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November 16, 2021

2021-SMT-0159
10 CFR 50.30

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

References:
(1) SHINE Medical Technologies, LLC letter to NRC, "SHINE Medical Technologies, LLC Application for an Operating License," dated July 17, 2019 (ML19211C143)
(2) SHINE Medical Technologies, LLC letter to NRC, "SHINE Medical Technologies, LLC Schedule Update," dated September 2, 2021 (ML21245A055)

SHINE Technologies, LLC Operating License Application Supplement No. 12
Submittal of a Revision to the SHINE Supplement to the Environmental Report

Pursuant to 10 CFR Part 50.30, SHINE Technologies, LLC (SHINE) submitted an application for an operating license for a medical isotope production facility to be located in Janesville, WI (Reference 1). SHINE has determined that a revision to the Supplement to the Environmental Report is necessary to incorporate consideration of the environmental impacts of the phased approach to initial facility operations. The revision supports the SHINE application supplement for the phased approach to initial facility operations, which SHINE expects to submit in January 2022 (Reference 2).

Enclosure 1 provides Revision 7 of the Supplement to the Applicant's Environmental Report – Operating License Stage.

If you have any questions, please contact Mr. Jeff Bartelme, Director of Licensing, at 608/210-1735.

I declare under the penalty of perjury that the foregoing is true and correct.
Executed on November 16, 2021.

Very truly yours,

DocuSigned by:
Jim Costedio
F52DB96989224FF...

James Costedio
Vice President of Regulatory Affairs and Quality
SHINE Technologies, LLC
Docket No. 50-608

Enclosure

cc: Project Manager, USNRC
SHINE General Counsel
Supervisor, Radioactive Materials Program, Wisconsin Division of Public Health

ENCLOSURE 1

SHINE TECHNOLOGIES, LLC

SHINE TECHNOLOGIES, LLC OPERATING LICENSE APPLICATION SUPPLEMENT NO. 12
SUBMITTAL OF A REVISION TO THE SHINE SUPPLEMENT TO THE ENVIRONMENTAL REPORT

2200-02-01, REVISION 7
SUPPLEMENT TO THE APPLICANT'S ENVIRONMENTAL REPORT –
OPERATING LICENSE STAGE

60 pages follow

REPORT REVISION LOG		
Revision Number	**Description of Changes**	**Date**
0	Initial Issue	05/07/2019
1	Minor edit to discussion of liquid effluent release.	06/13/2019
2	Minor administrative clean up.	06/13/2019
3	Minor administrative edits.	07/03/2019
4	Updated SHINE facility municipality water usage, revised Janesville Ordinance numbers due to recoding ordinances, removed reference to the performance requirements of 10 CFR 70.61	03/09/2020
5	Revised discussion of radioactive waste shipments to permit use of either common or contract carriers.	05/05/2020
6	Revised to account for the cumulative impacts of the SHINE headquarters and therapeutics buildings, the planned access road from the SHINE headquarters building site to the main production facility site, and changes to the SHINE accident analysis.	01/20/2021
7	Revised to incorporate impacts associated with the phased approach to initial facility operations and to update the status and cumulative impacts of past, present, and reasonably foreseeable projects.	11/09/2021

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1 Introduction of the Supplement to the Environmental Report

1.1 Purpose and Need for the Proposed Action

In accordance with 10 CFR § 51.53(b), SHINE Medical Technologies, LLC (SHINE), hereby submits for review the “Supplement to Applicant's Environmental Report—Operating License Stage" (the ER Supplement), which updates "Applicant's Environmental Report—Construction Permit Stage" (the Environmental Report, or ER). This report discusses the same matters described in §§ 51.45, 51.51, and 51.52, but only to the extent that they differ from those discussed or reflect new information in addition to that discussed in the final environmental impact statement (FEIS) prepared by the U.S. Nuclear Regulatory Commission (NRC) in connection with the construction permit.

The proposed action is the issuance of an Operating License (OL), under the provisions of 10 CFR Part 50, that would allow SHINE to operate a radioisotope production facility to produce molybdenum-99 (Mo-99), iodine-131 (I-131), and xenon-133 (Xe-133). Further discussion of the proposed action is provided in Section 2 of this Environmental Report Supplement (ERS).

Currently the entire United States (U.S.) supply of Mo-99 is produced internationally, as was the case when the FEIS was issued. Since the issuance of the FEIS, the National Research Universal reactor in Chalk River, Ontario, Canada, which previously provided the majority of the U.S. supply of Mo-99, discontinued operation. The largest current producer is located in Petten, Netherlands, and produces over 25 percent of global supply. The other international producers are located in Belgium, South Africa and Australia (Nuclear Energy Agency, 2018).

Until recently the U.S. had no domestic producer of I-131. Since the issuance of the FEIS, the Missouri University Research Reactor (MURR) has begun producing the isotope. Two companies, Jubilant Draximage and International Isotopes, Inc., supply I-131 to the U.S. market.

The domestic supply of Xe-133 has been susceptible to shortages because of production and availability issues. Currently, there is no domestic supply of Xe-133. Two companies, Lantheus Medical Imaging and Curium supply the U.S. market from European producers.

The impacts due to construction activities are not updated. In accordance with 10 CFR § 51.53(b), this report updates the information relevant to the OL, as impacts from construction have already been analyzed, and construction of the facility has been approved. As such, construction is expected to be ongoing during the review of the OL application. Changes to the design or physical construction that may impact operation or decommissioning of the facility are evaluated in the following sections.

1.2 Regulatory Provision, Permits, and Required Consultations

No additional operational permits or approvals have been identified since the issuance of the FEIS.

2 Proposed Action

The proposed federal action is issuance of an OL to SHINE for a radioisotope production facility to produce Mo-99, I-131, and Xe-133. The decay product of Mo-99, technetium-99m (Tc-99m), is used for diagnostic medical isotope procedures.

The applicant for this OL and owner of the radioisotope facility is SHINE Medical Technologies, LLC, a Delaware company. SHINE will have the necessary authority, control, and rights related to the operation of the isotope production facility once the OL is approved.

SHINE intends to pursue a phased approach to initial operations of the radioisotope production facility in order to help meet the national need for molybdenum-99 production as soon as possible while also ensuring requirements related to public health and safety are met. The phased approach to initial facility operations consists of four phases of process equipment installation and operation. SHINE will operate the completed phase(s) of the facility while process equipment installation continues on the latter phase(s) of the facility, as described in the SHINE phased approach application supplement.

2.1 Site Location and Layout

Site Location

The SHINE site is located approximately 4 miles (mi.) (6.4 kilometers [km]) south of Janesville city center, Rock County, Wisconsin. The site encompasses approximately 91 acres (ac.) (37 hectares [ha]) of cultivated crop lands that are bordered by U.S. Highway 51 and the Southern Wisconsin Regional Airport (SWRA) to the west and cultivated crop lands to the north, south, and east, and a Dollar General Distribution Center to the northeast.

The nearest sensitive receptors are a residence and Airport Park, which are about 0.33 mi. (0.53 km) and 0.30 mi. (0.53 km) from the site boundary, respectively.

Site Layout

Figure 2-1 shows the layout of major structures and the site boundary. The site boundaries cover approximately 91 ac. (37 ha). The following structures shown in **Figure 2-1** are located on the site:

- Main production facility (formerly production facility building)
- Storage building (formerly support facility building)
- Material staging building (formerly waste staging and shipping building)
- Resource building (formerly diesel generator building)
- Nitrogen purge system (N2PS) structure (new structure)

The building designs have been refined resulting in a smaller footprint. Collectively these buildings now cover approximately 80,000 square feet (ft^2) (7400 square meters [m^2]) as compared to the 91,000 ft^2 (8500 m^2) considered in the FEIS. The main production facility remains the largest building onsite. The redesign of the main production facility has reduced the length of the building from 284 feet (ft) (87 meters [m]) as considered in the FEIS to 213 ft (64 m). Similarly, the width of the building has been reduced from 194 ft (59 m) to 158 ft (48 m). The height remains approximately 58 ft (18 m). The highest exhaust stack height has been increased from 66 ft (20 m) to 67 ft (20 m). The bounding excavation depth for the main production facility has been reduced from 40 ft (12 m) as considered in the FEIS to 30 ft (9 m).

As a result of the redesign, the materials permanently consumed have been reduced overall. An estimate of materials consumed is provided in **Table 2-1**. The total permanently disturbed area has been reduced from 26 ac. (11 ha) to 18 ac. (7 ha). The total materials excavated will be approximately 58,000 cubic yards (yd^3) (44,300 cubic m [m^3]).

Other features of the site include storage tanks, a new paved entrance road, fences, and two sliding gates. Including buildings, parking lots, roads and the stormwater features, the site improvements now cover approximately 375,000 ft^2 (35,000 m^2) as compared to the 350,000 ft^2 (32,500 m^2) considered in the FEIS. The increase in area is primarily due to an increase in the estimated size of stormwater features and paved areas.

The main production facility center point and safety-related area center points have been moved approximately 55 ft south since the issuance of the FEIS. However, the safety-related area, including all buildings, remain concentrated in the center of the site. The aerial view of the SHINE site has been updated to include recent satellite imagery (see **Figure 3-2**).

Underground, Stormwater, and Sewer Features

No underground diesel fuel oil storage tank will be installed at the SHINE facility, as the standby diesel generator has been replaced with a standby natural gas generator. Additional information about the standby natural gas generator is provided in Section 2.7.

In the FEIS the NRC considered a storm water management plan that utilized site grading, berms, and a drainage ditches and swale areas to manage stormwater flow. The SHINE stormwater management plan has been updated. The site's impervious surfaces, including the SHINE facility buildings and paved areas, drain to a series of catch basins and underground piping to two infiltration cells to reduce the amount total dissolved solids. The sections of the property that are not controlled by the infiltration cells will sheet flow over dense grassland before leaving the site, causing any suspended solids to be filtered by the grass, which acts as a filter strip. Since the site is located in the SWRA Zoning District C and D, the design ensures that any ponding water is infiltrated within 24 hours. The stormwater system is designed to address 1-year, 2-year, 24-hour storm events per state regulations, and are also designed to address 10-year and 100-year events, as required by the City of Janesville Stormwater Ordinance.

2.2 Radioisotope Production Facility Description

The fundaments of the facility and isotope production process described in the Preliminary Safety Analysis Report (PSAR) have not changed. The removal of the uranium extraction (UREX) and thermal denitration processes have resulted in changes to the radioisotope production facility (RPF) design, effluent releases, and waste systems. Design enhancements developed during final design are described in FSAR Chapter 4 (for design changes to isotope processing) and Chapter 6 and 9 (for design changes to gas handling systems). Resulting changes to the environmental impacts are further discussed in this supplement.

Operational activities will require 200 workers, as opposed to the 150 workers presented in the PSAR. Production and shipment of radioactive waste are described in Section 2.5 and FSAR Chapter 11.

During the phased approach to initial facility operations, construction personnel will be on site completing installation activities supporting subsequent phases of the phased approach while operational personnel will be on site supporting operation of the completed phases. While the

number of on-site personnel during the phased approach is expected to exceed the number of workers required to support operational activities, the number will not exceed the peak construction workforce considered in the FEIS (i.e., 451 workers).

2.3 Water Consumption and Treatment

Water Use

The Janesville municipal water system will supply the water needs of the SHINE facility. The average daily water usage for the SHINE facility is expected to be approximately 10,360 gallons per day (gpd) (39,217 liters per day [lpd]), including potable and sanitary water, heating water system makeup, and radioisotope production process water, in comparison to 6,073 gpd (23,005 lpd) considered in the FEIS. Contrary to the information considered in the FEIS, the closes-loop cooling water systems are not anticipated to be flushed at regular intervals, so no water from these systems is regularly discharged to the Janesville Wastewater Treatment Plant (WTP). Additional information about the cooling systems is provided in FSAR Chapter 5.

