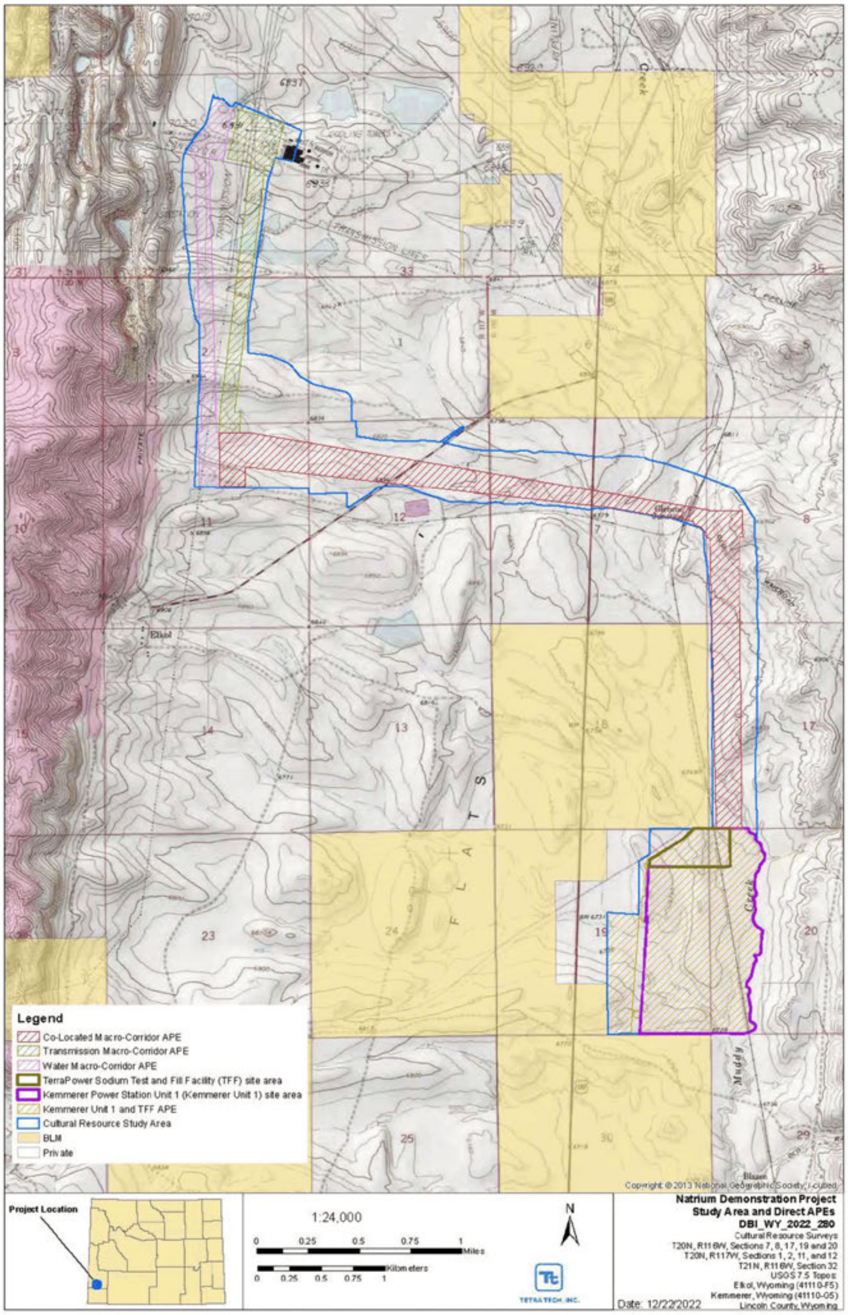
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March 15, 2023

Genevieve Fields, THPO
Confederated Tribes of the Goshute Reservation
PO Box 6104
Ibapah, UT 83034

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

Dear Genevieve Fields,

The U.S. Department of Energy (DOE) wishes to formally initiate consultation with the Confederated Tribes of the Goshute Reservation under Section 106 of the National Historic Preservation Act (NHPA) on the proposed TerraPower Natrium Reactor Project, in accordance with 36 CFR 800.3 of the regulations of the Advisory Council on Historic Preservation (ACHP). The DOE understands that the Confederated Tribes of the Goshute Reservation has ancestral ties to the proposed project area and seeks to initiate consultation with your office.

