**Enclosure 9 to E-55363**

**ER Changed Pages**

**(Public Version)**

the independent storage of SNF. ISP anticipates the SNF would be stored at the CISF for 60-100 years before a permanent geologic repository is opened consistent with the NRC's Continued Storage Rule.

The CISF will be decommissioned at the end of facility life in accordance with 10 CFR 20, Subpart E.

Below is the anticipated schedule for the construction and operation of the proposed CISF:

- Request restart of review of License Application in May 2018
- Receive license by September 2020
- Construction of Phase 1 of the CISF begins in September 2021
- WCS CISF commences operations in July 2023

## 1.3 APPLICABLE REGULATORY REQUIREMENTS, PERMITS, AND REQUIRED CONSULTATIONS

Construction and operation of the CISF in Andrews County, Texas, would require several environmental permits and related plans by various federal and state regulatory agencies. Pursuant to the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (40 CFR 1500-1508) enabling regulations, consultations with other federal agencies may be required, e.g. U.S. Fish and Wildlife Service (USFWS). Comments and recommendations by any affected or responsible agencies are part of the review process by the NRC. ISP has letters prepared for participating agencies and does not anticipate any administrative delays. *Table 1.3-1 provides a list of Federal, State, Tribal, and local approvals, authorizations, certifications, consultations, and permits required to construct and operate the facility.*

***Table 1.3-1, Federal, State, Tribal, and Local Authorizations Required for the CISF***

| ***ORGANIZATION*** | ***REQUIRED ACTION*** | ***CURRENT STATUS*** |
|---|---|---|
| *U.S. Nuclear Regulatory Commission* | *Materials License SNM-1050 (10 CFR Part 72)* | *Under NRC review* |
| *U.S. Nuclear Regulatory Commission* | *Transportation Package Approval and Certification (10 CFR Part 71). Certificate of Compliance* | *71-9255: Issued*<br>*71-9255: Issued*<br>*71-9302: Issued*<br>*71-9235: Issued*<br>*71-9270: Issued*<br>*71-9356: Issued* |
| *U.S. Fish and Wildlife Service* | *Consultation Required* | *Complete (ER Attach. 3-5)* |
| *Texas Parks and Wild* | *Consultation Required* | *Complete (ER Attach. 3-5)* |



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| ORGANIZATION | REQUIRED ACTION | CURRENT STATUS |
|---|---|---|
| Texas Commission on Environmental Quality (TCEQ) | Texas Pollutant Discharge Elimination System (TPDES) Permit | Application will be submitted one year prior to start of construction |
| TCEQ | Construction General Permit (CGP TXR150000) | Will be submitted 90 days prior to start of construction (Pre-Construction) |
| TCEQ | Stormwater Pollution Prevention Plan (SWPPP) | Will be submitted 90 days prior to start of construction (Pre-Construction) |
| TCEQ | Notice of Intent (NOI) | Will be submitted 90 days prior to start of construction (Pre-Construction) |
| TCEQ | Spill Prevention, Control, and Countermeasures Plan (SPCC) | Will be submitted 90 days prior to start of construction (Pre-Construction) |
| Texas Historical Commission (THC) | Notification Required | Notification has been made and ISP has received a “No Effects” Confirmation Letter from THC (Dated 6/15/2005). |
| New Mexico Department of Cultural Affairs (NMDCA) | Notification Required for 1 mile buffer area around CISF disturbance. | Notification has been made and ISP has received a letter of concurrence from NMDCA |
| U.S. Army Corp of Engineering (USACE) | Notification Required under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. | ISP has received a Determination of Non-Jurisdiction from USACE (Dated 6/24/2019) |
| Tribal Organizations | None | NA |
| Local Law Enforcement Agency: Andrews Texas Police Department | Memorandums of Understanding | Draft Updates of Existing MOU will be executed 90 days prior to start of operations |
| Local Law Enforcement Agency: Andrews County Sheriff’s Office | Memorandums of Understanding | Draft Updates of Existing MOU will be executed 90 days prior to start of operations |
| Local Law Enforcement Agency: Eunice Fire And Rescue | Memorandums of Understanding | Draft Updates of Existing MOU will be executed 90 days prior to start of operations |
| Local Law Enforcement Agency: Eunice NM Police Department | Memorandums of Understanding | Draft Updates of Existing MOU will be executed 90 days prior to start of operations |
| City Of Andrews | Memorandums of Understanding | Draft Updates of Existing MOU will be executed 90 days prior to start of operations |


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- 49 CFR Part 171, General Information, Regulations, and Definitions
- 49 CFR Part 172, *Hazardous Materials Tables, Special Provisions, Hazardous Material Communication, Emergency Response Information, and Training Requirements*
- 49 CFR Part 177, *Carriage by Public Highway*
- 49 CFR Part 107 Subpart G (registration/fee to DOT as a person who offers or transports hazardous materials)

### 1.3.2 State of Texas

At the state level, the environmental permitting of the CISF, which is located on ISP joint venture member Waste Control Specialists property, which will be subject to a long term lease to ISP, is primarily governed by the TCEQ. The following is a summary of environmental permitting activities to be undertaken with TCEQ.

#### 1.3.2.1 Surface Water Protection

In order to protect jurisdictional waters from pollutants that could be conveyed in construction-related storm water runoff, TCEQ enabling regulations require construction projects disturbing five or more acres of soil to secure coverage under a Texas Pollutant Discharge Elimination System (TPDES) permit authorizing construction-related storm water discharges.

The Owner Controlled Area (OCA) at the CISF is approximately 130 ha (320 acres). The CISF would require removal of vegetation in areas both within and outside of the OCA. The majority of construction-related operations at the CISF would be performed inside of the OCA. In order to protect surface water from construction-related storm water runoff for large construction activities which disturb five or more acres, or are part of a larger common plan of development that would disturb five or more acres, the TCEQ regulates the proper disposition of storm water with the Construction General Permit (CGP TXR150000). The construction operator would file and implement a Stormwater Pollution Prevention Plan (SWPPP) and a Notice of Intent (NOI) in accordance with CGP TXR150000.

Soil disturbing activities associated with construction of the CISF inside and outside the OCA include:

- 130 ha (320 acres) for the OCA, including all facility building and storage pads
- *0.6* ha (*1.5* acres) for the rail side track


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- 1.2 ha (3 acres) for construction of the 1.6 km (1 mi) long site access road
- 1.6 ha (4 acres) for a construction lay down area south of the CISF

Thus, approximately *133.4* ha (*330* acres) of soil would be disturbed during construction of the CISF and ancillary facilities on the site.

The NOI would provide general information about the site such as name, location, dates, and other general information relevant to the nature of the construction activities. Provisional coverage under CGP TXR150000 begins seven days after the completed storm water permit application NOI is postmarked for delivery to the TCEQ or immediately if the completed NOI is submitted electronically using the State of Texas Environmental Electronic Reporting System (STEERS). However, prior to filing an NOI, the construction operator must complete development and preparation of the SWPPP for the permitted construction site according to the provisions of this general permit. The SWPPP must include appropriate controls and measures to reduce erosion and discharge of pollutants in stormwater runoff from the construction support activities. The construction operator must also ensure the proper posting at the construction site of the CGP TXR150000 General Permit required “Large Construction Site Notice”.

Implementation of the SWPPP requirements would occur prior to any discharge and continue until permit termination. Within the SWPPP, there would be provisions outlining erosion and sediment controls, soil stabilization practices, structural controls, and other best management practices (BMPs) that would be employed during construction to protect offsite waters from adverse impacts from construction-related activities and mitigate any storm water runoff. The SWPPP would also outline maintenance and inspection requirements and identify BMPs for the effective management of storm water runoff.

The SWPPP would be maintained onsite throughout the construction process and would be updated as appropriate. This document would also be made available for review, upon request, to the TCEQ, NRC, and other authorized individuals.

Once construction has been completed, a separate TPDES permit is not required for the operation of the CISF since facility operations would not result in the discharge of process wastewater. In addition, facility operations are not subject to stormwater permit regulations.

A Spill Prevention, Control, and Countermeasures Plan (SPCC) may need to be developed since all diesel fuel storage tanks at the CISF would be placed above the ground. This fuel tank

#### 1.3.2.3 Preservation of Air Quality

*Construction of the proposed CISF will take place completely within the state of Texas. Permitting requirements taking place in the state of Texas are under the jurisdiction of the Texas Commission on Environmental Quality (TCEQ).* Construction and operations activities at the CISF are not expected to have any measurable impact on the local air quality since no significant criteria or hazardous air pollution emissions would occur. Gaseous criteria pollutant emissions at the CISF are limited to small propane space heating furnaces, a standby emergency diesel generator, a fire pump diesel engine, heavy haul trucks, cask transporters and workers' private vehicles.

Small space heating sources of air pollutants less than one million British Thermal Unit (BTU) per hour heat input are exempt from applicable air quality regulations. The emergency and fire pump diesel engines, which are non-construction stationary sources of air pollutants smaller than 150 kW and not operating more than 250 hours per year, would not trigger any new source review requirements. Moreover, the heavy haul trucks, transporters, and private vehicles are considered mobile sources, which are not regulated by the TCEQ.

*Since the proposed CISF will not directly affect operations or emissions from the areas of the existing Waste Control Specialists facility that are covered under the New Source Rule (NSR) permit or other Permits By Rule (PBR), potential stationary sources at the CISF are likely eligible for a new authorization under PBR per 30 TAC 106.4 without amending the site's existing NSR permit.*

*Permitting requirements typically apply to stationary sources of emissions at a site. Emissions anticipated during construction and operation of the CISF would be from mobile on-road and non-road sources that are not subjected to permitting requirements. Additionally, the buildings and other structures at the site that require electricity will be connected to existing infrastructure and will not rely on electric generating units for standard operating electrical power. It is not anticipated that the emissions from the construction and operation of the CISF will require permitting from the state of Texas.*

Any potential air quality-related impacts associated with construction of the CISF would result from gaseous pollutant emissions from diesel-powered construction equipment and from fugitive dust emissions from excavation activities and construction equipment. However, for a project of this size, steps need to be taken to minimize fugitive dust emissions. Accordingly, a BMP


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Emissions Control Plan would be developed to provide assurance that fugitive dust emissions would be effectively managed and minimized throughout all of the construction phases of the project. This BMP Emission Control Plan would include dust control techniques, such as watering and/or chemical stabilization of potential dust sources. *Dust control will be maintained under the requirements of the Construction General Permit (Table 1.3-1).*

There are no expected airborne effluents of radionuclides from normal operations at the CISF. Accordingly, airborne effluent monitoring should not be required.

Refrigerants used for air conditioning at the CISF would consist of Class II refrigerants (i.e., non-ozone depleting substances). Therefore, permits for Clean Air Act Title VI, Stratospheric Ozone Protection, relative to the usage and storage of refrigerants would not be required.

#### 1.3.2.4 Pollution Prevention and Waste Management

The CISF project is committed to pollution prevention practices and would incorporate all TCEQ pollution prevention goals, as identified in 30 TAC 335. Non-hazardous wastes from construction activities would be disposed of appropriately. During operations, the small quantities of waste generated in the health physics lab and the potentially hazardous materials, such as lead, dye-penetrant materials (i.e., phosphorescent materials), hydraulic fluids, and miscellaneous lubricants used at the CISF, would be appropriately handled and disposed of. The small quantities of hazardous wastes that would be generated are expected to be much less than 100 kg/month. Thus, the CISF would qualify as a Conditionally Exempt Small Quantity Generator (CESQG). All hazardous wastes that are generated would be identified, stored, and disposed of in accordance with state and federal requirements applicable to CESQGs. Since the CISF design does not include Underground Storage Tanks (USTs), no UST registration with TCEQ would be required.

#### 1.3.2.5 Historic and Archeological Resources

Because licensing of the CISF would be a federal action by NRC, Section 106 of the National Historic Preservation Act (NHPA) applies to the project. Coordination with the Texas Historical Commission (THC) and New Mexico State Historic Preservation Office (SHPO) has been completed for the CISF and a buffer area around the anticipated construction area. An archeological survey of the proposed facility was completed and no significant sites were identified within the area surveyed. Should the impacted area change, additional archeological


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largest population center; Midland-Odessa, Texas is located to the southeast, about 103 km (64 mi) from the CISF with a population over 278,000 (Appendix A).

### 2.2.2 Description of the Facility

The CISF would be constructed in eight phases over 20 years on approximately 130 ha (320 acres) of land just north of the CWF and FWF.

The CISF will include SNF storage systems licensed under 10 CFR 72, SNF storage pads, a Cask Handling Building used to offload spent nuclear fuel canisters licensed under 10 CFR 71, a Security And Administration Building, and a railroad side track. More detailed descriptions of the facility components, as well as additional design features, can be found in Section 4.1, *Summary Description, Section 4.2, Storage Structures, Section 4.3, Auxiliary Systems,* Section 1.2, *General Description of Installation,* and Section 1.3, *General Description of Systems and Operations* in the SAR.

#### 2.2.2.1 SNF Storage Systems

Currently, the NRC has licensed and approved SNF storage systems owned by TN Americas, NAC International, HOLTEC International, and Energy*Solutions*. Each of these systems is engineered to safely store spent fuel for 50 years or longer and this time can be extended almost indefinitely through rigorous inspections, aging management programs, maintenance, and re-licensing. SNF is stored horizontally in the TN Americas systems, vertically in both the NAC International or Holtec International systems, and either horizontally or vertically in the Energy*Solutions* system.

Approximately 80% of the SNF (approximately 4,000 MTU) currently stored at 12 decommissioned shutdown sites is in either TN Americas NUHOMS® or NAC International systems. ISP has teamed with TN Americas and NAC International to provide a safe alternative to store up to 40,000 MTUs of SNF at the CISF. Both NUHOMS® and MAGNASTOR® systems owned by TN Americas and NAC International, respectively, would be used for storing SNF at the CISF. The NRC has approved both of these SNF storage systems for use at existing commercial nuclear power plants located across the U.S. Additionally, both the NUHOMS® and MAGNASTOR® systems are licensed by the NRC for storage of SNF transported in canisters pursuant to the requirements in 10 CFR 71.


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### 2.2.2.2 SNF Storage Pads

The SNF storage systems will be placed on a concrete storage pad. The CISF will have a total of eight phases. Each phase will encompass an area 107 m (350 feet) wide and 244 m (800 feet) long. Each phase is sized to hold approximately 5,000 MTU for a total facility capacity of 40,000 MTU when all eight phases are complete. Within each phase there will be a series of concrete storage pads and vehicle approach aprons. The concrete pads will be 46 to 91 cm (18 to 36 in) thick, depending on specific load conditions and design requirements.

Casks received from the different facilities will be stored separately, to accommodate the different types of storage systems, the characteristics of different fuel types received from the facilities, and different storage and inspection requirements.

### 2.2.2.3 Cask Handling Building

The Cask Handling Building is where the SNF canisters will be transferred from rail cars onto transporters at the CISF. The building will be approximately *60* m (*197* feet) wide by *55* m (*179* feet) long and will have a height of approximately *22* m (*72* feet). Rail cars will enter on the *east* side of the building to be unloaded by an overhead 100-metric-ton crane. Once a rail car is unloaded, it will proceed forward and exit out the east side of the building. Adjacent to the rail track inside the building is space for cask staging and transporter loading. Once the transporter is loaded, it can exit the building and proceed to the appropriate storage module. The building will be tall enough to transfer casks for either horizontal or vertical storage modules. Areas are included in the building for radiological surveys of casks and transport vehicles and their cleaning and decontamination (in case contamination is discovered). Also placed in the Cask Handling Building are waste management areas and chemical storage areas for cleaning supplies needed to support these activities. There will be two 100-metric-ton overhead cranes inside the building to provide a redundant crane system for unloading casks. Preventative maintenance is performed on a regular basis on the overhead transfer cranes, transfer equipment, shipping casks, and other equipment in this building. Additional storage is provided for temporary staging of impact limiters and casks, as well as storage for maintenance tools and supplies.

### 2.2.2.4 Security and Administration Building

The Security and Administration building is located along the west edge of the Protected Area. The western exterior wall of the building will be integral with the Protected Area fence. The single story building is divided into two major functions: security and administration. Included inside the security portion will be the surveillance and monitoring stations for the Central Alarm Station (CAS), access control, and the armory. Security personnel will monitor sensors and intrusion alarms, control employee access, process visitors into the CISF, and control rail and vehicle access to the CISF. The Administration portion of the building will contain offices for operations, maintenance, and material control personnel; administrative functions related to processing shipments; emergency equipment and operations; communication and tracking center/facility; training and visitor center; health physics area; records storage; conference room; break room; and restroom facilities. Health physics will have areas in this building for operation and storage equipment and accumulation of small quantities of LLRW in a waste management area. Building dimensions are approximately 10 m (32 feet) wide by *48* m (*156* feet) long of enclosed space. Specific areas of the building which house the CAS and other essential functions will be constructed with ballistic materials. Adjacent to the building will be two outdoor covered areas. The first outdoor area is outside of the Protected Area and provides a covered entrance to the Access Control portion of the building for workers and visitors. The second outdoor covered area is inside the Protected Area and provides shelter for the emergency backup generators for the facility.

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### 2.2.2.5 Railroad Side Track

The CISF would be built adjacent to the existing Waste Control Specialists railroad access loop. The new side track will consist of approximately *6,600* feet of track for SNF deliveries to the CISF. *The railroad side track connects to the existing WCS rail line in Texas. Figure 2.2-6 provides an overall layout and limit of the new side track. The new rail side track will be constructed using conventional methods to meet the standards of 49 CFR Part 213, "Track Safety Standards" and will be maintained and inspected in accordance with Federal Railroad Administration (FRA) Class 1 Standards. Standard maintenance of the rail track over the life of the facility consists of monthly inspections and upkeep. The rail side track will stay in place after decommissioning activities occur.*

#### 2.2.2.6 *Not Used*

#### 2.2.2.7 Monitoring Wells

Located within the CISF OCA are eight monitoring wells associated with the adjacent Waste Control Specialists disposal facilities that are gauged periodically to check for the presence of water. Five of these wells are between the CISF OCA boundary and the CISF Protected Area Boundary and three are within the CISF Protected Area Boundary. Two of the five wells that are within the CISF Protected Area Boundary are within the footprint of a late-phase CISF storage cask array and will be removed or relocated as needed as the phased CISF project construction schedule progresses. There are no pipelines crossing the CISF. At the Security and Administration Building and at the Cask Handling Building, ISP will have underground sewage tank systems that discharge into above ground, grey water holding tanks with no onsite discharge. After testing to ensure compliance with applicable limits, the wastewater from these holding tanks will be drained or pumped for removal to an offsite POTW. There are no plans for underground tanks at the CISF other than the underground sewage tanks.

#### 2.2.2.8 Waste Management

Waste management impacts associated with the construction of and operations at the CISF are expected to be very low. The CISF will be designed to minimize the volumes of radiological waste generated during operations and at the time of license termination. The volumes of non-radiological solid waste will also be minimized to the extent practical. Descriptions of the sources and effluent systems for each of these waste streams are discussed in Section 3.12 of this report. Disposal plans, waste minimization practices, and related environmental impacts are discussed in Section 4.13 of this report and in Chapter 6 of the CISF SAR. Environmental impacts and mitigation measures for CISF facilities and associated operations are discussed in detail in Chapters 4 and 5 of this ER, respectively, whereas radiological monitoring is described in Chapter 6 of this ER. Sections 1.2, *General Description of Installation* and Section 1.3, *General Description of Systems and Operations* of the SAR provide additional details.

## 2.3 PROCESS FOR IDENTIFYING POTENTIAL CISF SITE LOCATIONS

In order to identify potential locations for a CISF site, a rigorous search and screening process was conducted. ISP began by identifying a Region-of-Interest (ROI) consisting of a set of states that have the basic characteristics appropriate for a CISF site. This set of states was then narrowed down to states and counties that had explicitly expressed support for siting a CISF in


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### 2.3.3 Site Selection Process: Factors in the Two-Tiered Screening Process

A two-tiered screening process was developed for evaluating each of the four counties for the purpose of identifying the preferred site location and suitable location alternatives. Under the first screening tier, five "Go: No Go" criteria were evaluated to determine whether any county should be excluded from further consideration. Criteria 1-5 comprised the first tier of the screening process: political support for the project, favorable seismological and geological characteristics, availability of rail access, land parcel size, and land availability. Any county that scored a "No Go" for any of these five criteria would be excluded from further consideration.

After completing the first tier of evaluations, a second tier screening process was used to evaluate each of the four counties in more detail. *Criteria 1-5 as previously discussed were quantitatively scored for each of the four counties.* Criteria 6 through 10 assessed Operational Needs and Criteria 11 through 15 assessed Environmental Considerations. For the second tier screening process, a score of 0 to 100 was assigned to multiple scoring factors for each criterion.

Descriptions of all criteria are provided below.

Criterion 1 assessed whether a county has adequate political support for a CISF, specifically whether the state and county governments had expressed an interest in siting a CISF.

Criterion 2 assessed the seismology and geology of the area to ensure that potential sites within each of the four counties were located in areas that were tectonically stable with favorable geologic characteristics.

Criterion 3 assessed the availability of rail access, which was determined to be important given the desire to transport SNF exclusively by rail. A county that could not support receipt of SNF exclusively by rail would require double handling of the SNF and additional adverse environmental impacts due to construction of the rail spur. The need to construct a spur less than 8 km (5 mi) long to connect to the rail line was considered a "Go". Requiring transport by road or constructing a spur more than 8 km (5 mi) to a rail line was considered "acceptable", but was not considered a substantial enough constraint to exclude the county from further consideration.


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CRITERION 8—OPERATIONAL LABOR FORCE

Operations labor force considerations for the Andrews County CISF operator would be virtually identical to those at a southeastern New Mexico CISF. Most CISF operations workers for the site in Andrews County will need to be degreed, technical, and highly trained workers hired from outside of the ROI or hired away from one of the nuclear–related facilities in the region for initial CISF operations. For long term hiring, major universities and other post-secondary schools are located in Midland-Odessa and Lubbock, while a local junior college in Hobbs is available to assist with training and qualification of workers. Given that the Andrews County site is in west Texas, where workers have not joined unions, the labor environment is favorable to multi-tasking of employees.

The Andrews County CISF operator has a staff of experienced radiation workers, radiation protection technicians, and health physicists it has established to create a stable organization of permanent resident employees. Additionally, ISP joint venture member Waste Control Specialists has worked many years to inculcate and mature a nuclear safety culture in operations, maintenance, technical support, and waste management personnel that will be highly advantageous during and at the start of CISF operations at the Andrews County CISF.

CRITERION 9—TRANSPORT ROUTES

A dedicated Waste Control Specialists–controlled rail loop encircles the Waste Control Specialists waste management facilities. The proposed CISF is to be built north of and adjacent to the existing Waste Control Specialists railroad access loop. ISP will have access to this rail loop for CISF purposes. A new side track will extend *northeast* to run east and west on the CISF Pad through the Cask Handling Building to provide for optimal and safe rail delivery of spent fuel and associated materials.

Texas State Highway 176, approximately 2 km (1.25 mi) south of the Andrews County site, provides for efficient movement of operations and construction traffic. Approximately 6 km (4 mi) to the west on Texas State Highway 176 is divided New Mexico Highway 18 in New Mexico; Interstate 20 is another 105 km (65 mi) south from there. Approximately 55 km (32 mi) to the east on Texas State Highway 176 is divided U.S. Highway 385; Interstate 20 at Odessa, Texas is another 68 km (42 mi) south from there.

### 2.3.8 Site Selection Process: Summary of Scores

Four possible locations to construct and operate a CISF were explored. One of these locations, the Waste Control Specialists property in Andrews County, Texas, ultimately became the Proposed Action, as described in Section 2.2 of this ER. The remaining three locations were not carried forward for detailed analysis based on their scores for the screening criteria.

The four locations were first evaluated using the first tier of five “Go: No Go” screening criteria. All four counties received “Go” or “Acceptable” ratings for all five criteria (Table 2.3-1). Therefore, all four locations were advanced to the second tier of screening.

**Table 2.3-1 First Tier Go: No Go Screening Criteria**

| | **FIRST PHASE SCREENING MATRIX** | | | | |
|---|---|---|---|---|---|
| Location | Criterion 1 Political Support | Criterion 2 Seismology/ Geology | Criterion 3 Rail Access | Criterion 4 Land Parcel Size | Criterion 5 Land Availability |
| Andrews County, TX | Go | Go | Go | Go | Go |
| Loving County, TX | Go | Go | Acceptable | Go | Acceptable |
| Lea County, NM | Go | Go | Go | Go | Go |
| Eddy County, NM | Go | Go | Go | Go | Go |

Results of the second tier of screening, which evaluated *quantitatively the site selection criteria, which are the same as the Go: No Go criteria, as well as* the operational considerations and environmental impacts at each location, are shown in Tables *2.3-1a, 2.3-2, and 2.3-4*.


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***Table 2.3-1a Second Phase Screening Matrix: Site Selection Scoring Summary***

| Site Selection Criteria* | Weight % | Sub-Criteria | Andrews County | Loving County | Lea County | Eddy County |
|---|---|---|---|---|---|---|
| Criterion 1 - Political Support | 100 | Advocates | 10 | 5 | 7 | 7 |
| | 100 | Incentives | 10 | 10 | 10 | 10 |
| | 80 | Cooperation in Permitting | 10 | 10 | 10 | 10 |
| Criterion 2 - Favorable Seismological and Geological Characteristics | 100 | Peak Ground | 10 | 10 | 10 | 10 |
| | 80 | Liquefaction Potential | 8 | 8 | 8 | 8 |
| | 100 | Acceptable Weight Bearing | 8 | 8 | 8 | 8 |
| | 50 | Differential Settling | 8 | 8 | 8 | 8 |
| | 30 | Surveys Available | 10 | 1 | 7 | 7 |
| | 80 | Away from Population Centers Exceeding 50,000 | 10 | 10 | 10 | 10 |
| | 100 | Away from Flood Plains | 10 | 10 | 10 | 10 |
| | 100 | Away from Aquifers | 10 | 10 | 10 | 10 |
| | 80 | Away from Rivers | 10 | 10 | 10 | 10 |
| | 80 | Away from Lakes | 10 | 10 | 10 | 10 |
| Criterion 3 - Rail Access | 100 | Proximity to Existing Rail Lines | 10 | 1 | 8 | 7 |
| | 100 | Existing Rail Spur | 10 | 1 | 6 | 6 |
| Criterion 4 - Land Parcel Size | 100 | Future Expansion | 10 | 10 | 10 | 10 |
| | 100 | Buffer Zone | 10 | 10 | 10 | 10 |
| | 80 | Plant Layout | 10 | 10 | 10 | 10 |
| Criterion 5 - Land Availability | 80 | Available and No Purchase Required | 10 | 1 | 10 | 5 |
| | | **Score** | **157.4** | **124.5** | **147.5** | **142.5** |
| *Total weight for site selection criteria is 100 | | | | | | |



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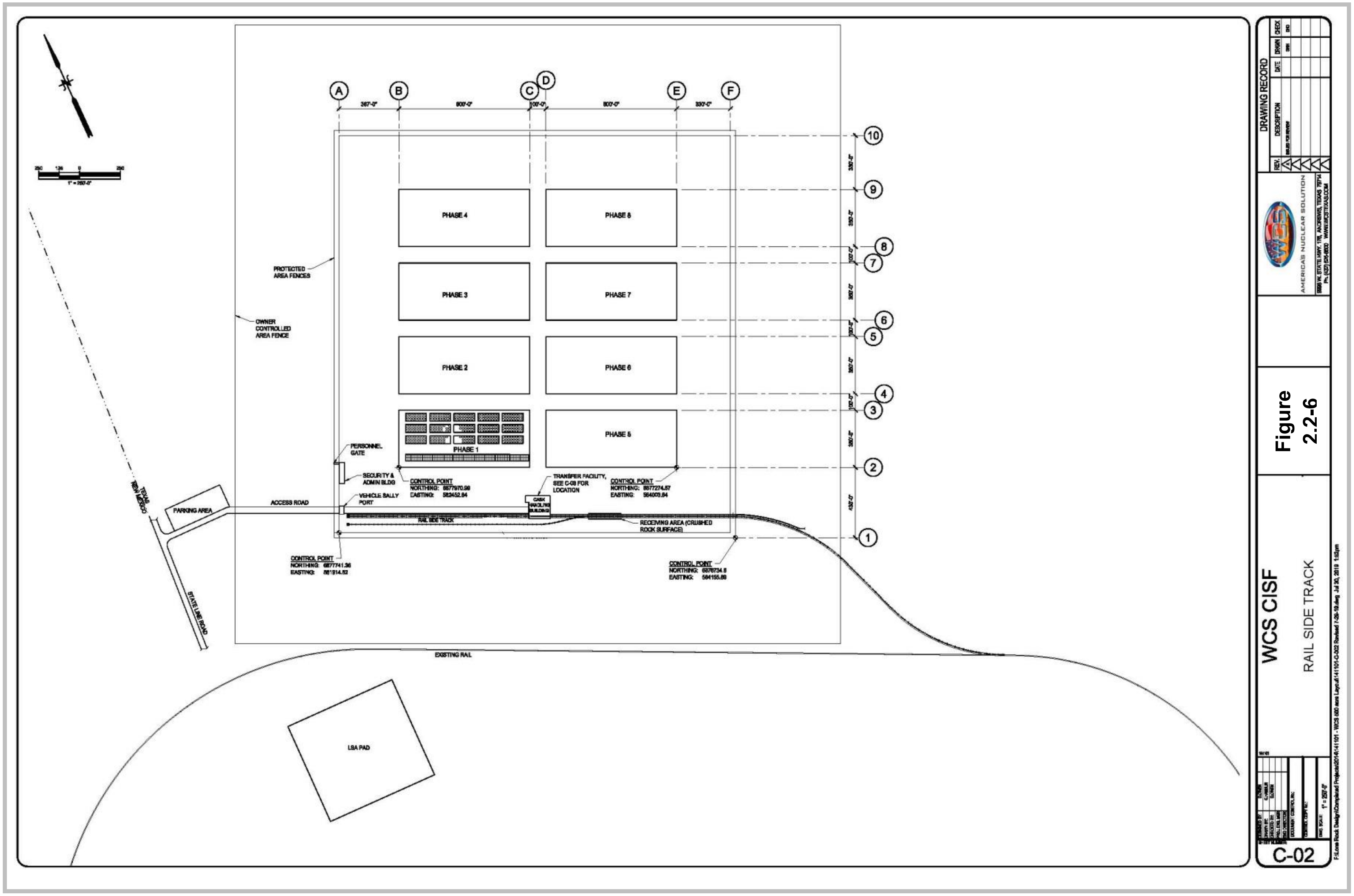




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# CHAPTER 3

# DESCRIPTION OF THE AFFECTED ENVIRONMENT

## 3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter provides information and data for the affected environment at the proposed CISF and surrounding vicinity. Topics include land use (3.1), transportation (3.2), geology and soils (3.3), water resources (3.4), ecological resources (3.5), meteorology, climatology, and air quality (3.6), noise (3.7), historic and cultural resources (3.8), visual and scenic resources (3.9), socioeconomics (3.10), environmental justice (3.11), public and occupational health (3.12), and waste management (3.13).

## 3.1 LAND USE

This section describes land uses near the proposed CISF. It also provides a discussion of off-site areas and the regional setting and includes a map of major land use areas. Major transportation corridors are identified in Section 3.2.

ISP joint venture member Waste Control Specialists controls approximately 5,666 ha (14,000 acres) of land in northwestern Andrews County. Within this property boundary, Waste Control Specialists currently operates a commercial waste management facility on approximately 541 ha (1,338 acres) of land (the existing facility). The CISF would be located north of and adjacent to the existing facility, approximately 300 m (984 ft) from the north edge of the rail loop as seen in Figure 3.1-1. The approximate coordinates for the centroid of Phase I of the CISF facility are Latitude 32° 27’ 08” N and Longitude 103° 03’ 35” W with an elevation of 1,043.587 m (3,423.843 ft) above mean sea level (msl). The portion of the Waste Control Specialists land on which the WCS CISF would be constructed and operated would be controlled by ISP through a long term lease from ISP joint venture member Waste Control Specialists.

The proposed CISF would be a *133.4 ha (330 acre) facility* situated within Andrews County, north of Texas State Highway 176, about 0.6 km (0.37 mi) from the Texas/New Mexico state line (Figure 3.1-1). It is located north of Waste Control Specialists’ existing radioactive waste storage, processing, and disposal facilities and is surrounded by Waste Control Specialists’ controlled property. The proposed CISF is currently unfenced, except for a gravel-covered road and a railroad spur that borders the south side of the property, and it is undeveloped.


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The CISF would be located near the boundary between the Southern High Plains Section (Llano Estacado) of the Great Plains Province to the east and the Pecos Plains Section to the west. The boundary between the two sections is the Mescalero Escarpment, locally referred to as Mescalero Ridge. This part of Andrews County is a gently southeastward sloping plain with a natural slope of about 2.4 to 3 m (8 to 10 ft) per mi as seen on the topographic map in figure 3.1-2. The Elliott Littman oil field is to the northwest, the Freund and Nelson oil fields are to the south, the Paddock South and Drinkard oil fields are to the southwest, and the Fullerton oil field is to the east. *Figures 3.1-5, 3.1-6, and 3.1-7 show oil and gas wells within a 10 km radius of the proposed CISF. Figure 3.1-8 shows existing oil and gas leases within a 10 km radius of the proposed CISF.* On-site soils are primarily of the undulating Blakeney and Conger soil association (76%), the Triomas and Wicket soil association (8%), the Ratliff soil association (14%), and the Jalmar-Penwell association (2%). These soils consist of well drained, fine sandy loam and fine sand underlain by gravelly loam and cemented material. On-site soils are common to areas used for rangeland and wildlife habitat; see section 3.5, Ecological Resources in this ER for more information.