A water-based fire protection system will also be used in portions of the facility. The dedicated water tank has been removed from the design of the fire protection system.

Water Treatment

Water treatment has not substantively changed from the information considered in the FEIS, with exceptions as follows. Contrary to previous design, the primary closed loop cooling system is designed to operate without corrosion inhibiting chemicals in the cooling fluid. Additionally, water in the process chilled water system and facility chilled water system may be treated with propylene glycol to maintain system functionality commensurate with outdoor winter conditions.

Boiler makeup water will be premixed with water additives in accordance with the boiler manufacturer recommended quantities to maintain the appropriate fluid concentrations of water and additive.

Additional information about the cooling systems is provided in FSAR Chapter 5.

Water Discharges

Wastewater generated outside the radiologically controlled area would be discharged directly to the City of Janesville sanitary sewer system and would be sent to the Janesville WTP in accordance with Janesville City Ordinance 40-170. Radioactive liquid discharges from the SHINE facility to the sanitary sewer are made in accordance with 10 CFR § 20.2003, 10 CFR § 20.2007, and Janesville City Ordinance 40-170. Additional information about liquid effluents is provided in FSAR Chapter 11.

2.4 Cooling and Heating Dissipation Systems

Cooling Systems

The configuration of the cooling systems described in the PSAR has been modified, including separation of functions into multiple systems. The primary closed loop cooling system removed heat from the target solution vessel by actively circulating water, as described in the FEIS. The light water pool system passively cools the subcritical assembly system. The process chilled water system provides cooling to the radioisotope process facility cooling system, for cooling process and non-process heat loads. The facility chilled water system provides cooling to the radiologically

controlled area ventilation and non-radiologically controlled area ventilation systems. Both chilled water systems are routed through chillers where the heat is ultimately discharged to the atmosphere. Additional information about the cooling systems is provided in FSAR Chapter 5.

Heating System

The heating system design for the facility has been changed since that described in the PSAR. The design is now composed of three 50 percent capacity natural gas fired heating boilers. The system will discharge approximately 59,000 gallons to the Janesville WTP per year (223,000 liters per year) after being neutralized. Water discharged shall not exceed 149 degrees Fahrenheit (°F) (65 degree Celsius [°C]) at its introduction to the sewer system or 104°F (40°C) at its introduction to the Janesville WTP in accordance with Janesville City Ordinance 40-170. The total annual natural gas consumption is estimated to be 6.5 million standard cubic feet, compared to 7.67 million standard cubic feet considered in the FEIS. Emission information are bounded by the original design as the heat loads remain largely unchanged and the natural gas consumption has decreased. Additional information is provided in the FSAR Chapter 9.

2.5 Waste Systems

The sources of radioactive liquid, solid, and gaseous waste generated by the operation of the SHINE facility are substantively unchanged since the issuance of the FEIS. Exceptions include removal of the UREX process during target solution cleanup. Additional information about radioisotope production processes and waste streams is provided in FSAR Chapters 4 and 11.

The fundamental design of the radioactive waste handling systems has not changed since the issuance of the FEIS. The liquid radioactive waste handling systems have been modified to account for the removal of the UREX and associated systems, and to optimize processing. Additional information about waste handling and disposal, including type and quantities of radioactive waste produced, and types, quantity, and frequency of radioactive waste shipments, is provided in FSAR Chapter 11.

Refinements to design have resulted in changes to the types and quantities or hazardous and radioactive materials stored onsite and released as waste. The quantities of radionuclides to be released as gaseous effluents are estimated in **Table 2-2**. The type and quantity of chemicals onsite is provided in FSAR Chapter 13.

2.6 Storage, Treatment, and Transportation of Radioactive and Nonradioactive Materials, Including LEU, Waste, Radioisotopes, and Any Other Materials

The fundamental design of the radioactive waste handling systems has not changed since the issuance of the FEIS. Additional information about waste handling and disposal, including type and quantities of radioactive waste produced, and types, quantity, and frequency of radioactive waste shipments, is provided in FSAR Chapter 11.

2.7 Power Requirements

Alliant Energy will supply electrical power to the facility. Each irradiation unit is projected to use 220 kilowatts. Overall the SHINE facility would have an estimated demand of approximately 3500 kilowatts and annually consume approximately 23 million kilowatt-hours.

The facility will have an uninterruptible electrical power supply system to power safety-related equipment in the event of a loss of offsite power. This system would use two independent 125-volt

direct-current battery system trains along with the associated chargers, inverters, and distribution systems.

SHINE will maintain a standby natural gas generator, instead of the previously reported diesel generator. The standby generator provides temporary power to select systems during a loss of offsite power event for operational convenience and defense-in-depth. The standby generator will require up to 10,000 cubic feet per hour of natural gas at 15 to 20 inches water column (WC). The standby generator will operate for approximately 25 hours per year, with a total annual gas consumption of 100 million British thermal units (BTUs). The generator will meet Environmental Protection Agency (EPA) emissions requirements for stationary, spark-ignited combustion engines. The estimated annual emissions have decreased from those associated with the standby diesel generator described in the PSAR. Estimated annual emissions for the standby natural gas generator are provided in **Table 2-3**.

Table 2-1 Materials Consumed During Construction

Material	FEIS Amount	ERS Amount
Concrete	27,700 yd^3	18,700 yd^3
Structural Steel	140 tons	443 tons
Miscellaneous Steel	30 tons	10 tons
Steel Liner	100 tons	83 tons
Asphalt	2,200 yd^3	2,900 yd^3
Stone Granular Material	16,000 yd^3	7,200 yd^3
Roofing	150 tons	44,600 ft^2

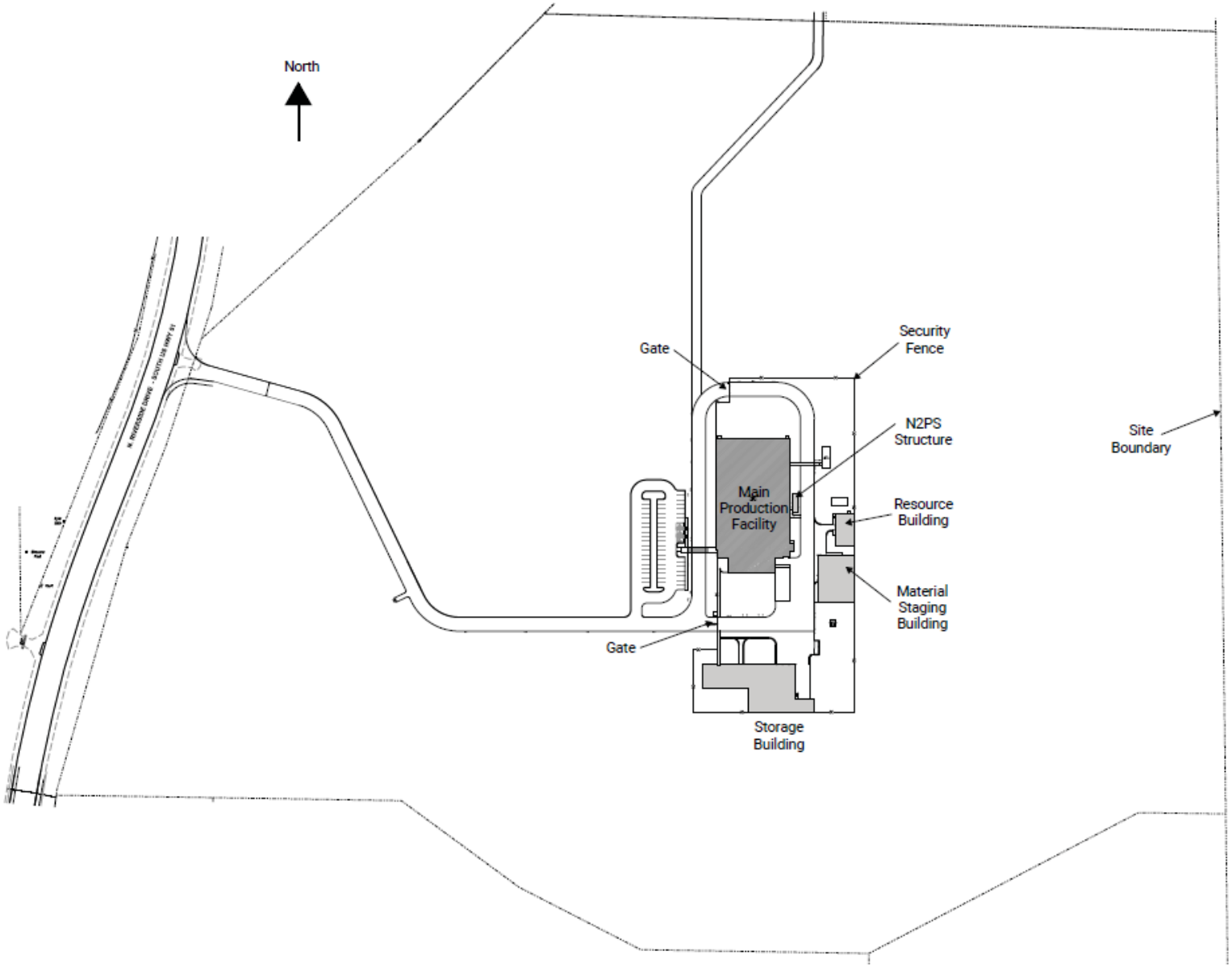
Table 2-2 Gaseous Radioactive Effluents

Effluent	FEIS Rate (Ci/yr)	ERS Rate (Ci/yr)
Krypton-85 (Kr-85)	< 120	170
Iodine-131 (I-131)	< 1.5	<0.1
Xenon-133 (Xe-133)	< 17,000	7800
Tritium (H-3)	< 4,400	73

Table 2-3 Standby Generator Annual Emissions

Effluent	FEIS Diesel Generator (ton/yr)	ERS Natural Gas Generator (ton/yr)
Carbon Monoxide	0.36	0.02
Nitrogen Oxide	3.52	0.20
Particulate Matter	0.026	<0.01
Hydrocarbons	0.12	0.01
Sulfur Dioxide	0.01	<0.01
Carbon Dioxide	345	5.5

Figure 2-1 Site Diagram



3 Description of the Affected Environment

3.1 Land Use and Visual Resources

Land Use

Region

The "region" of the SHINE site is defined as the area within a 5-mi. (8-km) radius of the site center point. Major land uses within the region, mapped by the updated National Land Cover Database (NLCD), are depicted in **Figure 3-1** (NLCD, 2011). The dominant land use in the region is agricultural/crops. Pasture/hay fields, low intensity developed lands, deciduous forest areas, and open space developed lands make up the other major land uses.

There has been no significant change in the regional land use near the SHINE site except the recent construction of a Dollar General Distribution Center (see **Figure 3-2**).

Major Population Centers and Infrastructure

The City of Janesville and the City of Beloit are major population centers (more than 25,000 residents) within the 5-mi. (8-km) vicinity of the proposed site, with 63,215 residents in the City of Janesville (down from 63,480 residents in 2013) and 36,520 residents in the City of Beloit (down from 36,820 residents in 2013) (Rock County, 2018).

Visual Resources

Previously, the viewshed to the north of the SHINE site consisted of agricultural fields with some light industrial development. With the recent construction of a Dollar General Distribution Center, the viewshed to the north now includes additional light industrial development adjacent to the SHINE site. Consistent with the Department of Interior-Bureau of Land Management Visual Resource Management System, this setting would be classified as C, meaning a low quality visual rating, and a low sensitivity rating, consistent with the ratings reported in the ER. **Figure 3-3** provides updated photos of the pre-development site.