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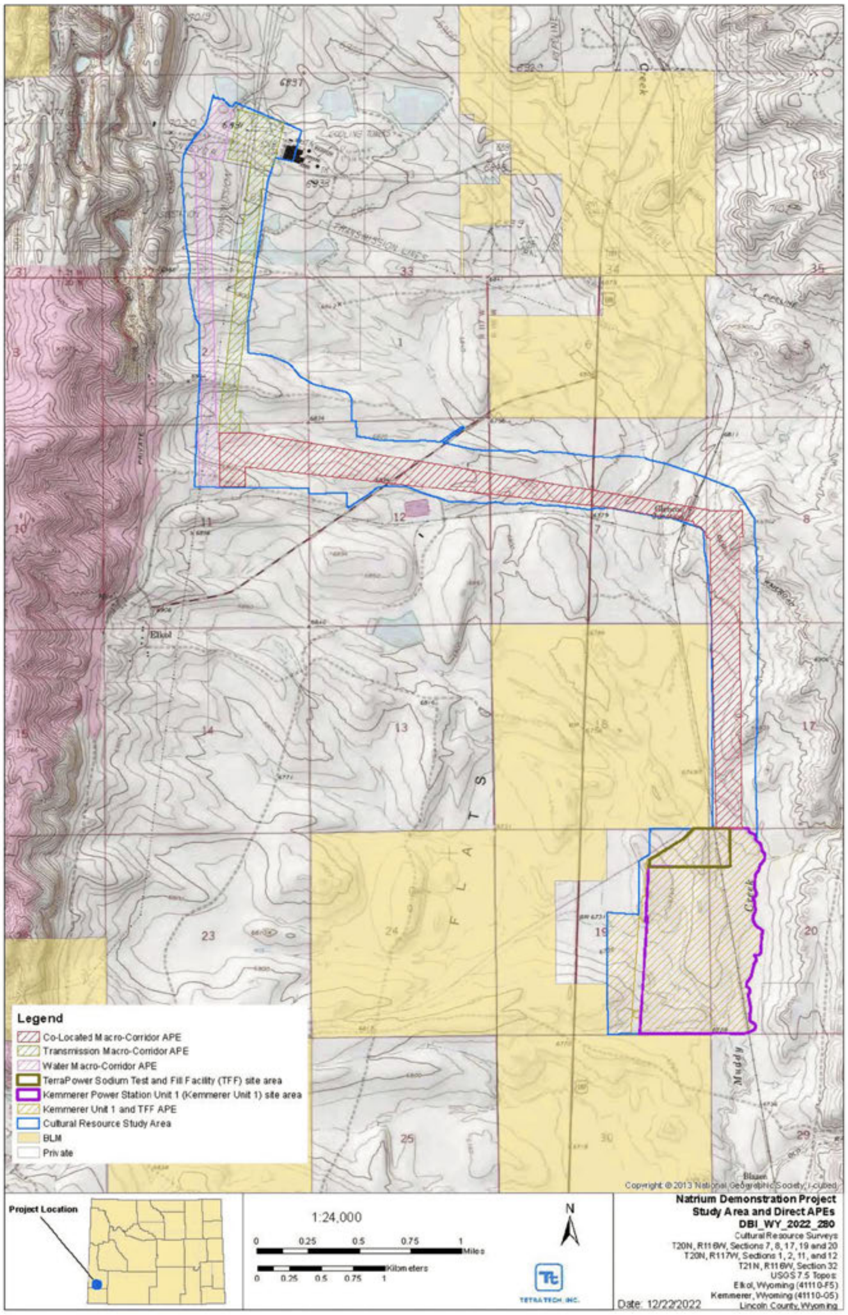

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Chairman Rupert Steele
Confederated Tribes of the Goshute Reservation
PO Box 6104
Ibapah, UT 83034

SUBJECT: TerraPower Natrium Reactor Project, Kemmerer, WY – Section 106 Consultation