RAI LU-2

The ISP joint venture member Waste Control Specialists controlled property contains several permitted and licensed facilities. Waste Control Specialists has two approved RCRA permits from the TCEQ and a TSCA authorization from the EPA. Waste Control Specialists also possesses Radioactive Material Licenses (RML) for the management and disposal of Low-Level Radioactive Wastes (LLRW) and uranium Byproduct Material License, respectively.

Land uses within a few miles of the CISF include agriculture, cattle ranching, drilling for and production from oil and gas wells, quarrying operations, uranium enrichment, municipal waste disposal, and the surface recovery and land farming of oil field wastes. *The United States Geological Survey (USGS) National Land Cover Database has data from 2016 that provides land uses in the project area. Table 3.1-1 below shows the land use types that appear within an 8 km (5 mile) radius of the project site, along with estimated acreages by land cover type. Table 3.1-2 shows the land use types that appear within the Study Area (these totals are a subset of the information shown in Table 3.1-1).*

RAI LU-1

*According to Table 3.1-1, approximately 97 percent of the land cover in the five-mile radius (more than 58.7k acres) is Shrub/Scrub. Developed, Open Space constitutes 1.5 percent of the land cover (902 acres) and all other land use categories that occur in this radius comprise less than one percent of the land cover.*

*In the Study Area, Table 3.1-2 shows that more than 99 percent of the land cover (322 acres) is Shrub/Scrub with just over one acre (0.4 percent) of barren land (rock/sand/clay).*

***Table 3.1-1, Land Cover within Five-Mile Buffer***

| Land Cover Gridcode (Legend) | Land Cover - Class | Acres | % of Total |
|---|---|---|---|
| 11 | Open Water | 73.8 | 0.1% |
| 21 | Developed, Open Space | 902.0 | 1.5% |
| 22 | Developed, Low Intensity | 229.2 | 0.4% |
| 23 | Developed, Medium Intensity | 128.1 | 0.2% |
| 24 | Developed, High Intensity | 49.8 | 0.1% |
| 31 | Barren Land (Rock/Sand/Clay) | 300.0 | 0.5% |
| 52 | Shrub/Scrub | 58,714.8 | 97.0% |
| 71 | Grassland/Herbaceous | 99.8 | 0.2% |
| 82 | Cultivated Crops | 17.8 | 0.0% |
| 90 | Woody Wetlands | 7.3 | 0.0% |
| | Total | 60,522.7 | 100.0% |

***Table 3.1-2, Land Cover within Five-Mile Buffer***

| Land Cover Gridcode (Legend) | Land Cover - Class | Acres | % of Total |
|---|---|---|---|
| 31 | Barren Land (Rock/Sand/Clay) | 1.2 | 0.4% |
| 52 | Shrub/Scrub | 321.8 | 99.6% |
| | Total | 323.0 | 100.0% |

*The attached Figure 3.1-4 depicts where these various land use types occur. The land cover that is Developed, Open Space occurs west of the study area near Eunice, New Mexico. Construction of the proposed facility would primarily convert Shrub/Scrub land to developed land uses.*

The Permian Basin Materials sand and gravel quarry and a large spoil pile are located west of the proposed CISF. Approximately 1.6 km (1 mi) west and adjacent to the quarry is the Sundance Services oil recovery and solids disposal facility. DD Landfarm, a non-hazardous oilfield waste disposal facility that closed in August 2013 and is undergoing decommissioning and post-closure monitoring, is located approximately 4 km (2.5 mi) west of the proposed CISF. Vacant land situated immediately to the north and east supports oil and gas production. Cattle are not allowed to graze on land controlled by Waste Control Specialists; however, cattle grazing on other nearby properties occur throughout the year. Approximately 2.5 km (1.6 mi) southwest of the proposed CISF, in Lea County, New Mexico, is the URENCO NEF. This plant enriches natural uranium by centrifuge for the commercial nuclear power industry. The Lea County Sanitary Waste Landfill is located approximately 3 km (1.8 mi) south/southwest of the proposed CISF, across New Mexico Highway 176, just across the Texas-New Mexico state line. Land further north, south and west has been mostly developed by the oil and gas industry. *Table 3.1-3 provides information on the depth and thickness of oil and gas producing geologic formations within a 10 km (6 mi) radius of the proposed CISF.* Land further east is ranchland.


All Indicated Changes are in response to RAI GS-4

***Table 3.1-3, Oil and gas production intervals within a 10 km radius of the proposed CISF.***

Although various crops are grown within Andrews County, Texas and Lea County, New Mexico, local and county officials report there is no agricultural activity in the vicinity of the proposed CISF, except for domestic livestock ranching. The principal livestock for both Andrews and Lea counties is cattle. Milk cows comprise a substantial portion of the cattle in Lea County; however, the nearest dairy farms are about 32 km (20 mi) northwest of the proposed CISF, near the city of Hobbs, New Mexico. There are no milk cows in Andrews County, Texas. The number of farms and acres of farmland decreased slightly within Lea County between 1992 and 1997, whereas the number of farms in Andrews County increased during this same timeframe.

## 3.2 TRANSPORTATION

Transportation services to the CISF would include the delivery of equipment, supplies, and staff, including contractors needed to work and provide miscellaneous maintenance activities at the CISF. The mode of transportation for these types of services would be by road. The transportation of solid and radioactive waste generated at the CISF would also be by road, respectively, to the Lea County Municipal Landfill or to one of Waste Control Specialists existing licensed disposal facilities (i.e., the Federal Waste Disposal Facility or the RCRA Landfill).

The DOE or the SNF Title Holder(s) would be responsible for transporting spent nuclear fuel (SNF) from existing commercial nuclear power reactors to the CISF. SNF would be transported to the CISF by rail. Approximately *3,400* canisters are expected to be transported *to the WCS CISF.* SNF would be shipped in transportation packages licensed pursuant to 10 CFR Part 71 and in compliance with requirements established by the U.S. Department of Transportation (DOT). Spent fuel received at the CISF would be stored until such time that a geologic repository for its disposal is constructed and operable as required under the Nuclear Waste Policy Act of 1982.

### 3.2.1 Connected Environmental Impacts Associated with SNF Transport from Shutdown Decommissioned Reactors

The DOE or the SNF Title Holder(s) are is also responsible for the transportation of SNF from the shutdown and decommissioned reactors across the country. Studies have been performed by the DOE to determine the level of work that would be needed to improve the infrastructure that would be required to remove SNF currently in storage at 12 shutdown and decommissioned reactors for transport to an ISFSI or a geologic repository. The evaluated shutdown sites include: Maine Yankee, Yankee Rowe, Connecticut Yankee, Humboldt Bay, Big Rock Point, Rancho Seco, Trojan, La Crosse, Zion, Crystal River, Kewaunee, and San Onofre (DOE, 2013a). The locations of the shutdown decommissioned reactor sites are depicted in Figure 3.2-1.

These sites have no operating nuclear power reactors. NRC has received notification that their reactors have permanently ceased power operations and that nuclear fuel has been permanently removed from their reactor vessels. Shutdown reactors at sites also having operating reactors are not included in this evaluation.

Not all of the shutdown reactor sites have rail access to transport SNF to an interim storage facility or geologic repository. Such sites would either require upgrades to provide rail access or transport by heavy haul truck to an intermodal rail transfer facility. Because of the size and weight of the licensed shipping casks, shipment by rail is the practical cross-country transportation option for SNF to be delivered to an ISFSI or a geologic repository. Transport by heavy haul trucks to an intermodal rail transfer facility could occur at a shutdown and decommissioned reactor site that does not have rail access. In that case, a heavy-haul transfer truck typically traveling at speeds between 16 to *40* km/hr (10 to *25* mph) could be used to move SNF relatively short distances to a rail transfer facility as discussed in NUREG-1714 (NRC, 2001). Moreover, SNF could also be transported by barge to another rail transfer facility where the SNF would subsequently be transported by rail to the CISF.

The environmental impacts to the affected areas would be attributable to radiation doses received by members of the public along the transportation routes. Over the next several years, the DOE is expected to commission new transportation systems needed to transport SNF from existing commercial reactor sites, including the shutdown reactor sites, to a CISF or geologic repository. Other environmental impacts would be attributable to upgrades that would be required to the railroad lines leading from the former reactor sites to a CISF or geologic repository. The connected environmental impacts potentially associated with the transportation of SNF and upgrades required to support the removal of SNF from the shutdown and decommissioned reactor sites are discussed in Section 4.2.

### 3.2.2 Transportation Corridor

The transportation corridor for delivery of equipment and supplies, as well as for workers and contractor hired to provide services at the CISF within the region-of-interest are primarily Texas State Highway 176 in Andrews County, Texas and New Mexico State Highways 18 and 8 in Lea County, New Mexico.

SNF would be transported from existing commercial nuclear power facilities across the U.S. using rail lines operated primarily by the Union Pacific Railroad to Monahans, Texas (Figure 3.2-2). SNF would subsequently be transported by rail from Monahans, Texas, approximately 169 km (105 mi) north through Eunice, New Mexico to the CISF. The transportation of SNF from Monahans, Texas to the CISF would be on existing rail owned and operated by the TNMR. The transportation corridor represents the rail operated by the TNMR from Monahans, Texas to the CISF (Figure 3.2-3).

The TNMR recently upgraded the rail lines (Class 1) to accommodate heavier loads expected to be transported to Waste Control Specialists. The TNMR rail lines are sufficient to transport SNF to the proposed CISF.

### 3.2.3 Rail Spur to the Proposed CISF

ISP joint venture member Waste Control Specialists operates a rail track from Eunice, New Mexico that encircles its facilities in Andrews County, Texas. SNF would be transported along the transportation corridor from Monahans, Texas to Eunice, New Mexico. Waste Control Specialists would transport the SNF along its rail track via a locomotive to the Transfer Facility at the CISF.

ISP would construct a rail sidetrack, approximately *2* km (*1.25* mi) in length, from the existing rail spur leading into the *Cask Handling Building* at the CISF (Figure 3.2-4).

SNF would be receipt inspected prior to acceptance at the CISF. After acceptance, the dual-purpose canisters would be offloaded in compliance with requirements specified in the license.

## 3.3 GEOLOGY AND SOILS

This section identifies the geological, seismological, and geotechnical characteristics of the CISF and its vicinity.

Some areas immediately adjacent to the proposed CISF have been thoroughly studied in recent years in preparation for construction of other facilities such as the Waste Control Specialists byproduct material (11e2) disposal unit, the Texas Compact LLRW disposal unit, the FWF unit, the radioactive waste storage and processing facility, the NEF in New Mexico, the International Isotopes, Inc. uranium hexafluoride de-conversion facility in New Mexico, and the former Atomic Vapor Laser Isotope Separation (AVLIS) site in New Mexico. Data are available from these investigations in the form of various reports (NEF, 2005) (DOE, 2013a). These documents and related materials provide a substantial database and description of geological conditions for the CISF.


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quarry (formerly Wallach Concrete) west of the CISF site and is also replenished by well water. In addition, Sundance Services, LLC operates the Parabo Disposal Facility for oil and gas waste west of the site. Water collects periodically in excavated and/or diked areas at this disposal facility and in the active quarry areas at this property adjacent to and west of the ISP joint venture member Waste Control Specialists property in New Mexico. *ER Figure 3.4-1 illustrates the USFSW classification of wetlands on the WCS facility and at neighboring facilities in New Mexico. The majority of the mapped features are classified as palustrine, seasonally or temporarily flooded over a few days to a few weeks. The palustrine classification system includes all nontidal wetlands dominated by trees, woody scrub shrubs, persistent emergent, and mosses or lichens. The palustrine features on the WCS facility are natural playas or localized impounded catchments. All of the palustrine features on the quarry of Permian Basin Materials and commercial recycling facilities in New Mexico are classified as seasonally flooded man-made excavations.*

*Average annual precipitation is approximately 15.3 inches (SAR Table 2-3). Precipitation is typical of a semi-arid climate with high intensity, short duration rainfall events generally during the months of July, August, and September, when precipitation is generally highest (SAR Table 2-3). When precipitation rates exceed infiltration capacity there is occasional ponding in the small, closed-drainage playas, which are typically a few acres or less in size. Ponded water depth in the playas is between a few inches and a few feet, with the water evaporating and infiltrating normally within a few days or weeks. The playas are typically dry throughout the year. A somewhat larger playa basin of about 30 acres occurs east of the Waste Control Specialists property approximately 3.5 miles to the east of the CISF (SAR Attachment B Flood Plain Report Figure 1.1-1 identified as a Depression Pond). Water depth in this larger playa basin, mapped as intermittent water by the USGS on the Jumbo Hill Quadrangle, is generally less than a few inches, and it is often dry throughout the year (USGS, 1971).*

*There is no permanent surface water in the vicinity. A sample of intermittently ponded surface water from the catchment at Baker Spring, west of the CISF in New Mexico, indicated a total dissolved solids content of 96 mg/L, pH of 7.46, total alkalinity (as CaCO3) of 77.6 mg/L and biochemical oxygen demand of 3.7 mg/L (WCS, 2007).*

The nearest surface water drainage feature to the CISF is Monument Draw in Lea County, New Mexico, a reasonably well-defined, southward-draining draw about 5 km (3 mi) west of the CISF. The draw does not have through-going drainage and loses surface expression after it


All Indicated Changes are in response to RAI WR-2

Local topographic features outside the permitted area include Baker Spring to the west, small depressions or solution pans between Baker Spring and the permitted area, and a spring about 4.8 km (3 mi) to the east on the western side of the playa or salt lake basin discussed above*, which is identified on USGS topographic maps as Scratch Spring (USGS Jumbo Hill Quadrangle, 2019). Brune (1981) states the spring was dry in 1923 when the then-current landowner arrrived*.

Baker Spring is located in Lea County, New Mexico, about 0.58 km (0.36 mi) west of the Waste Control Specialists permitted area. Two minor unnamed surface draws empty into the Baker Spring depression. Baker Spring is *not an aquifer-sourced spring, hence the name is somewhat of a misnomer. It is an area where surface runoff is impounded in a shallow excavation in the red bed clays, a remnant of a former quarry at the base of a caprock erosional bench.*

In this part of west Texas, the Cenozoic Alluvium aquifer is considered a major aquifer and the Triassic Dockum Group aquifer is considered a minor aquifer (Mace, 2001).

### 3.4.3 Floods

The CISF would not be located in the 100-year floodplain. Attachment B of the SAR Chapter 2, presents the Flood Plain Study for the CISF and Figure II.F.4 in Appendix 2.4.1 in that report identifies the 100-year floodplain at the location of the proposed CISF. The 100-year floodplain extends across the southern portion of the Waste Control Specialists property area along the ranch house drainage. The northernmost limit of the 100-year floodplain is approximately 1,219 m (4,000 ft) southeast of the CISF site while the northernmost limits of the 500-year and PMP floodplains are 1,209 m and 1,187 m (3,965 ft and 3895 ft) southeast of the CISF site respectively.

### 3.4.4 Flood History

The climate of the area is classified as semiarid, characterized by dry summers and mild, dry winters. Annual precipitation on average is approximately 14 inches and annual evaporation exceeds annual precipitation by nearly five times. The area is subject to occasional winter storms, which produce snowfall events of short duration.

Rainfall records from July 2009 through December 2015, provided by Waste Control Specialists from a weather station near the CISF site, indicate an average annual rainfall of 12.6 inches and

### 3.4.13 Environmental Acceptance of Effluents

There are no radioactive or other effluent releases associated with the proposed CISF facility. Stormwater runoff is not expected to contain any radiological effluents and facility stormwater runoff would be directed to the natural drainage system. Domestic wastes would be directed to above ground tanks on-site and the tanks would be periodically drained and all wastes would be transported offsite for disposal.

### 3.4.14 Subsurface Hydrology

The High Plains Aquifer of west Texas, the principal aquifer in west Texas, consists of water-bearing units within the Tertiary Ogallala Formation and underlying Cretaceous rocks (Nativ, R. and G.N. Gutierrez, 1988). In terms of hydrogeology, the High Plains aquifer is viewed as a single, hydraulically connected aquifer system, and groundwater exists under both unconfined and confined conditions. The term Ogallala aquifer is used interchangeably with the High Plains aquifer since, regionally, the Ogallala Formation is the primary component of the High Plains aquifer (Dutton, A.R., and W.W. Simpkins, 1986). Regionally the sands, gravels and sandstones that have been variously ascribed to the Tertiary Ogallalla Formations, the Tertiary aged sections of the Gatuña Formation, and the Cretaceous Antlers Formation are distinct and independent. Locally, these units are situated in the same stratigraphic interval and hydrogeologically they represent a single hydrostratigraphic unit overlying the Triassic red beds, the distinctive red and purple mudstones, siltstones, and sandstones of the Triassic Dockum Group. The hydrostratigraphic unit of undifferentiated sands and sandstones of the Ogallala/Antlers/Gatuña is locally referred to as the OAG unit. However, the Ogallala and Cretaceous aquifers are evaluated independently in the literature and would be addressed individually in the discussion below. In this part of west Texas, the Cenozoic Alluvium aquifer is considered a major aquifer and the Triassic Dockum Group aquifer is considered a minor aquifer; both will be addressed below (Mace, 2001).

The shallowest water bearing zone *at the neighboring Waste Control Specialist facility is located in a siltstone/sandstone lense at a depth of approximately 225 feet below ground surface.* Figure 3.4-2 is a groundwater contour map indicating the OAG unit is largely unsaturated beneath the WCS CISF. The nearest downgradient drinking water well identified in the hydrogeologic unit is located approximately 6.5 miles to the east of the proposed CISF at a residence on the Letter B Ranch. The method of storage (dry cask), the nature of the storage

#### 3.4.14.3 Triassic Dockum Group Aquifer

*There are no borings into the sandstone/siltstone lenses of the Dockum Group within the CISF footprint.*

The Dockum Group regionally consists of Triassic fluvial and lacustrine clays, shales, siltstones, sandstones, and conglomerates. The Dockum Group consists of five formations, the lowermost of which is the Santa Rosa Formation, followed by the Tecovas, the Trujillo, the Cooper Canyon, and the Redonda Formations. Only the Santa Rosa, Tecovas, Trujillo, and Cooper Canyon Formations are present in the vicinity of the proposed CISF. Water from the Dockum Group aquifer is used as a replacement for, or in combination with, the Ogallala aquifer as a regional source for irrigation, stock, and municipal water (Dutton, A.R., and W.W. Simpkins, 1986). There are two water-bearing sandstone formations in the Dockum Group in the vicinity of the proposed CISF. Both yield non-potable water with less than 5,000 mg/L total dissolved solids. The Santa Rosa Formation sandstone at the base of the Dockum Group is about 76 m (250 ft) thick and is considered the best aquifer within the Dockum Group (Bradley, R.G., and S. Kalaswad, 2003). The top of the Santa Rosa Formation sandstone is at 347 m (1,140 ft) below ground surface at the proposed CISF.

The Trujillo Formation sandstone, the other Dockum Group water-bearing formation in the area, is about 30.5 m (100 ft) thick. The top of the Trujillo Formation is about 183 m (600 ft) below ground surface. Approximately 137 m (450 ft) of very low permeability Dockum Group fluvial and lacustrine clays separate the two formations. The lower Dockum Group aquifer is recharged by precipitation where Dockum Group sediments are exposed at land surface (Bradley, R.G., and S. Kalaswad, 2003). However, most of the recharge to the sandstones in the lower Dockum Group (comprising the Santa Rosa and Trujillo Formation sandstones) is considered to have occurred during the Pleistocene some 15,000 to 35,000 years before present (Dutton, 1995) (Dutton, A.R., and W.W. Simpkins, 1986). Topographically controlled groundwater basin divides were developed during the Pleistocene by the erosion of the Pecos and Canadian River valleys. Prior to the development of these groundwater basin divides, the lower Dockum aquifer was recharged by precipitation on its outcrop area in eastern New Mexico. However, since the development of the Pecos and Canadian River valleys, the lower Dockum aquifer in Texas has been cut-off from its recharge area. Without recharge, the lower Dockum aquifer experiences a net loss of groundwater from withdrawal by wells and by seepage (Dutton, A.R., and W.W. Simpkins, 1986). The regional hydraulic gradient of the lower Dockum aquifer is toward the for the 69 m (225 ft) zone groundwater, as well as distinct separation of the shallower OAG unit from the 69 m (225 ft) zone. If groundwater from the shallow, unconfined OAG unit were readily reaching the 69 m (225 ft) zone, then it would be expected that the general water chemistry between the two zones would be similar. (TCEQ, 2015a).

## 3.5 ECOLOGICAL RESOURCES

This section describes the terrestrial and aquatic communities of the proposed CISF. This section is intended to provide a baseline characterization of the ecology at the CISF prior to any disturbances associated with construction or operation of the CISF. The impacts on ecology at the CISF from prior environmental disturbances (e.g., roads and existing radiological facilities) not associated with the proposed CISF are considered when describing the baseline condition. The plant and animal species associated with this major community are identified and their distributions are discussed. Those species that are considered important to the ecology at the CISF are described in detail. To the extent possible, these descriptions include discussions of the species' habitat requirements, life history, and population dynamics. Also, as part of the evaluation of important species at the CISF, pre-existing environmental conditions that may have impacted the ecological integrity of the CISF and affected important species are considered. Unless otherwise indicated, the information provided in this section is based on surveys conducted by ISP joint venture member Waste Control Specialists.

### 3.5.1 Prior Ecological Studies at the CISF

A complete ecological assessment of the proposed CISF area and adjoining areas was initially conducted in 1996-97 in conjunction with the proposed development of a LLRW processing and storage facility. That assessment was updated in 2003-04 and supplemented in 2006-07 to support further development of Waste Control Specialists existing treatment and radioactive waste disposal facilities to include additional facilities related to disposal of LLRW and uranium byproduct material. *Cox-Mclain Environmental Consulting completed the "Interim Storage Partners (ISP), Waste Control Specialists (WCS): Ecological Resources Report" in 2018 and 2019 and this report can be found in Attachment 3-6 of the ER.*

### 3.5.2 General Ecological Conditions of the CISF

Natural habitats in the study area, defined as the area within a 5 km (3.1 mi) radius of the proposed CISF, are mostly shrub land with grassy patches, which are typical of the larger surrounding region. Species observed in these areas are also typical of the region. Two species of concern, the Texas horned lizard (*Phyrnosoma cornutum*) and *dunes sagebrush lizard* (*Sceloporus arenicolus)*, occur within the area. The former is widespread in Texas and is considered threatened because of over-collecting, incidental loss, and habitat disturbance. The latter has a specialized habitat that occurs throughout much of the region of the proposed CISF. It is a *Species of Greatest Conservation Need* due to the loss of habitat, primarily due to spraying to remove shinnery oak (*Quercus havardii)* to improve grazing.

### 3.5.3 Description of Important Plant and Wildlife Species

#### 3.5.3.1 Vegetation

*The survey area is located within the Havard Shin-Oak-Mesquite Brush Vegetation Type of Texas (TPWD 2003). During field investigations, three distinct vegetation types were observed within the survey area. Identification of the vegetation types was based on species composition, canopy cover, and morphology. The Mesquite Thorn-Scrub observed vegetation type is mostly located within the central and southern extents of the survey area. ). Approximately 230.5 acres of this vegetation type would be impacted by the proposed project.*

*This vegetation type provides potentially suitable habitat for an array of migratory bird species as well as the state-listed Texas horned lizard. Animal species observed within this vegetation type during the October 2018 and/or April 2019 site visits included, but are not limited to: black-tailed jackrabbit, eastern cottontail, mule deer, javelina, robber fly, red harvester ant (and mounds), six-lined racerunner, and various bird species and inactive nests. The Havard Oak Dunes observed vegetation type is mostly located within the northern extent of the survey area. Approximately 76.0 acres of this vegetation type would be impacted by the proposed project. This vegetation type provides potentially suitable habitat for an array of migratory bird species, dunes sagebrush lizard (Species of Greatest Conservation Need (SGCN)), and lesser prairie-chicken (SGCN). Animal species observed within this vegetation type during the October 2018 and/or April 2019 site visits included, but are not limited to western box turtle, queen butterfly, and various bird species and inactive bird nests. The Maintained Grassland observed vegetation type is mostly located within the central extent of the survey area along the maintained roadway and graded area. Approximately 17.8 acres of this vegetation type would be impacted by the proposed project.*

*This vegetation type provides potentially suitable habitat for an array of migratory bird species as well as the state-listed Texas horned lizard. Animal species observed within this vegetation type during the October 2018 and/or April 2019 site visits included, but are not limited to eastern cottontail, various bird species, and inactive bird nests.*

*See ER Attachment 3-5, Section 5.0 for information on vegetative species.*

All areas suffer from some level of human-induced disturbance. *The survey area primarily consists of vacant, undeveloped land. Surrounding land use is also primarily undeveloped land with heavy industrial sites in the vicinity of the survey area. The vegetative species observed are addressed in Section 5.0.*

**3.5.3.2 Wildlife**

The mourning dove is the most abundant and widespread bird species observed. *Other bird species include Grasshopper Sparrow, Red-tailed Hawk, Swainson's Hawk, Lark Bunting, Cactus Wren, Northern Cardinal, Pyrrhuloxia, Hermit Thrush, Lark Sparrow, Norther Harrier, Northern Bobwhite, American Crow, Ladder-backed Woodpecker, Kark-eyed Junco, Loggerhead Shrike, Lincoln's Sparrow, Song Sparrow, Northern Mockingbird, Ash-throated Flycatcher, Vesper Sparrow, Great-tailed Grackle, Ruby-crowned Kinglet, Yellow-rumped Warbler, Dickcissel, Chipping Sparrow, Field Sparrow, Western Meadowlark, Curve-billed Thrasher, Scissor-tailed Flycatcher, Western Kingbird, Barn Owl, and White-crowned Sparrow.*

*Scientific names are included in Section 6.0 of the Ecological Resources Report.*

The only mammals observed or positively identified in the study area from sign were black-tailed jackrabbit (*Lepus californicus*) *and mule deer.* Previous surveys have identified a variety of rodents [e.g., Ord's kangaroo rat (*Dipodomys ordii*), silky pocket mouse (*Perognathus flavus*), deer mouse (*Peromyscus maniculatus*), northern grasshopper mouse (*Onchomys leucogaster*), southern plains woodrat (*Neotoma micropus*), and plains harvest mouse (*Reithrodontomys montanus*)] (Ortega, Bryant, Petit, & Rylander, 1997). Collared peccaries (*Tayasu tajacu*) have been observed east of the CISF. Rodent tracks are abundant, particularly in sandy areas.

No evidence of amphibians has been found at the *playas* located north and south of the CISF.

Reptiles observed in the study area include *the six-lined racerunner and Western box turtle (CMEC, 2019).*

Common invertebrate species have been observed at various locations *including the Robber fly, Queen butterfly, dung beetle, red harvester ant, and darkling beetle*. Grasshoppers are abundant, and most CISF harbor one or more ant species. Flies and mosquitoes are also common.

#### 3.5.3.3 Birds

Birds were surveyed through observation and by call at the proposed CISF and its vicinity to document species, potential breeding species, seasonal migrants, and winter residents. A barn owl (*Tyto alba*) was observed at Baker Spring during the March 2004 survey. A recently dead specimen was found in the same area during the June 2006 surveys. The species is common in all four southwestern deserts. Barn owls hunt for rodents along desert washes, where trees are present. Suitable habitat exists at Baker Spring and southeast of the CISF. No washes or trees are present in areas of proposed CISF development. *Bird species observed in 2018 and 2019 are in Section 3.5.3.2.*

All bird species encountered on and near the proposed CISF are consistent with the range information provided in *the "Ecological Assessment of the Low Level Waste Depository, Andrews County, TX" by the Ecology Group in Appendix 2.9.1 of the Waste Control Specialists License Application for the LLRW (WCS, 2007)* and references cited therein and with other records from the vicinity near the CISF. It is likely many of the summer resident species breed and raise their young on or in the vicinity of the CISF.

*The US Fish & Wildlife Service (FWS) listed the lesser prairie chicken as "threatened" in 2014. However, the FWS de-listed the species in July 2016, to comply with a court order. The FWS currently is conducting a more detailed review of the status of the species, and lists the species as "under review."* Historically, a Waste Control Specialists ranch manager reported seeing a female lesser prairie chicken (*Tympanuchus pallidicinctus*) near the CISF (Ortega, Bryant, Petit, & Rylander, 1997) but the sighting was never verified. Although the CISF is outside the known range of the species, areas of suitable habitat (e.g., shinnery oak) are present within a 5 km (3.1 mi) radius of the CISF. No active leks or prairie chickens have been detected during the 2004 Lyons surveys (Lyons, 2004). Surveys were conducted by a researcher who was familiar with standard techniques used to census this species in New Mexico and Texas.

New Mexico's Department of Game and Fish completed a lesser prairie chicken survey in 2000, examining the northern portion of Lea County, along with portions of Chavis, Roosevelt, and De

Baca counties (Massey & Dunn, 2000). The New Mexico report did not include the area adjacent to the CISF; however, more recent surveys for the lesser prairie chicken conducted in September 2003 and April 2004 in support of the licensing of the nearby NEF indicated the species does not occur on land of the proposed CISF. No visual sightings or aural detections were made and the researchers concluded there is little potential habitat in the survey area.

*A LPC survey was conducted in Andrews County in 2004 that yielded negative results (Lyons 2004). Despite the negative results of the survey in 2004, a presence/absence survey for the LPC was conducted by CMEC within the survey area during the April 2019 field investigations after observing potentially suitable habitat in October 2018 in the Havard Oak Dunes vegetation type (approximately 76 acres) within the northern extent of the survey area (see Figure 6 of Attachment 3-6). The survey was conducted by Ryan Blankenship (who has completed WAFWA technical service provider (TSP) training in 2016) in accordance with the Western Association of Fish and Wildlife Agencies' LPC Survey Protocol for Project Clearance (Updated February 2016).*

*The survey was conducted over three days during the April 2019 site visit to verify the presence/absence of this species. Surveys were conducted in the morning hours, lasted approximately 1.5 hours, and consisted of utilizing seven fixed-point listening stations which were placed within the survey area and within a one-mile vicinity of the survey area (see Figure 8 of Attachment 3-6). This diurnal survey time is optimal for observing LPC that may occur within or adjacent to the survey area. The survey was conducted during the LPC survey timeframe outlined in the Western Association of Fish and Wildlife Agencies' LPC Survey Protocol for Project Clearance (Updated February 2016) survey protocol. Observers listened for audible calls and visually surveyed suitable habitat within a 5-minute time period at each fixed-point listening station each day. Attachment C of Attachment 3-6 includes the dates and times for each survey event and atmospheric conditions (temperature, wind speed, and cloud cover).*

*Although potentially suitable habitat for the LPC is located within the survey area, the April 2019 presence/absence survey did not locate any individuals of these species within the survey area. There are no recorded TXNDD Elements of Occurrence within 1.5 miles of the study area (see Figure 7 of Attachment 3-6). It is believed that the habitat located within the survey area is not occupied by these species at this time. A summary of the Lesser Prairie-Chicken survey effort is included in Table 5 of Attachment 3-6 and Attachment C of Attachment 3-6. The results of* *this survey effort are consistent with a statewide survey conducted in 2000 and a survey conducted within and adjacent to the survey area in 2004 (NMDGF 2000, Lyons 2004).*

The USFWS currently lists the lesser prairie chicken as *a "de-listed"* species. Recent decline in population numbers of the lesser prairie chicken, a species that prefers shinnery oak habitat, has shifted concern on public lands towards protection of this habitat.

#### 3.5.3.4 Aquatic

Aquatic ecological studies have not been conducted in the area because there are no permanent—and only occasionally ephemeral—sources of surface water available on or in the vicinity of the proposed CISF. These are insufficient to support aquatic species.

*United States Army Corps of Engineers (USACE) has confirmed that no waters of the United States (including wetlands) are present within the survey area (see ER Attachment 3-3).*

The TCEQ has confirmed that wetlands are not located in the vicinity of the proposed CISF. Pools of water are intermittently present in the vicinity of the Baker Spring outcrop, located approximately 0.58 km (0.36 mi) west of the proposed CISF. These pools may support amphibians [such as spadefoot toads (*Scaphiopus multiplicatus*) and the Texas toad (*Bufo speciosus*),)] and invertebrates adapted to take advantage of such locations.

### 3.5.4 Rare, Threatened, and Endangered Species Known or Potentially Occurring in the Project Area

*Lists of rare, threatened, and endangered species maintained by the USFWS and TPWD were consulted to determine species of potential occurrence in the vicinity of the survey area. In all, 41 federally listed endangered, threatened, candidate species, or state-listed endangered, threatened species, or SGCNs were identified as having the potential to occur in Andrews County, TX. For more details, see Attachment 3-6, Section 6.0 of the ER.*

### 3.5.5 Major Vegetation Characteristics

The general vegetation community type at the proposed CISF is classified as Plains-Mesa Sand Scrub (Dick-Peddie, 1993) characterized by the presence of significant amounts of the indicator species shinnery oak, a low growing shrub. The community is further characterized by the presence of forbs, shrubs, and grasses that are adapted to the deep sand environment that occurs in parts of western Andrews County, Texas. *See Attachment 3-6, Section 5.0 of the ER for more information on vegetation.*

### 3.5.6 Habitat Importance

*Attachment 3-6, Section 6.2, Table 3 provides a complete list of the threatened, endangered, and other important species and whether the land around the proposed CISF provided suitable habitat for those species.*

### 3.5.7 Location of Important Travel Corridors

None of the important wildlife species identified at the proposed CISF are migratory in this part of their range; therefore, these species do not have established migratory travel corridors. However, three of the species, mule deer, lesser prairie chicken, and scaled quail, are highly mobile and utilize a network of diffuse travel corridors linking base habitat requirements (i.e., food, water, cover, etc.). These travel corridors may change from season to season as well as from year to year for each species and can occur anywhere within the species' home range.