3.2 Air Quality and Noise

Regional Climatology

In the FEIS the NRC cited climatological data from the Afton Station for the period of 1981 to 2010. Climatological data for that station has not been updated since 2010. In the absence of data from the Afton Station, data from the "First-order" stations (those operating 24 hours per day, year around) from Madison, WI and Rockford, IL (NCDC, 2018a and NCDC, 2018b) were evaluated against that data presented in the Environmental Report. These comparisons are detailed in **Table 3-1** and **Table 3-2**.

Regional Air Quality

In 2015, the EPA strengthened the 8-hour National Ambient Air Quality Standards (NAAQS). The EPA decreased the 8-hour ozone standard from the 2008 Ozone NAAQS (75 ppb) to 70 ppb. The EPA published the list of counties that are not in attainment with the 70 ppb standard based on ozone monitoring data (EPA, 2018). A number of Wisconsin counties were out of compliance with

the 2015 revised ozone standard in 2018, including Door County, Kenosha County, Manitowoc County, Milwaukee County, Oneida County, Ozaukee County, and Sheboygan County. Rock County is in compliance with the ozone standard. Previously, only Door and Sheboygan County were not in compliance the 8-hour 2008 Ozone NAAQS.

Severe Weather

The FEIS considered extreme weather events in Rock County through 2013 as reported by the National Climatic Data Center (NCDC). From 2014 to November 2018 the following extreme weather events have been observed in Rock County: cold/wind chill, winter weather, heat, thunderstorms, lightning, hail, strong winds, funnel clouds, tornadoes, heavy rain, floods, and flash floods. For the period of 2014 to November 2018, extreme weather events in Rock County occurred on 99 days with deaths or injuries occurring on 4 of those days and property damage occurring on 31 of those days (NCDC, 2018c).

In addition, one tornado, an F1, occurred on July 18, 2015. A second tornado, an F0, occurred on June 28, 2017. The F2 tornado recorded in 1998 remains the strongest tornado event in Rock County (NCDC, 2018c).

Local Meteorology

Table 3-1 and **Table 3-2** show small respective differences among the various climatic parameters published in 2011 and those published in 2018. However, the dominant wind remain remains from the west. None of the differences indicate substantive changes in local meteorology and air dispersion conditions in the environment of the SHINE site.

Noise

There has been no major change in the baseline noise conditions at the SHINE site. Baseline noise conditions are characterized by continuous daytime vehicle noise generation associated with traffic along U.S. Highway 51 and intermittent noise generated by take-offs and landings of aircrafts at SWRA. The Dollar General Distribution Center, which was constructed in 2017, and is located approximately 0.25 mi. (0.4 km) northeast of the site, will generate additional truck traffic and traffic noise on State Trunk Highway 11 between the Dollar General Distribution Center and Interstate 39/90. Updated information as of 2016, provided in **Table 3-3** and **Table 3-4**, indicates that the traffic volumes in the vicinity of the site were consistent with those considered in the FEIS, with only minimal changes (WDOT, 2016a and WDOT, 2016b). There are no other industries or businesses within 1 mi. (1.6 km) of the site that are characterized by notable noise emissions.

The nearest noise-sensitive receptors have not changed since the issuance of the FEIS. The nearest noise receptors to the SHINE site are Airport Park (0.30 mi. [0.48 km] to the northwest); a residence immediately west of Airport Park (0.33 mi. [0.53 km] to the northwest); and a church, Iglesia Hispania Pentecostes (0.35 mi. [0.56 km] to the south). There are no other known traffic-related noise receptors within an audible range of the SHINE site.

3.3 Geologic Environment

Seismology

Since the issuance of the FEIS, two earthquakes have occurred within 200 mi. (322 km) with a magnitude equal to or greater than 2.5. Both occurred in 2015. The first occurred approximately 1.9 mi. (3 km) west-northwest of Lake in the Hills, Illinois or about 70 mi. (113 km) southeast of the

SHINE site. The earthquake occurred in March 2015 and was recorded as a magnitude 2.9 event. The second occurred approximately 3 mi. (5 km) south of Galesburg, Michigan or about 185 mi. (298 km) southeast of the SHINE site. The earthquake occurred May 2015 and was recorded as a magnitude 4.2 event. This earthquake equals in magnitude the largest earthquake considered in the FEIS, but is considerably farther away at 185 mi. (298 km) compared to 80 mi. (130 km) (USGS, 2018).

3.4 Water Resources

In the FEIS the NRC cited Afton Station (Station 05430500) for the measure of mean annual discharge and the 90 percent exceedance flow. The values for exceedance flow have not been updated since the FEIS was issued. The average of annual discharge means for water years 2012 to 2016 is 2,263 cfs compared to 2,015 for water years 1914 to 2012 (USGS, 2012; USGS, 2013; USGS, 2014; USGS, 2015; USGS, 2016). For water year 2016, the annual mean flow was 3,051 cfs as compared to 1,927 cfs for water year 2012. The drainage area upstream of the Afton Station remains at 3,340 square miles (USGS, 2016).

The Monterey Dam on Rock River in Janesville was removed in July 2018. The removal of the dam was done in compliance with Wisconsin State Statute 31. The monthly flow data for the Afton Station (Station 05430500) is updated through April 2018 which is prior to the dam's removal. As such, no determination can be made as to the effect of the dam removal on downstream flows as recorded at the Afton Station.

3.5 Ecological Resources

Invasive Species

The Wisconsin Department of Natural Resources (WDNR) has revised the Wisconsin's Invasive Species Identification, Classification and Control Rule (Chapter NR 40, Wisconsin Administrative Code) to list additional species (WDNR, 2015). None of the newly-listed invasive species were identified as present on the site during the surveys conducted for the ER but may be present in nearby offsite areas. Only one of the newly-listed species, *Sorghum halepense* (Johnson grass), was observed near the site in 2013.

Protected Species

Table 3-5 lists five additional threatened or endangered species or species of special concern that could be present near the SHINE site (WDNR, 2018 and USFWS, 2018). The list includes one federally listed mammal, one federally listed reptile, one federally listed insect, one federally listed plant, and one state listed bird. None of the new species were observed on or near the SHINE site during the series of field studies conducted over a 1-year period extending from October 2011 to September 2012.

3.6 Historical and Cultural Resources

There are no new listings on the National Register of Historic Places within the 5-mi. (8 km) radius of the SHINE site.

3.7 Socioeconomics

Resident Population

The total population estimate for Rock County has decreased from 160,129 in 2012 to 159,372 in 2017. The City of Janesville and the City of Beloit are major population centers (more than 25,000 residents) within the 5-mi. (8-km) vicinity of the proposed site, with 63,215 residents in the City of Janesville (down from 63,480 residents in 2013) and 36,520 residents in the City of Beloit (down from 36,820 residents in 2013) (Rock County, 2018).

ER Subsection 19.3.7 cited the residential distribution of the majority of the construction and operational workforces for the SHINE facility. Updated residential distribution data is provided in **Table 3-6**. Comparing the 2013 Census Transportation Planning Products, 5-year American Community Survey to the 2010 data, the total labor force of Rock County, Wisconsin residing within Rock County has increased by 0.6 percent to 83.5 percent (AASHTO, 2013). Summary of the workforce of Rock County by labor type specific to the occupation categories to support operational phase is shown in **Table 3-7**, which demonstrates that the labor force availability in Rock County has increased and will be available to support the SHINE project during commercial operation.

Transient Population

No new data is available to address temporary migrant farm workers, who might temporarily affect the local population. The number of students attending college and universities within 20 mi. (32 km) of the site has increased from 15,970 students to 16,027 students (NCES, 2018).

Race and Ethnicity of the Resident Population

The 2017 demographic profiles for the City of Janesville and Rock County are provided in **Table 3-8**. The total minority population in the City of Janesville has decreased from 2010 to 2017 from 11.2 percent to 11.0 percent of the total population. The total minority population in Rock County has increased from 2010 to 2017 from 15.5 percent to 16.7 percent of the total population. These represent minimal changes from the data considered in the FEIS.

Income (Population and Household)

The median family and per capita incomes for the City of Janesville, Rock County, and State of Wisconsin are provided in **Table 3-9**. The family and per capita median income have increased since the issuance of the FEIS for the City of Janesville, Rock County, and the State of Wisconsin.

Labor Force and Unemployment

The 2017 civilian labor force in the City of Janesville is 33,986 compared to 32,862 in 2013. This represents a 3.4 percent increase from the total labor force in 2013. Similarly, the labor forces in Rock County and the State of Wisconsin have increased over this same time period, at 4.3 percent and 2.4 percent, respectively. The unemployment rates for the City of Janesville and Rock County have been consistently higher than the state unemployment rates between 2013 and 2017. **Table 3-10** provides the civilian labor force, total employed workforce, total unemployed workforce, and unemployment rates between 2013 and 2017 for the City of Janesville, Rock County, and State of Wisconsin. At the city, county, and state levels, the number of unemployed workers has decreased over a 5-year period (WDWD, 2017).

In 2017, trade, transportation, and utilities was the largest employment category in Rock County (27.67 percent of total jobs in the Rock County), followed by education and health services (17.97 percent) and manufacturing (17.69 percent). These industries were also the largest employment categories for the state data for 2017. The industries in Rock County that have captured a larger percent of the workforce since the issuance of the FEIS are natural resources and mining; manufacturing; trade, transportation, and utilities; and professional and business services. **Table 3-11** provide a summary of the employment by industry within Rock County (BLS, 2017a).

The top 10 employers in Rock County, as reported by the Rock County Development Alliance (RCDA), provide an illustration of the diversity of the local economy (**Table 3-12**). Based on comparison with Rock County's total employed labor force of 82,531 (**Table 3-10**), the combined employment of the top 10 employers accounts for approximately 14 percent of the total Rock County employment. The top 10 employers in the City of Janesville include three employers with greater than 1,000 employees: Mercy Health System, Janesville School District, and Rock County Government (RCDA, 2019).

Poverty Rates

The percent of people living below U.S. census poverty thresholds for the City of Janesville, Rock County, and Wisconsin are provided in **Table 3-13**. The percentages of families and people living below the poverty level in Rock County and Wisconsin are relatively consistent with those considered in the FEIS (less than a 1 percent change) and decreased slightly for the City of Janesville (USCB, 2018).

Housing

Housing unit characteristics, including the number of units available and vacancy rates in the City of Janesville and Rock County are provided in **Table 3-14**. The vacancy rates for both homeowners and renters have gone down in the City of Janesville and in Rock County since the issuance of the FEIS. The number of vacant units in the City of Janesville has gone down from 1,721 in the 2009-2011 estimates to 1,209 in the 2013-2017 estimates. The number of vacant units in Rock County has gone down from 5,478 in the 2009-2011 estimates to 4,279 in the 2013-2017 estimates (USCB, 2018).

Transportation

The average annual daily traffic counts in the vicinity of the site for 2016 are provided in **Table 3-3**. Estimated annual average peak and daily traffic totals in the vicinity of the site are provided in **Table 3-4**. Updated traffic counts and estimates indicate small changes from the 2010 data considered in the FEIS, without a discernable pattern (i.e., data does not indicate a substantial increase or decrease in traffic near the SHINE site).

Tax Payment Information

The State of Wisconsin has a flat corporate tax rate of 7.9 percent. Wisconsin assesses a variable tax rate on earned income. The personal income tax rate ranges from 4.0 to 7.65 percent depending on income level and marital status (adjusted from 4.0 to 7.75 as discussed in the FEIS). Wisconsin has a statewide sales tax rate of 5 percent. An additional 0.5 percent is added by Rock County as local sales tax. Property tax on owned property is assessed at the county and municipal levels (City of Janesville, 2018a).

The total net property tax rate in Rock County varies depending on which city and school district the property is located in. The net property tax rate for the SHINE site, which is located in the City of Janesville and the Janesville School District, is $25.9166 per $1,000 of assessed value in 2018. This is an increase from the 2012 net tax rate of $25.0148 per $1,000 of assessed value (City of Janesville, 2018a).