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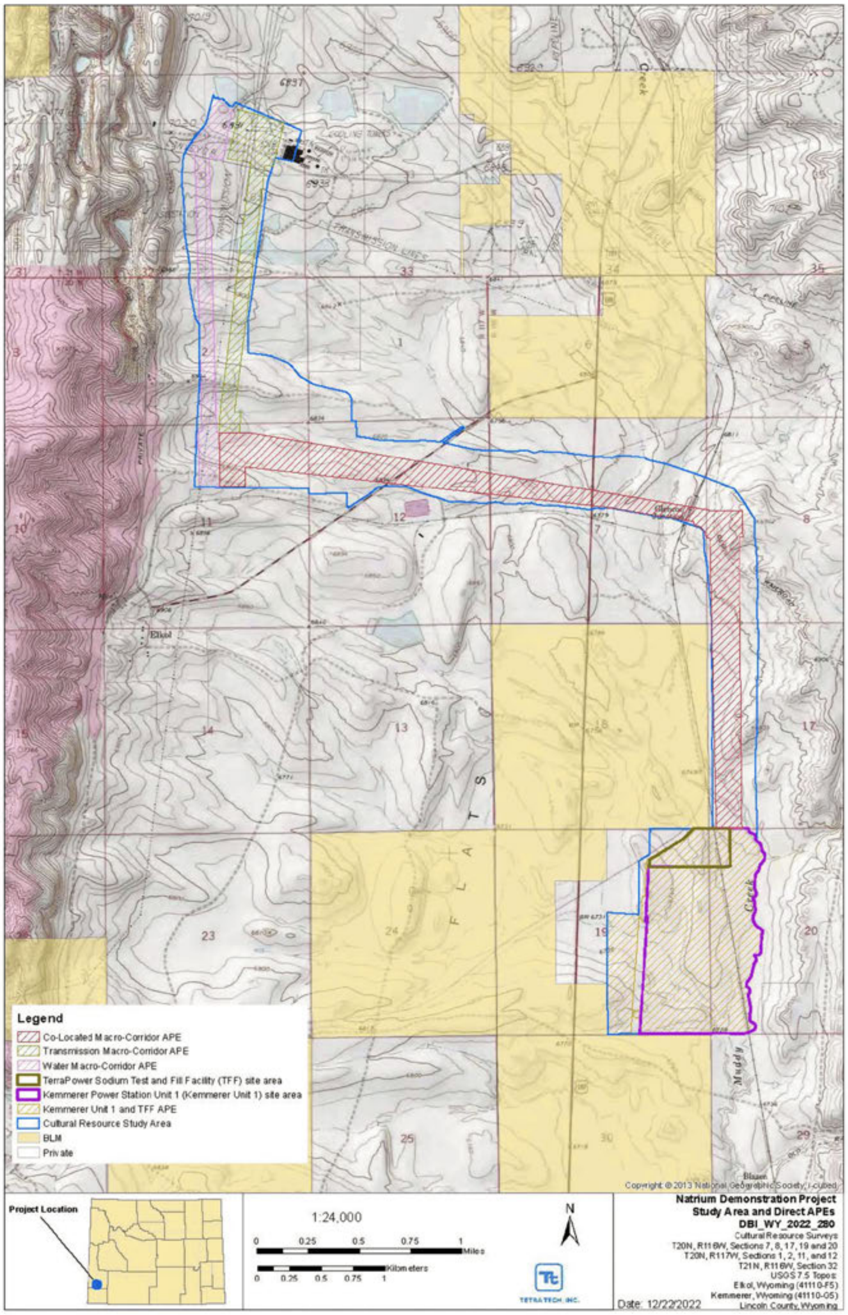
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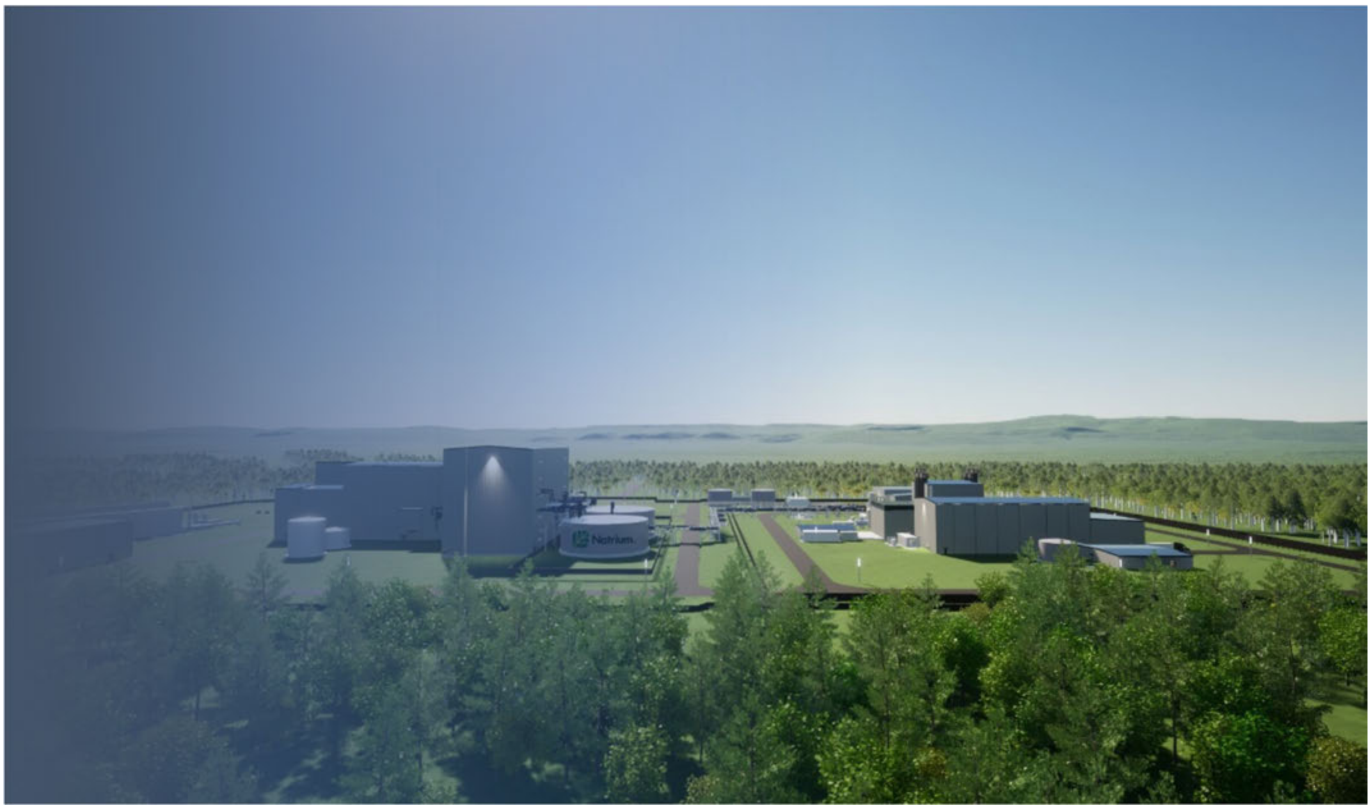