Mule deer and scaled quail utilize and often thrive in altered habitats and can and do live in close proximity to humans and human activities. For these two species, any travel corridors that would potentially be blocked by the proposed CISF would easily and quickly be replaced by an existing or new travel corridor linking base habitat requirements for these two species.

*Field investigations conducted in October 2018 confirmed the potentially suitable habitat for the lesser-prairie chicken, although none were seen. See Attachment 3-6, Section 3.3 for more information.*

The sand dune lizard is not a highly mobile species and is confined to small home ranges within the active sand dune-shinnery oak habitat type. Travel corridors are not important features of the lizard habitat. A field survey confirmed that the sand dune lizard is not present at the proposed CISF.


All Indicated Changes are in response to RAI ECO-1

The black-tailed prairie dog is not highly mobile. Considering that prairie dogs dig extensive, deep, and permanent burrows (i.e., they do not migrate) and are not dependent on free water, travel corridors are not important features of the prairie dog habitat. A field survey found no evidence of black-tailed prairie dogs at the proposed CISF.

### 3.5.8 Important Ecological Systems

The proposed CISF contains fair to poor quality wildlife habitat. The Plains-Mesa Sand Scrub vegetative community has been impacted by past land use practices. The proposed CISF has previously been grazed by domestic livestock for over a hundred years, has a Texas state highway along the southern boundary, a rail line spur right-of-way borders the southern perimeter of the CISF, and a gravel access road runs north to south along the south and east perimeter of the CISF. The degraded habitat generally lacks adequate cover and water for large animal species, and annual grazing by domestic livestock impacts ground nesting bird species.

Based on recent field studies and the published literature, there are no onsite important ecological systems that are especially vulnerable to change or that contain important species habitats such as breeding areas, nursery, feeding, resting, and wintering areas, or other areas of seasonally high concentrations of individuals of important species. The species selected as important for the CISF are all highly mobile species, with the exception of the sand dune lizard and the black-tailed prairie dog, and are not confined to the CISF or dependent on habitats at the CISF. The Plains-Mesa Sand Scrub vegetation type covers hundreds of thousands of acres in western Andrews County Texas and is not unique to the proposed CISF.

Critical habitat for the lesser prairie chicken occurs in New Mexico northwest of the CISF. Field surveys for the lesser prairie chicken conducted in September 2003 and April 2004 *and October 2018 and April 2019* indicated the species does not occur on the proposed CISF.

Although the CISF does contain sand dune/shinnery oak communities, which could be potential sand dune lizard habitat, field surveys conducted in October 2003 and June 2004 *and October 2018 and April 2019* revealed that the sand dune lizards are not present on the CISF.

The high density of shrubs on the proposed CISF is not optimal prairie dog habitat. No prairie dogs were found onsite during the September 2003 *and October 2018 and April 2019 surveys.*


All Indicated Changes are in response to RAI ECO-1

have probably increased. No other environmental stresses on the terrestrial wildlife community (e.g., disease, chemical pollutants) have been documented at the proposed CISF.

### 3.5.15 Description of Ecological Succession

Long-term ecological studies of the proposed CISF are not available for analysis of ecological succession at this specific location. The property is located in a *Havard Shin-Oak Mesquite Brush* vegetation community, which is a climax community that has been established in western Andrews County for an extended period. The majority of the subject property is a mid-successional stage, primarily due to historic grazing of domestic livestock and climactic conditions.

Development of the proposed CISF would be limited to an access road for a neighboring property and faded two-track roads along the perimeter of the property; the two-track roads are probably used for fence maintenance. These areas contain some colonizing plants that are common to disturbed ground. An example of a disturbed ground colonizing species in western Andrews County is broom snakeweed (*Gutierrezia sarothrae*). The proposed CISF has been grazed for an unknown period of time, although regional grazing by domestic livestock has occurred for 150 years. Evidence of past grazing was also apparent from reduced amounts of standing vegetation. Moderately high densities of honey mesquite (*Prosopis glandulosa*) seedlings were observed during the vegetation survey. Reduced grass canopy from historic and contemporary livestock grazing may be contributing to the colonization of honey mesquite due to reduced competition. Honey mesquite is considered noxious on rangeland because of its ability to compete for soil moisture and its reproductive ability.

### 3.5.16 Description of Ecological Studies

*Cox-McLain Environmental Consulting completed an Ecological Resources Report for the proposed CISF (Attachment 3-6). ISP partner WCS completed several ecological assessments for licensing activities starting in 1997. The reports included in the WCS License application for the LLRW Appendix 2.9.1 (WCS, 2007) are listed below:*

1. *"Habitat Characterization and Rare Species Survey for the Proposed Low Level Waste Repository, Andrews County, TX;" Doug Reagan and associates (2004).*

2. *"Supplemental Survey to Ecological Assessment of the Low Level Waste Depository, Andrews County, Texas;" URS (2007).*

3. *"Ecological Assessment of the Low Level Waste Depository, Andrews County, TX;" Ecology Group (1997).*

4. *"Survey for the Active Lesser Prairie-Chicken Leks: Spring 2000;" New Mexico Department of Game and Fish (2000).*

5. *"Survey of Lesser Prairie Chickens at the Low Level Waste Depository, Andrews County, TX;" Eddie K. Lyons (2004).*

*These additional ecological studies have been performed for the area adjacent to the proposed CISF:*

1. *"Status and Habitat of the Sand Dune Lizard at National Enrichment Facility Project;" GL Environmental, Inc.; ADAMS Accession Number ML040850611 (2003).*

2. *"The Habitat and Geographic Range of the Sand Dune Lizard in Lea County, New Mexico in the vicinity of Section 32, Township 21S, Range 38E;" GL Environmental, Inc.; ADAMS Accession Number ML042170040 (2004).*

3. *"Environmental Assessment Report Prepared for Application for Renewal of Radioactive Material License R04971 Waste Control Specialists LLC Andrews County, Texas;" Waste Control Specialists (2008).*

### 3.5.17 Information on Rare, Threatened, and Endangered Species Sightings

No rare, threatened, or endangered species have been observed in the vicinity of the proposed CISF.

### 3.5.18 Agency Consultation

Consultation was initiated with all appropriate federal and state agencies and affected Native American Tribes. Consultation Documents are presented in Attachment 3-3 *and Attachment 3-6*.


All Indicated Changes are in response to RAI ECO-1

**Table 3.6-6, Average Morning and Afternoon Mixing Heights for Midland-Odessa, Texas**

| | Winter | Spring | Summer | Fall | Annual |
|---|---|---|---|---|---|
| Morning | 290 meters (951 feet) | 429 meters (1,407 feet) | 606 meters (1,988 feet) | 419 meters (1,375 feet) | 436 meters (1,430 feet) |
| Afternoon | 1,276 meters (4,186 feet) | 2,449 meters (8,035 feet) | 2,744 meters (9,003 feet) | 1,887 meters (6,191 feet) | 2,089 meters (6,854 feet) |

Source: (Holzworth, 1972)

### 3.6.9 Diffusion Estimates

*This section is reproduced from WCS CSIF SAR Section A.11.3.4, "Atmospheric Dispersion Coefficients."*

For normal and off-normal conditions, an atmospheric dispersion coefficient is calculated using D-stability and a wind speed of 5 m/sec and a 100 m (328 ft) distance to the controlled area boundary. The controlled area boundary is more than 100 m (328 ft) from the WCS CISF, so use of 100 m (328 ft) is conservative. For accident conditions, a dispersion coefficient is calculated using F-stability and a wind speed of 1 m/sec. These atmospheric conditions are consistent with the guidance of NUREG-1536 and NUREG-1567. The smallest vertical plane cross-sectional area of one horizontal storage module (HSM) is conservatively used as the vertical plane cross-sectional area of the building: area = HSM Width * HSM Height = 9 ft 8 in x 15 in = 20,880 in$^2$ = 13.47 m$^2$.

The atmospheric dispersion coefficients can be determined through selective use of Equations 1, 2, and 3 of Regulatory Guide 1.145 for ground-level relative concentrations at the plume centerline. For D-stability, 5 m/sec wind speed and a distance of 100 m (328 ft), the horizontal dispersion coefficient, $\sigma_y$, is 8 m per Figure 1 of (NRC, 1982). The vertical dispersion coefficient, $\sigma_z$, is 4.6 m per Figure 2 of (NRC, 1982). The correction factor at these conditions is determined to be 1.122 per Figure 3 of (NRC, 1982).

For F-stability, 1 m/sec wind speed and a distance of 100 m, the horizontal dispersion coefficient, $\sigma_y$, is 4 m per Figure 1 of (NRC, 1982). The vertical dispersion coefficient, $\sigma_z$, is 2.3


All Indicated Changes are in response to RAI AQ-6

m per Figure 2 of (NRC, 1982). The correction factor at these conditions is 4 per Figure 3 of (NRC, 1982).

With the three values of $\chi$/Q determined, the higher $\chi$/Q value of the first two (Equation 1 and Equation 2) is compared with the last one (Equation 3) and the lower of those two is evaluated as the appropriate atmospheric dispersion coefficient per in Regulatory Guide 1.145 (NRC, 1982).

The parameters used and the calculated atmospheric dispersion coefficients are summarized in Table 3.6-7.

**Table 3.6-7, Atmospheric Dispersion Coefficients**

| Parameter | Normal/Off-Normal | Accident |
|---|---|---|
| Stability | D | F |
| $\overline{U_{10}}$ (m/sec) | 5 | 1 |
| A ($m^2$) | 13.47 | 13.47 |
| $\sigma_y$ (m) | 8 | 4 |
| $\sigma_z$ (m) | 4.6 | 2.3 |
| M | 1.122 | 4 |
| Equation 1 of [3] (sec/$m^3$) | 1.635E-03 | 2.806E-02 |
| Equation 2 of [3] (sec/$m^3$) | 5.766E-04 | 1.153E-02 |
| Equation 3 of [3] (sec/$m^3$) | 1.542E-03 | 8.650E-03 |
| $\chi$/Q (sec/$m^3$) | 1.542E-03 | 8.650E-03 |

### 3.6.10 Air Quality

To assess air quality, the EPA has established maximum concentrations for pollutants that are referred to as the National Ambient Air Quality Standards (http://www3.epa.gov/ttn/naaqs/criteria).

***Table 3.6-8, 2014 Baseline Emissions and Lifetime Projections***

| | $CO$ [1] | $NO_X$ [1] | $PM_{10}$ [1] | $PM_{2.5}$ [1] | $SO_2$ [1] | VOC [2] | HAP [2] |
|---|---|---|---|---|---|---|---|
| **2014 Andrews County Baseline** | 13,145 | 9,184 | 996 | 310 | 1,968 | 54,638 | 1,136 |
| **2014 Statewide Baseline** | 4,625,519 | 1,334,750 | 1,305,098 | 315,644 | 461,118 | 6,772,080 | 170,090 |
| **5-Year Incremental Increase** | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 17.66% | 2.40% |

***Andrews County Emissions Increase Estimates (tpy)***

| | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | HAP |
|---|---|---|---|---|---|---|---|
| **2019 Estimate** | 13,802 | 9,643 | 1,046 | 326 | 2,066 | 64,290 | 1,163 |
| **2024 Estimate** | 14,492 | 10,125 | 1,098 | 342 | 2,169 | 75,646 | 1,191 |
| **2029 Estimate** | 15,217 | 10,631 | 1,153 | 359 | 2,278 | 89,008 | 1,219 |
| **2034 Estimate** | 15,978 | 11,163 | 1,211 | 377 | 2,392 | 104,730 | 1,249 |
| **2039 Estimate** | 16,776 | 11,721 | 1,271 | 396 | 2,511 | 123,229 | 1,278 |
| **2044 Estimate** | 17,615 | 12,307 | 1,335 | 416 | 2,637 | 144,996 | 1,309 |
| **2049 Estimate** | 18,496 | 12,922 | 1,402 | 437 | 2,769 | 170,609 | 1,341 |
| **2054 Estimate** | 19,421 | 13,568 | 1,472 | 459 | 2,907 | 200,745 | 1,373 |
| **2059 Estimate** | 20,392 | 14,247 | 1,545 | 482 | 3,053 | 236,204 | 1,406 |



All Indicated Changes are in response to RAI AQ-3

***Statewide Emissions Increase Estimates (tpy)***

| | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | HAP |
|---|---|---|---|---|---|---|---|
| ***2019 Estimate*** | *4,856,795* | *1,401,488* | *1,370,353* | *331,426* | *484,174* | *7,968,296* | *174,172* |
| ***2024 Estimate*** | *5,099,634* | *1,471,562* | *1,438,871* | *347,998* | *508,383* | *9,375,811* | *178,353* |
| ***2029 Estimate*** | *5,354,616* | *1,545,141* | *1,510,814* | *365,398* | *533,802* | *11,031,949* | *182,634* |
| ***2034 Estimate*** | *5,622,347* | *1,622,398* | *1,586,355* | *383,667* | *560,492* | *12,980,626* | *187,017* |
| ***2039 Estimate*** | *5,903,464* | *1,703,517* | *1,665,672* | *402,851* | *588,517* | *15,273,516* | *191,506* |
| ***2044 Estimate*** | *6,198,637* | *1,788,693* | *1,748,956* | *422,993* | *617,943* | *17,971,421* | *196,103* |
| ***2049 Estimate*** | *6,508,569* | *1,878,128* | *1,836,404* | *444,143* | *648,840* | *21,145,882* | *200,810* |
| ***2054 Estimate*** | *6,833,998* | *1,972,034* | *1,928,224* | *466,350* | *681,282* | *24,881,078* | *205,630* |
| ***2059 Estimate*** | *7,175,698* | *2,070,636* | *2,024,635* | *489,668* | *715,346* | *29,276,057* | *210,565* |

*CO = Carbon Monoxide; $NO_X$ = Nitrogen Oxides; $PM_{10}$ = Particulate Matter less than 10 microns; $PM_{2.5}$ = Particulate Matter less than 10 microns; $SO_2$ = Sulfur Dioxide; VOC = Volatile Organics Compound; HAP = Hazardous Air Pollutant.*

*NOTES:*

1. *Historical trends for these pollutants have shown decreases in the evaluated dataset from 2002-2014. As a conservative estimation to account for industrial and population growth, assuming control technology remains constant, a 1% increase per year has been assumed.*
2. *Based on historical trends for these pollutants in the evaluated dataset from 2002-2014.*



All Indicated Changes are in response to RAI AQ-3

*See ER Section 4.6 for more information.*

## 3.7 NOISE

Noise is defined as "unwanted sound." At high levels noise can damage hearing, because sleep deprivation, interfere with communication, and disrupt concentration. In the context of protecting the public health and welfare, noise implies adverse effects on people and the environment. The sound we hear is the result of a source inducing vibration in the air, creating sound waves. These waves radiate in all directions from the source and may be reflected and scattered or, like other wave actions, may turn corners. Sound waves are a fluctuation in the normal atmospheric pressure, which is measurable. This sound pressure level is the instantaneous difference between the actual pressure produced by a sound wave and the average, or barometric, pressure at a given point in space. This provides us with the fundamental method of measuring sound, which is in "decibel" (dB) units.

The dB scale is a logarithmic scale because the range of sound intensities is so great that it is convenient to compress the scale to encompass all the sound pressure levels that need to be measured. The sound pressure level is defined as 20 times the logarithm, to the base 10, of the ratio of the pressure of the sound measured to the reference pressure, which is 20 μPa (0.0002 dyne/$cm^2$). In equation form, sound pressure level in units of dB is expressed as:

$$dB = 20 \text{ Log10 } P/P_r$$

Where: P = measured sound pressure level μPa (dynes/$cm^2$)

$P_r$ = reference sound pressure level 20 μPa (0.0002 dyne/$cm^2$)

Due to its logarithmic scale, if a noise increases by 10 dB, it sounds as if the noise level has doubled. If a noise increases by 3 dB, the increase is just barely perceptible to humans. Additionally, as a rule-of-thumb the sound pressure level from an outdoor noise source radiates out from the source, decreasing 6 dB per doubling of distance. Thus, a noise that is measured at 80 dB 15 m (50 ft) away from the source would be 74 dB at 30.5 m (100 ft), 68dB at 61 m (200 ft), and 62 dB at 122 m (400 ft). However, natural and man-made obstructions such as trees, buildings, land contours, etc. would often reduce the sound level further due to dissipation

Because the nighttime noise levels are significantly lower than the daytime noise levels, the daytime $L_{eq}$ is used alone, without averaging the lower nighttime value, to provide a more conservative representation of the actual exposure.

Measurements were made at the nearby NEF in New Mexico in September 2003 during the development of that facility. The results of those measurements showed higher noise levels resulting from vehicle traffic near New Mexico Highway 234, which is an extension of Texas State Highway 176, particularly heavy-duty tractor-trailer trucks. Other noise sources were low-flying aircraft operating out of the Eunice Airport and sudden high wind gusts. Average background noise levels ranged from 40.1 to 50.4 dBA. These noise levels are considered moderate, and are below the average range of speech, which ranges from 48 to 72 dBA (HUD, 1985).

*ISP performed an acoustical analysis of the background sound levels in July of 2019 (Nelson Acoustics, 2019) in areas surrounding the proposed ISP CISF. Measurements were taken at and around the existing WCS facility and in and around the city of Eunice, NM. Roadway traffic is the primary noise contributor at all locations monitored.*

*In general it is found that the Noise Sensitive Areas (NSA) in Eunice, NM which are nearest to the proposed CISF are also very near to highways NM 176 and NM 18 as well as the Gas Plant located on the south side of the city. These Eunice NSA measurements possess elevated background levels above $L_{dn}$ 55. At the current northeast corner of Eunice, NM, sound levels are more moderate. The EPA's 1974 recommendation for residential communities is $L_{dn}$ 55. Sounds originating at the CISF are unlikely to be audible in Eunice and are not expected to exceed the EPA's recommended guideline.*

*NSAs along the western WCS property line are in the 30s and 40s $L_{dn}$. Construction is likely to be generally audible at these locations. Operations at the CISF are expected to be only audible from time to time. The EPA's 1974 recommendation for industrial sites, as well as for "Farm Land and General Unpopulated Land" is $L_{dn}$ 70. Sounds originating at the CISF are not expected to exceed the EPA's recommended guideline.*

### 3.7.2 Community Distribution

The area immediately surrounding the proposed CISF is unpopulated and used primarily for disposal of various waste products, for mining, and for intermittent cattle grazing. The nearest

(RTHL), properties or districts listed on the National Register of Historic Places (NRHP), State Antiquities Landmarks (SALs), cemeteries, or other cultural resources that may have been previously recorded. No such resources were identified within the APE for direct effects. The nearest previously identified resource is the OSHM for Andrews County, located approximately 27 km (17 mi) southeast of the project area.

According to a search of the New Mexico Cultural Resources Information System (NMCRIS), there are no previously-identified non-archeological historic resources located within the APE for direct or indirect impacts. The closest historic resource in New Mexico is “HCPI 37299” (building at 703 Ruth Circle, Eunice, Lea County), located approximately 7.2 km (4.5 mi) from the CISF.

### 3.8.2 Historical and Cultural Resource Analysis

In May 2015, a pedestrian archeological survey was completed in order to inventory and evaluate any archeological resources on private land within the footprint of the proposed spent nuclear fuel the CISF at the existing Waste Control Specialists waste disposal facility in western Andrews County, Texas *(Attachment 3-4)*. Because the project includes a host agreement with Andrews County, a political subdivision of the State of Texas, the project is considered subject to the Antiquities Code of Texas. The project would also be subject to Section 106 of the NHPA, as amended, due to oversight and licensing by the NRC.

Chris Dayton, PhD in Archeology and a Registered Professional Archeologist and Steven Schooler, MA in Anthropology/Archeology of CMEC carried out the survey on behalf of the County and Waste Control Specialists under Texas Antiquities Permit 7277.

### 3.8.3 Previous Investigations and Previously Identified Archeological Resources

*Neighboring facility Waste Control Specialists completed a "Cultural Resource Survey of A Proposed Waste Facility Andrews County, Texas" in 1994. The 1994 survey and associated letters from the Texas Historical Commission are located in Attachment 3-5.*

A data search of the Texas Archeological Sites Atlas maintained by the THC and the Texas Archeological Research Laboratory (TARL) was conducted in order to identify any previously recorded cemeteries, historical markers, NRHP properties or districts, SALs, archeological sites, and previous surveys in the archeological APE, which consisted of the footprint of the proposed


All Indicated Changes are in response to RAI CHR-2 transmission substation, a county landfill, a uranium enrichment plant, and an aboveground oilfield waste disposal land farm.

Adjacent to the CISF to the west in New Mexico is a large uranium enrichment plant called the NEF, operated by URENCO. This facility was developed and constructed since the last visual resources inventory was conducted. This facility is the most substantial new structure on the visual landscape. The relationship of the CISF to other WCS operations and URENCO is shown in Figure C-1 in Appendix A. Photo locations are shown in Appendix A, Figure C-2 along with an 8 km (5 mi) radius and a 16 km (10 mi) radius around the CISF. The proposed CISF activities would take place beyond the existing railroad spur on the Waste Control Specialists property, farthest from Texas State Highway 176 compared to other current activities at the CISF.

It was determined that the visual resources study area does not contain notable representations of any of the landscape features listed above, although the relative lack of visual obstructions to a vast view of this section of the west Texas/east New Mexico landscape could be considered the "visual character" of the area. With the exception of a roadside picnic area and historical marker, no recreational resources are identified in the immediate area of the site. Overall, the entire study area can be considered to have modest scenic quality that is pleasant to regard for its rural, undeveloped nature, but not dramatic, unique, or rare. Facilities geared towards resources extraction (the Lea County Landfill and oil well pump jacks) exist in the project area, in addition to the URENCO facility, all of which have an equal or higher impact on the visual landscape compared to the proposed CISF.

## 3.10 SOCIOECONOMICS

This section describes the current social and economic characteristics of the ROI surrounding the CISF *and describes ISP public outreach efforts to inform the communities and affected populations within the region of the proposed CISF about the storage and transportation of spent nuclear fuel*. Information is provided on population, including minority and low-income areas, economic trends, housing, and community services in the areas of education, health, public safety, and transportation.

The primary labor markets for the operation of the processing and storage facility will be Andrews County, Texas, and Lea County, New Mexico. The Andrews County seat is located in the City of Andrews, about 48 km (30 mi) east-southeast of the CISF. There are no population


All Indicated Changes are in response to RAI NP-1 local economy, in addition to a growing manufacturing sector. Five libraries, nine financial institutions, and two daily newspapers serve Lea County. Cities in Lea County that are within the ROI include Hobbs, Eunice, and Jal. In Lea County, there are five public school districts and four private schools. The closest school district is in Eunice, located 9.7 km (6 mi) to the west, with the other districts located in Hobbs, Jal, Lovington, and Tatum. The main campus of the University of the Southwest (USW) and New Mexico Junior College (NMJC) are located in and near Hobbs, New Mexico. NMJC's Training and Outreach Facility provides workforce training, online courses, and a center for legal studies.

There are two hospitals in Lea County, New Mexico. The Lea Regional Medical Center is located in Hobbs, New Mexico, about 32 km (20 mi) north of the CISF. In Lovington, New Mexico, 63 km (39 mi) north-northwest of the CISF, Covenant Medical Systems manages Nor-Lea Hospital, a 25-bed Medicare-certified Critical Access Hospital serving southeastern New Mexico.

Andrews County had a tax base (total certified net taxable value) in 2014 of over $7.2 billion dollars, a general fund tax rate of 0.2936 per $100, and a road and bridge tax rate of 0.0477 per $100 (Andrews County Appraisal District 2015). The county tax levy in 2014 for all funds amounted to almost $21,177,205. Total tax rates (per $100) in 2014 for jurisdictions within Andrews County Appraisal District include: Andrews Independent School District – a combined rate of $1.17000; City of Andrews - $0.18900; Andrews County - $0.2936; and, Andrews Hospital District - $0.29612 (CMEC, 2015).

*Finally, ISP has and continues to have strong community outreach to inform communities and affected populations within the region of the proposed CISF about the storage and transportation of spent nuclear fuel. ISP joint venture member Waste Control Specialists hosts regular tours for community members from Texas, New Mexico, and beyond. ISP provides a vast amount of information on their website in both English and Spanish to try and inform the public about the proposed facility. In addition, ISP launched a social media campaign to help educate the general public about radiation to include the storage and transportation of spent fuel. ISP joint members Waste Control Specialists and Orano both provide information on their websites about the WCS CISF. ISP and its joint venture members utilize the local media to keep the local communities updated on the license status and aspects of the project on a regular basis. ISP also participates in many industry conferences to inform not only the immediate area near the proposed facility but also the rest of the United States.*

**Table 3.11-1, Detected concentrations of background radionuclides in samples collected in the vicinity of Waste Control Specialists during 2010 and 2011.**

| *Sample Location* | Sample type | Radionuclide | Min | Max | Mean | SD | Units | # samples |
|---|---|---|---|---|---|---|---|---|
| *Note 1* | Air | Cs-137 | 2.45E-04 | 1.19E-03 | 4.94E-04 | 2.07E-04 | pCi/m3 | 18 |
| | Air | GROSSA | 4.36E-04 | 7.80E-03 | 1.68E-03 | 9.37E-04 | pCi/m3 | 583 |
| | Air | GROSSB | 4.81E-04 | 3.67E-02 | 7.95E-03 | 3.33E-03 | pCi/m3 | 624 |
| | Air | K-40 | 1.78E-03 | 6.92E-03 | 3.64E-03 | 1.07E-03 | pCi/m3 | 80 |
| | Air | Pb-210 | 7.42E-04 | 1.23E-01 | 6.80E-03 | 6.21E-03 | pCi/m3 | 759 |
| | Air | Ra-226 | 2.44E-05 | 3.42E-03 | 1.47E-04 | 1.82E-04 | pCi/m3 | 415 |
| | Air | Ra-228 | 6.03E-05 | 4.93E-03 | 2.63E-04 | 4.46E-04 | pCi/m3 | 270 |
| | Air | Th-228 | 1.40E-05 | 2.43E-04 | 6.95E-05 | 2.96E-05 | pCi/m3 | 265 |
| | Air | Th-230 | 6.01E-06 | 2.93E-04 | 7.02E-05 | 3.23E-05 | pCi/m3 | 354 |
| | Air | Th-232 | 9.39E-06 | 2.51E-04 | 5.61E-05 | 2.67E-05 | pCi/m3 | 325 |
| | Air | Th-234 | 7.50E-03 | 9.53E-03 | 8.76E-03 | 1.10E-03 | pCi/m3 | 3 |
| | Air | U-233/234 | 5.49E-05 | 1.41E-03 | 1.54E-04 | 9.10E-05 | pCi/m3 | 604 |
| | Air | U-235/236 | 3.71E-06 | 7.29E-05 | 1.63E-05 | 1.04E-05 | pCi/m3 | 135 |
| | Air | U-238 | 3.84E-05 | 9.53E-03 | 1.94E-04 | 6.15E-04 | pCi/m3 | 604 |



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| Sample Location | Sample type | Radionuclide | Min | Max | Mean | SD | Units | # samples |
|---|---|---|---|---|---|---|---|---|
| Note 2 | Ground Water | GROSSA | 1.36E+00 | 6.16E+01 | 1.15E+01 | 8.03E+00 | pCi/L | 677 |
| | Ground Water | GROSSB | 1.75E+00 | 1.12E+02 | 1.17E+01 | 1.02E+01 | pCi/L | 617 |
| | Ground Water | K-40 | 4.08E+01 | 1.39E+02 | 8.56E+01 | 2.91E+01 | pCi/L | 9 |
| | Ground Water | Pb-210 | 1.79E+00 | 6.42E+02 | 2.24E+01 | 9.45E+01 | pCi/L | 58 |
| | Ground Water | Ra-226 | 1.25E-01 | 7.71E+00 | 5.93E-01 | 5.26E-01 | pCi/L | 567 |
| | Ground Water | Ra-228 | 4.01E-01 | 4.16E+00 | 1.29E+00 | 6.28E-01 | pCi/L | 544 |
| | Ground Water | Th-228 | 2.75E-02 | 2.03E-01 | 8.17E-02 | 3.89E-02 | pCi/L | 103 |
| | Ground Water | Th-230 | 1.76E-02 | 3.07E-01 | 7.46E-02 | 4.35E-02 | pCi/L | 174 |
| | Ground Water | Th-232 | 1.74E-02 | 1.36E-01 | 4.15E-02 | 2.45E-02 | pCi/L | 20 |
| | Ground Water | Th-234 | 1.82E+02 | 1.82E+02 | 1.82E+02 | NULL | pCi/L | 1 |
| | Ground Water | U-233/234 | 7.43E-02 | 3.73E+01 | 8.91E+00 | 6.95E+00 | pCi/L | 689 |
| | Ground Water | U-235/236 | 4.23E-02 | 1.79E+00 | 2.97E-01 | 2.49E-01 | pCi/L | 415 |
| | Ground Water | U-238 | 7.84E-02 | 1.82E+02 | 2.86E+00 | 7.43E+00 | pCi/L | 685 |
| Note 3 | Soil | Cs-137 | 1.29E-02 | 7.55E-01 | 1.07E-01 | 9.68E-02 | pCi/g | 441 |
| | Soil | GROSSA | 2.78E+00 | 2.27E+01 | 7.76E+00 | 2.90E+00 | pCi/g | 462 |
| | Soil | GROSSB | 3.14E+00 | 4.60E+01 | 1.28E+01 | 5.35E+00 | pCi/g | 489 |
| | Soil | K-40 | 1.68E+00 | 1.89E+01 | 8.88E+00 | 3.24E+00 | pCi/g | 529 |


All Indicated Changes are in response to RAI POH-1

| *Sample Location* | Sample type | Radionuclide | Min | Max | Mean | SD | Units | # samples |
|---|---|---|---|---|---|---|---|---|
| *Note 3* | Soil | Pb-210 | 1.92E-01 | 5.56E+00 | 1.17E+00 | 7.13E-01 | pCi/g | 355 |
| | Soil | Ra-226 | 1.21E-01 | 1.29E+00 | 5.54E-01 | 1.79E-01 | pCi/g | 580 |
| | Soil | Ra-228 | 1.07E-01 | 3.11E+00 | 6.35E-01 | 3.08E-01 | pCi/g | 628 |
| | Soil | Th-228 | 2.06E-01 | 2.04E+00 | 6.85E-01 | 2.65E-01 | pCi/g | 293 |
| | Soil | Th-230 | 1.21E-01 | 3.01E+00 | 6.72E-01 | 2.67E-01 | pCi/g | 890 |
| | Soil | Th-232 | 1.73E-01 | 2.52E+00 | 6.53E-01 | 2.80E-01 | pCi/g | 376 |
| | Soil | Th-234 | 1.48E-01 | 2.50E+00 | 7.49E-01 | 3.17E-01 | pCi/g | 275 |
| | Soil | U-233/234 | 5.52E-02 | 1.09E+00 | 4.35E-01 | 1.64E-01 | pCi/g | 472 |
| | Soil | U-235/236 | 1.63E-02 | 1.00E-01 | 4.55E-02 | 1.71E-02 | pCi/g | 133 |
| | Soil | U-238 | 7.85E-02 | 2.50E+00 | 5.59E-01 | 2.73E-01 | pCi/g | 750 |

*NOTES:*

3. *Air Sample Locations are shown on Figure 4.12-7*
4. *Ground Water Sample Location are shown on Figure 4.12-8*
5. *Soil Sample Locations are shown on Figure 4.12-9*



All Indicated Changes are in response to RAI POH-1

#### 3.11.1.1 Background Levels of Radiation at the CISF

ISP joint venture member Waste Control Specialists conducted pre-operational monitoring of the environment in 2010 and 2011 to develop a data set that could be used to characterize baseline levels of radiation and radioactivity prior to any LLRW disposal site operations, which began in 2012 (WCS, 2011). Pre-operational data, along with all subsequently collected data, are available through the RACER application. Available data for samples collected in 2010 and 2011 were obtained from the RACER database and are summarized in Table 3.11-1 to provide an indication of baseline radiological conditions in the vicinity of the Waste Control Specialists disposal facility. *Sample locations are shown on Figures 4.12-7, 4.12-8, and 4.12-9.* Table 3.11-1 shows the range of detected concentrations (min and max), along with the mean and standard deviation, for the background radionuclides expected to contribute most to radiation exposure in the CISF area. The CISF area is characterized as having relatively lower radon concentrations, consistent with other areas of Texas and the southwest U.S. and the levels of uranium and radium in the soil shown in Table 3.11-1 (NCRP, 2009).