In 2017 and 2018 the Janesville School District collected $36,260,850.00 in school district tax levies based on Department of Public Instruction (DPI) data (DPI, 2018). This represents a small increase from the 2012 and 2013 taxes discussed in the FEIS, which were $36,077,620. The full property tax value for the City of Janesville in 2017 was $4,605,798,000 (compared to $3,895,706,200 in 2012) (WDOR, 2018). The City of Janesville's proposed budget for 2018 lists a total estimated assessed value of real and personal property at $4.1 billion (compared to $3.9 billion in 2013) (City of Janesville, 2018b).

Public Services

The EIS cited the local public school enrollments near the SHINE site. Based on Department of Public Instruction data (DPI, 2016), the student enrollment in 2016 in Rock County was 27,918 (see **Table 3-15**), a decrease of approximately 0.4 percent from 2012 enrollment.

3.8 Human Health

In February 2018, SHINE completed construction of Building One, which is an additional nearby facility that stores, uses, and releases radioactive material. This building is located adjacent to the SHINE site. Building One is used to perform demonstration testing of the accelerators used in the production process in support of final design activities, as well as for therapeutic isotope production and other research and development activities. The State of Wisconsin Department of Health Services has licensed SHINE's use of radioactive materials in Building One. The demonstration activities conducted in Building One utilize primarily tritium. No uranium will be used as a target during the conduct of these demonstration activities.

The accelerator will be tested in Building One while contained in a shielded structure. During the demonstration, personnel exposures will be monitored to ensure an unsafe condition is not created. Additional monitoring on the perimeter of Building One and exhaust points will be performed.

During operation of the main production facility, SHINE will perform environmental monitoring as part of the Radiological Environmental Monitoring Program (REMP) and compare results to the values established during baseline monitoring. SHINE previously described plans to complete baseline monitoring prior to beginning construction of the SHINE facility. SHINE now intends to complete baseline monitoring prior to commencement of operations. Additional details of SHINE's REMP are provided in FSAR Chapter 11.

Table 3-1 Madison, Wisconsin Climatic Data

Element	2011 Value	2018 Value
Normal Daily Maximum (°F)	55.8	55.9
Normal Daily Minimum (°F)	36.4	36.8
Normal Precipitation (in)	32.95	34.48
Normal No. of Days with Precipitation >= 0.01"	124.9	124.8
Normal Snowfall (in)	49.9	50.9
Normal No. of Days with Snowfall >= 1.0	14.2	14.7

Reference: NCDC, 2018a

Table 3-2 Rockford, Illinois Climatic Data

Element	2011 Value	2018 Value
Normal Daily Maximum (°F)	57.8	59.2
Normal Daily Minimum (°F)	38.1	39.1
Normal Precipitation (in)	36.63	36.24
Normal No. of Days with Precipitation >= 0.01"	122.2	119.2
Normal Snowfall (in)	38.7	36.7
Normal No. of Days with Snowfall >= 1.0	11.2	11.0

Reference: NCDC, 2018b

Table 3-3 Average Annual Daily Traffic Counts in the Vicinity of the Proposed Site

	Vehicles Per Day	
Traffic Count Location	**2010**	**2016**
U.S. Highway 51, south of State Trunk Highway 11	9,000	8,100
U.S. Highway 51, north of Town Line Road	9,400	8,600
State Trunk Highway 11, east of U.S. Highway 51	8,400	11,100
State Trunk Highway 11, west of U.S. Highway 51	4,500	5,100
State Trunk Highway 11, west of Interstate 39/90	12,400	12,800
Interstate 39/90, south of State Trunk Highway 11	45,700	47,400
Interstate 39/90, north of State Trunk Highway 11	50,400	53,500
Town Line Road, east of U.S. Highway 51	3,400	3,400

Reference: WDOT, 2016a

Table 3-4 Estimated Annual Average Peak and Daily Total Traffic Counts in the Vicinity of the Proposed Site

Count Site No.	Location	Year of Count	A.M. Peak	Midday Peak	P.M. Peak	Daily Total
531345	U.S. Highway 51, north of Happy Hollow Road, Rock Township	2016	577	549	656	8,083
530104	U.S. Highway 51, 1.0 mi. (1.6 km) south of SWRA	2016	597	575	696	8,558
531344	State Trunk Highway 11, east of U.S. Highway 51	2016	795	642	830	11,075
531491	State Trunk Highway 11, between River Road and U.S. Highway 51	2016	427	331	432	5,084
530215	U.S. Highway 51, 0.5 mi. (0.8 km) south of Burbank Avenue, City of Janesville	2016	684	754	857	10,334
531300	Townline Road, between County Highway G and the Interstate 39/90 overpass	No new information available.				

Reference: WisDOT, 2016b

Table 3-5 Additional Protected Species near the SHINE Site

Species	Status	Date Listed
Northern Long-Eared Bat (*Myotis septentrionalis*)	Federally Threatened	05/04/2015
Eastern Massasauga (rattlesnake) (*Sistrurus catenatus*)	Federally Threatened	09/30/2016
Rusty patched bumble bee (*Bombus affinis*)	Federally Endangered	03/21/2017
Eastern prairie fringed orchid (*Platanthera leucophaea*)	Federally Threatened	09/28/1989
Upland Sandpiper (*Bartramia longicauda*)	State Threatened	01/01/2014

References: WDNR, 2018 and USFWS, 2018

Table 3-6 Rock County Labor Force Distribution by County of Employee Residence

County of Employee Residence	State	Rock County Labor Force			
		Number		Percent	
		2010	2013	2010	2013
Rock County	WI	56,850	55,100	82.9%	83.5%
Winnebago County	IL	4,095	3,690	6.0%	5.6%
Dane County	WI	1,990	1,920	2.9%	2.9%
Walworth County	WI	1,455	1,345	2.1%	2.0%
Green County	WI	1,325	1,120	1.9%	1.7%
Jefferson County	WI	1,090	1,015	1.6%	1.5%
Milwaukee County	WI	265	180	0.4%	0.3%
Boone County	IL	250	240	0.4%	0.4%
Stephenson County	IL	85	75	0.1%	0.1%

Reference: AASHTO, 2013

Table 3-7 Comparison of Estimated Major SHINE Labor Force Needs with Estimated Rock County Available Work Force – Operational Phase

Occupation	SHINE Peak Need	Estimate of Availability	
		2011	2017
Operation Support	53		
First line supervisors of production and operating workforces		340	470
Production/Operations	49		
Industrial production managers		110	110
Tech Support[(a)]	53		
Maintenance		500	770
Engineers		90	90
Craftspeople		2,000	2,310
Total Operational Labor Force[(b)]	200		

a) Tech support subcategories include: maintenance (machinery maintenance workers and general maintenance and repair workers), engineers (industrial engineers and mechanical drafters), and craftspeople (janitors and cleaners, landscaping and groundskeepers, electricians, plumbers and pipefitters, industrial

b) SHINE total labor force estimate at peak month includes all labor categories (including administrative and support personnel)

References: BLS, 2017b

Table 3-8 Race and Ethnicity for the City of Janesville and Rock County

	City of Janesville	Rock County
Total Population	63,957	161,226
Race (percent of total population, Not-Hispanic or Latino)		
White	89.0	83.3
Black or African American	1.9	4.4
American Indian and Alaska Native	0.1	0.1
Asian	1.5	1.2
Native Hawaiian or Other Pacific Islander alone	0.0	0.0
Some other race	0.0	0.0
Two or more races	2.3	2.6
Ethnicity		
Hispanic or Latino	5.3	8.4
Minority Population (including Hispanic or Latino)		
Total Minority Population	7055	26,881
Percent Minority Population	11.0	16.7

Reference: USCB, 2018

Table 3-9 Median Family and Per Capita Income for the City of Janesville, Rock County, and Wisconsin

	Family	Per Capita
City of Janesville	$66,290	$27,862
Rock County	$64,322	$26,954
Wisconsin	$72,542	$30,557

Reference: USCB, 2018

Table 3-10 Civilian Labor Force and Unemployment Rates within the City of Janesville, Rock County, and State of Wisconsin: 2013-2017

	2013	2014	2015	2016	2017	Growth Rate 2013-17 (%)
City of Janesville						
Labor Force	32,862	32,702	33,128	33,496	33,986	3.4
Employed	30,119	30,688	31,414	32,051	32,768	8.8
Unemployed	2,743	2,014	1,714	1,445	1,218	-55.6
Unemployment Rate (%)	8.3	6.2	5.2	4.3	3.6	-56.6
Rock County						
Labor Force	82,183	82,308	83,405	84,444	85,722	4.3
Employed	75,847	77,627	79,082	80,725	82,531	8.8
Unemployed	6,336	5,041	4,323	3,719	3,191	-49.6
Unemployment Rate (%)	7.7	6.1	5.2	4.4	3.7	-51.9
State of Wisconsin						
Labor Force	3,079,141	3,082,695	3,094,300	3,130,683	3,152,287	2.4
Employed	2,873,047	2,915,803	2,954,230	3,005,503	3,048,088	6.1
Unemployed	206,094	166,892	140,069	125,180	104,199	-50.0
Unemployment Rate (%)	6.7	5.4	4.5	4	3.3	-50.7

Reference: WDWD, 2017

Table 3-11 Employment by Industry in Rock County for 2017

Employment Industry	Number	Percent
Natural Resources and Mining	646	1.12
Construction	2,800	4.85
Manufacturing	10,214	17.69
Trade, Transportation, Utilities	15,974	27.67
Information	1,447	2.51
Financial Activities	1,792	3.10
Professional and Business Services	5,925	10.26
Education and Health Services	10,373	17.97
Leisure and Hospitality	6,877	11.91
Other Services	1,681	2.91

References: BLS, 2017a

Table 3-12 Largest Employers within Rock County, City of Janesville

Employer	Employees	Product/Service
Top 10 Employers within Rock County		
Mercy Health System	2,635	Medical Services
Janesville School District	1,515	Public Education
Beloit School District	1,199	Public Educations
Rock County	1,189	Government
Beloit Memorial Hospital	1,108	Medical Services
Grainger (Lab Safety)	910	Safety Equipment Distribution
Wal-Mart/Sam's Club	819	Retail
Frito-Lay	700	Snack Foods
Seneca Foods Corporation	700	Food Processing
SSI Technologies/Bournes	560	Automobile Control Devices
Top 10 Employers within the City of Janesville		
Mercy Health System	2,635	Medical Services
Janesville School District	1,515	Public Education
Rock County	1,189	Government
W.W. Grainger (Lab Safety)	910	Safety Equipment Distribution
Wal-Mart/Sam's Club	819	Retail
Seneca Foods Corporation	700	Food Processing
SSI Technologies/Bournes	560	Automobile Control Devices
Blackhawk Technical College	517	Technical College
Woodman's Good Market, Inc.	490	Supermarkets
Blain Supply Company/Farm & Fleet	490	Wholesale distributors/retail

Reference: RCDA, 2019

Table 3-13 People Living Below U.S. Census Poverty Thresholds for the City of Janesville, Rock County, and Wisconsin

	Families	All People
City of Janesville	10.2%	13.3%
Rock County	11.1%	14.3%
Wisconsin	8.1%	12.3%

Reference: USCB, 2018

Table 3-14 Housing Unit Characteristics for the City of Janesville and Rock County

	Total Number of Housing Units	Number of Vacant Housing Units	Homeowner Vacancy Rate	Renter Vacancy Rate
City of Janesville	27,679	1,209	0.6%	2.4%
Rock County	68,761	4,279	0.9%	2.9%