Kemmerer Power Station Unit 1
ER, Appendix B

US SFR Owner, LLC, a wholly owned subsidiary of TerraPower, LLC

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

TABLE OF CONTENTS

APPENDIX B ENVIRONMENTAL PROTECTION PLAN (NONRADIOLOGICAL)

B.1 Objective of the Environmental Protection Plan

The objective of the Environmental Protection Plan (EPP) is to ensure compliance with the Endangered Species Act of 1973 (ESA) and National Historic Preservation of 1966, as amended, and to ensure that the U.S. Nuclear Regulatory Commission (NRC) is kept informed of other significant environmental issues that may arise at Kemmerer Power Station Unit 1 (Kemmerer Unit 1). The EPP is intended to be consistent with pertinent Federal, State, and local requirements related to environmental protection.

B.2 Environmental Protection Issues

This EPP applies to the licensee’s actions affecting the environmental resources evaluated in project-related Environmental Impact Statements associated with the issuance of a construction permit for the construction and operation of a new nuclear plant at the Kemmerer Unit 1 Site as well as the licensee’s actions that may affect any newly discovered environmental resources.

B.2.1 Aquatic Resources Issues

Federal agencies other than the NRC, such as the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers, regulate aquatic resources under the Federal Water Pollution Control Act (Clean Water Act) and the Rivers and Harbors Appropriation Act of 1899. Certain water quality environmental considerations, including effluent limitations, monitoring requirements, and mitigation measures, are regulated under the licensee’s Clean Water Act permits, such as the Wyoming Pollutant Discharge Elimination System and Section 404 permits. Nothing within this EPP shall be construed as placing additional requirements on the regulation of aquatic resources unless additional requirements are imposed in a Biological Opinion under the ESA (see Section B.2.3).

B.2.2 Terrestrial Resources Issues

Several statutes govern the regulation of terrestrial resources. For example, the U.S. Fish and Wildlife Service regulates matters involving migratory birds and their nests in accordance with the Migratory Bird Treaty Act. Activities affecting migratory birds or their nests sometimes require permits under the Migratory Bird Treaty Act. The U.S. Fish and Wildlife Service also regulates matters involving the protection and taking of bald and golden eagles in accordance with the Bald and Golden Eagle Protection Act. Nothing within this EPP shall be construed as placing additional requirements on the regulation of terrestrial resources unless additional requirements are imposed in a Biological Opinion under the ESA (see Section B.2.3).