#### 3.11.1.2 Current Radiation Sources and Exposure Levels at the CISF

Radiation sources at the CISF include the naturally occurring background radiation and the LLRW and uranium byproduct material waste that is received by the facility and prepared and stabilized for disposal. Natural background levels were discussed in the previous section. The CWF will accept only stabilized LLRW of Classes A, B, or C from commercial waste generators. Waste shipments are received in a variety of sealed containers such as 55-gallon drums, rectangular steel boxes, and shipping casks. Waste is stabilized before disposal in the facility using concrete containers and grout. The FWF also accepts Classes A, B, and C LLRW. The FWF allows for two different disposal methods, containerized waste and non-containerized waste in the In-Cell Non-Containerized Disposal Unit (IC NCDU). The containerized section of the FWF, similar to the CWF, grouts containerized waste in concrete canisters. The IC NCDU accepts federal Class A waste in larger volumes of bulk soil or soil-like debris, rubble, or a single uniform piece qualified for disposal under the facility's license. Waste packaging and stability requirements limit the amount of radionuclide particulates or gasses that may be suspended into the air during waste handling, including unloading of shipments, repackaging, and containerizing of waste for disposal. Thus, inhalation is not a large contributor to worker dose. Waste Control Specialists accepts remotely handled waste with exposure rates of up to


All Indicated Changes are in response to RAI POH-1

#### 3.11.1.3 Historical Exposure to Radioactive Materials at the CISF

Both occupational and public external exposures at and around the CISF for the past five years are summarized in this section. These exposures are based on quarterly readings obtained from the thermoluminescent dosimeters (TLDs) and optically stimulated luminescent dosimeters (OSLs) worn by ISP joint venture member Waste Control Specialists site personnel and placed at various locations in the environment around the CISF. Table 3.11-2 summarizes occupational exposures for the past five years. Personnel exposures increased after operations began in 2012 because radioactive waste shipments for disposal commenced.

Table 3.11-3 summarizes environmental TLD and OSL measurements and calculated doses to the public for the past five years. *The sample locations are shown in Figure 4.12-10.* Background corrected doses are also shown based on subtraction of the pre-operational background dose as assumed by ISP joint venture member Waste Control Specialists as part of its annual REMP reporting (10 mrem). Averages including zero values (i.e., nondetects or values <= 0 after background subtraction) and excluding zero values are both shown. Doses measured during the pre-operational period of 2010–2011 are consistent with those measured during 2012–2014, and there is no evidence of an increase in external radiation exposure to the public after operations began in 2012. External radiation is not expected to be a significant source of exposure to members of the public due to distance and shielding from the materials managed at the CISF.

**Table 3.11-3, Summary of environmental exposures at Waste Control Specialists' existing facilities based on TLD and OSL measurements (mean mrem $y^{-1}$)[c]**

| *Sample Location* | Type | Year | Before background subtraction | | | | | | After background subtraction | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Annual total | | Public dose (bounding) | | Public dose (site-specific) | | Annual total | | Public dose (bounding) | | Public dose (site-specific) | |
| | | | a | b | a | b | a | b | a | b | a | b | a | b |
| *See Figure 4.12-10* | OSLD | 2010 | 8.7 | 8.7 | 2.0 | 2.0 | 0.4 | 0.4 | 2.1 | 7.1 | 0.5 | 1.6 | 0.1 | 0.4 |
| | OSLD | 2011 | 7.7 | 8.7 | 1.8 | 2.0 | 0.4 | 0.4 | 1.9 | 8.1 | 0.4 | 1.9 | 0.1 | 0.4 |
| | OSLD | 2012 | 6.7 | 9.1 | 1.5 | 2.1 | 0.3 | 0.5 | 2.0 | 8.6 | 0.5 | 2.0 | 0.1 | 0.4 |
| | OSLD | 2013 | 8.1 | 8.1 | 1.8 | 1.8 | 0.4 | 0.4 | 1.0 | 4.3 | 0.2 | 1.0 | 0.1 | 0.2 |
| | OSLD | 2014 | 7.3 | 11.3 | 1.7 | 2.6 | 0.4 | 0.6 | 2.4 | 9.2 | 0.5 | 2.1 | 0.1 | 0.5 |
| | TLD | 2010 | 16.8 | 16.8 | 3.8 | 3.8 | 0.8 | 0.8 | 7.2 | 9.0 | 1.6 | 2.1 | 0.4 | 0.5 |
| | TLD | 2011 | 16.3 | 16.3 | 3.7 | 3.7 | 0.8 | 0.8 | 6.9 | 8.6 | 1.6 | 2.0 | 0.3 | 0.4 |
| | TLD | 2012 | 12.2 | 12.2 | 2.8 | 2.8 | 0.6 | 0.6 | 4.2 | 7.9 | 1.0 | 1.8 | 0.2 | 0.4 |
| | TLD | 2013 | 6.1 | 6.1 | 1.4 | 1.4 | 0.3 | 0.3 | 1.0 | 3.8 | 0.2 | 0.9 | 0.0 | 0.2 |
| | TLD | 2014 | 14.7 | 14.7 | 3.4 | 3.4 | 0.7 | 0.7 | 7.4 | 12.1 | 1.7 | 2.8 | 0.4 | 0.6 |

a = with zero values included b = without zero values included c = 1mrem = 0.01mSv



All Indicated Changes are in response to RAI POH-2

**Table 3.11-10, Incidence Rates of Cancer in Andrews County Region (HSR9) and Texas 2007–2011**

| Rate per 100,000 | | | Rate per 100,000 | | |
|---|---|---|---|---|---|
| Males | Region | State | Females | Region | State |
| All sites | 497.1 | 504.6 | All sites | 378.9 | 387.1 |
| Prostate | 112.9 | 126.9 | Breast | 104.8 | 113.6 |
| Lung | 79.7 | 75.6 | Lung | 49.5 | 47.4 |
| Colorectal | 51.2 | 49.7 | Colorectal | 36.2 | 34.6 |

## 3.12 WASTE MANAGEMENT

Waste management for the CISF is divided into gaseous and liquid effluent, as well as solid waste. Descriptions of the sources and effluent systems for each of these waste streams are discussed in this section. *Waste volumes for CISF construction, operations (annual), and decommissioning life-cycle phases are provided in Tables 3.12-2, 3.12-3, and 3.12-4, respectively; lifetime cumulative waste volumes are provided in Table 3.12-5.* Disposal plans, waste minimization practices, and related environmental impacts are discussed in Section 4.13 of this report and Chapter 6 of the SAR.

### 3.12.1 Effluent Systems

Effluent systems are used to manage gaseous and liquid effluents to ensure that potential radiation doses to workers are compliant with the discharge limits specified in 10 CFR Part 20, maintain ALARA, and consistent with the philosophy of waste minimization, the term "waste" as used in this section refers to waste generated during operations at the CISF, and does not include SNF waste materials handled at the CISF.

These systems are described in more detail in Chapters 4 and 6 of the SAR.

#### 3.12.1.1 Gaseous Effluents

Non-radiological air emissions would be generated primarily from diesel generators and engines used to provide electrical power and move equipment, including SNF, at the CISF. Non-


All Indicated Changes are in response to RAI WM-1

Only very low levels of the above constituents are expected in CISF conventional wastewater. The non-reactive liquid waste streams shall be managed and would potentially be released to the environment at the CISF only in accordance with federal and state requirements (e.g., a TPDES Permit issued by the TCEQ).

#### 3.12.1.2.2 Sanitary Wastes

Sanitary wastes generated at the CISF include the effluents from facility drinking water fountains, water closets, lavatories, mop sinks, and other similar fixtures. Sanitary waste generated at the CISF would be transferred to aboveground holding tanks, prior to discharge in a permitted POTW.

### 3.12.1.3 Solid Wastes

LLRW*, hazardous,* and non-radioactive solid waste may be generated at the CISF. Mixed waste is not expected to be generated at the CISF.

#### 3.12.1.3.1 Solid Low-Level Radioactive Waste

The CISF would be designed, and procedures developed, to minimize the volumes of solid LLRW generated at the CISF in accordance with 10 CFR 20.1406, *Minimization of Contamination*, and 10 CFR 72.130, *Criteria for Decommissioning*.

Solid radioactive wastes may be generated at the CISF as a result of cask contamination surveillance and decontamination activities. These wastes generally consist of paper or cloth swipes, paper towels, protective clothing, and other job control wastes contaminated with low levels of radioactivity. Expended HEPA filters from the transfer facility ventilation system along with job control waste associated with filter change-out, also may contribute to the generation of solid radioactive waste. Job control waste generated during filter change-out is collected and monitored along with other low-level wastes for off-site processing.


All Indicated Changes are in response to RAI WM-4

Solid radioactive wastes would be collected in containers and temporarily stored in the transfer facility. Small volumes of solid radioactive wastes are anticipated. These low activity wastes would be disposed of at Waste Control Specialists' permitted or licensed disposal facility. *A likely location for the low activity wastes would be the WCS Low-Level Radioactive Waste (LLRW) facility's Compact Waste Facility (CWF). This disposal facility, which opened in 2011, is currently in the first of nine planned phases of operation. The facility is licensed to dispose of 9,000,000 cubic feet of waste in its lifetime and its remaining disposal capacity is sufficient for the expected life of the CISF.*

RAI WM-2

#### 3.12.1.3.2 Non-Radioactive Solid Waste

Solid non-radioactive waste may also be generated at the CISF. The majority of the solid non-radioactive waste is expected to be generated during fabrication of some of the SNF storage systems. Approximately 3,200 storage systems would be fabricated to store 40,000 MTUs of SNF and related GTCC waste over 20 years. However, some storage systems would be fabricated offsite, but assembled at the CISF.

RAI WM-3

Other non-radioactive solid wastes are expected to be generated as a result of routine maintenance, operations, and administrative support functions at the CISF. Prior to releasing solid materials for unrestricted release, radiological surveys would be conducted to ensure that any potential levels of radioactivity are below the limits specified in *Table 3.12-1. The release levels provided in Table 3.12-1 are taken from Table R.3 of NUREG-1556, Volume 9 and Table 2 of NRC Regulatory Guide 8.30. These limits are also consistent with 30 Texas Administrative Code 336.364 Appendix G.*

Non-radiological solid waste would be disposed of at a solid waste municipal landfill. *The Lea County Landfill near Euncie, NM would be the first option for non-radioactive and non-hazardous waste disposal. The facility was permitted in 1998 and has planned life of 80 years. The remaining capacity is sufficient for the expected life of the CISF.*

RAI WM-2

#### 3.12.1.3.3 Hazardous and Mixed Waste

RAI WM-4

*Mixed waste is not expected to be generated at the CISF. Hazardous waste potentially generated at the facility will be limited to small quantities as described in Section 1.3.2.4.*

*Hazardous waste generated by the CISF would be sent to the WCS Resource Conservation and Recovery Act (RCRA) Subtitle C Landfill. This landfill, which opened in 1995, is currently at approximately 32% of its permitted capacity of 62,370,000 cubic feet of waste. The remaining disposal capacity is sufficient for the expected life of the CISF.*

RAI WM-2

**Table 3.12-1, *Acceptable Surface Contamination Levels for Uncontrolled Release of Material***

| ***NUCLIDE*** [a] | ***AVERAGE*** [b c] | ***MAXIMUM*** [b d] | ***REMOVABLE*** [b e] | ***REFERENCE*** |
|---|---|---|---|---|
| *U-nat, U-235, U-238, and associated decay products* | *5,000 dpm $\alpha$ / 100 cm²* | *15,000 dpm $\alpha$ / 100 cm²* | *1,000 dpm $\alpha$ / 100 cm²* | *Table 2 of RG 8.30 (Revision 1)* |
| *Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129* | *100 dpm / 100 cm²* | *300 dpm / 100 cm²* | *20 dpm / 100 cm²* | *Table R.3 of NUREG-1556, Volume 9 (Revision 2)* |
| *Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133* | *1,000 dpm / 100 cm²* | *3,000 dpm / 100 cm²* | *200 dpm / 100 cm²* | *Table R.3 of NUREG-1556, Volume 9 (Revision 2)* |
| *Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and other noted above.* | *5,000 dpm $\beta$-$\gamma$ / 100 cm²* | *15,000 dpm $\beta$-$\gamma$ / 100 cm²* | *1,000 dpm $\beta$-$\gamma$ / 100 cm²* | *Table R.3 of NUREG-1556, Volume 9 (Revision 2)* |

*NOTES:*

a. *Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.*

b. *As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.*

c. *Measurements of average contaminate should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.*

d. *The maximum contamination level applies to an area of not more than 100 cm².*

e. *The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.*



All Indicated Changes are in response to RAI WM-3

***Table 3.12-2, Estimated Initial Construction Waste Volume***

| ***Initial Construction Activity*** | ***Non-Hazardous Solid Waste (tons)*** | ***Solid Low-Level Radioactive Waste (tons)*** | ***Hazardous Solid Waste (tons)*** | ***Sanitary Waste Water (gallons)*** |
|---|---|---|---|---|
| *Storage Pad Construction* | *560* | *0* | *0.25* | |
| *Storage Module Construction* | *0* | *0* | *0* | |
| *Building Construction* | *47* | *0* | *0.33* | |
| *Site Preparation, Fence, Admin, Finish Work, Rail Construction* | *106* | *0* | *0.75* | |
| ***TOTAL*** | ***713*** | ***0*** | ***1.33*** | ***450,000*** |

***Table 3.12-3, Estimated Annual Operational Waste Volume***

| ***Annual Operations Activity*** | ***Non-Hazardous Solid Waste (tons)*** | ***Solid Low-Level Radioactive Waste (tons)*** | ***Hazardous Solid Waste (tons)*** | ***Sanitary Waste Water (gallons)*** |
|---|---|---|---|---|
| *Standard Operations and Admin* | *53* | *1.33* | *1.33* | |
| *Storage Module Construction (160 per year average)* | *2,336* | *0* | *0* | |
| *Expansion (Storage Pads, Fence line, etc.)* [1] | *232* | *0* | *0* | |
| ***TOTAL*** | ***2,621*** | ***1.33*** | ***1.33*** | ***185,000*** |

*Note:*

1. *Averaged out per year*

**Table 3.12-4, Estimated Decommissioning Waste Volume**

| Decommissioning Activity | Non-Hazardous Solid Waste (tons) | Solid Low-Level Radioactive Waste (tons) | Hazardous Solid Waste (tons) | Sanitary Waste Water (gallons) |
|---|---|---|---|---|
| Survey, Decontamination, and Admin | 33 | 98.34 [1] | 1.0 | |
| Building Cleanout | 47 | 0 | 0.33 | |
| **TOTAL** | **80** | **98.34** | **1.33** | **190,000** |

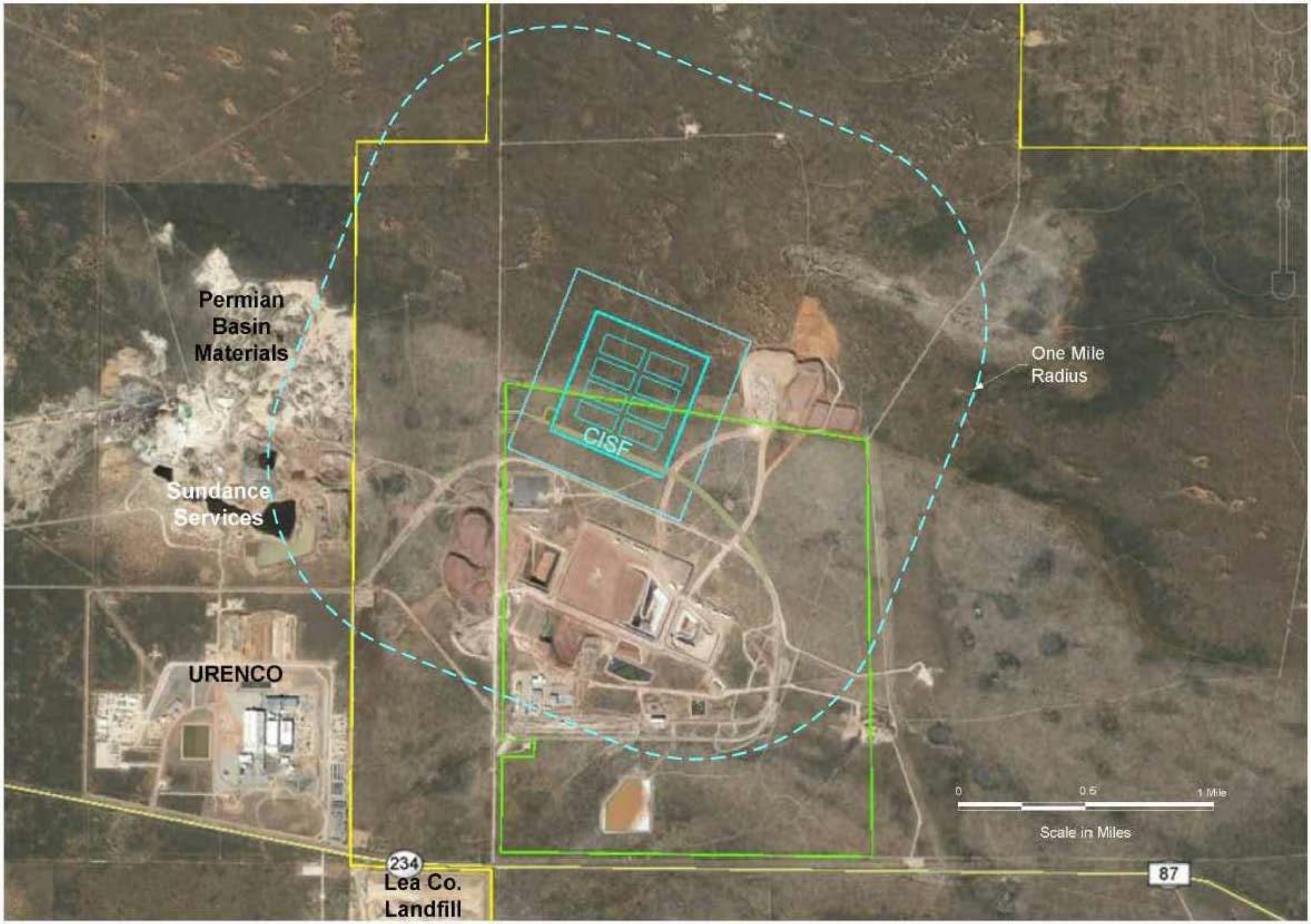
Note:

1. Based on the Decommissioning Plan estimate of 60.7 cubic yards and an assumed density of 120 pounds per cubic foot.

**Table 3.12-5, Estimated Cumulative Waste Volume**

| CISF Facility Phase | Non-Hazardous Solid Waste (tons) | Solid Low-Level Radioactive Waste (tons) | Hazardous Solid Waste (tons) | Sanitary Waste Water (gallons) |
|---|---|---|---|---|
| Initial Construction | 713 | 0 | 1.33 | 450,000 |
| Operation (20 years) | 52,420 | 26.6 | 26.6 | 3,700,000 |
| Decommissioning | 80 | 98.34 | 1.33 | 190,000 |
| **TOTAL** | **53,213** | **124.94** | **29.26** | **4,340,000** |


All Indicated Changes are in response to RAI WM-1




| | | | |
|---|---|---|---|
| Title: Proposed CISF 1-mile Radius | Figure: 3.1-3 | Date: Feb 2016<br>Scale: Graphic | WCS ANDREWS, TEXAS |



All Indicated Changes are in response to RAI PA-1

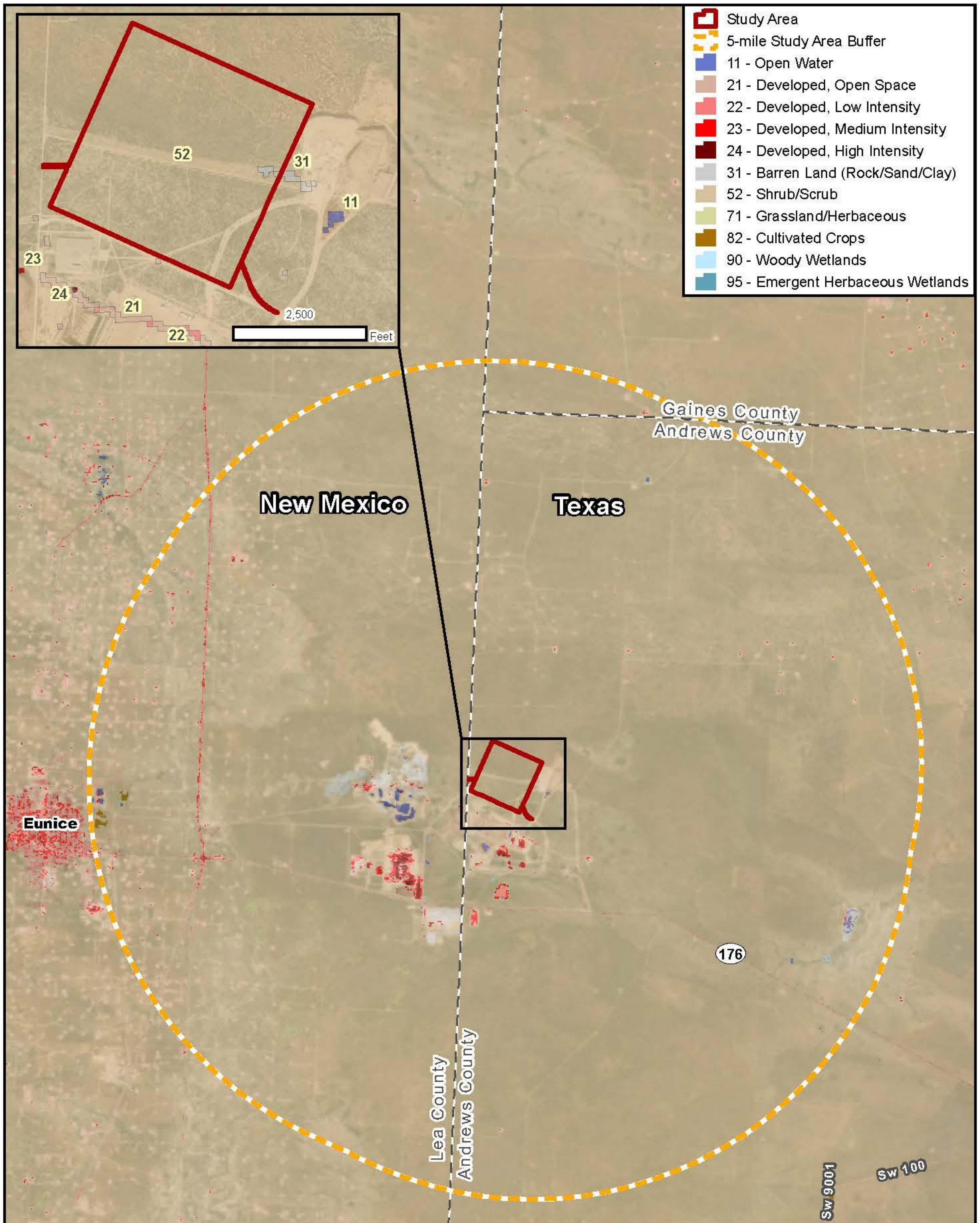
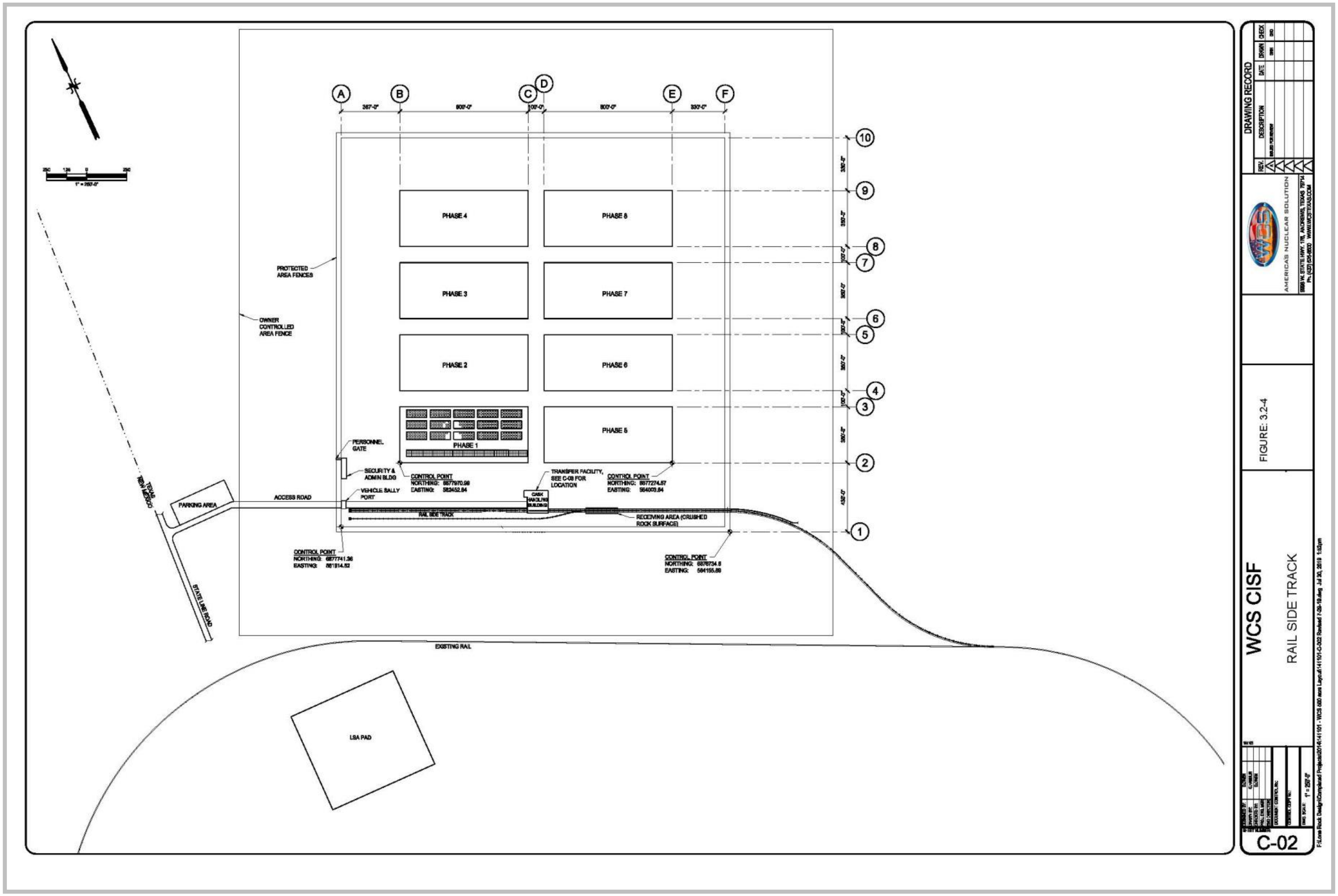



**Figure 3.1-4**
**Land Use (USGS National Land Cover Dataset)**
**Interim Storage Partners (ISP) Storage Facility**



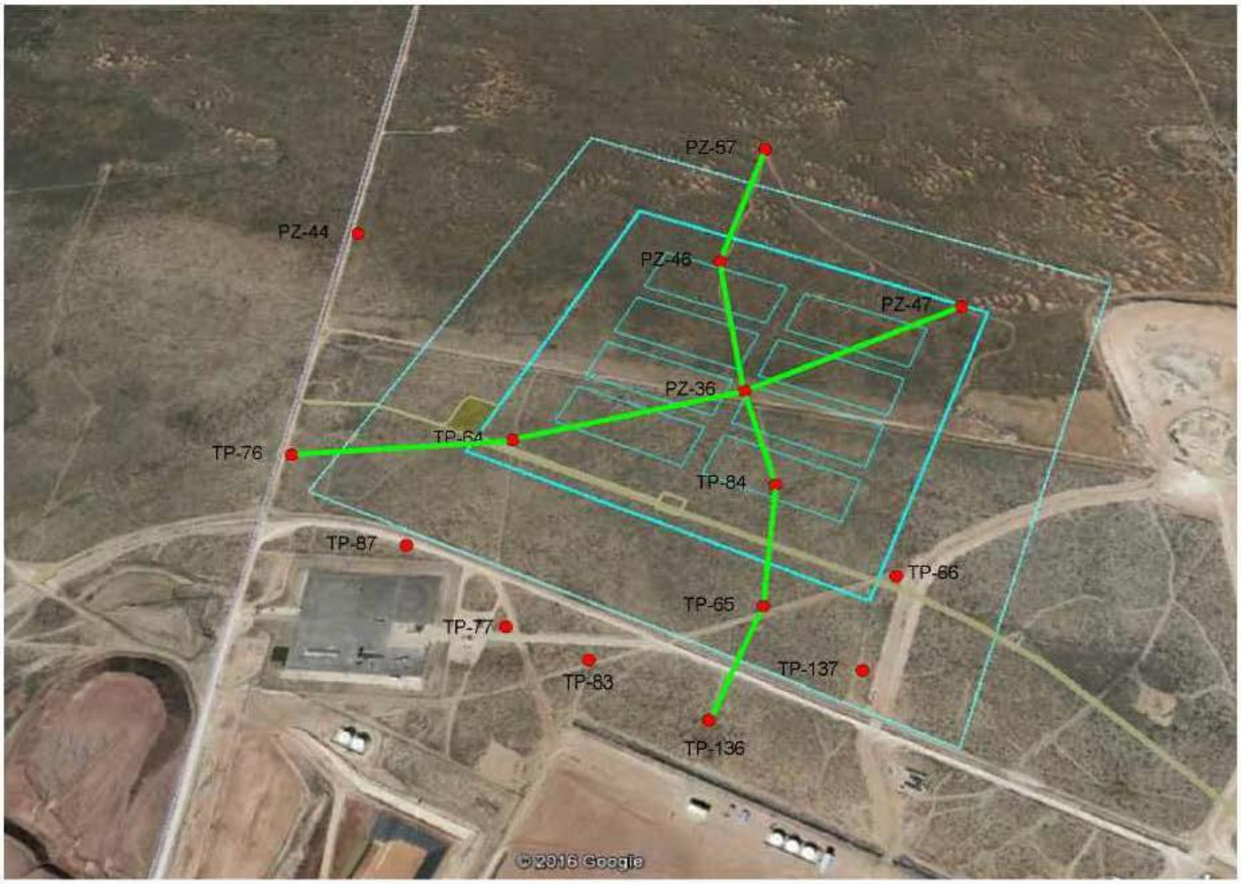
All Indicated Changes are in response to RAI LU-1

Proprietary Information on Pages 3-98 through 3-101
Withheld Pursuant to 10 CFR 2.390






All Indicated Changes are in response to RAI PA-1




| Monitoring Well/ Piezometer Name | Date Drilled/ Completed | Total Depth Well (ft btoc) | Bottom of Well Elevation (ft msl) | Ground Elevation (ft msl) | Top of Casing Elevation (ft msl) | Depth to Top of Red Beds (ft bgs) | Top of Red Bed Elevation (ft msl) |
|---|---|---|---|---|---|---|---|
| PZ-36 | 7/20/05 | 78.98 | 3419.51 | 3494.79 | 3498.49 | 75.0 | 3419.79 |
| PZ-44 | 1/22/08 | 82.98 | 3416.90 | 3496.59 | 3499.88 | 77.1 | 3419.49 |
| PZ-46 | 1/23/08 | 93.83 | 3412.04 | 3502.38 | 3505.87 | 87.4 | 3414.98 |
| PZ-47 | 1/24/08 | 92.22 | 3411.56 | 3500.60 | 3503.78 | 87.0 | 3413.60 |
| PZ-57 | 1/23/08 | 99.56 | 3415.44 | 3511.79 | 3515.00 | 93.5 | 3418.29 |
| TP-64 | 1/11/08 | 70.81 | 3433.99 | 3502.08 | 3504.80 | 65.3 | 3436.78 |
| TP-65 | 1/11/08 | 57.68 | 3436.07 | 3490.40 | 3493.75 | 52.5 | 3437.90 |
| TP-66 | 1/10/08 | 57.78 | 3430.88 | 3485.45 | 3488.66 | 51.0 | 3434.45 |
| TP-76 | 2/7/08 | 53.42 | 3436.78 | 3487.06 | 3490.20 | 47.1 | 3439.96 |
| TP-77 | 2/7/08 | 51.30 | 3436.09 | 3484.19 | 3487.39 | 45.4 | 3438.79 |
| TP-83 | 2/11/08 | 55.55 | 3435.60 | 3487.77 | 3491.15 | 49.8 | 3437.97 |
| TP-84 | 2/12/08 | 65.24 | 3429.59 | 3491.56 | 3494.83 | 58.7 | 3432.86 |
| TP-87 | 3/15/08 | 49.02 | 3438.47 | 3484.17 | 3487.49 | 43.3 | 3440.87 |
| TP-136 | 3/20/09 | 55.21 | 3438.01 | 3490.17 | 3493.22 | 50.5 | 3439.67 |
| TP-137 | 3/20/09 | 56.46 | 3434.68 | 3488.00 | 3491.14 | 51.5 | 3436.50 |