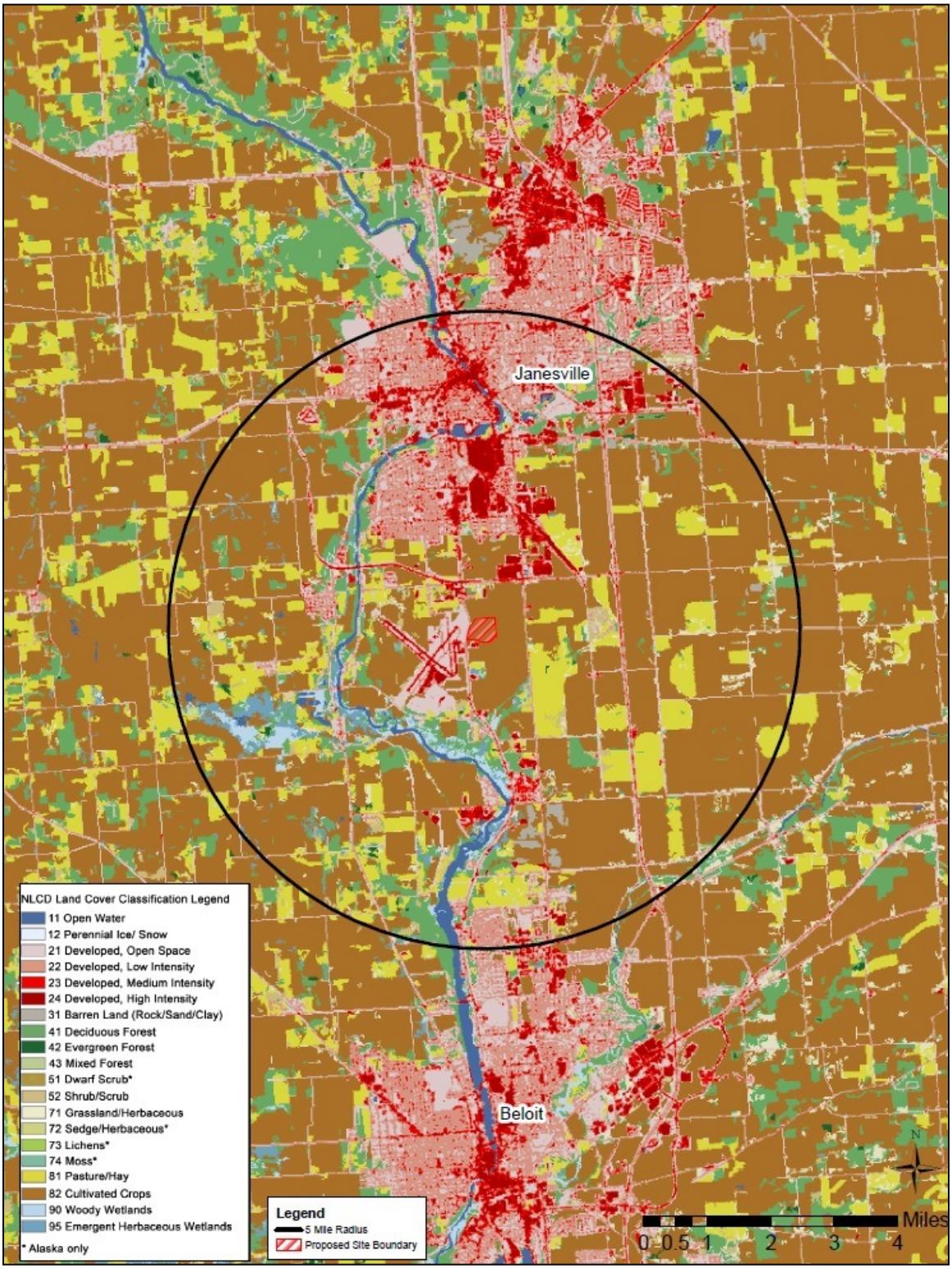
Reference: USCB, 2018

Table 3-15 Public School Enrollment within Rock County

District	Student Enrollment (2016)	Number of Schools
Beloit School District	7,012	15
Beloit Turner School District	1,528	4
Clinton Community School District	1,162	3
Edgerton School District	1,853	4
Evansville Community School District	1,838	4
Janesville School District	10,321	23
Milton School District	3,437	7
Parkview School District	767	3
Total, Rock County	27,918	63

Reference: DPI, 2016

Figure 3-1 Major Land Uses within the Region



Reference: NLCD, 2011

Figure 3-2 Aerial View of the SHINE Site

Figure 3-3 Visual Setting of the SHINE Site

View of the Proposed SHINE Site from U.S. Highway 51 Looking Northeast

View of the Proposed SHINE Site from U.S. Highway 51 Looking East

View of the Proposed SHINE Site from U.S. Highway 51 Looking Southeast

4 Impact of Proposed Operation and Decommissioning

No new or different information has been identified about the impacts of decommissioning on any resource area, except for impacts due to cumulative effects. Therefore, decommission is not discussed in this section except in Section 4.13, Cumulative Effects. None of the new or different information provided in this supplement affects the conclusions reached in the FEIS. Therefore, the impacts of decommissioning on all resource areas are SMALL, except for the impact on transportation, which are MODERATE, consistent with the FEIS. Neither minority nor low-income populations, nor general population living near SHINE would be adversely affected during decommissioning. Additional information about decommissioning is provided in FSAR Chapter 15. Additionally, SHINE will submit detailed decommissioning plans, including a consideration of environmental impacts, prior to commencing decommissioning activities in accordance with 10 CFR § 51.53(d).

The impacts due to construction activities are not updated. In accordance with 10 CFR § 51.53(b), this report updates the information relevant to the Operating License, as impacts from construction have already been analyzed, and construction of the facility has been approved.

The impacts due to the phased approach to initial facility operations have been analyzed and the analysis is summarized in the discussion of each resource area below.

4.1 Land Use and Visual Resources

Land Use

As described in Section 2, the SHINE site boundaries have not changed but the production facility center point and safety-related area center points have been moved approximately 55 ft south since the issuance of the FEIS. However, the safety-related area and all buildings remain concentrated in the center of the site. The aerial view of the SHINE site has been updated to include recent satellite imagery (see **Figure 3-2**). The building will have a smaller footprint, a similar overall height, a shallower excavation for the foundation, and a smaller permanently disturbed area. Thus, none of the new and different information identified affect the conclusions reached in the FEIS and the impacts on land use during operation are SMALL. The phased approach to initial facility operations does not alter the land usage on the SHINE site; therefore, the impacts on land use during operation remain SMALL.

Visual Resources

The buildings will have a smaller footprint and a similar overall height as described in Section 2. Thus, none of the new and different information identified affect the conclusions reached in the FEIS and the impacts on visual resources during operation are SMALL. The phased approach to initial facility operations does not alter the location or sizing of structures on the SHINE site; therefore, the impacts on visual resources during operation remain SMALL.

4.2 Air Quality and Noise

Air Quality

Gaseous effluents resulting from operation of the SHINE facility are from two types of processes: isotope production and fuel combustion.

Estimates of gaseous effluents from the isotope production process have changed due to process design changes, including the removal of the thermal denitration process. Updated estimates of

gaseous radioactive effluents are provided in **Table 2-2**. An overview of the isotope production process is provided in FSAR Chapter 4. None of the modifications to the radioisotope production processes affect the conclusions reached in the FEIS. Therefore, the impacts on air quality due to isotope production during operations are SMALL, consistent with the conclusion reached in the FEIS. Gaseous effluents from the isotope production process during the phased approach to initial facility operations are bounded by the gaseous effluents from full facility operation; therefore, the impacts on air quality due to isotope production during operations remain SMALL.

Gaseous effluents from fuel combustion comes from the standby natural gas fired generator, the facility heating system, and emissions from commuting workers. The number of commuting workers has increased from 150 to 200 workers. However, the emissions due to onsite fuel combustion sources have been reduced by the replacement of the standby diesel fired generator with a standby natural gas fired generator, as shown in **Table 2-3**. The expected emissions due to fuel combustion during operations are bounded by those considered in the FEIS. Total concentrations (including background concentrations) for any pollutant released from the SHINE facility will not exceed the applicable NAAQS. Total emissions of criteria pollutants remain below the major source threshold of 100 tons per year (TPY) that would require a Title V permit and are below 250 TPY, which is the threshold for triggering prevention of significant deterioration requirements. Total greenhouse gases (GHGs) will be below the 75,000 TPY of carbon dioxide equivalent threshold for prevention of significant deterioration and Title V permits set in the Greenhouse Gas Tailoring Rule. Given that air emissions from operation will not exceed NAAQS, that estimated emissions from operation-related activities will be below the 100-TPY major source threshold, and that Rock County is designated attainment/unclassifiable status, the impacts on air quality due to fuel combustion during operation are SMALL, consistent with the conclusion reached in the FEIS. Gaseous effluents from fuel combustion caused by worker vehicles during the phased approach to initial facility operations will increase due to construction personnel and operational personnel being on site during the phased approach; however, this increase in gaseous effluents from fuel combustion due to increased vehicle traffic is bounded by the gaseous effluents from fuel combustion due to increased vehicle traffic considered in the FEIS for the construction phase, which was not expected to contribute to concentrations that would exceed NAAQS. Additionally, gaseous effluents from fuel combustion from the standby natural gas fired generator and facility heating system during the phased approach to initial facility operations are bounded by the corresponding gaseous emissions from full facility operation. Therefore, the impacts on air quality due to fuel combustion during operation remain SMALL.

<u>Noise</u>

The FEIS concluded that the added traffic volume due to an operational workforce of 150 employees would increase the levels near U.S. Highway 51 by about 1 dBA. Most people are unable to discern noise level differences less than about 3 dBA. The increase in the operational workforce from 150 employees to 200 employees will still be within the undetectable noise range. The number of flight operations at the SWRA has slightly decreased from 38,400 flights per year in 2014 to 34,877 flights per year for the 12-month period from May 2017 to April 2018 (FAA, 2018), suggesting that background noise levels have decreased slightly. Outgoing shipments of product from the SWRA are not expected to significantly increase the number of flights or per year or noticeably increase the noise levels from the SWRA. Given that noise emissions from operating equipment are not expected to be audible beyond the site, that additional noise emissions caused by worker vehicles are minor, and that noise emissions from shipments are not anticipated to increase noise levels from current airport operations, the offsite noise impacts during operation are

SMALL, consistent with the conclusion reached in the FEIS. Noise emissions caused by worker vehicles during the phased approach to initial facility operations will increase due to construction personnel and operational personnel being on site during the phased approach; however, this increase in noise emissions from increased vehicle traffic is bounded by the noise emissions from increased vehicle traffic considered in the FEIS for the construction phase, which was determined to be unable to be discerned by most people. Additionally, noise emissions from outgoing product shipments and operating equipment during the phased approach to initial facility operations are bounded by the corresponding noise emissions from full facility operation. Therefore, the offsite noise impacts during operation remain SMALL.

4.3 Geologic Environment

None of the new and different information about geologic hazards described in Section 3.3 affect the conclusion reached in the FEIS that the site is located in a region with a low seismic hazard.

Changes to construction parameters, including a reduced excavation depth, a reduction in total excavated materials, and adjustments to the site's stormwater management plan are described in Section 2. The implementation of stormwater management principals, including stormwater infiltration cells, will effectively reduce surface erosion and sediment transport. The facility will be sited, designed, and constructed in accordance with applicable building codes, which provide for the evaluation of site geologic and soil conditions, including potential seismic hazards. Therefore, the impacts on the geological environment during operation are SMALL, consistent with the conclusion reached in the FEIS. The phased approach to initial facility operations does not alter the geological environment for the SHINE site; therefore, the impacts on the geological environment during operation remain SMALL.

4.4 Water Resources

Surface Water

There are no surface-water features on the SHINE site. As described in the FEIS, the nearest water bodies are the nearby unnamed tributary to Rock River, located 1.6 mi. (2.6 km) south of the SHINE site, and the Rock River, located 1.9 mi. (3.1 km) southwest of the SHINE site.