B.2.3 Endangered Species Act of 1973

The NRC may be required to protect some aquatic and terrestrial resources in accordance with the ESA. If a Biological Opinion is issued to the NRC in accordance with ESA Section 7 prior to the issuance of an operating license or other NRC license or approval over the life of Kemmerer Unit 1, the licensee shall comply with the Terms and Conditions in the Incidental Take Statement of the Biological Opinion. If any Federally listed species or designated critical habitat occurs in an area affected by construction of the plant that was not previously identified as occurring in such areas, including species and critical habitat that were not previously listed, the licensee shall inform the NRC within four hours of discovery. The time of discovery is identified as the specific time when a decision is made to notify another agency or to issue a press release. Similarly, the licensee shall inform the NRC within four hours of discovery of any take, as defined in the ESA, of a Federally listed species, or destruction or adverse modification of designated critical habitat. These notifications shall be made to the NRC Operations Center via the Emergency Notification System. The licensee shall provide any necessary information to the NRC if the NRC initiates or reinitiates consultation under the ESA.

Unusual Event - The licensee shall inform the NRC of any onsite mortality, injury, or unusual occurrence of any species protected by the ESA within four hours of discovery, followed by a written report within 30 days (see Section B.4.1). The time of discovery is identified as the specific time when a decision is made to notify another agency or to issue a press release. Such incidents shall be reported regardless of licensee’s assessment of causal relation to plant construction or operation.

B.2.4 National Historic Preservation Act of 1966

NRC is required by the National Environmental Policy Act to take into account the potential effects of their actions on the cultural environment, which includes archaeological sites, historic buildings, and traditional places that are important to local populations. The National Historic Preservation Act of 1966, as amended, requires Federal agencies to assess impacts to cultural resources if they are eligible for listing on the National Register of Historic Places. The licensee will, in consultation with the NRC and the State Historic Preservation Office, develop a memorandum of agreement or programmatic agreement to address and mitigate anticipated construction impacts to any sites eligible for the National Register of Historic Places. The licensee will also develop an Unanticipated Discoveries Plan with a protocol to be followed in the event that cultural resources or artifacts are unearthed unexpectedly during construction or ground disturbing activities during operation of the plant.

B.3 Consistency Requirements

The licensee shall notify the NRC of proposed changes to permits or certifications concerning aquatic or terrestrial resources by providing the NRC with a copy of the proposed change at the same time it is submitted to the permitting agency. The licensee shall provide the NRC with a copy of the application for renewal of permits or certifications at the same the time the application is submitted to the permitting agency.

Changes to or renewals of permits or certifications shall be reported to the NRC within 30 days following the later of the date the change or renewal is approved or the date the change becomes effective. If a permit or certification, in part of in its entirety, is appealed and stayed, the NRC shall be notified within 30 days following the date the stay is granted.

B.4 Administrative Procedures

B.4.1 Plant Reporting Requirements: Non-routine Reports

A written report shall be submitted to the NRC within 30 days of any unusual event described in Section B.2.3 or Section B.2.4 of this EPP. The report shall (a) describe, analyze, and evaluate the event, including extent and magnitude of the impact and plant operating characteristics at the time of the event, (b) describe the probable cause of the event, (c) indicate the action taken to correct the reported event, (d) indicate the corrective action taken to preclude repetition of the event and to prevent similar occurrences involving similar components or systems, and (e) indicate the agencies notified and their preliminary responses.

Events reportable under this subsection, which also require reports to other Federal, State, or local agencies, shall be reported in accordance with those reporting requirements in lieu of the requirements described in the previous subsection. The NRC shall be provided with copies of such reports at the same time they are submitted to other agencies.

B.4.2 Review and Audit

The licensee shall provide for review and audit of compliance with Section B.2.3 of the EPP. The audits shall be conducted independently of the individual or groups responsible for performing the activity. A description of the organizational structure used to achieve the independent review and audit results shall be retained and available for inspection.

B.4.3 Records Retention

Records required by this EPP shall be made and retained in a manner convenient for review and inspection. These records shall be made available to the NRC upon request. The records, data, and logs relating to this EPP shall be retained for five years, or, where applicable, in accordance with the requirements of other agencies with oversight responsibility.

B.4.4 Changes in Environmental Protection Plan

A request for a change in the EPP shall include an assessment of the environmental impact of the proposed change and a supporting justification. Implementation of such changes in the EPP shall not commence prior to NRC approval of the proposed changes in the form of a license amendment incorporating appropriate revision to the EPP.

The licensee shall request a license amendment to incorporate the requirements of any Terms and Conditions set forth in the Incidental Take Statement of applicable Biological Opinions issued subsequent to the effective date of this EPP.