AMERICA'S NUCLEAR SOLUTION

Figure 3.3-1
Location of Cross-Sections



All Indicated Changes are in response to RAI PA-1

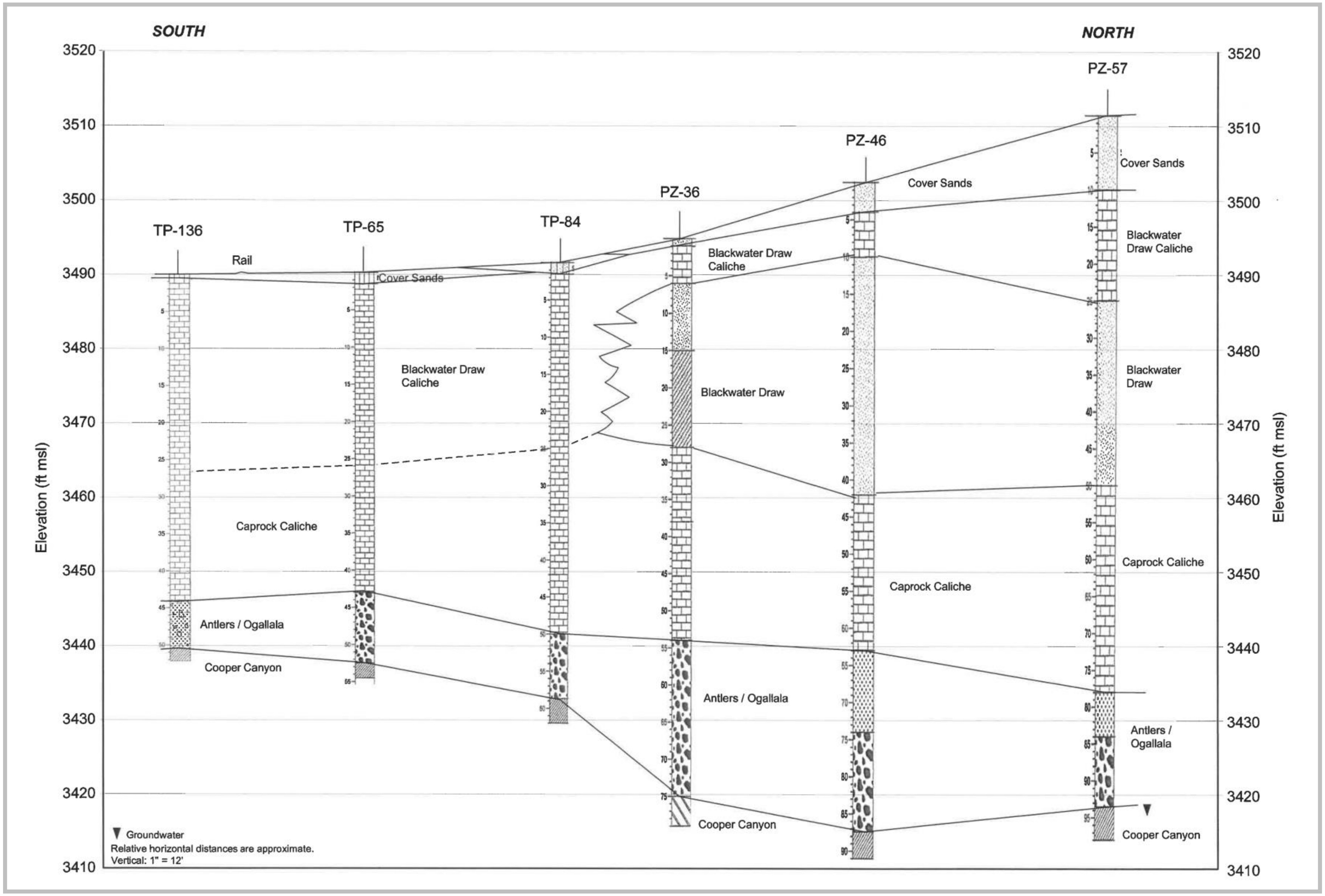



*Figure 3.3-2 Cross Sections*


All Indicated Changes are in response to RAI WR-8

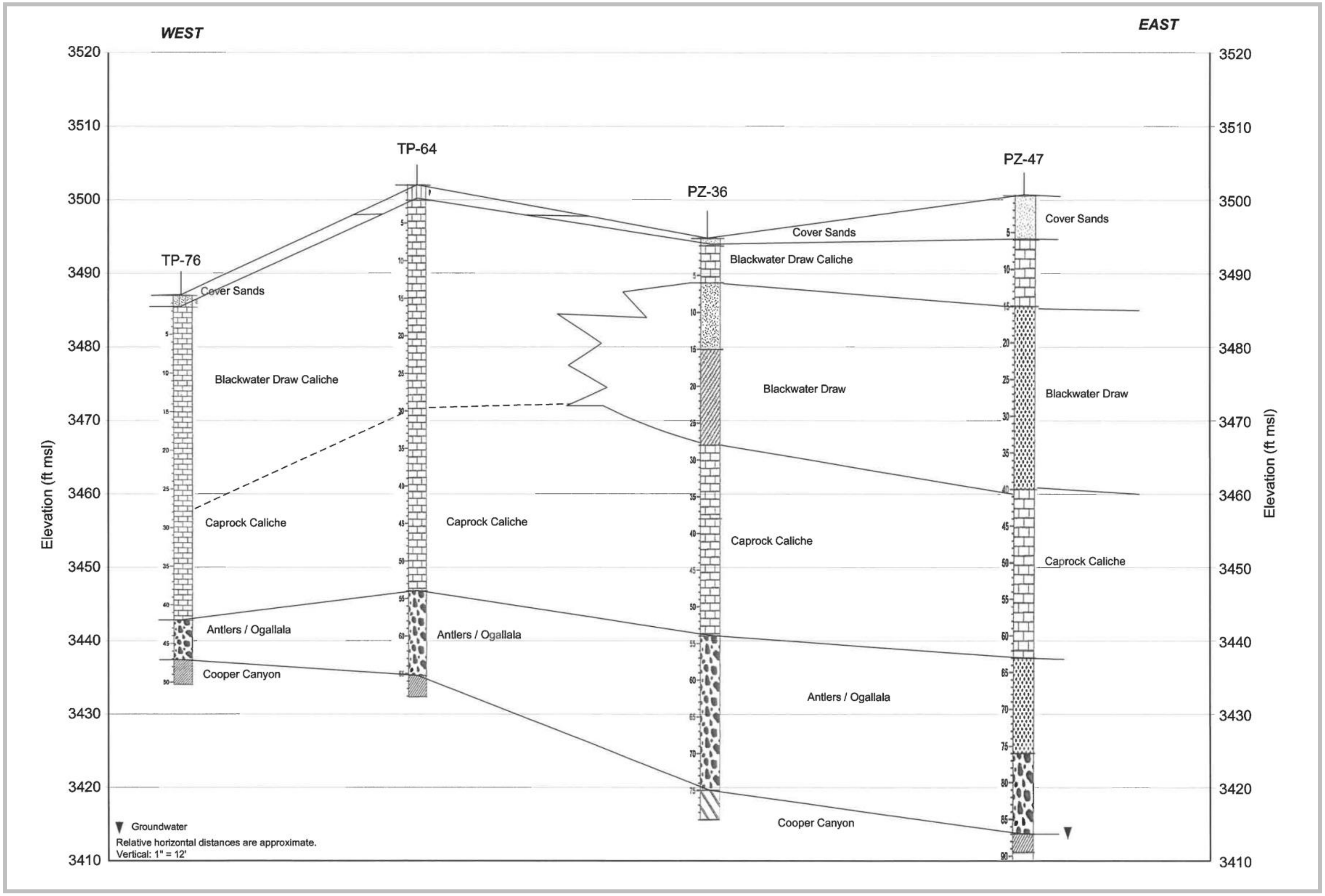



*Figure 3.3-3 Cross Sections*



All Indicated Changes are in response to RAI WR-8

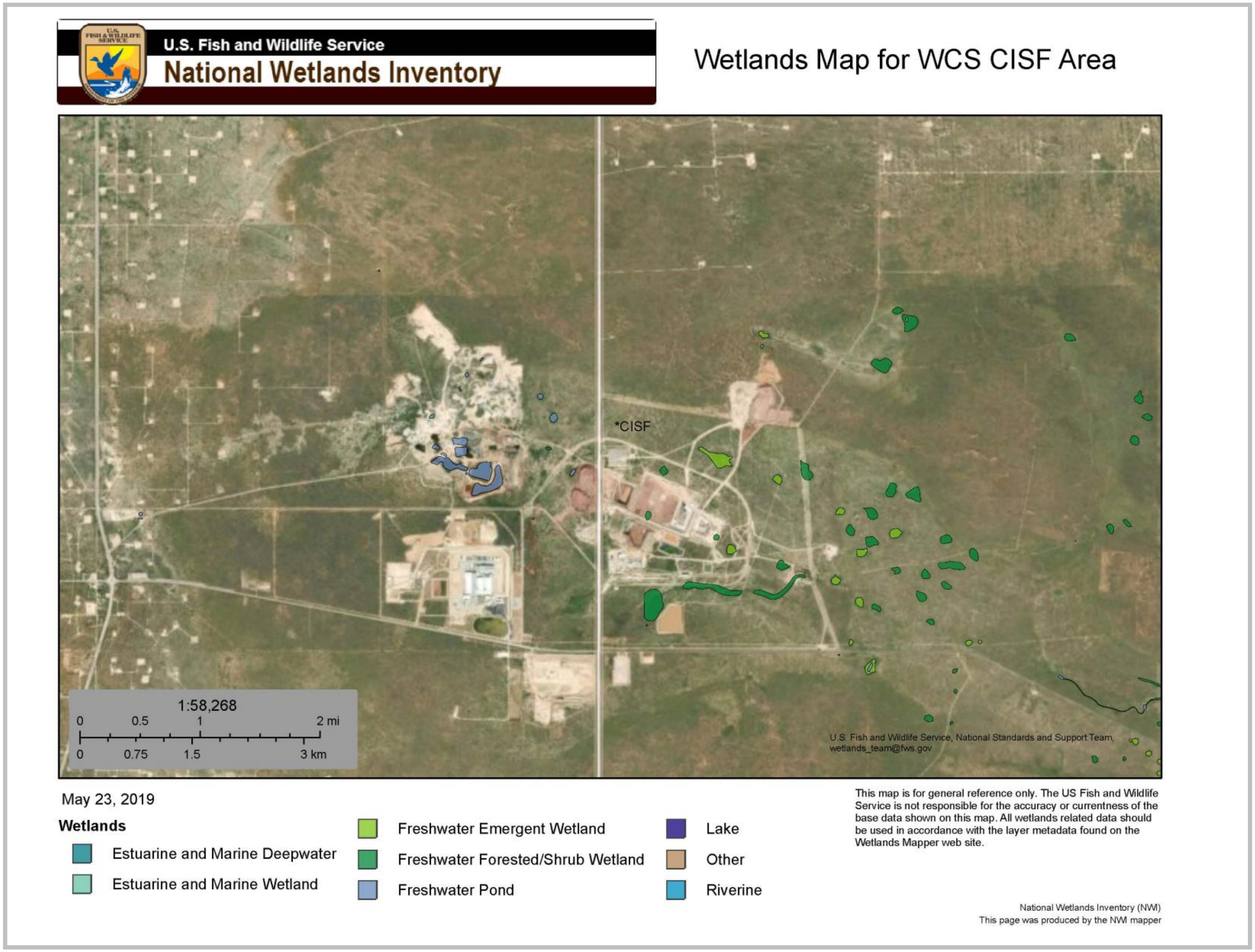
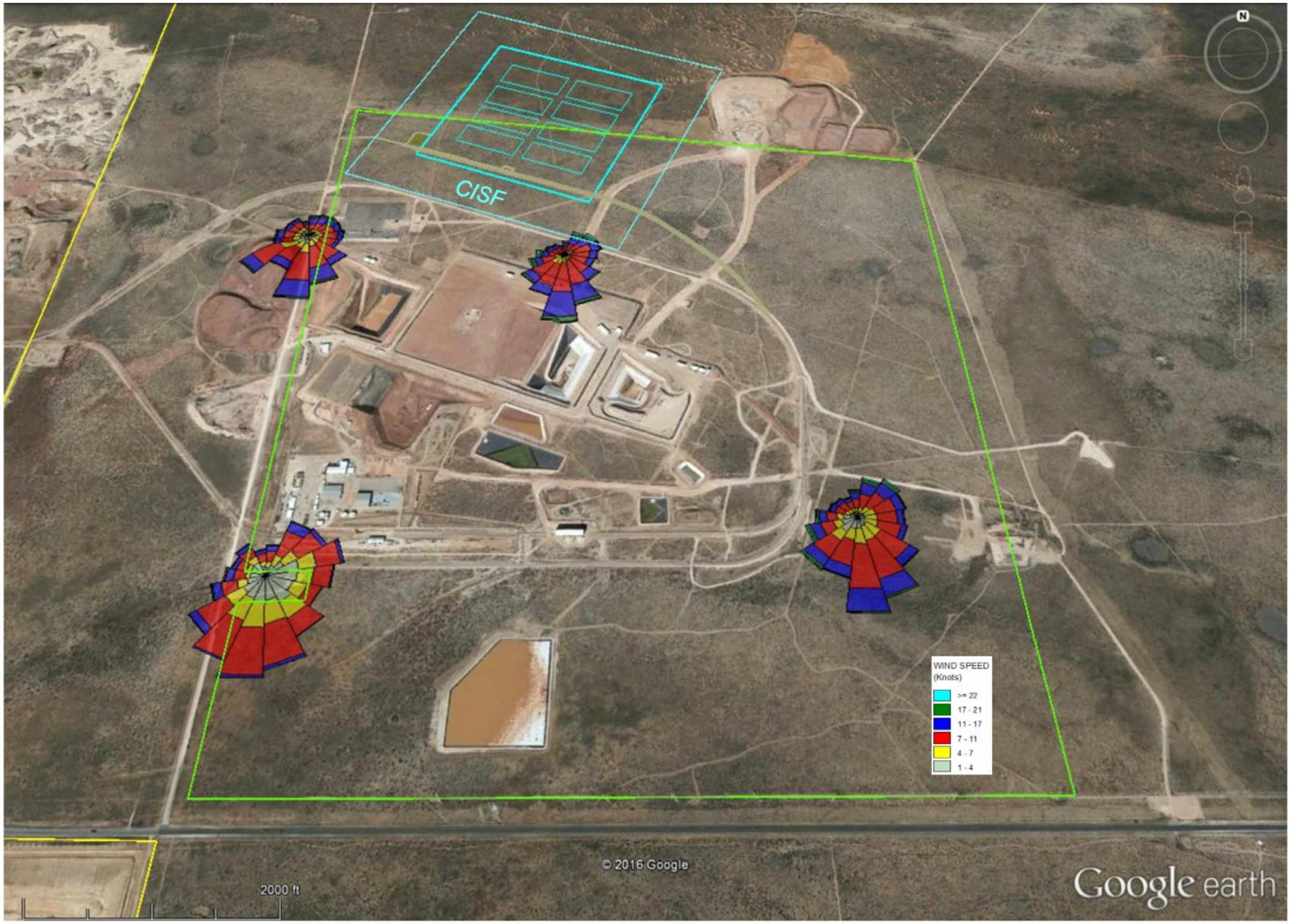



***Figure 3.4-1 Wetlands***



All Indicated Changes are in response to RAI WR-2




Title:
Figure 3.6-1
Wind Rose Location Map

Date:
2/18/2016

AMERICA'S NUCLEAR SOLUTION

# CHAPTER 4

# ENVIRONMENTAL IMPACTS

## 4.0 ENVIRONMENTAL IMPACTS

This chapter evaluates the potential environmental impacts associated with the construction, operation, and decommissioning of the proposed CISF. The chapter is divided into sections that assess the impact to each resource described in Chapter 3, Description of the Affected Area. These include land use (4.1), transportation (4.2), geology and soils (4.3), water resources (4.4), ecological resources (4.5), air quality (4.6), noise (4.7), historic and cultural resources (4.8), and visual and scenic resources (4.9), socioeconomics (4.10), environmental justice (4.11), public and occupational health (4.12), waste management (4.13)*, integrated environmental impacts (4.14), and cumulative impacts (4.15)*.

RAI CI-1

## 4.1 LAND USE IMPACTS

RAI PA-1

The proposed CISF would be built on land leased to Interim Storage Partners (ISP) by Waste Control Specialists LLC. The facility would be built in eight phases, with one phase being completed approximately every 2.5 years. Initial construction of Phase One would encompass approximately 63 ha (155 acres). Each phase would increase the overall footprint incrementally until the final footprint reaches approximately 130 ha (320 acres) with the completion of Phase Eight, of the owner controlled area. *In addition to the owner controlled area, there is an additional 0.6 ha (1.5 acres) of area for the new railroad side track which will be outside of the OCA and 1.2 ha (3 acres) of area for a new access road.* Because the site is currently undeveloped, potential land use impacts would primarily be from site preparation and construction activities. Approximately *1.6 ha (4 acres)* would be used for contractor parking and lay-down areas during facility construction. The total disturbed area would therefore be approximately *133.4 ha (330 acres)* including the contractor parking and lay-down area. The contractor lay-down and parking area would be restored after completion of facility construction.

During the construction phase of the CISF, conventional earthmoving and grading equipment would be used. *It is anticipated that excavation will be limited to the cover sands and Blackwater Draw caliche, however if hard caliche is encountered, heavy equipment with ripping tools may be utilized.* Soil removal work for foundations would be controlled to reduce over-excavation to minimize construction costs. In addition, loose soil and/or damaged caliche would be removed prior to installation of foundations for seismically designed structures.

RAI GS-2

No additional construction access roadways off of Texas State Highway 176 would be required to support construction. The materials delivery and construction worker access road would run north off of Texas State Highway 176 along the west side of the existing LLRW site. These roadways would eventually be converted to permanent access roads upon completion of construction. Therefore, impacts from new access road construction would be minimized.

### 4.2.1 Facility Construction Impacts

Impacts from construction transportation would include the generation of fugitive dust, changes in scenic quality, and added noise. Dust would be generated to some degree during the various stages of construction activity. The amount of dust emissions would vary according to the types of activity. The first 12 months of construction would likely be the period of highest emissions since approximately 63 ha (155 acres) would be involved, along with the greatest number of construction vehicles operating on an unprepared surface. However, it is expected that no more than 20 ha (50 acres) would be involved in this type of work at any one time.

RAI AQ-6

*See ER Section 4.6 for air quality impacts from construction.*

RAI PA-2 and RAI AQ-6

#### 4.2.1.1 Scenic Views

Although CISF construction would substantially alter the natural state of the landscape, impacts to scenic views are not considered to be significant, based on the absence of high quality scenic views in the area and the presence of currently developed industrial land uses on surrounding properties substantial. Construction vehicles would be comparable to trucks servicing neighboring facilities in terms of their impact on the scenic views.

During decommissioning, the site would be decommissioned to levels that would allow for the unrestricted release of the CISF pursuant to 10 CFR 20, Subpart E. Accordingly, the impact to scenic views during decommissioning would be small.

### 4.2.3 Mitigation Measures

RAI AQ-8

RAI AQ-8

To control fugitive dust production, reasonable precautions would be taken to prevent PM and/or suspended PM from becoming airborne. When necessary, water would be used to control dust on dirt roads, in clearing and grading operations, and during construction activities. Water conservation would be considered *for activities which are not essential to* dust suppression. See Section 4.4 for a discussion of water conservation measures. Mitigation measures would not be required during operations or decommissioning of the CISF.

RAI PA-2 and RAI AQ-8

### 4.2.4 Radioactive Material Transportation Impacts

Over the course of the 20-year operational life of the CISF, ISP would receive up to 40,000 MTUs of SNF and related GTCC waste from decommissioned commercial nuclear reactor sites and operating reactors. SNF would be transported exclusively by rail. All SNF would be transported approximately 169 km (105 mi) from Monahans, Texas to the CISF along the transportation corridor.

The DOE or nuclear plant owner(s) holding title to the SNF will be responsible for transporting SNF from existing nuclear power plants to the CISF by rail in transportation casks licensed by the NRC pursuant to 10 CFR 71. The preparation of such shipments will be conducted in accordance with written procedures prepared by the commercial nuclear power plant, the DOE, or their contractors. The DOE or private qualified logistics company will also be responsible for coordinating with federal agencies, such as the U.S. Department of Transportation, U.S. Department of Homeland Security, U.S. Environmental Protection Agency, and the Federal Emergency Management Agency, regarding transportation of SNF from the commercial nuclear reactor sites to the CISF.

If the DOE is the shipper, the federal government, through DOE, is responsible for providing emergency training to states, tribes, and local emergency responders along the transportation routes where SNF would be transported to the CISF. ISP joint venture member Waste Control Specialists has acquired considerable experience in responding to the potential transportation events given its relative proximity to the Waste Isolation Pilot Plant. Local fire fighters, law enforcement, and emergency medical staff have been trained to respond to put out fires and organizing any emergency response actions that may be needed to reduce the severity of events related to transportation incidents involving SNF.

#### 4.2.4.1 Connected Transportation Impacts Associated with SNF Transport from Shutdown Decommissioned Reactors

Non-radiological environmental impacts connected to upgrades associated with the fabrication of new rail transport carriers and enhancements to rail infrastructure needed to remove SNF from the decommissioned reactors and transport to an ISFSI or geologic repository are discussed in a DOE report titled, *A Project Concept for Nuclear Fuels Storage and Transportation* (DOE, 2013a).

ISP anticipates initially receiving up to approximately 5,000 MTUs of SNF and related GTCC waste from decommissioned reactor sites at 12 locations across the U.S. As discussed in Section 3.2, heavy-haul trucks may be needed to move SNF over short distances from a decommissioned reactor site to a rail transfer facility. The NRC previously analyzed the environmental impacts associated with using heavy haul trucks to transport SNF from a rail transfer facility to an interim storage facility in NUREG-1714 (NRC, 2001). The distances analyzed in the NUREG-1714 report transporting are much greater than the distances between the shutdown decommissioned reactor sites and the rail transfer facilities. Thus, the environmental impacts analyzed in NUREG-1714 are bounding.

The radiological impacts potentially affecting members of the public along the three transportation routes have been analyzed and are described below. The radiological environmental impacts attributable to the transport of SNF from the decommissioned reactor sites are insignificant.

### 4.2.5 Transportation Impacts to Air and Water Quality

SNF received at the main rail line in Eunice, New Mexico operated by the TNMR, would be placed on the existing rail side track controlled by ISP joint venture member Waste Control Specialists and transported approximately 8 km (5 mi) to the CISF. ISP would construct an additional side track approximately *2* km (*1.25* mi) in length to allow the transport of SNF to the Cask Handling Building at the CISF as described in Section 3.2.

During construction, fugitive dust emissions are expected and are authorized under a “Permit By Rule” by the TCEQ. Transportation impacts to air quality include emissions from employee automobiles and the diesel locomotive used to transport SNF along the transportation corridor to the Cask Handling Facility at the CISF. Air quality would also be impacted from emissions of


All Indicated Changes are in response to RAI PA-1

*The assumptions related to the number of casks per shipment, number of casks shipped per year, total number of casks and shipments over the time used to determine the radiological impacts of transporting SNF in this evaluation are different that those used to calculate the Cost Benefits documented in Chapter 7. The assumptions used in herein are appropriate because they are bounding and conservative for determining bounding dose estimates.*

#### 4.2.6.2 Comparable NRC Analyses

The radiological impacts of transporting SNF have been extensively studied for nearly 40 years. Several Transportation risk studies have been published by NRC during this period of time; the most recent is *Spent Nuclear Fuel Risk Transportation, NUREG-2125 (NRC, 2014).* This study was *preceded by* Sprung, J.L., et al., *Reexamination of Spent Fuel Shipment Risk Estimates*, NUREG/CR-6672 (NRC,2000), which in turn was preceded by the *Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes,*" NUREG-0170.(NRC, 1977).

All of the NRC's *studies mentioned above* have concluded that the risk from radiation emitted from a transportation cask during routine, incident-free transportation is a small fraction of the radiation dose received from the natural background.

NUREG 2125, *Spent Fuel Transportation Risk Assessment,* that (NRC, 2014) *concluded that*:

1. The collective dose risks from routine transportation are very small. These doses are approximately four to five orders of magnitude less than the collective background radiation dose.
2. Radioactive material would not be released in an accident if the fuel is contained in an inner welded canister inside the cask.
3. *Rail* casks without inner welded canisters *could* release radioactive material, and only then in exceptionally severe accidents.
4. If there were an accident during a spent fuel shipment, there is only about one-in-a-billion chance that the accident would result in a release of radioactive material.
5. If there were a release of radioactive material in a spent fuel shipment accident, the dose to the maximally exposed individual (MEI) would be less than 2 Sv (200 rem) and would not result in an acute lethality.

## 4.3 GEOLOGY AND SOILS IMPACTS

*Geoservices advanced 18 boreholes in the CISF Phase I and facilities areas, logging the upper 5 ft as silty sand with caliche (WCS CISF SAR, Attachment E). These borings were all located within an area where Blakeney and Conger soils are inferred by the USDA Soil Survey (ER Figure 4.3-1). Table 3 of the USDA Soil Resources Report lists the percent of soil passing a No. 200 sieve for the Blakeney and Conger soils as ranging from 40 to 75 percent. The Geoservices Report in Appendix B of the SAR lists the material properties from soil samples taken from the upper 5 feet as having 35 to 48 percent passing a No. 200 sieve, which is mostly within range of what is expected for the Blakeney soils according to the USDA Soil Resource Report (ER Attachment 3-2). Previous onsite boring logs (WCS CSIF SAR, Attachment C) where the Blakeney and Conger soils occur (TP-64, TP-84, TP-76, PZ-36, and TP-65) note 1-2 ft of dry, tan sandy silt overlying caliche, which is in agreement with the USDA description of the Blakeney and Conger soils as 0-18 inches of brown, fine sandy loam underlain by white, strongly cemented caliche. Previous onsite boring logs where the Jalmar-Penwell association occurs (PZ-46 and PZ-47) indicate 4 to 6 ft of orangish-tan, well-sorted sand, consistent with the USDA description of Jalmar-Penwell soils as sand to sandy-loam ranging in color from brown to reddish-yellow and extending to depths around 85 inches. There are no onsite borings that verify the characteristics of either the Ratliff or Triomass and Wickett soils which together occupy about 38% of the proposed CISF footprint. Based on the consistency between the USDA and recent and previous onsite boring descriptions, these soils are likely similar to the loam and fine sandy clay loam descriptions in the USDA report.*

Subsurface geologic materials at the CISF site generally consist of competent clay red beds. The clay red beds are covered with about 6.7 to 16 m (22 to 54 ft) of silty sand, sand, sand and gravel, and alluvium that are part of the *Ogallala* and/or Antlers Formation *overlain by the Blackwater Draw Formation.* Foundation conditions at the site are generally good and no potential for mineral development exists or has been found at the site.

The site terrain currently ranges in elevation from 1067, to 1052, m (3520, to 3482, ft) msl, respectively. *The existing proposed CISF area is undeveloped and the land surface is fairly flat with an average slope of 0.8% towards the southeast. The cut and fill activities proposed for the CISF will allow construction and operation of the facility and maintain overall grading and drainage in the same direction as the existing undeveloped area. Excavation and backfill activity will mostly be focused in the 133 acres of the Protected Area. A net volume of approximately 700,000 cubic yards is anticipated to be excavated and stockpiled. The majority of this material (approximately 650,000 cubic yards) will be excavated as a result of site grading. The remaining excavation will be a result of drainage berm and ditch construction, storage pad and building construction, and rail side track construction. Material will be stockpiled at the existing material stockpile northeast of the proposed CISF. Figures 2.26, 2.27, 2.28, 2.29, 2.30, 2.31, 2.32, and 2.33 of Chapter 2, "Site Characteristics," of the Safety Analysis Report (ISP 2019) show plans and profiles for the extent of excavation and backfill as part of construction and final grading.*

RAI GS-2

RAI GS-1

Surface storm water runoff for the permanent facility would be controlled by an engineered drainage system. Those controls would essentially eliminate any potential for significant discharge of runoff from the CISF site. Construction activities may cause some short-term increases in soil erosion at the site, although rainfall in the region is limited. Erosional impacts due to site clearing and grading would be mitigated by utilization of construction and erosion control BMPs *as detailed in Section 4.1 of the ER*. Disturbed soils would be stabilized as part of construction work. Earth berms, dikes, and sediment fences would be utilized as necessary during all phases of construction to limit runoff.

CISF construction and operation will require minimal disturbance to the subsurface and should be limited to the upper 3 m (10 ft). Construction and operation activities being limited to the upper 3 m (10 ft) will create little disruption to the subsurface and should not produce any induced seismic activity or affect subsurface faults in a way that may result in the accidental discharge of radioactive materials or other contaminants into the groundwater table and surrounding areas. *Effects of the site grading and excavation on stratigraphy will involve removal of the cover sands and part of the Blackwater Draw caliche.*

RAI GS-2

Much of the excavated areas would be covered by structures or paved, limiting the creation of new dust sources. Watering would be used to control potentially fugitive construction dust. Water conservation would be considered when deciding how often dust suppression sprays would be applied. The Andrews County Soils Survey describes soils found at the CISF site as

- TPDES General Permit for Construction Storm Water: Because construction of the CISF would involve the disturbance of no more than 40 ha (100 acres) of land, a TPDES Construction General Permit from the TCEQ and an oversight review by the EPA Region 6 is required. ISP would develop a SWPPP and file a NOI with the TCEQ in Austin, TX prior to the commencement of construction activities.

RAI WR-1

- Section 401 Certification: Under Section 401 of the federal Clean Water Act, states can review and approve, approve with conditions, or deny all federal permits or licenses that might result in a discharge to State waters, including wetlands. A 401 certification confirms compliance with the State water quality standards. Activities that require a 401 certification include Section 404 permits issued by the U. S. Army Corps of Engineers (USACE). The State of Texas has a cooperative agreement and joint application process with the USACE relating to 404 permits and 401 certifications. By letter dated *June 24, 2019*, the USACE notified ISP joint venture member Waste Control Specialists of its determination that there are no USACE jurisdictional waters at the Waste Control Specialists site *or the proposed CISF* and for this reason the project does not require a 404 permit. As a result, a Section 401 certification is not required.

RAI WR-4

Collection and discharge of storm water runoff would be directed to the natural drainage network. The overall site would be graded to match the existing natural drainage and to prevent standing water at the CISF. The storm water runoff would be directed away from the facility and toward *existing drainage patterns. A detailed site-specific topographic map with 1 ft contour intervals based on aerial survey flown May 29, 2014 is provided in Figure 4.4-1. The map illustrates the proposed CISF and the specific location of the surface water drainage divide between the Rio Grande (Pecos Valley) and Colorado River Basins and confirms the proposed CISF location is entirely within the Rio Grande River Basin. See the CISF Drainage Evaluation and Floodplain Analysis in SAR Chapter 2 Attachment B regarding runoff and drainage.*

Industrial construction at the CISF site would create a short-term risk with regard to a variety of operations and constituents used in construction activities. BMPs would assure storm water runoff related to construction activities would be detained prior to release to the surrounding land surface. BMPs would also be used for dust control associated with excavation and fill operations during construction. Impact from storm water runoff generated during plant operations is not expected to differ substantially from impacts currently experienced at the site. The water quality of the discharge from the site storm water would be typical of runoff from building roofs and paved areas from any industrial facility. Except for small amounts of oil and grease typically found in runoff from paved roadways and parking areas, the discharge is not expected to contain contaminants.

Other potential sources for runoff contamination during plant operation include the cask storage pad containing SNF and associated components. This pad is a potential source of low-level radioactivity that could enter runoff, though such an occurrence is highly unlikely. The storage system design and construction, along with environmental monitoring of the storage pad, combine to make the potential for contaminant release through this system extremely low. An initial analysis of maximum potential levels of radioactivity in rainwater runoff due to surface contamination of the dry casks shows that any potential levels of radioactivity in discharges would be well below (two orders of magnitude or more) the effluent discharge limits of 10 CFR Part 20, Appendix B.

During construction and operation of the proposed WCS CISF, potable water will be supplied by *the* existing potable water system at ISP joint venture member Waste Control Specialists. *The Waste Control Specialists potable water system is supplied with water by Eunice, New Mexico via pipeline. Construction and operation of the proposed WCS CISF will not use potable groundwater resources from the Waste Control Specialists property and will not have any impact on groundwater resources at the Waste Control Specialists property, since the potable water is supplied by Eunice, NM. The total gallons of potable water supplied to ISP partner Waste Control Specialists by Eunice, NM for the neighboring Waste Control Specialists facilities for the years 2014 to 2018 ranged from 882,815 gallons (2016) up to 3,631,508 gallons (2018). The increase in 2018 was due to the expansion of the Waste Control Specialists landfill facilities. For construction and operation of the proposed WCS CISF, the potable water usage is expected to be minimal. Water needs during construction (5,000 gallons/day) and operation (1,800 gallons/day) of the WCS CISF are conservative. During operation, water usage would be similar to a light industrial facility with 24-hour a day security personnel. Highest water demand is associated with dust suppression and increased personnel during initial construction. Construction and operation of the WCS CISF will have little measurable off-site effects on water quality or levels from the City of Eunice.* There *is no permanent* surface water in the vicinity of the proposed CISF. The closest surface water conveyance is *Monument* Draw, New Mexico, *which is* located approximately 3 miles from the proposed WCS CISF. No adverse impacts to *groundwater or* surface water are anticipated during construction and operation of the proposed WCS CISF.


All Indicated Changes are in response to RAI WR-9

#### 4.5.1.4 Ecological Impacts of "Alternative Sites" Alternative

As described in Chapter 2, the alternative sites are three proposed away from reactor ISFSIs located in: Lea County, New Mexico; Eddy County, New Mexico; and Loving County, Texas. Due to the alternative sites close geographical proximity, comparable ecological resources, and necessary analogous design components, with respect to the WCS CISF, the level of ecological impact of each should be essentially the same as that of the WCS CISF, which is small. The proposed Lea County facility's ecology, like the WCS CISF's, is highly comparable to that of the URENCO NEF. The NEF was extensively studied during its NRC licensing process. The Eddy County Facility is adjacent to the DOE's WIPP and was the subject of virtually unparalleled intense study during its regulatory review and authorization process. Though little is known of the Loving County site, the potential for variance in ecological impact of any significance between it and the WCS CISF can be expected to be small due to the homologous nature of the ecosystems and facility functions.