Changes to the stormwater management plan are described in Section 2. The stormwater system is designed to address the 1-year, 2-year, 10-year and 100-year storm events, as required by the City of Janesville, and to minimize the existence of standing water per the SWRA Overlay District zoning requirements. No discharge of stormwater associated with industrial activity (i.e., where stormwater can come into contact with stockpiles, raw materials, or process areas) will occur. There will be no discharges of radiological effluents to surface water.

Additionally, SHINE will no longer be using an underground storage tank for diesel fuel storage. A natural gas fired generator has replaced the standby diesel generator discussed in the FEIS. The amount of diesel stored onsite has been greatly reduced, reducing the risk of oil spills.

Given that SHINE will not divert or withdraw surface water to support facility operations, that a site-specific plan that details stormwater pollution prevention measures will be in place, and that the storage and use of fuel onsite has been greatly reduced, the impacts on water hydrology, quality, and use from operation are SMALL, consistent with the conclusion reached in the FEIS. The phased approach to initial facility operations does not alter the considerations related to surface water for the SHINE site; therefore, the impacts on water hydrology, quality, and use from operation remain SMALL.

Groundwater

Routine facility operation should have no impact on local groundwater hydrology because of the depth of groundwater and provisions for proper design and construction of the site's stormwater management plan. Additionally, SHINE no longer plans to store diesel fuel in an underground storage tank, reducing the risk associated with an oil spill. Furthermore, SHINE will not use onsite groundwater nor discharge liquid effluents to the subsurface.

Water used by the SHINE facility will be supplied by the City of Janesville Water Utility. The changes to anticipated water needs are discussed in Section 2.3, with daily water use increasing from 6,073 gpd (23,005 lpd) to 10,360 gpd (39,217 lpd).

Given that SHINE will not use groundwater from onsite sources, and the estimated water demand will be a very small percent (less than 0.1 percent) of the City of Janesville Water Utility's total capacity, the impacts on groundwater from operation are SMALL, consistent with the conclusions reached in the FEIS. SHINE will not use groundwater from onsite sources during the phased approach to initial facility operations, and water usage during the phased approach is bounded by the water usage from full facility operation; therefore, the impacts on groundwater during operations remain SMALL.

4.5 Ecological Resources

The height of the production facility exhaust stack, the tallest structure onsite, has increased approximately 1 ft from 66 ft (20 m) to 67 ft (20 m). This change is minimal; therefore, the mortality from bird collision is expected to remain negligible. Changes to the list of invasive species and threatened or endangered species are described in Section 3.5. None of the newly identified species were present at the SHINE site during the 2011 and 2012 field investigations. Thus, no new and different information has been identified that would change the conclusions reached in the FEIS.

Indirect impacts during operation could include runoff that may contain sediments, contaminants from the road and parking surfaces, or herbicides. However, the stormwater management plan includes infiltration ponds and filtration grasses to prevent excessive runoff.

Given that mortality from bird collisions is expected to be negligible, habitat disturbances during operations would be minimal, any disturbed wildlife could find similar habitat in the vicinity, and no aquatic features or federally or state-listed species occur on the proposed site, the impacts to ecological resources during operations are SMALL, consistent with the conclusions reached in the FEIS. The phased approach to initial facility operations does not alter the considerations related to ecological resources for the SHINE site; therefore, the impacts on ecological resources from operation remain SMALL.

4.6 Historical and Cultural Resources

As discussed in Section 3.6, no new or different information has been identified about historical and cultural resources. Therefore, the impacts of operation on the historical and cultural resources are SMALL, consistent with the conclusion reached in the FEIS. The phased approach to initial facility operations does not alter the considerations related to historical and cultural resources for the SHINE site; therefore, the impacts on historical and cultural resources from operation remain SMALL.

4.7 Socioeconomics

The socioeconomic impacts on the City of Janesville and Rock County resulting from operation of the SHINE facility are SMALL and no mitigation measures are required to minimize socioeconomic impacts. New or different information pertaining to socioeconomic impacts is provided in Section 3.7. The phased approach to initial facility operations does not alter the considerations related to socioeconomics for the SHINE site. While both construction personnel and operational personnel will be on site during the phased approach, construction activities during the phased approach occur during a limited timeframe and do not require relocation of construction personnel to Rock County. Therefore, socioeconomic impacts resulting from operation remain SMALL, and no mitigation measures are required to minimize socioeconomic impacts.

Population Impacts

Under the conservative assumption that all operational workers relocated to Rock County, the addition of 200 operational workers results in an estimated population increase of approximately 0.1 percent of the 2018 population of Rock County (Rock County, 2018). The total number of jobs generated during operations represents less than 1 percent of the available labor force in Janesville and Rock County (see **Table 3-10**). Additionally, there is sufficient available housing in the City or Janesville and Rock County to accommodate the population increase (see **Table 3-15**).

Most operations staff are not anticipated to require relocation to Rock County. Thus, the impacts of population increase on employment and housing availability due to operation are SMALL, consistent with the conclusion reached in the FEIS.

Tax Revenue

As described in Section 3.7, changes to local tax revenue since the issuance of the FEIS have been minimal. Therefore, tax revenue impacts during operations are SMALL, consistent with the conclusion reached in the FEIS.

Transportation

An abbreviated Traffic Impact Analysis (TIA) was completed in 2017 to evaluate the impacts of the larger operational workforce on traffic conditions.

The TIA assessment compared the projected traffic volumes in 2020 without the SHINE facility operating to the volumes expected during the operations phase of the SHINE facility in 2020. The study assessed traffic conditions at the intersections of U.S. Highway 51 and State Trunk Highway 11, State Trunk Highway 11 and South County Road G, U.S. Highway 51 and Town Line Road, and the intersection of U.S. Highway 51 and the entrance to the SHINE facility. The TIA concluded the level of service did not change with the addition of SHINE operational workers for any of the analyzed intersections during either the morning or evening peak traffic times.

The traffic operations analysis indicates that the existing nearby intersections are capable of accommodating the additional traffic volumes without a change of service, and without the need for geometric modifications. Because the updated TIA showed no degradation of service, the impacts of operation are SMALL.

Public Services

Increase in local populations due to operation of the SHINE facility will be minimal. Therefore, the impact of increased demand on community services, including recreational activities, tourism, and

education during SHINE operations are SMALL, consistent with the conclusion reached in the FEIS.

4.8 Human Health

Nonradiological Impacts

The chemical inventory of major chemicals used during operations of the SHINE facility, including source terms and consequences of accidents involving hazardous chemicals, is provided in FSAR Chapter 13.

Nonradiological exposures from the SHINE facility to workers and members of the public will be regulated by the State of Wisconsin in accordance with the Wisconsin Administrative Code. Given that SHINE will manage and minimize worker hazards by complying with Occupational Safety and Health Administration (OSHA) and State of Wisconsin regulations, and by using multiple planned features (e.g., facility design, Chemical Hygiene Plan, supervision, training, and protective equipment), the nonradiological impacts to workers and members of the public during routine operations are SMALL, consistent with the conclusion reached in the FEIS. The inventory of major chemicals used during full facility operations remains bounding of those chemicals used during the phased approach to initial facility operations, and the controls to manage and minimize worker hazards during operation of the SHINE facility will be in place for the phased approach; therefore, the nonradiological impacts to workers and members of the public during routine operations remain SMALL.

Radiological Impacts

Sources and types of radioactive gaseous effluents are discussed in Section 2 and FSAR Chapter 4. FSAR Chapter 11 provides information on control of radiation exposure to workers and the public.

Occupational and public exposures due to operations at the SHINE site are as low as reasonably achievable (ALARA). Exposure minimization goals are met through both engineered and administrative controls. SHINE will comply with the 10 CFR Part 20 annual dose limits to members of the public from a licensed facility of 100 mrem (1 milliSievert [mSv]) for normal operations. In addition, SHINE will comply with 10 CFR § 20.1101(d), which imposes a constraint of 10 mrem (0.1 mSv) on radiological gaseous effluents to ensure that doses to members of the public are ALARA. In accident scenarios, SHINE will implement an accident dose criterion of 1 rem (10 mSv) to the public. Adherence to these limits ensures that radiological impacts of operation are SMALL, consistent with the conclusion reached in the FEIS. SHINE will adhere to the 10 CFR Part 20 annual dose limits to members of the public from a licensed facility and will implement the 1 rem accident dose criterion to the public during the phased approach to initial facility operations; therefore, the radiological impacts of operation remain SMALL.

4.9 Waste Management

The radiological waste management program, including administrative controls, waste processing systems, and types and quantities of radiological waste and radiological waste shipments, are described in FSAR Chapter 11. No new or different information has been identified that would affect the conclusions reached in the FEIS. SHINE will use engineered design features and programmatic elements to minimize radioactive contamination and chemical contamination, and operate within the NRC's, Department of Transportation's (DOT's), and State of Wisconsin's radiation requirements. Therefore, the impacts of waste management during operation are SMALL,

consistent with the conclusion reached in the FEIS. The types and quantities of radiological waste generated during the phased approach to initial facility operations are provided in Chapter 11 of the SHINE phased approach application supplement. During the phased approach to initial facility operations, SHINE will apply engineered design features and programmatic elements to minimize radioactive contamination and chemical contamination operate with the NRC's, DOT's, and State of Wisconsin radiation requirements during the phased approach to initial facility operations. Therefore, impacts of waste management during operation remain SMALL.

4.10 Transportation

Nuclear Materials Transported

SHINE will ship medical isotope product and radioactive waste from the SHINE facility. SHINE's preferred method of product shipment is to transport products by carrier truck from the facility to the SWRA when shipping to domestic recipients, and to O'Hare International Airport for international recipients.

SHINE will ship radioactive waste to EnergySolutions in Clive, Utah and Waste Control Specialists in Andrews, Texas, via either common or contract carriers. Additional information about shipments, including waste types, quantities, and shipment frequencies, can be found in FSAR Chapter 11. SHINE and the carriers will be required to adhere to the applicable regulatory packaging and transportation requirements for radioactive material in NRC regulations (10 CFR Parts 20, 40, and 71), the State of Wisconsin Administrative Code Chapter Trans 326, ("Transportation"), and DOT requirements (49 CFR Parts 172 and 173). These regulations help ensure public health and safety on roadways; therefore, the impacts due to nuclear materials transportation during operation are SMALL, consistent with the conclusions reached in the FEIS. Medical isotope product shipments during the phased approach to initial facility operations are bounded by the product shipments from full facility operations. The types and quantities of radiological waste generated during the phased approach to initial facility operations are provided in Chapter 11 of the SHINE phased approach application supplement. As shipment of nuclear materials during the phased approach to initial facility operations will occur in accordance with applicable federal and state requirements for packaging and transportation, the impacts due to nuclear materials transportation during operation remain SMALL.

4.11 Postulated Accidents

Maximum Hypothetical Accident

The maximum hypothetical accident (MHA) is a conservative evaluation and represents the bounding consequences for potential design basis accidents at the SHINE facility. The MHA is an event that could result in radiological consequences exceeding those of any credible accident. It is a bounding calculation on the radiological consequences of postulated design basis accidents at SHINE. The MHA is used to demonstrate that the maximum radiological consequences in operating the facility at a specific site are within acceptable accident dose limits. The MHA for the SHINE facility, including resulting dose consequences, is described in FSAR Chapter 13a2. The calculated dose for the MHA does not exceed SHINE's accident dose criterion of 1 rem (10 mSv) to a member of the public. Therefore, the impacts from potential radiological accidents are SMALL, consistent with the conclusions reached in the FEIS. The phased approach to initial facility operations does not alter the MHA for the SHINE facility; therefore, the impacts from potential radiological accidents during operation remain SMALL.