### 4.5.2 Documentation of Consultations with Agencies on Impacts to Species and Habitat

Consultation was initiated with all appropriate federal and state agencies. Consultation Documents are presented in Attachment 3-3.

### 4.5.3 Proposed Schedule of Activities

Design, licensing and construction of phase one of the CISF is scheduled for a five-year period from 2015 through 2020. Construction of the phase 1 storage pad and the site infrastructure would begin in the second half of 2019 and be completed by the end of 2020. Operations at the phase 1 storage pad would commence in early 2021. Subsequent phases 2 through 8 could be constructed thereafter continuously from 2021 to 2040; each phase will require approximately 2.5 years for construction and startup. The facility could operate from 2021 to 2059. Decommissioning and closure would require 2 years. *It is noted that the proposed schedule of activities outlined above is contingent on issuance of the Part 72 license for the WCS CISF and will therefore be adjusted based on the actual license issuance. However, the durations used in the evaluations and results included in this ER remain the same, only the start and subsequent dates move with the license issuance date.*

It is possible that the license will be renewed for an additional 20-year period. In that event, the operating lifetime of the facility could be extended to 2076. Decommissioning and closure could be completed in 2078.

### 4.5.4 Land Clearing and Area of Disturbance

The land to be cleared is the land within the CISF Owner Controlled Area as depicted in Figure 4.5-1. The total area of land to be disturbed is approximately *133.4 ha (330 acres)*. This area includes *1.6 ha (4 acres)* that will be used for contractor parking and lay-down areas. The ecological impacts of this land disturbance are expected to be small given the CISF area size, especially in relation to the vast amount of uninhabited and undisturbed land found throughout the region. The contractor lay-down and parking area will be restored after completion of plant construction. The CISF consists entirely of an upland area with no streams, ponds or other water environments to be cleared. There are no waste disposal areas present at the CISF.

### 4.5.5 Area of Disturbance by Habitat Type

The proposed CISF consists of one primary vegetation community type. The Plains-Mesa Sand Scrub vegetation community is identified by the dominant presence of deep sand tolerant and deep sand adapted plants. The Plains-Mesa Sand Scrub vegetation community is common in parts of the southeastern high plains. The density of specific plant species, quantified by individuals per acre, varies slightly across the proposed site. Differences in the composition of the vegetation community within the proposed site are accounted for by slight variations in soil texture and structure and small changes in aspect.

The Plains-Mesa Sand Scrub vegetation community is interrupted by a couple of access roads through the proposed CISF. These roads are devoid of vegetation. This area represents a small fraction of the total area and is not considered a habitat type. The majority of the proposed site is suitable for use by wildlife resources. The Plains-Mesa Sand Scrub provides potential habitat for an assortment of birds, mammals, and reptiles. The total area of disturbance proposed for the proposed CISF is approximately *133.4 ha (330 acres)* of the 5,668 ha (14,000 acres) ISP joint venture member Waste Control Specialists property. The disturbance would have a small impact on the Plains-Mesa Sand Scrub biota due to CISF construction, operations, and decommissioning.

### 4.5.6 Maintenance Practices

Roadway maintenance will be employed during the construction and operations and decommissioning of the CISF. However, because road maintenance is currently being employed along the existing access roads, this will not represent a substantial new impact to biota. The impacts to biota from maintenance practices during CISF construction, operations, and decommissioning will be small.

Maintenance practices, roadway maintenance, and clearing practices will be employed both during construction and plant operation. Herbicides may be used in limited amounts according to government regulations and manufacturer's instructions to control unwanted noxious vegetation during construction or operation of the facility. However, none of the practices are anticipated to permanently affect biota.

Brush clearing will be employed during construction of the CISF. The additional noise, dust, and other factors associated with the clearing will be short-lived in duration and will represent only a temporary impact to the biota of the CISF. Because *133.4 ha (330 acres)* in the owner controlled area of the 5,668 ha (14,000 acres) Waste Control Specialists property will be disturbed, biota will have an opportunity to move to undisturbed areas within the site as well as additional areas of suitable habitat bordering the site. Additionally, during operations, natural, low water consumption landscaping will be used and maintained.

### 4.5.7 Short Term Use Areas and Plans for Restoration

All areas to be used on a short-term basis during construction, including contractor parking and lay-down areas, will be limited to approximately *1.6 ha (4 acres)*. These areas will be re-vegetated with native plant species and other natural, low water consumption landscaping to control erosion upon completion of site construction and returned as close as possible to original conditions. Lay-down (short term use areas) will be selected to minimize the impacts to local vegetation and ensure that any adverse ecological impacts are as small as possible.

### 4.5.8 Activities Expected to Impact Sensitive Communities or Habitats

No communities or habitats that have been defined as rare or unique or that support threatened and endangered species have been identified on the CISF. Thus, proposed activities are not expected to impact communities or habitats defined as rare or unique or that support threatened and endangered species within the *133.4 ha (330 acres)*.

Dune formations in combination with the Plains Sand Scrub vegetation community at the WCS CISF site have the potential to provide habitat for the sand dune lizard (*Sceloporus arenicolus*). Some dune formations are adjacent to the proposed area of disturbance. Surveys were conducted at the WCS CISF site in 2004 and at the NEF site in October 2003 and June 2004 to detect the presence of the sand dune lizard. No individuals were identified during the surveys and, although the area has some components of sand dune lizard habitat, various factors make it unsuitable. The closest known sand dune lizard population was approximately 4.8 km (3 mi) north of the NEF site. Areas to the west, south, and east of the site do not appear to have suitable habitat for the sand dune lizard within 16 to 32 km (10 to 20 mi).

In the general region of the CISF, there are several thousand acres of sand dune formation that would not be impacted by the project. Although black-tailed prairie dogs (*Cyonomys ludovicianus*) have expanded their range into shinnery oak and other grass-shrub habitats, they usually establish colonies in short grass vegetation types. The predominant vegetation type, Plains Sand Scrub, on the CISF is not optimal prairie dog habitat due to high-density shrubs. There have been no recorded sightings of black-tailed prairie dogs, active or inactive prairie dog mounds/burrows, or any other evidence, such as trimming of the various shrub species, at the CISF.

The Texas horned lizard is vulnerable to construction activities that could result in a direct loss of breeding habitat. Because the species has adapted to areas of human activities such as overgrazed pastures, plowed fields, and fencerows, it could potentially be present during the CISF operations phase. Decommissioning activities could have similar impacts on the lizard as the construction phase.

#### 4.5.9 Impacts of Elevated Construction Equipment or Structures

The construction of new towers can create a potential impact on migratory birds, especially night-migrating species. Some of the species affected are also protected under the Endangered Species Act and the Bald and Golden Eagle Act. However, the estimate of the potential impacts of elevated construction equipment or structures on species is extremely low for the CISF.

RAI PA-1

#### 4.5.12 Special Maintenance Practices Used in Important Habitats

No important habitats (e.g., marshes, natural areas, bogs) have been identified within the *133.4 ha (330 acres)* CISF. Therefore, no special maintenance practices are proposed.

#### 4.5.13 Wildlife Management Practices

Several best management practices to limit or minimize impacts to existing wildlife habitat in association with the CISF will be included. These best management practices include:

- Use of design and BMPs to minimize the construction footprint to the extent possible
- Site stabilization practices to reduce the potential for erosion and sedimentation
- When possible, leave open areas undisturbed, including areas of native grasses and shrubs for the benefit of wildlife
- The use of native plant species to re-vegetate disturbed areas to enhance wildlife habitat

#### 4.5.14 Practices and Procedures to Minimize Adverse Impacts

Several practices and procedures have been designed to minimize adverse impacts to the ecological resources of the proposed CISF. These practices and procedures include the use of BMPs, minimizing the construction footprint to the extent possible, avoiding all direct discharge (including storm water) to any waters of the U. S., the protection of all undisturbed naturalized areas, and site stabilization practices to reduce the potential for erosion and sedimentation. The use of native plant species to re-vegetate disturbed areas will enhance and maximize the opportunity for native wildlife habitat to be reestablished at the site.

RAI AQ-4

### 4.6 AIR QUALITY IMPACTS

*The greatest expected air quality impacts would be attributed to products of combustion from construction and earthmoving equipment and fugitive dust involved in site preparation and construction. Air quality impacts from construction site preparation for the proposed CISF were evaluated using AERMOD version 15181 to determine hourly impacts and emission rates quantified for these sources. Emission rates for products of combustion and fugitive dust were calculated using emission factors provided in AP-42, the EPA's Compilation of Air Pollutant Emission Factors (EPA, 1995), and the most recent emissions standards from the EPA with regard to on-road and non-road engines. Emission rates for construction activities were estimated for a 10-hour workday assuming peak construction activity levels were maintained for* *approximately eight months of the year. The calculated impacts of emissions of products of combustion and fugitive dust are compared to the National Ambient Air Quality Standards (NAAQS) and are presented in Table 4.6-1 and Table 4.6-2 for construction activities and Table 4.6-3 for operations activities.*

*Fugitive dust emissions were estimated using an AP-42 emission factor for construction site preparation that was adjusted to account for dust suppression measures (per TCEQ's Rock Crushing Plant Emission Calculation Workbook) and the fraction of total suspended particulate that is expected to be in the range of particulates less than or equal to 10 micrometers ($PM_{10}$) in diameter and 2.5 micrometers ($PM_{2.5}$) in diameter. Emissions were modeled as a point source for engines and a series of volume sources for fugitive dust with emissions occurring 10 hours per day, 5 days per week, and 34.5 weeks per year. Emissions of criteria pollutants from construction activities are below the NAAQS.*

*Construction and operation emissions lifetime totals are shown in Table 4.6-4.*

*Air quality impacts are expected to be highest during phase 1 of construction, with subsequent phases of construction having less emissions. Operational emissions would be intermittent and would not be expected to contribute to an exceedance of any ambient air quality standard, as shown in Table 4.6-3. Visibility impacts during construction would be minimal and water spray dust suppressants would be used to help minimize visibility impacts. During operation, there are no anticipated visibility impacts. The proposed CISF would be designed and constructed in a manner that would minimize the quantity of radioactive wastes and contaminated equipment, and facilitate the removal of radioactive wastes and contaminated materials at the time the proposed CISF is permanently decommissioned pursuant to 10 CFR 72.130, Criteria for decommissioning. At the time of license termination, the site would be released for unrestricted use in accordance with 10 CFR 20, Subpart E, and the site would be abandoned in place. Therefore, the impact to air quality during decommissioning would be negligible, if any at all.*

**Table 4.6-1**
**NAAQS Compliance Demonstration – Phase 1**

(6 pages)

### 1-Hour NO2, SO2, and CO NAAQS

| Phase | Emissions Source | 1-hr NOx Emission Rate (lb/hr) | 1-hr SO2 Emission Rate (lb/hr) | 1-hr CO Emission Rate (lb/hr) | NO2* AERMOD 1-hour Unit Impact ([μg/m³]/[lb/hr]) | NO2** Background Concentration (μg/m³) | NO2 Total Impact (μg/m³) | 1-hour SIL (μg/m³) | Meets SIL? | 1-hour NAAQS (μg/m³) | Meets NAAQS? | SO2 AERMOD 1-hour Unit Impact ([μg/m³]/[lb/hr]) | SO2*** Background Concentration (μg/m³) | SO2 Total Impact (μg/m³) | 1-hour SIL (μg/m³) | Meets SIL? | 1-hour NAAQS (μg/m³) | Meets NAAQS? | CO AERMOD 1-hour Unit Impact ([μg/m³]/[lb/hr]) | CO**** Background Concentration (μg/m³) | CO Total Impact (μg/m³) | 1-hour SIL (μg/m³) | Meets SIL? | 1-hour NAAQS (μg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Earthwork | Heavy Haul Truck | 0.62 | 2.87 | 9.35 | 3.73 | | 2.30 | | | | | 4.15 | | 11.91 | | | | | 4.15 | | 38.79 | | | | |
| | Earth Mover | 5.75 | 2.05 | 6.68 | 2.73 | | 15.72 | | | | | 3.04 | | 6.22 | | | | | 3.04 | | 20.28 | | | | |
| | | | | | | **Total** | **18.02** | | | | | | | **18.13** | | | | | | | **59.07** | | | | |
| Cask Bldg | Pump Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| | Ready Mix Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| | Construction Equipment | 4.60 | 1.64 | 5.34 | 3.29 | | 15.14 | | | | | 3.65 | | 5.99 | | | | | 3.65 | | 19.53 | | | | |
| | Earth Mover | 2.88 | 1.03 | 3.34 | 2.73 | | 7.86 | | | | | 3.04 | | 3.11 | | | | | 3.04 | | 10.14 | | | | |
| | | | | | | **Total** | **16.30** | | | | | | | **11.99** | | | | | | | **39.06** | | | | |
| Admin Bldg | Pump Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| | Ready Mix Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| | Construction Equipment | 4.60 | 1.64 | 5.34 | 3.29 | | 15.14 | | | | | 3.65 | | 5.99 | | | | | 3.65 | | 19.53 | | | | |
| | Earth Mover | 2.88 | 1.03 | 3.34 | 2.73 | | 7.86 | | | | | 3.04 | | 3.11 | | | | | 3.04 | | 10.14 | | | | |
| | | | | | | **Total** | **16.30** | | | | | | | **11.99** | | | | | | | **39.06** | | | | |
| SNF Pad | Pump Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| | Ready Mix Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| | Earth Mover | 5.75 | 2.05 | 6.68 | 2.73 | | 15.72 | | | | | 3.04 | | 6.22 | | | | | 3.04 | | 20.28 | | | | |
| | | | | | | **Total** | **16.88** | | | | | | | **12.22** | | | | | | | **39.81** | | | | |
| Protected | Heavy Haul Truck | 0.15 | 0.72 | 2.34 | 3.73 | | 0.57 | | | | | 4.15 | | 2.98 | | | | | 4.15 | | 9.70 | | | | |
| Area | Earth Mover | 5.75 | 2.05 | 6.68 | 2.73 | | 15.72 | | | | | 3.04 | | 6.22 | | | | | 3.04 | | 20.28 | | | | |
| | | | | | | **Total** | **16.29** | | | | | | | **9.20** | | | | | | | **29.97** | | | | |
| **Total******* | | | | | | **26.2** | **33.17** | **7.50** | **NO** | **188** | **YES** | | **22.80** | **23.98** | **7.80** | **NO** | **196** | **YES** | | **343.60** | **78.13** | **2,000** | **YES** | **40,000** | **YES** |

NOTES:
*AERMOD ARM2 NOx/NO2 method used to determine 1-hour unit impact.
**Based on 1-hour NO2 readings of monitoring data - TCEQ El Paso Ascarate Park SE Ambient Monitoring Station, monthly maximum, August 2019
***Based on 1-hour SO2 readings of monitoring data - TCEQ Big Spring Midway Ambient Monitoring Station, monthly average, August 2019
****Based on 1-hour CO readings of monitoring data - TCEQ El Paso Ojo De Agua Ambient Monitoring Station, monthly maximum, August 2019
*****Impacts take into account the maximum of General Earthwork, the sum of Cask and Admin Building operations, and the sum of SNF Pad and Protected Area construction, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-1**
**NAAQS Compliance Demonstration - Phase 1**

(6 pages)

### 3-Hour SO2 NAAQS

| Phase | Emissions Source | 1-hr SO2 Emission Rate (lb/hr) | SO2 3-hr Unit Impact ([μg/m³]/[lb/hr]) | Background Concentration* | Total Impact (μg/m³) | 3-hour SIL (μg/m³) | Meets SIL? | 3-Hour NAAQS (μg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| Earthwork | Heavy Haul Truck | 2.87 | 2.42 | | 6.95 | | | | |
| | Earth Mover | 2.05 | 2.05 | | 4.20 | | | | |
| | | | | **Total** | **11.15** | | | | |
| Cask Bldg | Pump Truck | 0.82 | 2.29 | | 1.88 | | | | |
| | Ready Mix Truck | 0.82 | 2.29 | | 1.88 | | | | |
| | Construction Equipment | 1.64 | 2.29 | | 3.76 | | | | |
| | Earth Mover | 1.03 | 2.05 | | 2.10 | | | | |
| | | | | **Total** | **7.52** | | | | |
| Admin Bldg | Pump Truck | 0.82 | 2.29 | | 1.88 | | | | |
| | Ready Mix Truck | 0.82 | 2.29 | | 1.88 | | | | |
| | Construction Equipment | 1.64 | 2.29 | | 3.76 | | | | |
| | Earth Mover | 1.03 | 2.05 | | 2.10 | | | | |
| | | | | **Total** | **7.52** | | | | |
| SNF Pad | Pump Truck | 0.82 | 2.29 | | 1.88 | | | | |
| | Ready Mix Truck | 0.82 | 2.29 | | 1.88 | | | | |
| | Earth Mover | 2.05 | 2.05 | | 4.20 | | | | |
| | | | | **Total** | **7.97** | | | | |
| Protected | Heavy Haul Truck | 0.72 | 2.42 | | 1.74 | | | | |
| Area | Earth Mover | 2.05 | 2.05 | | 4.20 | | | | |
| | | | | **Total** | **5.94** | | | | |
| **Total**** | | | | **22.8** | **15.05** | **25.00** | **YES** | **1,300** | **YES** |

NOTES:
*Based on 1-hour SO2 readings of monitoring data - TCEQ Big Spring Midway Ambient Monitoring Station, monthly average, August 2019
**Impacts take into account the maximum of General Earthwork, the sum of Cask and Admin Building operations, and the sum of SNF Pad and Protected Area construction, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-1**
**NAAQS Compliance Demonstration - Phase 1**

(6 pages)

**8-Hour CO NAAQS**

| Phase | Emissions Source | 1-hr CO Emission Rate (lb/hr) | CO 8-hr Unit Impact ([μg/m³]/[lb/hr]) | Background Concentration* | Total Impact (μg/m³) | 8-hour SIL (μg/m³) | Meets SIL? | 8-hr NAAQS (μg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| Earthwork | Heavy Haul Truck | 9.35 | 1.46 | | 13.70 | | | | |
| | Earth Mover | 6.68 | 1.42 | | 9.48 | | | | |
| | | | | **Total** | **23.18** | | | | |
| Cask Bldg | Pump Truck | 2.67 | 1.43 | | 3.83 | | | | |
| | Ready Mix Truck | 2.67 | 1.43 | | 3.83 | | | | |
| | Construction Equipment | 5.34 | 1.43 | | 7.66 | | | | |
| | Earth Mover | 3.34 | 1.42 | | 4.74 | | | | |
| | | | | **Total** | **15.32** | | | | |
| Admin Bldg | Pump Truck | 2.67 | 1.43 | | 3.83 | | | | |
| | Ready Mix Truck | 2.67 | 1.43 | | 3.83 | | | | |
| | Construction Equipment | 5.34 | 1.43 | | 7.66 | | | | |
| | Earth Mover | 3.34 | 1.42 | | 4.74 | | | | |
| | | | | **Total** | **15.32** | | | | |
| SNF Pad | Pump Truck | 2.67 | 1.43 | | 3.83 | | | | |
| | Ready Mix Truck | 2.67 | 1.43 | | 3.83 | | | | |
| | Earth Mover | 6.68 | 1.42 | | 9.48 | | | | |
| | | | | **Total** | **17.14** | | | | |
| Protected | Heavy Haul Truck | 2.34 | 1.46 | | 3.42 | | | | |
| Area | Earth Mover | 6.68 | 1.42 | | 9.48 | | | | |
| | | | | **Total** | **12.91** | | | | |
| **Total**** | | | | **343.60** | **30.63** | **500.00** | **YES** | **10,000** | **YES** |

NOTES:
*Based on 1-hour CO readings of monitoring data - TCEQ El Paso Ojo De Agua Ambient Monitoring Station, monthly maximum, August 2019
**Impacts take into account the maximum of General Earthwork, the sum of Cask and Admin Building operations, and the sum of SNF Pad and Protected Area construction, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-1**
**NAAQS Compliance Demonstration - Phase 1**

(6 pages)

**24-Hour PM2.5 NAAQS**

| Phase | Emissions Source | 1-hr PM2.5 Emission Rate (lb/hr) | PM2.5 24-hr Unit Impact ([μg/m³]/[lb/hr]) | Background Concentration* | Total Impact (μg/m³) | 24-hour SIL (μg/m³) | Meets SIL? | 24-Hour NAAQS (μg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| Earthwork | Heavy Haul Truck | 0.03 | 0.78 | | 0.02 | | | | |
| | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.07** | | | | |
| Cask Bldg | Pump Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Construction Equipment | 0.05 | 0.78 | | 0.04 | | | | |
| | Earth Mover | 0.03 | 0.75 | | 0.02 | | | | |
| | | | | **Total** | **0.08** | | | | |
| Admin Bldg | Pump Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Construction Equipment | 0.05 | 0.78 | | 0.04 | | | | |
| | Earth Mover | 0.03 | 0.75 | | 0.02 | | | | |
| | | | | **Total** | **0.08** | | | | |
| SNF Pad | Pump Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.06** | | | | |
| Protected | Heavy Haul Truck | 0.01 | 0.78 | | 0.01 | | | | |
| Area | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.06** | | | | |
| General | Excavation | 0.18 | 0.66 | | 0.12 | | | | |
| **Earthmoving** | | | | **Total** | **0.12** | | | | |
| **Total**** | | | | **7.6** | **0.47** | **1.20** | **YES** | **35** | **YES** |

NOTES:
*Based on PM2.5 readings of monitoring data - TCEQ Socorro Hueco Ambient Monitoring Station, monthly average, August 2019
**Impacts take into account the maximum of General Earthwork, the sum of Cask and Admin Building operations, and the sum of SNF Pad and Protected Area construction, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-1**
**NAAQS Compliance Demonstration - Phase 1**

(6 pages)

**24-Hour PM10 NAAQS**

| Phase | Emissions Source | 1-hr PM10 Emission Rate (lb/hr) | PM10 24-hr Unit Impact ([μg/m³]/[lb/hr]) | Background Concentration* | Total Impact (μg/m³) | 24-hour SIL (μg/m³) | Meets SIL? | 24-Hour NAAQS (μg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| Earthwork | Heavy Haul Truck | 0.03 | 0.78 | | 0.02 | | | | |
| | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.07** | | | | |
| Cask Bldg | Pump Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Construction Equipment | 0.05 | 0.78 | | 0.04 | | | | |
| | Earth Mover | 0.03 | 0.75 | | 0.02 | | | | |
| | | | | **Total** | **0.05** | | | | |
| Admin Bldg | Pump Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Construction Equipment | 0.05 | 0.78 | | 0.04 | | | | |
| | Earth Mover | 0.03 | 0.75 | | 0.02 | | | | |
| | | | | **Total** | **0.05** | | | | |
| SNF Pad | Pump Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.06** | | | | |
| Protected | Heavy Haul Truck | 0.01 | 0.78 | | 0.01 | | | | |
| Area | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.06** | | | | |
| General | Excavation | 3.20 | 0.33 | | 1.05 | | | | |
| **Earthmoving** | | | | **Total** | **1.05** | | | | |
| **Total**** | | | | **20** | **1.28** | **5.00** | **YES** | **150** | **YES** |

NOTES:
*Based on PM10 readings of monitoring data - TCEQ El Paso Riverside Ambient Monitoring Station, monthly average, March 2019
**Impacts take into account the maximum of General Earthwork, the sum of Cask and Admin Building operations, and the sum of SNF Pad and Protected Area construction, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-1**
**NAAQS Compliance Demonstration - Phase 1**

*(6 pages)*

**Annual NO2 and PM2.5 NAAQS**

| Phase | Emissions Source | 1-hr NOx Emission Rate (lb/hr) | NO2 Annual Unit Impact ([µg/m³]/[lb/hr]) | Background* Concentration (µg/m³) | Annual** Impact Ratio (1,725 hours) | Total Annual Impact (µg/m³) | Annual SIL (µg/m³) | Meets SIL? | Annual NAAQS (µg/m³) | Meets NAAQS? | 1-hr PM2.5 Emission Rate (lb/hr) | PM2.5 Annual Unit Impact ([µg/m³]/[lb/hr]) | Background* Concentration (µg/m³) | Annual** Impact Ratio (1,725 hours) | Total Annual Impact (µg/m³) | Annual SIL (µg/m³) | Meets SIL? | Annual NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Earthwork | Heavy Haul Truck | 0.62 | 0.26 | | 0.20 | 0.03 | | | | | 0.03 | 0.28 | | 0.20 | 0.00 | | | | |
| | Earth Mover | 5.75 | 0.24 | | 0.20 | 0.27 | | | | | 0.07 | 0.27 | | 0.20 | 0.00 | | | | |
| | | | | | **Total:** | **0.31** | | | | | | | | **Total:** | **0.01** | | | | |
| Cask Bldg | Pump Truck | 0.18 | 0.25 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 0.00 | | | | |
| | Ready Mix Truck | 0.18 | 0.25 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 0.00 | | | | |
| | Construction Equipment | 4.60 | 0.25 | | 0.20 | 0.23 | | | | | 0.05 | 0.28 | | 0.20 | 0.00 | | | | |
| | Earth Mover | 2.88 | 0.24 | | 0.20 | 0.14 | | | | | 0.03 | 0.27 | | 0.20 | 0.00 | | | | |
| | | | | | **Total:** | **0.38** | | | | | | | | **Total:** | **0.01** | | | | |
| Admin Bldg | Pump Truck | 0.18 | 0.25 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 0.00 | | | | |
| | Ready Mix Truck | 0.18 | 0.25 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 0.00 | | | | |
| | Construction Equipment | 4.60 | 0.25 | | 0.20 | 0.23 | | | | | 0.05 | 0.28 | | 0.20 | 0.00 | | | | |
| | Earth Mover | 2.88 | 0.24 | | 0.20 | 0.14 | | | | | 0.03 | 0.27 | | 0.20 | 0.00 | | | | |
| | | | | | **Total:** | **0.38** | | | | | | | | **Total:** | **0.01** | | | | |
| SNF Pad | Pump Truck | 0.18 | 0.25 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 0.00 | | | | |
| | Ready Mix Truck | 0.18 | 0.25 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 0.00 | | | | |
| | Earth Mover | 5.75 | 0.24 | | 0.20 | 0.27 | | | | | 0.07 | 0.27 | | 0.20 | 0.00 | | | | |
| | | | | | **Total:** | **0.29** | | | | | | | | **Total:** | **4.46E-03** | | | | |
| Protected | Heavy Haul Truck | 0.15 | 0.26 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 0.00 | | | | |
| Area | Earth Mover | 5.75 | 0.24 | | 0.20 | 0.27 | | | | | 0.07 | 0.27 | | 0.20 | 0.00 | | | | |
| | | | | | **Total:** | **0.28** | | | | | | | | **Total:** | **3.92E-03** | | | | |
| General | Excavation | | | | | | | | | | 0.18 | 10.10 | | 0.20 | 0.36 | | | | |
| Earthmoving | | | | | | | | | | | | | | **Total:** | **0.36** | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **Total** | | | | **26.2** | | **1.65** | **1.00** | **NO** | **100** | **YES** | | | **7.6** | | **0.39** | **0.20** | **NO** | **15** | **YES** |

NOTES:
*Background concentrations for annual compliance have been conservatively assumed to be equal to be the same as those of shorter averaging periods.
**Annual hours of operation are a total of 1,725 hours based on 10 hours per day, 5 days per week, 34.5 weeks of operations.  This has been ratioed against 8,760 hours to determine the most appropriate annual impact.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-2**
**NAAQS Compliance Demonstration - Phases 2-8 and Operations**

(5 Pages)

## 1-Hour NO2, SO2, and CO NAAQS

| Phase | Emissions Source | 1-hr NOx Emission Rate (lb/hr) | 1-hr SO2 Emission Rate (lb/hr) | 1-hr CO Emission Rate (lb/hr) | NO2* AERMOD 1-hour Unit Impact ([μg/m³]/[lb/hr]) | NO2** Background Concentration (μg/m³) | NO2 Total Impact (μg/m³) | 1-hour SIL (μg/m³) | Meets SIL? | 1-hour NAAQS (μg/m³) | Meets NAAQS? | SO2 AERMOD 1-hour Unit Impact ([μg/m³]/[lb/hr]) | SO2*** Background Concentration (μg/m³) | SO2 Total Impact (μg/m³) | 1-hour SIL (μg/m³) | Meets SIL? | 1-hour NAAQS (μg/m³) | Meets NAAQS? | CO AERMOD 1-hour Unit Impact ([μg/m³]/[lb/hr]) | CO**** Background Concentration (μg/m³) | CO Total Impact (μg/m³) | 1-hour SIL (μg/m³) | Meets SIL? | 1-hour NAAQS (μg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SNF Pad | Pump Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| | Ready Mix Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| | Earth Mover | 5.75 | 2.05 | 6.68 | 2.73 | | 15.72 | | | | | 3.04 | | 6.22 | | | | | 3.04 | | 20.28 | | | | |
| | | | | | | **Total** | **16.88** | | | | | | | **12.22** | | | | | | | **39.81** | | | | |
| Protected | Heavy Haul Truck | 0.15 | 0.72 | 2.34 | 3.73 | | 0.57 | | | | | 4.15 | | 2.98 | | | | | 4.15 | | 9.70 | | | | |
| Area | Earth Mover | 5.75 | 2.05 | 6.68 | 2.73 | | 15.72 | | | | | 3.04 | | 6.22 | | | | | 3.04 | | 20.28 | | | | |
| | | | | | | **Total** | **16.29** | | | | | | | **9.20** | | | | | | | **29.97** | | | | |
| Storage Module | Ready Mix Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.65 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| **Construction** | | | | | | **Total** | **0.58** | | | | | | | **3.00** | | | | | | | **9.77** | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| Storage Module | Module Transporter | 2.01 | 0.72 | 2.34 | 3.73 | | 7.52 | | | | | 4.15 | | 2.98 | | | | | 4.15 | | 9.70 | | | | |
| **Transport** | | | | | | **Total** | **7.52** | | | | | | | **2.98** | | | | | | | **9.70** | | | | |
| **Total******* | | | | | | **26.2** | **33.17** | **7.50** | **NO** | **188** | **YES** | | **22.80** | **21.41** | **7.80** | **NO** | **196** | **YES** | | **343.60** | **69.78** | **2,000** | **YES** | **40,000** | **YES** |

NOTES:
*AERMOD ARM2 NOx/NO2 method used to determine 1-hour unit impact.
**Based on 1-hour NO2 readings of monitoring data - TCEQ El Paso Ascarate Park SE Ambient Monitoring Station, monthly maximum, August 2019
***Based on 1-hour SO2 readings of monitoring data - TCEQ Big Spring Midway Ambient Monitoring Station, monthly average, August 2019
****Based on 1-hour CO readings of monitoring data - TCEQ El Paso Ojo De Agua Ambient Monitoring Station, monthly maximum, August 2019
*****Impacts take into account the maximum of the sum of the sum of SNF Pad and Protected Area construction and the sum of Storage Module Construction and Transport emissions, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-2**
**NAAQS Compliance Demonstration - Phases 2-8 and Operations**
(5 Pages)

### 3-Hour SO2 NAAQS

| Phase | Emissions Source | 1-hr SO2 Emission Rate (lb/hr) | SO2 3-hr Unit Impact ([µg/m³]/[lb/hr]) | Background Concentration* | Total Impact (µg/m³) | 3-hour SIL (µg/m³) | Meets SIL? | 3-Hour NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| SNF Pad | Pump Truck | 0.82 | 2.29 | | 1.88 | | | | |
| | Ready Mix Truck | 0.82 | 2.29 | | 1.88 | | | | |
| | Earth Mover | 2.05 | 2.05 | | 4.20 | | | | |
| | | | | **Total** | **7.97** | | | | |
| Protected | Heavy Haul Truck | 0.72 | 2.42 | | 1.74 | | | | |
| Area | Earth Mover | 2.05 | 2.05 | | 4.20 | | | | |
| | | | | **Total** | **5.94** | | | | |
| Storage Module | Ready Mix Truck | 0.82 | 2.29 | | 1.88 | | | | |
| **Construction** | | | | **Total** | **1.88** | | | | |
| | | | | | | | | | |
| Storage Module | Module Transporter | 0.72 | 2.42 | | 1.74 | | | | |
| **Transport** | | | | **Total** | **1.74** | | | | |
| **Total**** | | | | **22.8** | **13.91** | **25.00** | **YES** | **1,300** | **YES** |

NOTES:
*Based on 1-hour SO2 readings of monitoring data - TCEQ Big Spring Midway Ambient Monitoring Station, monthly average, August 2019
**Impacts take into account the maximum of the sum of the sum of SNF Pad and Protected Area construction and the sum of Storage Module Construction and Transport emissions, as these operations are not expected to take place during the same time period.

### 8-Hour CO NAAQS

| Phase | Emissions Source | 1-hr CO Emission Rate (lb/hr) | CO 8-hr Unit Impact ([µg/m³]/[lb/hr]) | Background Concentration* | Total Impact (µg/m³) | 8-hour SIL (µg/m³) | Meets SIL? | 8-hr NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| SNF Pad | Pump Truck | 2.67 | 1.43 | | 3.83 | | | | |
| | Ready Mix Truck | 2.67 | 1.43 | | 3.83 | | | | |
| | Earth Mover | 6.68 | 1.42 | | 9.48 | | | | |
| | | | | **Total** | **17.14** | | | | |
| Protected | Heavy Haul Truck | 2.34 | 1.46 | | 3.42 | | | | |
| Area | Earth Mover | 6.68 | 1.42 | | 9.48 | | | | |
| | | | | **Total** | **12.91** | | | | |
| Storage Module | Ready Mix Truck | 2.67 | 1.43 | | 3.83 | | | | |
| **Construction** | | | | **Total** | **3.83** | | | | |
| | | | | | | | | | |
| Storage Module | Module Transporter | 2.34 | 1.46 | | 3.42 | | | | |
| **Transport** | | | | **Total** | **3.42** | | | | |
| **Total**** | | | | **343.60** | **30.05** | **500.00** | **YES** | **10,000** | **YES** |

NOTES:
*Based on 1-hour CO readings of monitoring data - TCEQ El Paso Ojo De Agua Ambient Monitoring Station, monthly maximum, August 2019
**Impacts take into account the maximum of the sum of the sum of SNF Pad and Protected Area construction and the sum of Storage Module Construction and Transport emissions, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-2**
**NAAQS Compliance Demonstration - Phases 2-8 and Operations**
(5 Pages)

**24-Hour PM2.5 NAAQS**

| Phase | Emissions Source | 1-hr PM2.5 Emission Rate (lb/hr) | PM2.5 24-hr Unit Impact ([µg/m³]/[lb/hr]) | Background Concentration* | Total Impact (µg/m³) | 24-hour SIL (µg/m³) | Meets SIL? | 24-Hour NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| SNF Pad | Pump Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.06** | | | | |
| Protected | Heavy Haul Truck | 0.01 | 0.78 | | 0.01 | | | | |
| Area | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.06** | | | | |
| General | Excavation | 0.00 | 0.66 | | 0.00 | | | | |
| **Earthmoving** | | | | **Total** | **0.00** | | | | |
| | | | | | | | | | |
| Storage Module | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| **Construction** | | | | **Total** | **0.01** | | | | |
| | | | | | | | | | |
| Storage Module | Module Transporter | 0.02 | 0.78 | | 0.02 | | | | |
| **Transport** | | | | **Total** | **0.02** | | | | |
| **Total**** | | | | **7.6** | **0.12** | **1.20** | **YES** | **35** | **YES** |

NOTES:
*Based on PM2.5 readings of monitoring data - TCEQ Socorro Hueco Ambient Monitoring Station, monthly average, August 2019
**Impacts take into account the maximum of the sum of the sum of SNF Pad and Protected Area construction and the sum of Storage Module Construction and Transport emissions, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-2**
**NAAQS Compliance Demonstration - Phases 2-8 and Operations**

(5 Pages)

**24-Hour PM10 NAAQS**

| Phase | Emissions Source | 1-hr PM10 Emission Rate (lb/hr) | PM10 24-hr Unit Impact ([µg/m³]/[lb/hr]) | Background Concentration* | Total Impact (µg/m³) | 24-hour SIL (µg/m³) | Meets SIL? | 24-Hour NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| SNF Pad | Pump Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.06** | | | | |
| Protected | Heavy Haul Truck | 0.01 | 0.78 | | 0.01 | | | | |
| Area | Earth Mover | 0.07 | 0.75 | | 0.05 | | | | |
| | | | | **Total** | **0.06** | | | | |
| General | Excavation | 0.08 | 0.33 | | 0.03 | | | | |
| **Earthmoving** | | | | **Total** | **0.03** | | | | |
| Storage Module | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| **Construction** | | | | **Total** | **0.01** | | | | |
| Storage Module | Module Transporter | 0.02 | 0.78 | | 0.02 | | | | |
| **Transport** | | | | **Total** | **0.02** | | | | |
| **Total**** | | | | **20** | **0.15** | **5.00** | **YES** | **150** | **YES** |

NOTES:
*Based on PM10 readings of monitoring data - TCEQ El Paso Riverside Ambient Monitoring Station, monthly average, March 2019
**Impacts take into account the maximum of the sum of the sum of SNF Pad and Protected Area construction and the sum of Storage Module Construction and Transport emissions, as these operations are not expected to take place during the same time period.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-2**
**NAAQS Compliance Demonstration - Phases 2-8 and Operations**

*(5 Pages)*

**Annual NO2 and PM2.5 NAAQS**

| Phase | Emissions Source | 1-hr NOx Emission Rate (lb/hr) | NO2 Annual Unit Impact ([µg/m³]/[lb/hr]) | Background* Concentration (µg/m³) | Annual** Impact Ratio | Total Annual Impact (µg/m³) | Annual SIL (µg/m³) | Meets SIL? | Annual NAAQS (µg/m³) | Meets NAAQS? | 1-hr PM2.5 Emission Rate (lb/hr) | PM2.5 Annual Unit Impact ([µg/m³]/[lb/hr]) | Background* Concentration (µg/m³) | Annual** Impact Ratio (1,725 hours) | Total Annual Impact (µg/m³) | Annual SIL (µg/m³) | Meets SIL? | Annual NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SNF Pad | Pump Truck | 0.18 | 0.25 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 4.85E-04 | | | | |
| | Ready Mix Truck | 0.18 | 0.25 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 4.85E-04 | | | | |
| | Earth Mover | 5.75 | 0.24 | | 0.20 | 0.27 | | | | | 0.07 | 0.27 | | 0.20 | 3.49E-03 | | | | |
| | | | | | **Total** | **0.29** | | | | | | | | **Total** | **4.46E-03** | | | | |
| Protected | Heavy Haul Truck | 0.15 | 0.26 | | 0.20 | 0.01 | | | | | 0.01 | 0.28 | | 0.20 | 4.32E-04 | | | | |
| Area | Earth Mover | 5.75 | 0.24 | | 0.20 | 0.27 | | | | | 0.07 | 0.27 | | 0.20 | 3.49E-03 | | | | |
| | | | | | **Total** | **0.28** | | | | | | | | **Total** | **3.92E-03** | | | | |
| General | Excavation | | | | | | | | | | 0.00 | 0.24 | | 0.20 | 2.28E-04 | | | | |
| Earthmoving | | | | | | | | | | | | | | **Total** | **2.28E-04** | | | | |
| Storage Module | Ready Mix Truck | 0.18 | 0.25 | | 0.29 | 0.01 | | | | | 0.01 | 0.28 | | 0.29 | 7.03E-04 | | | | |
| **Construction** | | | | | **Total** | **0.01** | | | | | | | | **Total** | **7.03E-04** | | | | |
| Storage Module | Module Transporter | 2.01 | 0.26 | | 0.29 | 0.15 | | | | | 0.02 | 0.28 | | 0.29 | 1.87E-03 | | | | |
| **Transport** | | | | | **Total** | **0.15** | | | | | | | | **Total** | **1.87E-03** | | | | |
| **Total** | | | | **26.2** | | **0.73** | **1.00** | **YES** | **100** | **YES** | | | **7.6** | | **0.01** | **0.20** | **YES** | **15** | **YES** |

NOTES:
*Background concentrations for annual compliance have been conservatively assumed to be equal to be the same as those of shorter averaging periods.
**Annual hours of operation are a total of 1,725 and 2,500 hours based on 10 hours per day, 5 days per week, 34.5 weeks of construction and 10 hours per day, 5 days per week, 50 weeks per year of operations.
This has been ratioed against 8,760 hours to determine the most appropriate annual impact.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-3**
**NAAQS Compliance Demonstration – Operations**

(4 Pages)

### 1-Hour NO2, SO2, and CO NAAQS

| Phase | Emissions Source | 1-hr NOx Emission Rate (lb/hr) | 1-hr SO2 Emission Rate (lb/hr) | 1-hr CO Emission Rate (lb/hr) | NO2* AERMOD 1-hour Unit Impact ([µg/m³]/[lb/hr]) | NO2** Background Concentration (µg/m³) | NO2 Total Impact (µg/m³) | 1-hour SIL (µg/m³) | Meets SIL? | 1-hour NAAQS (µg/m³) | Meets NAAQS? | SO2 AERMOD 1-hour Unit Impact ([µg/m³]/[lb/hr]) | SO2*** Background Concentration (µg/m³) | SO2 Total Impact (µg/m³) | 1-hour SIL (µg/m³) | Meets SIL? | 1-hour NAAQS (µg/m³) | Meets NAAQS? | CO AERMOD 1-hour Unit Impact ([µg/m³]/[lb/hr]) | CO**** Background Concentration (µg/m³) | CO Total Impact (µg/m³) | 1-hour SIL (µg/m³) | Meets SIL? | 1-hour NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Storage Module | Ready Mix Truck | 0.18 | 0.82 | 2.67 | 3.29 | | 0.58 | | | | | 3.6549 | | 3.00 | | | | | 3.65 | | 9.77 | | | | |
| **Construction** | | | | | | **Total** | **0.58** | | | | | | | **3.00** | | | | | | | **9.77** | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| Storage Module | Module Transporter | 2.01 | 0.72 | 2.34 | 3.73 | | 7.52 | | | | | 2.42131 | | 1.74 | | | | | 4.15 | | 9.70 | | | | |
| **Transport** | | | | | | **Total** | **7.52** | | | | | | | **1.74** | | | | | | | **9.70** | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Total** | | | | | | **26.2** | **8.10** | **7.50** | **NO** | **188** | **YES** | | **22.80** | **4.73** | **7.80** | **YES** | **196** | **YES** | | **343.60** | **19.46** | **2000.00** | **YES** | **40,000** | **YES** |

NOTES:
*AERMOD ARM2 NOx/NO2 method used to determine 1-hour unit impact.
**Based on 1-hour NO2 readings of monitoring data - TCEQ El Paso Ascarate Park SE Ambient Monitoring Station, monthly maximum, August 2019
***Based on 1-hour SO2 readings of monitoring data - TCEQ Big Spring Midway Ambient Monitoring Station, monthly average, August 2019
****Based on 1-hour CO readings of monitoring data - TCEQ El Paso Ojo De Agua Ambient Monitoring Station, monthly maximum, August 2019



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-3**
**NAAQS Compliance Demonstration – Operations**

(4 Pages)

**3-Hour SO2 NAAQS**

| Phase | Emissions Source | 1-hr SO2 Emission Rate (lb/hr) | SO2 3-hr Unit Impact ([µg/m³]/[lb/hr]) | Background Concentration* | Total Impact (µg/m³) | 3-hour SIL (µg/m³) | Meets SIL? | 3-Hour NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| Storage Module | Ready Mix Truck | 0.82 | 2.29 | | 1.88 | | | | |
| **Construction** | | | | **Total** | **1.88** | | | | |
| Storage Module | Module Transporter | 0.72 | 2.42 | | 1.74 | | | | |
| **Transport** | | | | **Total** | **1.74** | | | | |
| **Total** | | | | **22.8** | **3.62** | **25.00** | **YES** | **1,300** | **YES** |

NOTE:
*Based on 1-hour SO2 readings of monitoring data - TCEQ Big Spring Midway Ambient Monitoring Station, monthly average, August 2019

**8-Hour CO NAAQS**

| Phase | Emissions Source | 1-hr CO Emission Rate (lb/hr) | CO 8-hr Unit Impact ([µg/m³]/[lb/hr]) | Background Concentration* | Total Impact (µg/m³) | 8-hour SIL (µg/m³) | Meets SIL? | 8-hr NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| Storage Module | Ready Mix Truck | 2.67 | 1.43 | | 3.83 | | | | |
| **Construction** | | | | **Total** | **3.83** | | | | |
| Storage Module | Module Transporter | 2.34 | 1.46 | | 3.42 | | | | |
| **Transport** | | | | **Total** | **3.42** | | | | |
| **Total** | | | | **343.60** | **7.25** | **500.00** | **YES** | **10,000** | **YES** |

NOTE:
*Based on 1-hour CO readings of monitoring data - TCEQ El Paso Ojo De Agua Ambient Monitoring Station, monthly maximum, August 2019



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-3**
**NAAQS Compliance Demonstration – Operations**

(4 Pages)

**24-Hour PM2.5 NAAQS**

| Phase | Emissions Source | 1-hr PM2.5 Emission Rate (lb/hr) | PM2.5 24-hr Unit Impact ([μg/m³]/[lb/hr]) | Background Concentration* | Total Impact (μg/m³) | 24-hour SIL (μg/m³) | Meets SIL? | 24-Hour NAAQS (μg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| Storage Module | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| **Construction** | | | | **Total** | **0.01** | | | | |
| Storage Module | Module Transporter | 0.02 | 0.78 | | 0.02 | | | | |
| **Transport** | | | | **Total** | **0.02** | | | | |
| **Total** | | | | **20** | **0.02** | **1.20** | **YES** | **150** | **YES** |

NOTE:
*Based on PM10 readings of monitoring data - TCEQ El Paso Riverside Ambient Monitoring Station, monthly average, March 2019

**24-Hour PM10 NAAQS**

| Phase | Emissions Source | 1-hr PM10 Emission Rate (lb/hr) | PM10 24-hr Unit Impact ([μg/m³]/[lb/hr]) | Background Concentration* | Total Impact (μg/m³) | 24-hour SIL (μg/m³) | Meets SIL? | 24-Hour NAAQS (μg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|
| Storage Module | Ready Mix Truck | 0.01 | 0.78 | | 0.01 | | | | |
| **Construction** | | | | **Total** | **0.01** | | | | |
| Storage Module | Module Transporter | 0.02 | 0.78 | | 0.02 | | | | |
| **Transport** | | | | **Total** | **0.02** | | | | |
| **Total** | | | | **20** | **0.02** | **5.00** | **YES** | **150** | **YES** |

NOTE:
*Based on PM10 readings of monitoring data - TCEQ El Paso Riverside Ambient Monitoring Station, monthly average, March 2019



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-3**
**NAAQS Compliance Demonstration – Operations**

*(4 Pages)*

**Annual NO2 NAAQS**

| Phase | Emissions Source | 1-hr NOx Emission Rate (lb/hr) | NO2 Annual Unit Impact ([µg/m³]/[lb/hr]) | Background* Concentration (µg/m³) | Annual** Impact Ratio | Total Annual Impact (µg/m³) | Annual SIL (µg/m³) | Meets SIL? | Annual NAAQS (µg/m³) | Meets NAAQS? | 1-hr PM2.5 Emission Rate (lb/hr) | PM2.5 Annual Unit Impact ([µg/m³]/[lb/hr]) | Background* Concentration (µg/m³) | Annual** Impact Ratio | Total Annual Impact (µg/m³) | Annual SIL (µg/m³) | Meets SIL? | Annual NAAQS (µg/m³) | Meets NAAQS? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Storage Module | Ready Mix Truck | 0.18 | 0.25 | | 0.29 | 0.01 | | | | | 0.01 | 0.28 | | 0.29 | 7.03E-04 | | | | |
| **Construction** | | | | | **Total** | **0.01** | | | | | | | | **Total** | **7.03E-04** | | | | |
| Storage Module | Module Transporter | 2.01 | 0.26 | | 0.29 | 0.15 | | | | | 0.02 | 0.28 | | 0.29 | 1.87E-03 | | | | |
| **Transport** | | | | | **Total** | **0.15** | | | | | | | | **Total** | **1.87E-03** | | | | |
| **Total** | | | | **26.2** | | **0.16** | **1.00** | **YES** | **100** | **YES** | | | **7.8** | | **2.57E-03** | **0.20** | **YES** | **100** | **YES** |

NOTES:
*Background concentrations for annual compliance have been conservatively assumed to be equal to be the same as those of shorter averaging periods.
**Annual hours of operation are a total of 2,500 hours based on 10 hours per day, 5 days per week, 50 weeks per year of operations. This has been ratioed against 8,760 hours to determine the most appropriate annual impact.



All Indicated Changes are in response to RAI AQ-4

**Table 4.6-4**
**Construction and Operations Emissions - Lifetime Totals**

| | PHASE 1 | | | PHASE 2 | | PHASE 3 | | | | PHASE 4 | | PHASE 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
| Pollutant | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) |
| NOx | 26.38 | 0.34 | 0.34 | 10.75 | 0.34 | 10.75 | 0.34 | 0.34 | 0.34 | 10.75 | 0.34 | 10.75 | 0.34 | 0.34 |
| CO | 45.59 | 2.37 | 2.37 | 21.14 | 2.37 | 21.14 | 2.37 | 2.37 | 2.37 | 21.14 | 2.37 | 21.14 | 2.37 | 2.37 |
| SOx | 13.99 | 0.73 | 0.73 | 6.49 | 0.73 | 6.49 | 0.73 | 0.73 | 0.73 | 6.49 | 0.73 | 6.49 | 0.73 | 0.73 |
| $PM_{10}$ | 1.08 | 0.01 | 0.01 | 0.18 | 0.01 | 0.18 | 0.01 | 0.01 | 0.01 | 0.18 | 0.01 | 0.18 | 0.01 | 0.01 |
| $PM_{2.5}$ | 0.38 | 0.01 | 0.01 | 0.14 | 0.01 | 0.14 | 0.01 | 0.01 | 0.01 | 0.14 | 0.01 | 0.14 | 0.01 | 0.01 |
| $CO_2$ | 7,849.33 | 408.25 | 408.25 | 3,639.75 | 408.25 | 3,639.75 | 408.25 | 408.25 | 408.25 | 3,639.75 | 408.25 | 3,639.75 | 408.25 | 408.25 |
| HAP | 0.18 | 0.01 | 0.01 | 0.08 | 0.01 | 0.08 | 0.01 | 0.01 | 0.01 | 0.08 | 0.01 | 0.08 | 0.01 | 0.01 |
| VOC | 16.86 | 0.88 | 0.88 | 7.82 | 0.88 | 7.82 | 0.88 | 0.88 | 0.88 | 7.82 | 0.88 | 7.82 | 0.88 | 0.88 |

| | PHASE 6 | | PHASE 7 | | | | PHASE 8 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 |
| Pollutant | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) |
| NOx | 10.75 | 0.34 | 10.75 | 0.34 | 0.34 | 0.34 | 10.75 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| CO | 21.14 | 2.37 | 21.14 | 2.37 | 2.37 | 2.37 | 21.14 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 |
| SOx | 6.49 | 0.73 | 6.49 | 0.73 | 0.73 | 0.73 | 6.49 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 |
| $PM_{10}$ | 0.18 | 0.01 | 0.18 | 0.01 | 0.01 | 0.01 | 0.18 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| $PM_{2.5}$ | 0.14 | 0.01 | 0.14 | 0.01 | 0.01 | 0.01 | 0.14 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 |
| $CO_2$ | 3,639.75 | 408.25 | 3,639.75 | 408.25 | 408.25 | 408.25 | 3,639.75 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 |
| HAP | 0.08 | 0.01 | 0.08 | 0.01 | 0.01 | 0.01 | 0.08 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| VOC | 7.82 | 0.88 | 7.82 | 0.88 | 0.88 | 0.88 | 7.82 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |

| | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pollutant | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) | Annual Emissions (tpy) |
| NOx | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| CO | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 |
| SOx | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 |
| $PM_{10}$ | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| $PM_{2.5}$ | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| $CO_2$ | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 | 408.25 |
| HAP | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| VOC | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |



All Indicated Changes are in response to RAI AQ-4

## 4.7 NOISE IMPACTS

Sources of noise during facility construction and operation would be related to traffic entering and leaving the facility and to construction equipment. Ambient background noise sources in the area include vehicular traffic along New Mexico Highway 234, the concrete quarry to the north of the site, the landfill to the south of the site, the waste facility to the south of the site, train traffic along the tracks located on the south border of the site, low flying aircraft traffic from Eunice Airport, birds, cattle, and wind gusts.

### 4.7.1 Predicted Noise Levels

*The EPA's recommended Day-Night Average Sound Level (LDN) for industrial sites, as well as "Farm Land and General Unpopulated Land" is 70 dBA* (EPA, 1973). *ISP performed an acoustical analysis of the background sound levels in July of 2019 in areas surrounding the proposed CISF (Nelson Acoustics, 2019). This formed the basis for determining estimates of noise levels that would be generated during construction and operation of the proposed CISF. Estimates were performed for nine Noise-Sensitive Areas (NSA) around the proposed CISF and the city of Eunice, NM. Figures 4.7-1 and 4.7-2 provide the locations for each of the NSAs.*

*Noise levels during construction and operations were estimated based on noise levels from construction equipment and additional noise sources related to mechanical equipment associated with the Security and Administration Building and the Cask Handling Building. In addition, noise from vehicle backup alarms were added (Nelson Acoustics, 2019).*

*A-weighted Sound Power Level and temporal Usage Factors for construction vehicles were obtained from the Federal Highway Administration's Roadway Construction Noise Guide User's Manual (FHWA, 2005). Typical construction octave band spectral shapes and Sound Power Levels for other equipment were obtained from various resources as stated in the report (Nelson Acoustics, 2019). Noise emission levels from the Waste Control Specialists locomotive were extracted from direct measurements performed during the site visit. Factors for geometric divergence and excess attenuation due to air and ground absorption were computed in accordance with ISO 9613-2 (ISO, 1996), then applied to yield Sound Pressure Level estimates. No "credit" was taken for intervening terrain or material stockpiles that could further reduce offsite levels since occasional weather conditions can cause these barriers to be bypassed.*

*During construction, increased sound levels may be noticeable from directly neighboring facilities (URENCO, Sundance Services, and Permian Basin Materials), especially during Phase 1 construction. During operation of the facility, the nominal average sound levels increase primarily due to the potential of the passage of an additional train per day. The sound level, $L_{dn}$ for construction and operation is well below the EPA guideline for industrial land use.*

*Residents of Eunice will be unable to hear construction activities during any phase of construction due to the relatively high level of traffic noise already in the area. During operation the nominal average sound levels increase primarily due to the potential passage of an additional train per day adjacent to Eunice. The $L_{dn}$ at the proposed CISF during construction and operation are well below both the EPA guideline for residential properties and prevailing background levels.*

*Estimated $L_{dn}$ values during construction and operation at the proposed CISF are provided in Tables 4.7-1, 4.7-2, and 4.7-3.*

***Table 4.7-1: Estimated Noise Impact at NSAs during Phase 1 Construction***

| NSA | Type | Approximate Distance and Direction Relative to the CISF | Estimated Ambient $L_{dn}$ (dBA) | Estimated CISF Phase1 Construction $L_{dn}$ (dBA) | Estimated Total $L_{dn}$ During Construction (dBA) | EPA Recommended $L_{dn}$ (dBA) | Potential Noise Increase (dBA) |
|---|---|---|---|---|---|---|---|
| 1 | Boundary | 6100 ft. SW | 47.9 | 43.2 | 49.1 | 70 | 1.3 |
| 2 | Boundary | 3900 ft. W | 42.6 | 48.4 | 49.4 | 70 | 6.8 |
| 3 | Boundary | 4000 ft. WNW | 41.6 | 48.6 | 49.4 | 70 | 7.8 |
| 4 | CISF | SW Corner | 39.1 | 69.9 | 69.9 | --- | 30.8 |
| 5 | WCS LSA Pad | NE Corner | 39.8 | 60.0 | 60.1 | --- | 20.3 |
| 6 | Residential | 3.8 mi. WSW | 64.5 | 30.2 | 64.5 | 55 | 0.0 |
| 7 | Residential | 4.1 mi. WSW | 58.9 | 29.6 | 58.9 | 55 | 0.0 |
| 8 | Residential | 5.3 mi. WSW | 47.0 | 27.1 | 47.0 | 55 | 0.0 |
| 9 | Residential | 4.9 mi. WSW | 55.5 | 27.9 | 55.5 | 55 | 0.0 |

**Table 4.7-2: Estimated Noise Impact at NSAs during Phase 2-8 Construction**

| NSA | Type | Approximate Distance and Direction Relative to the CISF | Estimated Ambient $L_{dn}$ (dBA) | Estimated CISF Phase 2-8 Construction $L_{dn}$ (dBA) | Estimated Sound $L_{dn}$ During Operation (dBA) | Estimated Total $L_{dn}$ During Construction (dBA) | EPA Recommended $L_{dn}$ (dBA) | Potential Noise Increase (dBA) |
|---|---|---|---|---|---|---|---|---|
| 1 | Boundary | 6100 ft. SW | 47.9 | 37.7 | 41.4 | 49.1 | 70 | 1.2 |
| 2 | Boundary | 3900 ft. W | 42.6 | 43.0 | 39.9 | 46.8 | 70 | 4.2 |
| 3 | Boundary | 4000 ft. WNW | 41.6 | 43.7 | 39.1 | 46.6 | 70 | 5.0 |
| 4 | CISF | SW Corner | 39.1 | 57.8 | 58.4 | 61.2 | --- | 22.1 |
| 5 | WCS LSA Pad | NE Corner | 39.8 | 52.2 | 55.1 | 57.0 | --- | 17.2 |
| 6 | Residential | 3.8 mi. WSW | 64.5 | 25.0 | 33.3 | 64.5 | 55 | 0.0 |
| 7 | Residential | 4.1 mi. WSW | 58.9 | 24.3 | 28.8 | 58.9 | 55 | 0.0 |
| 8 | Residential | 5.3 mi. WSW | 47.0 | 21.8 | 34.5 | 47.2 | 55 | 0.3 |
| 9 | Residential | 4.9 mi. WSW | 55.5 | 22.6 | 33.2 | 55.5 | 55 | 0.0 |

**Table 4.7-3: Estimated Noise Impact at NSAs during CISF Operation**

| NSA | Type | Approximate Distance and Direction Relative to the CISF | Estimated Ambient $L_{dn}$ (dBA) | Estimated CISF Operation $L_{dn}$ (dBA) | Estimated Total $L_{dn}$ CISF + Ambient (dBA) | EPA Recommended $L_{dn}$ (dBA) | Potential Noise Increase (dBA) |
|---|---|---|---|---|---|---|---|
| 1 | Boundary | 6100 ft. SW | 47.9 | 41.4 | 48.7 | 70 | 0.9 |
| 2 | Boundary | 3900 ft. W | 42.6 | 39.9 | 44.5 | 70 | 1.9 |
| 3 | Boundary | 4000 ft. WNW | 41.6 | 39.1 | 43.5 | 70 | 1.9 |
| 4 | CISF | SW Corner | 39.1 | 58.4 | 58.5 | --- | 19.4 |
| 5 | WCS LSA Pad | NE Corner | 39.8 | 55.1 | 55.3 | --- | 15.5 |
| 6 | Residential | 3.8 mi. WSW | 64.5 | 33.3 | 64.5 | 55 | 0.0 |
| 7 | Residential | 4.1 mi. WSW | 58.9 | 28.8 | 58.9 | 55 | 0.0 |
| 8 | Residential | 5.3 mi. WSW | 47.0 | 34.5 | 47.2 | 55 | 0.2 |
| 9 | Residential | 4.9 mi. WSW | 55.5 | 33.2 | 55.5 | 55 | 0.0 |


All Indicated Changes are in response to RAI NOI-2

*The acoustic analysis report performed for ISP also estimated the maximum noise levels to workers that would occur during construction and operation of the proposed CISF. Personnel noise exposure is a function of the shift average sound pressure level $L_{A,EQ}$, identical to Time Weighted Average (TWA) as defined by the Occupational Safety and Health Administration (OSHA) for continuous noise sources, and slightly less for the sources contemplated in the report. OSHA regulations per 29 CFR 1910.95 require that personnel not receive an unprotected noise dose in excess of 100% in any given shift. This corresponds to 90.0 dBA for an 8 hour shift and 88.4 dBA for a 10 hour shift.*

*Estimated shift-average construction levels are high especially in the work areas for the buildings due to the amount of equipment active in a relatively small area. Levels are lower on the more extended areas (General Earthwork, Protected Area, Storage Pad Construction). Levels are dependent on the assumed source sound power levels and utilization percentages.*

*Tables 4.7-4, 4.7-5, and 4.7-6 provide estimated Shift-Average (TWA) and Shift-Maximum ($L_{pA}$) sound levels for construction and operation of the proposed CISF.*

*Based on the estimated noise levels, hearing protection is recommended for most of these activities (TWA>80 dBA). Noise reduction ratings (NRRs) of hearing protectors should be capable of reducing at-the-ear exposure to 85.0 dBA (8-hour, Operation) and 83.2 dBA (10-hour, Construction). For maximum sound levels ($L_{pA}$) there is not an explicit OSHA limitation. The maximum sound levels occur on rare occasions when everything at a facility/operation occurs at the exact same time. The TWA are based on the fact that noise producing activities are starting and stopping for the given utilization and the maximum sound levels are included in the TWA.*

**Table 4.7-4 Estimated Baseline Noise Exposure during Phase 1 Construction**

| Activity | TWA (dBA) | Max $L_{pA}$ (dBA) |
|---|---|---|
| General Earthwork | 83 | 89 |
| Cask Handling Building | 92 | 99 |
| Security/Admin Building | 94 | 100 |
| Storage Pad | 88 | 96 |
| Protected Area | 83 | 89 |

**Table 4.7-5 Estimated Baseline Noise Exposure during CISF Operation**

| Activity | TWA (dBA) | Max $L_{pA}$ (dBA) |
|---|---|---|
| Storage Module Construction | 92 | 103 |
| Cask Transport | 89 | 97 |

**Table 4.7-6 Estimated Baseline Noise Exposure during Phase 2-8 Construction Including Operation**

| Location | TWA (dBA) | Max $L_{pA}$ (dBA) |
|---|---|---|
| Storage Pad | 87 | 97 |
| Protected Area | 78 | 89 |

### 4.7.2 Potential Impacts

*ISP performed an acoustical analysis of the background sound levels in July of 2019 (Nelson Acoustics, 2019) in areas surrounding the proposed CISF. Measurements were taken at and around the existing WCS facility and in and around the city of Eunice, NM. Roadway traffic is the primary noise contributor at all locations monitored.*

*In general it is found that the NSAs in Eunice, NM which are nearest to the proposed CISF are also very near to highways NM 176 and NM 18 as well as the Gas Plant located on the south side of the city. These Eunice NSA measurements possess elevated background levels above $L_{dn}$ 55. At the current northeast corner of Eunice, NM, sound levels are more moderate. The EPA's 1974 recommendation for residential communities is $L_{dn}$ 55. Sounds originating at the CISF are unlikely to be audible in Eunice and are not expected to exceed the EPA's recommended guideline.*

Noise impacts resulting from the temporary increase in noise levels along Texas State Highway 176 due to construction vehicles are not expected to impact nearby receptors significantly. Noise from truck traffic already using the road is currently substantially louder than would be caused by the incremental increase in traffic related to the construction and operation of the CISF. The nearest commercial noise receptors are four businesses located within a 2.4 km (1.5-mi) radius of the proposed site. These four businesses are URENCO to the west just over the New Mexico border; Lea County Landfill, located to the southeast; Sundance Services, Inc.and Permian Basin Materials, located to the north. Potential impacts to local schools, churches, hospitals, and residences are not expected to be significant. The nearest residential noise receptor is located west of the site at a distance of approximately 4.3 km (2.63 mi). Due to its distance from the proposed CISF site, the residential receptor is not expected to perceive an increase in noise levels due to operational noise levels. The nearest school, hospital, church, and other sensitive noise receptors are located even farther away, thereby allowing the noise to dissipate and be absorbed, helping decrease the sound levels even further. Homes located near the construction traffic at the intersection of New Mexico Highway 234 and New Mexico Highway 18 would be affected by the vehicle noise, but due to existing heavy tractor trailer vehicle traffic, the change is expected to be minimal. No schools or hospitals are located at this intersection.

### 4.7.3 Cumulative Noise Impacts

*ISP conducted background noise-level survey at four locations on and along the boundaries of the existing Waste Control Specialists facility and proposed CISF site on July 25-26, 2019 (Nelson Acoustics, 2019). The measured background noise levels at these locations ranged from between 36.3 and 40.7 decibels A-weighted, represent the nearest receptor locations for the general public.*

Cumulative impacts from all site noise sources should be small and typically remain at or below HUD guidelines of 65 dBA $L_d$, and the EPA guidelines of 55 dBA $L_{dn}$ during CISF construction, operation, and decommissioning. Residences closest to the site boundary would experience only minor impacts from construction noise, with the majority of the noise sources being from additional construction vehicle traffic. Since phases of construction include a variety of activities, there may be short-term occasions when higher noise levels would be present; examples include the use of backhoes and large generators.

The level of noise anticipated offsite is comparable to noise levels near a busy road and less than noise levels found in most city neighborhoods. Expected noise levels would mostly affect an area within a 1.6 km (1 mile) radius of the proposed CISF site. The cumulative noise of all site activities should have a minor impact and only on those receptors closest to the site boundary.

## 4.8 HISTORIC AND CULTURAL RESOURCE IMPACTS

Historic resources include buildings, structures, objects, and non-archaeological sites and districts that are important in the history of a community, a region, a state, or the nation. The NRC regulates the proposed licensing activities; therefore, the project is subject to Section 106 of the NHPA.

The APE for direct impacts is the project footprint. Taking into consideration the height of the crane that would be required, the height of the potential aboveground facility, and the relatively flat surrounding terrain, the APE for indirect/visual impacts is a 1.6 km (1 mi) radius from the proposed project footprint. The direct effects APE is contained entirely within the state of Texas, while the indirect effects APE extends into New Mexico.

### 4.13.4 Non-Radioactive Solid Waste

Non-radiological solid waste primarily resulting from the onsite fabrication of SNF Storage Systems is expected to be generated at the CISF. Approximately *3,400* SNF Storage Systems would be used at the CISF. However, some the SNF Storage Systems would not be fabricated onsite, only assembled. Additional small volumes of non-radiological solid waste are expected to be generated during routine, normal operations and decommissioning.

All solid waste generated at the CISF during operations and decommissioning would be disposed of in a Municipal solid waste landfill.

### 4.13.5 Hazardous and Mixed Waste

Hazardous or mixed wastes are not expected to be generated during operations at the CISF.

### 4.13.6 Waste Management Cumulative Impacts

Small quantities of waste are anticipated and would be controlled, stored and disposed of in compliance with 10 CFR Part 20. The cumulative impacts are expected to be small.