Hazardous Chemical Accidents

Hazardous chemical accidents, including the chemical source terms, concentrations, and resulting consequences, are described in FSAR Chapter 13. The impacts to the maximum offsite individual from the potential uncontrolled release of hazardous chemicals under accident conditions may include mild transient adverse health effects but would not include serious irreversible health effects. SHINE's hypothetical nonradiological accident exposures meet the safety criteria defined in FSAR Section 3.1. Therefore, the impacts from potential chemical accidents during operation are SMALL, consistent with the conclusions reached in the FEIS. The phased approach to initial facility operations does not alter the hypothetical nonradiological accident exposures for the SHINE facility; therefore, the impacts from potential chemical accidents during operation remain SMALL.

4.12 Environment Justice

Since the issuance of the FEIS, the minority and the low-income populations in the City of Janesville have slightly decreased (see **Table 3-8**). The nearest resident remains about 0.33 mi. away. Minority and low-income populations have neither increased nor moved closer to the SHINE site since the issuance of the FEIS; therefore, none of the new or different information identified since the FEIS impacts the conclusions reached in the FEIS.

Potential impacts to minority and low-income populations during operations would mostly consist of radiological and nonradiological human health and environmental (e.g., noise and traffic) effects. The impacts of operation on the surrounding community for all resource areas are SMALL. Therefore, neither minority nor low-income populations, nor general population living near SHINE would be adversely affected during operations, consistent with the conclusion reached in the FEIS. The phased approach to initial facility operations does not adversely impact the potential human health and environmental (e.g., noise and traffic) effects of the SHINE facility; therefore, the impacts of operation on the surrounding community for all resource areas remain SMALL..

4.13 Cumulative Effects

SHINE considered new or different information that could affect the analysis of cumulative impacts during operation and decommissioning. Cumulative impacts may result when the environmental effects associated with the SHINE facility are overlaid or added to temporary or permanent effects associated with other past, present, and reasonably foreseeable actions. Recent past, present, and reasonably foreseeable future actions within Rock County are provided in **Table 4-1**. Projects discussed in the FEIS were only included in the following analysis is they have new or different operations since the issuance of the FEIS. As described in Sections 4.1 through 4.12 above, the impacts due to the phased approach to initial facility operations does not alter the resulting impacts in each resource area from operations. As the resulting impact in each resource area is not altered by the phased approach to facility operations, the cumulative effects analysis provided below is considered representative of the cumulative effects from operations, inclusive of the phased approach to initial facility operations.

Land Use and Visual Resources

The projects and activities described in **Table 4-1** would result in minimal changes to existing land uses because new construction would occur either within or adjacent to existing facilities or within areas currently zoned for industrial use. For example, in 2012, the City of Janesville approved a new industrial park within tax increment financing (TIF) District No. 35. When the FEIS was issued, a large distribution center, the Dollar General Distribution Center, had expressed interest in a plot of land in TIF District No. 35. Construction of the Dollar General facility commenced in 2016 and was completed in 2017. Given that the TIF District No. 35 is zoned for light industrial use, the development was compatible with current land use plans and zoning requirements. Similarly, any new developments with the TIF district, including a new facility just north of Dollar General, NaturPak Pet, would be consistent with current land use plans and zoning requirements.

Given that reasonably foreseeable new construction activities would occur within or adjacent to existing facilities or within areas zoned for industrial use and of low scenic quality, cumulative land use and visual impacts during operation and decommissioning are SMALL, consistent with the conclusion reached in the FEIS.

Air Quality and Noise

None of the projects under consideration for cumulative effects are expected to have appreciable impacts on air quality and noise. TIF District No. 35 (the Dollar General Distribution Center), Alliant Energy, NorthStar Medical Radioisotopes, and United Ethanol were analyzed for cumulative air emission impacts during SHINE operation in the FEIS. The FEIS concluded that the impacts were minimal because of low emissions, the short term or temporary duration of construction activities, and/or the distance from the proposed SHINE facility. Emissions from Alliant Energy may increase with the expansion of the generating capacity. However, any currently operating or future facility with the potential to impact air quality must meet State of Wisconsin permitting requirement, limiting the potential cumulative impacts on air quality. Overall, the potential cumulative air quality impacts during operation and decommissioning are SMALL, consistent with the conclusion reached in the FEIS.

The FEIS analyzed potential cumulative noise impacts from transportation-related noise from aircraft traffic at the SWRA and traffic on U.S. Highway 51, occasional noise from farming equipment, and construction noise from the development of TIF District No. 35 (the Dollar General Distribution Center). The FEIS concluded that cumulative noise impacts would be SMALL. Additional projects that may have cumulative noise impacts include the construction of the SHINE therapeutics building and the operation of NaturPak Pet, the expanded Alliant Energy Generation Facility, and the SHINE headquarters. Given that the construction of the SHINE therapeutics buildings is much smaller in scope than the Dollar General Distribution Center, which completed construction in 2017, and the operation of NaturPak Pet, the Alliant Energy Generation Facility, and the SHINE headquarters is not expected to create appreciable noise emissions, the cumulative noise impacts due to the construction and operation of these nearby facilities would be bounded by those considered in the FEIS, and therefore be SMALL.

Geologic Environment

Any new construction projects identified in **Table 4-1** within the immediate 5-mi. (8-km) radius would require the conversion or consumption of geologic resources, including soils, rock and mineral assets. However, once construction of the SHINE facility is complete, operation of the facility will not convert or consume additional geological resources. Operation and

decommissioning will not contribute to the consumption of geological resources; therefore, the cumulative impacts on geological resources are SMALL, consistent with the conclusion reached in the FEIS.

Water Resources

No surface water will be used for the operation or decommissioning of the SHINE facility. Therefore, there will be no incremental contribution to cumulative effects of surface-water use. Construction and industrial stormwater management permitting requirements would ensure that cumulative effects due to stormwater runoff and erosion are minimal.

Radioactive liquid discharges from the SHINE facility to the sanitary sewer are made in accordance with 10 CFR § 20.2003 and 10 CFR § 20.2007. The WTP has an average design wet weather flow of 19.8 mega gallons per day (Mgd) (75.0 megaliters per day [Mld]), a design peak flow of 25 Mgd (94.6 Mld), and an average daily flow of 13 Mgd (49.2 Mld), which is discharged to the Rock River. The reported capacity has increased since the issuance of the FEIS and the average daily flow has decreased (City of Janesville, 2018c). Wastewater generated by the proposed SHINE facility and conveyed to the City of Janesville WTP would contribute very little (< 0.1%) to the facility's treatment burden with negligible impacts on receiving water quality. Therefore, the cumulative impacts on surface water use are SMALL, consistent with the conclusion reached in the FEIS.

Groundwater is the source of water supply for municipal water suppliers and individual users in Rock County. Consistent with the information considered in the FEIS, the Janesville Water Utility still has a total capability of up to 32 Mgd and the current capacity is still approximately 10 Mgd (City of Janesville, 2018c). Operation of the SHINE facility will require a very small percentage of the available groundwater supply capacity of the Janesville Water Utility. This additional demand combined with current and forecast demands would not be expected to affect the utility's ability to provide adequate water supplies and would not be likely to affect regional ground water conditions. Therefore, the cumulative impacts from operations and decommissioning of the SHINE facility on groundwater resources are SMALL, consistent with the conclusion reached in the FEIS.

Ecological Resources

The impacts of operation and decommissioning of the SHINE facility will not noticeably alter the terrestrial and aquatic environment, and therefore, are SMALL. New development projects identified in **Table 4-1** are likely to have minimal impacts on ecological resources because the projects are sited within areas that are currently agricultural land, open space, or developed. These types of land covers provide low-quality habitats for wildlife, birds, and aquatic resources. However, as environmental stressors, such as runoff from agricultural fields and urban areas and climate change, continue over the proposed operation and decommissioning periods, certain attributes of the terrestrial and aquatic environment (such as habitat quality) are likely to noticeably change. The impacts are not expected to destabilize any important attributes of the terrestrial and aquatic environment because such impacts will cause gradual change, which should allow the terrestrial and aquatic environment to appropriately adapt. Therefore, the cumulative impacts during operation and decommissioning on ecological resources are MODERATE, consistent with the conclusion reached in the FEIS.

Historical and Cultural Resources

The impacts to historical and cultural resources from the operations and decommissioning of the SHINE facility would be SMALL. No known historical or cultural resources or historic properties are identified within the Area of Potential Effect, as defined by the NRC in the FEIS. Therefore, the cumulative impacts during operation and decommissioning on historical and cultural resources, would be SMALL, consistent with the conclusion reached in the FEIS.

Socioeconomic Environment

The socioeconomic impacts from the operation and decommissioning of the SHINE facility are SMALL. Past, present and reasonably foreseeable future projects identified in **Table 4-1** could contribute to cumulative socioeconomic impacts. New or different projects that are considered in this cumulative impacts analysis that will require operational workforce concurrent with SHINE operation are the Dollar General Distribution Center, Building One, NaturPak Pet, SHINE headquarters, and the SHINE therapeutics building.

The Dollar General Distribution Center employs 400 to 500 people currently and plans to increase its workforce to 600 to 700 employees in the coming year. NaturPak Pet has not published an anticipated workforce, but operation of the facility will overlap with operation of the SHINE facility. Building One and SHINE headquarters will not require any additional workforce, because the facility will be staffed by SHINE employees. Operation of the SHINE therapeutics building is expected to require approximately 30 additional SHINE employees. Demand for workers is not anticipated to create a shortage in Rock County because Rock County has sufficient labor force to meet the anticipated needs for these facilities.

The impacts of the SHINE facility on transportation are SMALL during operation and MODERATE during decommissioning. Construction projects and increases in operational workforce for facilities in **Table 4-1** could produce an increase in vehicle traffic on roads with the 5-mi. (8-km) radius of the proposed SHINE site. Operation of NaturPak Pet and the Dollar General Distribution Center will overlap with the operation of the SHINE facility. Therefore, depending on whether increased vehicular activity from workers or residents on roads near the SHINE site have a noticeable impact on traffic volumes, the cumulative effect of transportation-related traffic impacts during SHINE operation and decommissioning would be SMALL to MODERATE, consistent with the conclusion reached in the FEIS.

Human Health

The radiological and nonradiological impacts from operation and decommissioning on human health are SMALL.

Construction of the NorthStar Medical Radioisotopes facility in Beloit has been completed, and operation has commenced. No new or different information about NorthStar Medical Radioisotopes operations has been identified that would affect the conclusions reached in the FEIS.

Building One is the only newly identified facility that currently uses radioactive materials in the vicinity of the site since the issuance of the FEIS. Building One, located south and adjacent to the SHINE site, houses demonstration activity areas and an isotope production area and is operated by SHINE. Building One stores and uses radioactive material under a State of Wisconsin radioactive materials license (license number 105-2083-01). Operations at Building One will comply with public dose limits set forth in Chapter DHS 157 of the Wisconsin Administrative Code. In order to demonstrate that air emissions are ALARA, SHINE controls routine airborne effluent

releases such that an individual member of the public likely to receive the highest dose does not receive a total effective dose equivalent in excess of 10 mrem/year from air emissions. Additionally, SHINE ensures that the maximally exposed member of the public does not exceed a dose of greater than 2 mrem in any one hour and 50 mrem/year from external sources.

Operation of the SHINE therapeutics building will require the use of radioactive material under a State of Wisconsin radioactive materials license and will be subject to the public dose limits set forth in Chapter DHS 157 of the Wisconsin Administrative Code.

The cumulative dose to workers and the public from normal operations of the SHINE facility, NorthStar Medical Radioisotopes, Building One, and the SHINE therapeutics building will remain below the regulatory limits set in 10 CFR Part 20. Therefore, the cumulative radiological impacts remain SMALL, consistent with the conclusion reached in the FEIS.

Waste Management

Construction of the NorthStar Medical Radioisotopes facility in Beloit has been completed, and operation has commenced. No new or different information about NorthStar Medical Radioisotopes operations has been identified that would affect the conclusions reached in the FEIS.

Building One and the SHINE therapeutics building are newly identified facilities that use or will use radioactive materials in the vicinity of the site since the issuance of the FEIS. SHINE has independently confirmed the existence of a disposal pathway for radioactive waste produced at Building One and the SHINE production facility. The existence of sufficient disposal capacity for each facility ensures that the cumulative impacts of waste management and disposal will be minimal. There is no planned radioactive waste resulting from isotope production at the SHINE therapeutics building.

The FEIS concluded that no known capacity restraint exists on the disposal of nonradioactive solid-waste either within Wisconsin or the nation as a whole. No new or different information has been identified that would impact this conclusion.

Given that there is adequate disposal space on a state and national level for radioactive and nonradioactive waste from the multiple current and reasonably foreseeable sources, and that the waste will be handled and disposed of in accordance with federal, state, and local requirements, the cumulative impacts on waste management during operations and decommissioning are SMALL, consistent with the conclusion reached in the FEIS.

Environmental Justice

The environmental impacts from operation and decommissioning are SMALL for all resource areas, except for traffic related impacts during decommissioning, which are MODERATE. There is no evidence that impacts from decommissioning would be disproportionately high and adverse for minority or low-income populations. The additional projects considered in this impact analysis are not expected to have a disproportionately high and adverse impact on minority or low-income populations above those considered in the FEIS. Therefore, the contributory effects of operating and decommissioning the SHINE facility are not likely to create high and adverse cumulative human health and environmental effects on minority and low-income populations living near the Janesville site.

Table 4-1 Past, Present, and Reasonably Foreseeable Projects and Other Actions Retained for the Cumulative Impacts Analysis

Project Name	Summary of Project	Location	Status
Alliant Energy Generation Facility	Power generation facility	3.2 mi. (5.1 km) south of site	Existing operating facility
Building One	Demonstration and isotope production facility housing radioactive materials	0.25 mi. (0.4 km) south of the site	Existing operating facility
Dollar General Distribution Center	Distribution facility	0.25 mi. (0.4 km) northeast of the site	Existing operating facility
NaturPak Pet	Pet food processing plant	0.4 mi (0.6 km) northeast of the site	Existing operating facility
NorthStar Medical Radioisotopes	Medical radioisotope facility	7.7 mi (12.4 km) south of site	Existing operating facility
United Ethanol	Ethanol production plan	11 mi. (17.7 km) northeast of site	Existing operating facility
SHINE Headquarters and Therapeutics Building	Corporate headquarters and therapeutic isotope production	0.15 mi. (0.24 km) north of the site	Existing operating facility (Headquarters); Planned new facility (Therapeutics Building)

5 Alternatives

No alternative sites for the facility are under consideration for the SHINE production facility, consistent with the guidance in 10 CFR § 51.53(b).

Construction of the SHINE production facility was approved in 2016 at the site in Janesville, Wisconsin, and with the accelerator driven subcritical assembly technology. Since the issuance of the Construction Permit, SHINE technology has developed into the design described in this OL application. As such, no alternative technologies are under consideration for the SHINE production facility.

Therefore, no new or different information has been identified for this section.

6 Conclusions

This supplement provides new or different information to that discussed in the FEIS. **Table 6-1** provides a comparison of the conclusion reached by the NRC and the impact of the information contained in this supplement as relates to operation of the SHINE facility. Because no new or different information has been identified about decommissioning that would affect the conclusions reached in the FEIS, the impacts stated in the FEIS remain valid. Thus, decommissioning impacts have not been addressed in **Table 6-1**.

SHINE has determined that there is no impact to any of the conclusions stated in the FEIS, with the exception of the impacts of operations on traffic related infrastructure, which have gone from SMALL to MODERATE in the FEIS to SMALL in the ERS.

Table 6-1 Summary of Environmental Impacts from Operation of the SHINE Production Facility (Sheet 1 of 5)

Resource Area	FEIS Summary of Impact	FEIS Impact Level	ERS Summary of Impact	ERS Impact Level
Land Use	The site would include 91.1 ac. (36.9 ha) of agricultural land and 0.18 ac. (0.07 ha) of developed open areas, which is a small portion of the agricultural land within a 5-mi. (8-km) radius of the site. The location of the proposed facility is within an area zoned for light industrial use. No additional land would be disturbed during operations or decommissioning.	SMALL	Local land uses have not substantively changed since the issuance of the FEIS. Minor changes to the size and arrangement of buildings on the site have no overall impact on the land usage.	SMALL
Visual Resources	The proposed SHINE facility would not noticeably alter visual resources, based on the low scenic quality, low scenic value, and light industrial viewshed within the vicinity of the proposed site.	SMALL	There have been no substantive changes to the visual resources that would impact the scenic quality of the area since the issuance of the FEIS.	SMALL
Air Quality	Construction, operations, and decommissioning of the proposed SHINE facility would result in additional air emissions. Given the relatively low emissions and the pollution control measures that air permits from the Wisconsin Department of Natural Resources would require the proposed SHINE facility would not noticeably alter air quality in Rock County.	SMALL	New and different information about operational air emissions are provided in this supplement. The emissions will still be within applicable regulations and permit requirements, such that the impact on air quality in Rock County will be minimal.	SMALL
Noise	During construction, operations, and decommissioning, noise would be minimal given the minor (1 to 3 dBA) expected increases in noise levels.	SMALL	New and different information provided in this supplement suggest that the noise conditions remain largely unchanged, and the SHINE site will still contribute negligible noise.	SMALL

Table 6-1 Summary of Environmental Impacts from Operation of the SHINE Production Facility (Sheet 2 of 5)

Resource Area	FEIS Summary of Impact	FEIS Impact Level	ERS Summary of Impact	ERS Impact Level
Geologic Environment	Construction of the proposed SHINE facility would consume geologic resources and have the potential to increase soil erosion, but the overall impact would be minor, given that the geologic resources are widely available within the region and erosion would be managed with the implementation of best management practices (BMPs).	SMALL	There have been no substantive changes in the geologic environment at the SHINE site since the issuance of the FEIS.	SMALL
Water Resources	Water-resource impacts during construction, operations, and decommissioning would be negligible, because of the lack of surface-water features onsite and the use of municipal water.	SMALL	New and different information about water usage during operation is provided in this supplement. Because the SHINE site still lacks surface water, and SHINE will still use a small percent of the available municipal water, the impacts of operation on water resources will be negligible.	SMALL
Ecological Resources	Terrestrial and aquatic ecology impacts are expected to be SMALL, based on the limited amount of land that would be disturbed and because the entire site includes previously disturbed habitat.	SMALL	There have been no substantive changes to the ecological resources on the site since the issuance of the FEIS.	SMALL
Historic and Cultural Resources	SHINE could inadvertently discover previously unidentified cultural resources caused by land disturbance during construction, operations, or decommissioning. However, impacts would be SMALL based on (1) no known historic properties eligible for listing in the National Register of Historic Places, or historic and cultural resources on the proposed SHINE facility site, (2) tribal input, (3) SHINE's cultural resource management plan procedures, and (4) cultural resource assessment and consultations performed by the NRC staff.	SMALL	No new of different information has been identified about historical and cultural resources since the issuance of the FEIS.	SMALL

Table 6-1 Summary of Environmental Impacts from Operation of the SHINE Production Facility (Sheet 3 of 5)

Resource Area	FEIS Summary of Impact	FEIS Impact Level	ERS Summary of Impact	ERS Impact Level
Socioeconomic	Socioeconomic impacts would be SMALL based on the size of the workforce required to construct, operate, and decommission the SHINE facility.	SMALL	New and different information about the socioeconomic environment is provided in this supplement. Additionally, SHINE has increased its operational workforce to a conservative estimate of 200 workers. Because of the availability of local workforce, housing, and public services, and the ability of local infrastructure to handle the increased traffic, the increased workforce doesn't substantively change the socioeconomic impact.	SMALL
Human Health	Human health impacts would be minimized because access to the site would be restricted, SHINE would implement normal safety practices contained in OSHA regulations, and SHINE would operate the proposed SHINE facility in accordance with all applicable federal and State of Wisconsin regulatory requirements.	SMALL	New and different information about human health is provided in this supplement. However, the human health impacts will still be minimized. SHINE will still implement normal safety practices contained in OSHA regulations and operate the facility in accordance with all applicable federal and State of Wisconsin regulatory requirements.	SMALL

Table 6-1 Summary of Environmental Impacts from Operation of the SHINE Production Facility (Sheet 4 of 5)

Resource Area	FEIS Summary of Impact	FEIS Impact Level	ERS Summary of Impact	ERS Impact Level
Waste Management	Based on the availability of waste disposal pathways for radiological and nonradiological waste; SHINE's proposed waste management systems; engineered design features to minimize radioactive and nonradioactive contamination; and NRC, DOT, and State of Wisconsin radiation protection requirements, the NRC staff concludes that radioactive waste is expected to be managed in accordance with applicable regulatory requirements.	SMALL	New and different information about waste management can be found in FSAR Chapter 11. SHINE still has disposal pathways for waste produced onsite and will follow applicable NRC, DOT, and State of Wisconsin regulations.	SMALL
Transportation	Traffic would noticeably increase on local roads during construction and decommissioning from commuting workers; the use of construction vehicles; and transportation of construction materials, goods, and other materials to and from the proposed sites (Section 4.10). During operations, the increase in traffic would be minor because of the lower number of employees commuting to and from the site. SHINE and common-carrier trucks would be required to adhere to the applicable NRC, DOT, and State of Wisconsin regulatory packaging and transportation requirements for radioactive material.	SMALL to MODERATE	SHINE intends to use either common or contract carriers to ship radioactive waste. SHINE and the carriers will be required to adhere to applicable NRC, DOT, and State of Wisconsin regulatory packaging and transportation requirements for radioactive material. Impacts of operation on traffic volumes are analyzed in the discussion of Socioeconomic Impacts.	SMALL
Accidents	The NRC staff is conducting a thorough independent review of the potential dose to the public from chemical and radiological accidents in its safety evaluation report (SER). Assuming that the NRC staff determines in its SER that the hypothetical accident dose is within the dose limits in 10 CFR § 70.61 and 10 CFR § 20.1301, the NRC staff concludes that the impacts from potential chemical and radiological accidents would be SMALL.	SMALL	New and different information about accidents is provided in FSAR Chapter 13. Hypothetical accidents doses are within the SHINE accident dose limit of 1 rem (10 mSv) to members of the public.	SMALL

Table 6-1 Summary of Environmental Impacts from Operation of the SHINE Production Facility (Sheet 5 of 5)

Resource Area	FEIS Summary of Impact	FEIS Impact Level	ERS Summary of Impact	ERS Impact Level
Environmental Justice	Minority and low-income populations residing along site access roads or near the proposed site could be affected by noise and dust and increased commuter and other vehicular traffic during construction and decommissioning. However, these would be short term and primarily limited to onsite activities. Operation of the proposed SHINE facility is not expected to disproportionately affect minority and low-income populations, as everyone living near the proposed SHINE facility and the existing industrial park would be exposed to the same potential human health and environmental effects from operations, and any impacts would depend on the magnitude of the change in ambient conditions. Permitted nonradiological air emissions are expected to remain within regulatory standards.	Minority and low-income populations would not be expected to experience any high and adverse human health and environmental effects.	The percentage of minority and low-income populations in Janesville have slightly decreased. Operation of the facility is still unlikely to disproportionately affect these populations, as everyone living near the site and the existing industrial park will be exposed to the same potential human health and environmental effects from operations, and any impacts would depend on the magnitude of the change in ambient conditions. Additionally, SHINE's permitted nonradiological air emissions will remain with regulatory standards.	Minority and low-income populations would not be expected to experience any high and adverse human health and environmental effects.

7 References

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