Air Quality

There would be small integrated impacts to air from fugitive dust emissions during construction activities. Mitigation measures can be used to suppress the amount of dust in the air during construction. Dust emission will be reduced once earth moving activities cease and paved roads are constructed.

Historic and Cultural Resources

There would be no integrated adverse impacts to cultural or historic resources. Evaluations conducted for the construction phase did not identify any archeological materials within the area of potential effects (APE), and no further work was recommended. Because the operations phase would not result in any new subsurface impacts, there would be no integrated impacts.

No historic resources were identified within the APE for indirect/visual impacts, which was buffered from the full project footprint. There would be no effects to historic resources in either the construction or operations phases; therefore there would be no integrated impacts to historic resources.

Visual and Scenic Resources

For visual/scenic resources, the analysis in Section 4.9 includes cumulative impacts from other nearby operations. ISP does not anticipate any additional integrated impacts to visual and scenic resources due to the simultaneous construction and operation of different phases of the CISF.

Socioeconomics

There would be minor socioeconomic integrated impacts. The input-output IMPLAN model used for the Socioeconomic Impact Analysis (SIA) for the proposed project evaluated the impacts of both the construction and operations phase. Although sequential construction campaigns would occur, the model used the initial investment of approximately $16.1 million (including all excavation and grading, fencing, and security system costs, plus building sufficient storage pads for the first 200 storage systems).

Impacts of both the construction and operations phase were found to be economically positive, resulting in additional jobs that would also be higher paying than the average for the waste disposal sector in the region. Total 2013 employment in the three-county analysis region was

## *4.15 CUMULATIVE IMPACTS*

*Cumulative effects are defined by the Council on Environmental Quality (CEQ) as effects "on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 Code of Federal Regulations [CFR] §1508.7).*

*The WCS Environmental Report currently discusses potential cumulative effects in Section 2.6 after the alternatives analysis. In this discussion, the Region of Interest (ROI) is a 30-mile radius. Based on information obtained from the Toole County Environmental Impact Statement (EIS) (NRC, 2001) and the EIS for the National Enrichment Facility (NRC, 2005b), plus analysis prepared for the WCS Low-Level Radioactive Waste Disposal Facility (TCEQ, 2008), the resources with the highest potential for cumulative effects were identified as air quality impacts and noise impacts during construction. Competition for use of aggregate and other mineral resources was cited as a non-radiological cumulative impact to resources.*

*Radiological environmental impacts are described in detail in Section 2.6.*

*Cumulative impacts to environmental resources from the full build out of the proposed project as well as other known pertinent sites are discussed by resource in Chapter 4 of this Environmental Report. Section 4.14 Integrated Environmental Impacts also analyzes potential integrated impacts when construction and operation are concurrent (see Table 4.14.-1). Figure 4.12-2 also illustrates other facilities ("key sites") considered in Chapter 4.*

### *4.15.1 CURRENT AND REASONABLY FORESEEABLE ACTIONS*

*Current and reasonably foreseeable actions could be private developments, public initiatives by local, county, or federal government entities, and other development activities with the potential to result in environmental impacts. This discussion identifies activities within a Region of Influence (ROI) that extends for a 50-mile radius around the proposed CISF site for consideration of potential cumulative impacts. The timeframe considered is approximately 40 years into the future, consistent with the timeframe for the initial operating license for the CISF. Present and reasonably foreseeable activities are divided into nuclear and non-nuclear*


All Indicated Changes are in response to RAI CI-1

*activities. See Figure 4.15-1: Project Area – 50 Miles Region of Interest, Road Base and Aerial Base. See also Figure 4.15-2: Projects and Facilities in the 50-mile Region of Interest.*

#### *4.15.1.1 Non-Nuclear Activities in the Region of Influence*

*There are several non-nuclear activities in the 50-mile Region of Influence, many of them suited to the very low population density within the ROI. There are large areas of undeveloped scrub/shrub land. Developed uses include oil and gas related industry. Various disposal operations and surface material extraction land uses exist. One wind farm is proposed in the ROI. Outside the small population centers, there is little infrastructure to support more dense development.*

*Some projects and facilities are discussed below.*

##### *4.15.1.1.1 General Activities – Oil and Gas Activity, Ranching Activity, and Mining*

*Figure 4.15-3: Land Use in the 50-mile Region of Interest depicts land use within the 50-mile radius of the facility from the USGS National Land Cover Dataset. The majority of land within the 50-mile radius is shrub/scrub or grassland/herbaceous with approximately one-quarter of the land (primarily to the northeast) depicted as cultivated crops.*

*With regard to livestock/grazing activities, the five-mile radius land cover map does not show any pasture or hay land cover (See Figure 4.15-4); however, the majority of the land within five miles of the site has historically been used for ranching and grazing activities.*

*Oil and gas development is prominent near the CISF site. See Section 3.1 for further discussion.*

##### *4.15.1.1.2 Permian Basin Materials, LLC*

*Permian Basin Materials, LLC (PBM) operates an aggregates quarry and concrete ready mix facility in New Mexico near the CISF. PBM shares a property boundary with WCS and this boundary is approximately 4,000 feet from the CISF Protected Area.*

##### *4.15.1.1.3 Lea County – Eunice NM Solid Waste Landfill Facility*

*Lea County Landfill (LCLF) is operated by Waste Connections, Inc. and accepts solid waste primarily from Lea County. It is located at 3219 East State Road 234, Eunice, NM 88231. It is approximately 5 to 6 miles east of Eunice in Sections 4 and 9, Township 22 South, Range 38*


All Indicated Changes are in response to RAI CI-1

*East, NMPM. Operations began in 1999 and the facility is scheduled to close in 2048. Most of the waste delivered to the site is brought by haulers; 95% in 2012 (NMRC 2012). The facility accepts commercial, residential, construction, and demolition waste including tires, yard trimmings, and six special wastes: sludge, petroleum-contaminated soils (PCS), industrial solid waste (ISW), offal, spill of a chemical substance or commercial product (spill waste), and treated formerly characteristic hazardous waste (TFCH). Solid waste is placed and compacted in lined cells that are monitored by environmental control systems. At the end of each working day, the working face of the waste disposal area is covered with at least six inches of soil or an alternative daily cover approved by the Department.*

*LCLF received approximately 96,550 tons of MSW and 472 tons of special waste in 2018, or approximately 266 tons of solid waste per calendar day. LCLF estimates waste receipts of up to 100 tons per year each of TFCH, offal, sludge, and spill waste; up to 500 tons per year each of ISW, PCS, and solid waste – not otherwise specified (SWNOS); and up to 2,500 tons per year of asbestos waste.*

*On May 15, 2019 a public hearing was held at the Lea County Event Center for a permit renewal and modification (NMED 2019). The permit renewal and modification application seeks approval of a facility approximately 350.1 acres in size with approximately 252.7 acres designated for municipal solid waste (MSW) disposal, approximately 8.1 acres designated for construction and demolition (C&D) debris disposal, and approximately 8.1 acres designated for asbestos waste disposal.*

*The modification would allow construction of dedicated disposal cells for asbestos waste and C&D debris; vertical expansion of the solid waste disposal boundary to increase the final grade in the MSW disposal area by approximately 75 feet; and authorization for acceptance of two new special wastes (asbestos waste and SWNOS). Waste received at LCLF generally originates from Lea County but may originate from areas outside of Lea County, including out-of-state areas. Impacts could include emissions, truck traffic, and waste migration.*

#### ***4.15.1.1.4 Renewable Energy Activities***

*The Jumbo Hill Wind Project is operated by ENGIE North America, who acquired it in 2018 from Infinity Power Partners, a joint venture between Infinity Renewables and MAP Energy (Kovaleski 2019). It is located in northwest Andrews County, Texas, approximately 7.5 miles from the city of Eunice, New Mexico and 2 miles from the New Mexico/Texas border.*


All Indicated Changes are in response to RAI CI-1

*The project, which consists of a wind farm with a total capacity of approximately 160 MW, is planned and is scheduled to be online by spring of 2020 (Froese 2019). In total, Jumbo Hill will use 57 GE Renewable Energy turbines with 127-meter rotors (Kovaleski 2019).*

*In general (from a programmatic level), noise, visual impacts, and avian/bat mortality are the primary potential environmental impacts caused by wind farms (BLM 2019). Specific environmental permitting studies were not located for this discussion.*

#### *4.15.1.1.5 Ochoa Sulphate of Potash (SOP) Mine, New Mexico*

*This mine is located in Lea County, New Mexico with a very small portion in Eddy County, New Mexico; 60 miles east of Carlsbad, New Mexico and less than 20 miles west of the Texas/New Mexico border. The project location totals more than 86,024 acres (GA 2016). It is a mineral mining (Polyhalite/Sulphate of Potash) and fertilizer production operation.*

*The project has been planned and the project construction has been approved by the Bureau of Land Management (BLM) as captured in the Record of Decision (BLM 2014). The project completed positive preliminary economic assessment (PEA) in November 2016 and is expected to start production in 2019 (Mining Technology 2019).*

*The Record of Decision states that:*

- *The Preferred Alternative meets the purpose and need while minimizing potential conflicts with other land uses and mineral development.*
- *Implementation of this Decision will not cause unnecessary or undue degradation of the public lands and is consistent with other legal requirements.*
- *The potential visual impacts of the tailings stockpile will be minimized through early and frequent reclamation and the sale of marketable byproducts.*
- *The Decision will help maintain revenue for local and state government and will provide additional employment for the local economy.*
- *Monitoring and mitigation measures have been incorporated into the [Mine Plan of Operations] to support adaptive management and minimize environmental impacts as the project progresses.*

##### *4.15.1.1.6 CK Disposal E & P Landfill and Processing Facility*

*CK Disposal, LLC proposes to develop a surface waste management facility consisting of a landfill, liquid processing area, and deep well injection. The CK Facility is located 0.05-miles south of State Highway 234, approximately 4.16-miles southeast of Eunice, New Mexico, in Lea County. The CK Facility will encompass 316.97-acres. The landfill will be 141.5 acres, the liquid processing will be 51.75 acres, and saltwater disposal will be 5.1 acres. Buffer areas, site structures, and access roads are a total of 118.62 acres. The six (6) waste cells will have a combined disposal capacity of approximately 24,585,056-cubic yards. Plans for the CK Facility evaporation ponds, tank holding area, stabilization, and solidification area have been designed by Parkhill, Smith and Cooper, Inc. (PSC) under New Mexico Registered Professional Engineer, Nicholas Ybarra. Landfill volumetric calculations include waste capacity analysis and the soil material balance. The CK Disposal facility has a gross airspace of approximately 24,585,056 cubic yards. Assuming a contingency of 15% for variation in waste density and other operational uses, the result is an estimated approximately 20,897,298 cubic yards of waste capacity remaining. Based on the daily tonnage received, the CK Facility landfill will have an active life between 38 years (for 1,500 cubic yards per day) and 115 years (for 500 cubic yards per day).*

*On November 6, 2015, CK Disposal, LLC (Applicant) submitted a draft application to the Oil Conservation Division (Division) for a permit to construct and operate a commercial surface waste management facility in Lea County, New Mexico (NMEMNRD 2016). On November 22, 2016, Louisiana Energy Services, LLC, dba Urenco USA (LES), which operates a uranium enrichment facility to the north of Applicant's proposed commercial surface waste management facility, filed a request for hearing pursuant to 19.15.36.10 (A) NMAC. In addition, several legislators requested that the Commission schedule a hearing. On January 9, 2017, in Eunice, New Mexico, the Commission accepted public comments regarding CK Disposal, LLC's application. The public has voiced concerns regarding hydrogen sulfide gas emissions, impacts to economic development, truck traffic, and the tracking of liquid and solid waste from the facility onto public roadways. The permit was approved on April 4, 2017. Several documents exist that appear to include some local opposition to the facility.*

#### *4.15.1.1.7 Sundance West, Inc. – Sundance West Surface Waste Management Facility, New Mexico*

*The proposed Sundance West Facility is located 3 miles east of Eunice, 18 miles south of Hobbs, and approximately 1.5 miles west of the Texas/New Mexico state line. The proposed location is within unincorporated Lea County, New Mexico. The site is situated on an approximately 320-acre tract of land as shown in Figure 4.15-5 from (GEI 2016).*

*The Sundance West Facility is a planned facility that will include a landfill and ancillary oilfield waste management infrastructure. An existing facility, Sundance Services, Inc. is located and currently operating adjacent to the location of the proposed facility. Sundance Services, Inc. has been operating in this location since approximately 1977. The intended purpose of the new Sundance West, Inc. facility is to replace the older Sundance Services, Inc. facility. The phased development of the Sundance West facility is estimated to take place approximately four years from the issuance of the final permit. A draft, tentative permit was released in January 2017.*

*The Sundance West is a non-nuclear facility that will include two main components: a liquid oil field waste Processing Area and an oil field waste Landfill. Oil field wastes are anticipated to be delivered to the Sundance West Facility from oil and gas exploration and production operations in southeastern NM and west Texas.*

*The intended use of the Sundance West Facility is the permanent disposal of exempt and non-exempt/non-hazardous oil field waste. Sundance West, Inc. is/will be responsible for terms and conditions of the New Mexico Oil Conservation Division (OCD) permit and in conformance with all pertinent rules and regulations under the Oil & Gas Act, to protect public health and the environment, prevent the waste of oil and gas, and prevent the contamination of fresh waters.*

*According to the draft permit (NMEMNRD 2017), the OCD regulates the disposition of water produced or used in connection with the exploration and production of oil and gas and directs disposal of that water in a manner which will afford reasonable protection against contamination of fresh water supplies pursuant to authority granted in the Oil & Gas Act (Chapter 70, Article 2 NMSA 1978). Under that Act, OCD also regulates the disposition of nondomestic wastes resulting from exploration, production, or storage of crude oil and natural gas to protect public health and the environment. Similarly, OCD regulates the disposition of nondomestic wastes resulting from the oil field service industry, the transportation of crude oil and natural gas, the* *treatment of natural gas, and the refinement of crude oil to protect public health and the environment pursuant to jurisdiction and authority granted by the same Act.*

#### *4.15.1.1.8 Railroad Spur Underground Boring Easement*

*Rice Operating Company (ROC) Line Railroad Bore Easement (for saltwater disposal pipeline) is located in Lea County, New Mexico east of the city of Eunice. The location is from SE/SE of Section 25, Township 21S, Range 37E to the NE/NE of Section 36, Township 21 South, Range 37 East (WCS 2019).*

*The pipeline would be owned and operated/maintained by the Rice Operating Company (ROC). The easement would be approximately 250 feet long, and the pipeline would be located underground under an existing railroad, which received an easement from private landowners in 1962 and 1969 and is currently owned by WCS (WCS 2019).*

*This is a planned project: The easement was obtained July 2019 and construction is expected to start in 2019. This is a non-nuclear facility (saltwater disposal pipeline).*

*Saltwater would be ejected from wells (from an oil/gas fracking operation) through this pipeline to natural underground formations sealed within impenetrable rock to prevent the saltwater from escaping into surrounding soil and groundwater. The EPA regulates saltwater disposal systems. The Safe Water Drinking Act (1974) requires that the EPA maintain minimal federal requirements for the practice of saltwater disposal (Sunshine 2019). New Mexico Oil Conservation Division (OCD) regulates disposal wells as EPA delegated the Class II program to the OCD.*

*Additionally, The New Mexico Public Regulation Commission Pipeline Safety Bureau enforces federal and state pipeline safety regulations through the issuance of permits in order to provide for the safe operation of hazardous liquid facilities (such as saltwater disposal pipelines) (NMPRC 2019).*

#### *4.15.1.1.9 Sprint Andrews County Disposal Facility*

*This proposed Sprint Andrews County Disposal Facility site is approximately 30 miles west of Andrews on land owned by the applicant. The property is on the south side of SH 176 approximately 16 miles northwest of FM 181. The facility is about 165 acres of a 640-acre tract and is shown in Figure 4.15-6 from (BME 2019).*

*Land uses have been agriculture and oil exploration and production. There are currently no oil and gas wells and no water wells on the property and there are no community facilities nearby.*

*According to the permit application, the proposed Sprint Andrews County Disposal Facility would "receive, store, handle, treat, reclaim, and dispose on site of certain non-hazardous oil and gas waste subject to the jurisdiction of the Railroad Commission of Texas (RRC) including numerous specific processes associated with this type of permit as defined by Statewide Rule 57(b)(2)".*

*The permit application assesses environmental conditions such as wetlands, precipitation, floodplains, and a detailed groundwater analysis. The permit application describes the processes that would be used, the type of waste that would be accepted, documentation and monitoring commitments for permit compliance, closure plan, and other required components. The facility life is estimated to be approximately 36 years and the disposal capacity would be approximately 11.5 million cubic yards. Since the stamped drawings associated with the permit application show May 2019, it is assumed that the permitting process is still underway. This is a planned and reasonably foreseeable action.*

#### *4.15.1.1.10 OWL Landfill Services LLC Facility*

*The OWL Landfill Services LLC Facility will accept oil field waste for processing and disposal from oil and gas exploration and production operations in southeastern New Mexico (NM) and west Texas. The proposed OWL site is located approximately 22 miles northwest of Jal, adjacent and to the south of NM State Route 128 in Lea County, NM. The OWL site is comprised of a 560-acre ± tract of land located within a portion of Section 23, Township 24 South, Range 33 East, Lea County, NM. Site access will be provided on the south side of NM State Route 128 (GEI 2016).*

*The OWL Surface Waste Management Facility will comprise approximately 500 acres ± of the 560-acre ± site and will include two main components: an oil field waste Processing Area (81 acres ±) and an oil field waste Landfill (224 acres ±), as well as related infrastructure (195 acres ±). At full build-out, the Processing Area may include an oil treatment facility consisting of an estimated 8 produced water load-out points, 45 produced water tanks, 12 evaporation ponds, 3 crude oil recovery tanks, and 2 oil sales tanks; as well as 1 stabilization and solidification area; and a customer jet wash (6 bays). The Landfill disposal footprint is 224 acres ± with a waste capacity (airspace) of approximately 38.3 million cubic yards. Design and operating refinements* *are likely, particularly in the number and type of processing units, in response to market conditions; evolving technologies; etc. The plans for actual installations will be the subject of future submittals to the OCD (e.g., Construction Plans and Technical Specifications) in advance of construction.*

*The permit was approved on March 7, 2017 and appears to be under construction. Material transported to the proposed WCS site would be delivered by rail and would not impact the road capacity and the petroleum industry in the area that the OWL facility relies on. No environmental studies were located on the project.*

#### *4.15.1.2 Nuclear Activities in the ROI*

##### *4.15.1.2.1 Eddy Lea Energy Alliance/Holtec Hi-Store Consolidated Interim Storage*

*The proposed Holtec Hi-Store CIS Facility is 32 miles east of Carlsbad, New Mexico and 34 miles west of Hobbs, New Mexico. The facility would provide interim spent nuclear fuel storage pending licensing of a permanent repository. Phase 1 construction would disturb 119.4 acres for various components of the plant. Holtec is requesting a license to store up to 8,860 MTUs in Phase 1 and analyzed the environmental impacts of storing up to 100,000 MTUs at the CIS Facility in their license application and environmental report. "The proposed action is the issuance of an NRC license under 10 CFR 72 authorizing the construction and operation of a CIS facility on approximately 1,040 acres of land controlled by Holtec in Lea County, New Mexico. The CIS Facility would receive, possess, and store Spent Nuclear Fuel containing up to 100,000 metric tons of uranium (MTUs) of SNF" (Holtec 2019).*

*Their license application process has run roughly in parallel with WCS/ISP's license application and their report references the WCS CISF facility. Their approach uses different storage technology and includes a private purchase of land from the Eddy-Lea Energy Alliance (ELEA) at a site that is bordered by Federal and state lands on all sides. Their license application is in review as of August 2019.*

*The Environmental Report for the proposed Holtec Hi-Store CIS Facility includes a comprehensive environmental analysis of the proposed action in compliance with the application for license through the Nuclear Regulatory Commission and other applicable local, state, and federal laws and regulations. Their report concludes: "The Proposed Action would not cause any notable impacts for the following areas: visual and scenic resources; geology and* *soils; ecological resources; water resources; noise; cultural resources; socioeconomics and environmental justice; non-radiological transportation; infrastructure; and waste management." The resource areas with potential for cumulative impacts according to their analysis include: "land resources, air quality, transportation of nuclear materials, and health and safety (normal operations)." See Figure 4.15-7 from (Holtec 2019).*

#### *4.15.1.2.2 National Enrichment Facility (UUSA NEF)*

*UUSA National Enrichment Facility (NEF) is operated by Louisiana Energy Services LLC and it is the "only operating commercial enrichment facility on US soil and is located in Eunice, New Mexico." According to Urenco, the facility began operations in 2010. Their production capacity is 4,900 tSW/a and the facility employs more than 230 people (NEF 2019). The facility is used to enrich uranium for use in manufacturing nuclear fuel for commercial nuclear power reactors. A gas centrifuge process is used at the site for uranium enrichment. The environmental impacts of the project are documented in the EIS, NUREG-1790 (NRC 2005b). This site location is also shown on Figure 4.12-2. Due to its proximity to the proposed CISF, the NEF is referenced across several sections in Chapter 4 of this license application with regard to environmental impacts.*

#### *4.15.1.2.3 Waste Isolation Pilot Plant (WIPP)*

*According to the Department of Energy, the WIPP is the "nation's only repository for the disposal of nuclear waste known as transuranic, or TRU, waste. It consists of clothing, tools, rags, residues, debris, soil, and other items contaminated with small amounts of plutonium and other man-made radioactive elements. Disposal of transuranic waste is critical to the cleanup of Cold War nuclear production sites. Waste from DOE sites around the country is sent to WIPP for permanent disposal." (DOE 2019a). The facility has been in operation since 1999 and uses underground salt caverns for storage. More than 90,000 cubic meters of this TRU waste has been disposed of at this facility (DOE 2019b). Environmental impacts have been assessed and the environmental impact statement documents are entitled Waste Isolation Pilot Plan Disposal Phase Final Supplemental Environmental Impact Statement, DOE/EIS-0026-S2 (DOE 2018) and Waste Isolation Pilot Plant Annual Site Environmental Report for 2016 (DOE 2017). This site location is also shown on ER Figure 4.12-2.*

#### *4.15.1.2.4 International Isotopes Fluorine Products Inc. (IIFP) Depleted Uranium Deconversion Plant (FEP/DUP)*

*International Isotopes Fluorine Products Inc. (IIFP) facility was granted a license from NRC in October 2012 (NRC 2019). The license would allow construction and operation of a depleted uranium deconversion facility to be known as the Fluorine Extraction Process and Depleted Uranium Deconversion Plant (FEP/DUP). According to NRC, the site in Lea County, New Mexico would "convert depleted uranium hexafluoride (UF6) into fluoride products (i.e., deconversion) for commercial resale and uranium oxides for disposal. The proposed facility is projected to be capable of processing up to 11 million pounds of depleted UF6 per year." According the NRC website, no construction activities have occurred at the FEP/DUP. Environmental Impacts were assessed in a Final EIS that was published in 2012 (NUREG-2113), incorporated here by reference (NRC 2012b). This site location is also shown on ER Figure 4.12-2.*

## *4.15.2 POTENTIAL CUMULATIVE IMPACTS*

*Chapter 4 of the Environmental Report discusses environmental impacts from the proposed CISF. The project would not result in more than small or limited direct impacts to the following resources: geology and soils; water resources; ecological resources; air quality; noise; cultural resources; visual and scenic resources; environmental justice; transportation (non-nuclear); and waste management. A brief summary of resource impacts is included in the following section.*

*The following resources could be impacted to a moderate degree by the CISF project and therefore could contribute to cumulative impacts: land use, transportation (of nuclear materials); socioeconomics (positive); and public and occupational health. A brief summary of resource impacts is included below.*

### *4.15.2.1 Resource Areas with Minimal Potential for Cumulative Impacts*

#### *4.15.2.1.1 Geology and Soils*

*The potential impacts to the geology and soils have been characterized in Section 4.3, Geology and Soils Impacts. No substantial impacts would occur from the following activities:*

- *Soil re-suspension, erosion, and disruption of natural drainage*
- *Excavations to be conducted during construction*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*Impacts to geology and soils would be limited to surface runoff due to routine operation and low annual rainfall. Construction activities may cause some short-term increases in soil erosion at the CISF.*

*Because these direct impacts would be minimal and short-term, there is low potential to contribute to substantial cumulative impacts to these resources.*

#### *4.15.2.1.2 Water Resources*

*The potential impacts to water resources have been characterized in ER Section 4.4, Water Resources Impacts. No substantial impacts are anticipated to the following:*

- *Surface water and groundwater quality*
- *Consumptive water uses (e.g., groundwater depletion) on other water users and adverse impacts on surface-oriented water users resulting from facility activities. Site groundwater would not be utilized for any reason, and therefore, should not be impacted by routine CISF operations. The CISF water supply would be obtained from the same local publicly owned water system sources as the existing operations.*
- *Hydrological system alterations or impacts*
- *Withdrawals and returns of ground and surface water*
- *Cumulative effects on water resources.*

*The CISF would not obtain any water from onsite surface or groundwater resources. Sanitary wastewater discharges would be made through sewerage to holding tanks and subsequently transported offsite to publicly owned treatment works. Storm water is not expected to contain any radiological effluents, and with a low annual rainfall, storm water runoff would be directed to natural drainage areas.*

*Because these direct impacts would be minimal and short-term, there is low potential to contribute to substantial cumulative impacts to these resources.*

#### *4.15.2.1.3 Ecological Resources*

*The potential impacts to ecological resources have been characterized in Section 4.5, Ecological Resources Impacts. No substantial impacts are anticipated from the following factors:*

- *Total area of land to be disturbed*
- *Area of disturbance for each habitat type*
- *Use of chemical herbicides, roadway maintenance, and mechanical clearing*
- *Areas to be used on a short-term basis during construction*
- *Communities or habitats that have been defined as rare or unique or that support federally listed threatened and endangered species*
- *Impacts of elevated construction equipment or structures on species (e.g., bird collisions, nesting areas)*
- *Impact on important biota*

*Based on database searches and site inventories conducted by qualified ecologists, impacts to ecological resources would be minimal due to the absence of potentially suitable habitat for any federally listed threatened or endangered species on the land proposed for the CISF. No federally listed species were observed within the survey area during the October 2018 or April 2019 field investigations. The project has the potential to impact one state-listed endangered species for which potentially suitable habitat is located within the survey area: the Texas horned lizard. No state-listed threatened or endangered individuals were observed during the October 2018 or April 2019 field investigations. State law prohibits direct harm to state-listed species. If any individuals of these state-listed species are observed within the survey area during construction, care should be taken to avoid harming them, and the contractor should be educated about the potential presence of these species. No further coordination is required with the USFWS or TPWD at this time.*

*Best management practices would be in place during construction activities. Since no impacts are anticipated to federally listed species, and one state-listed species may occur in a large area* *in and around the proposed CISF facility, minimal impacts are anticipated and the project has low potential to contribute to substantial cumulative impacts to ecological species.*

#### *4.15.2.1.4 Air Quality*

*The potential impacts to the air quality have been characterized in Section 4.6, Air Quality Impacts. No substantial impacts from gaseous effluents would occur and visibility would not be impacted. Impacts to air quality would be minimal. Construction and operational activities would result in interim increases in hydrocarbons and particulate matter due to vehicle emissions and dust. During construction activities, best practices would be employed to reduce and control dust emissions.*

*Because these direct impacts would be minimal and short-term, there is low potential to contribute to substantial cumulative impacts to air quality.*

#### *4.15.2.1.5 Noise*

*The potential impacts related to noise generated by the facility have been characterized in Section 4.7, Noise Impacts. No substantial impacts to sensitive receptors (e.g., hospitals, schools, residences, wildlife) from predicted typical noise levels at the facility perimeter are anticipated. Noise levels would increase during construction and during operation of the CISF, but not to a level that would cause significant impact to nearby residents. The nearest residence is 6 km (3.8 mi) from the CISF.*

*Because these direct impacts would be minimal and short-term, there is low potential to contribute to substantial cumulative impacts to sensitive noise receivers.*

#### *4.15.2.1.6 Cultural Resources*

*The potential impacts to historic and cultural resources have been characterized in Section 4.8, Historic and Cultural Resource Impacts. The archeological Area of Potential Effect (APE) consists of the 216.6-acre footprint of the proposed CISF. No archeological materials of any kind were observed within the APE during a survey conducted in May 2015, and no further work is recommended within the APE prior to construction of the proposed CISF. Since the area containing the proposed project footprint is devoid of any standing structures, the proposed project would not result in a direct impact to any non-archeological historic resources. The APE for indirect/visual impacts was defined as the area within a 1.6 km (1 mi) radius from the proposed project footprint. There do not appear to be any historic resources 45 years or older* *(dating to 1974 or earlier) within the 1.6 km (1 mi) indirect effects APE. The Texas Historical Commission (THC) as well as the New Mexico Department of Cultural Affairs concurred that further cultural resource investigations are not warranted prior to construction.*

*Because these direct impacts would be minimal and short-term, there is low potential to contribute to substantial cumulative impacts to cultural resources.*

#### *4.15.2.1.7 Visual and Scenic Resources*

*The potential impacts to visual/scenic resources have been characterized in Section 4.9, Visual/Scenic Resources Impacts. The proposed CISF construction would be visible only from fairly close vantage points and would be less of an impact than the adjacent URENCO NEF, which lies between the denser population of viewers in Eunice, NM and the proposed CISF, where the largest component would be the cask handling building. The Socioeconomic Impact Assessment (SIA) characterizes the proposed CISF location as having a modest scenic quality that is pleasant to regard for its rural, undeveloped nature, but not dramatic, unique, or rare (CMEC 2015). Facilities geared towards resources extraction, the Lea County Landfill, and oil well pump jacks exist in the project area, in addition to the URENCO NEF facility, which have an equal or higher impact on the visual landscape compared to the proposed new CISF activities.*

*Because these direct impacts would be minimal and short-term, there is low potential to contribute to substantial cumulative impacts to visual and scenic resources.*

#### *4.15.2.1.8 Environmental Justice*

*The potential impacts with respect to environmental justice have been characterized in the Environmental Justice section of the ER, Section 4.11. No substantial disproportionate impacts to low-income or minority persons are anticipated to result from the proposed project. Based on the data analyzed and the NUREG-1748 guidance applicable to that analysis, ISP determined that no further evaluation of potential environmental justice concerns was necessary, as no Census Block Group within the 6.4 km (4 mi) radius, i.e., 128 km² (50 mi²), of the CISF site contained a minority or low-income population exceeding the NUREG-1748 "20%" or "50%" criteria.*

*Because no direct adverse impacts would occur to environmental justice communities, there is low potential to contribute to substantial cumulative impacts to environmental justice communities.*

#### *4.15.2.1.9 Transportation (Non-Nuclear)*

*Transportation impacts have been characterized in Section 4.2, Transportation Impacts. With respect to construction-related transportation, no substantial impacts would occur. The analysis incorporated the following considerations:*

- *No new access road would be required on Texas State Highway 176 to provide access to the facility. An existing roadway on the Waste Control Specialists property would be extended north to the CISF.*
- *The transportation route and mode for conveying construction material to the facility currently exists.*
- *The increase in traffic from heavy haul vehicles and construction worker commuting would not substantially change traffic patterns.*
- *Impacts from construction transportation such as fugitive dust, scenic quality, and noise would be temporary.*

*Minor impacts related to construction traffic such as fugitive dust, noise, and emissions are discussed in ER Section 4.7. Additional information on noise impacts is contained in ER Section 3.7.*

*Because these direct impacts would be limited due to much of the transportation infrastructure already existing at the site, and construction traffic impacts would be minor and short-term, there is low potential to contribute to substantial cumulative impacts from transportation activities.*

#### *4.15.2.1.10 Waste Management*

*The potential impacts of waste generation and waste management have been characterized in Section 4.13, Waste Management Impacts. No substantial impacts would occur to:*

- *The public, due to the composition and disposal of solid, hazardous, radioactive and mixed wastes*
- *Facility workers, due to storage, processing, handling, and disposal of solid, hazardous, radioactive, and mixed wastes.*

*Impacts related to waste management would be minimal. Additionally, there would be no substantial cumulative impacts from waste generation and waste management.*

#### *4.15.2.2 Resource Areas with Potential for Cumulative Impacts*

##### *4.15.2.2.1 Land Use*

*Land use impacts have been characterized in Section 4.1, Land Use Impacts. No substantial impacts would occur with regard to the following: Land-use impacts at the CISF and impacts from any related federal action that may have cumulatively significant impacts; and area and location of land that would be disturbed on either a long-term or short-term basis. As discussed in Section 4.1, the proposed action would have a footprint of 130 ha (320 acres) after Phase Eight build out. An additional 5 ha (12 acres) would be used for contractor parking and lay-down area, which would be restored after the construction phase. The total impact would be approximately 135 ha (332 acres) of the 5,666 ha (14,000 acres) of land controlled by ISP Joint Venture Waste Control Specialists. As stated in Section 4.1, "overall land use impacts to the proposed CISF and vicinity would be small considering that the majority of the site would remain undeveloped, the current industrial activity on neighboring properties, the nearby expansive oil and gas well fields, and the placement of most utility installations along highway easements. ISP is not aware of any Federal action that would have cumulatively significant land use impacts."*

*The non-nuclear and nuclear-related activities that were previously discussed would each have some impacts on land use. Some activities discussed are generalized activities such as livestock grazing (not permitted at the ISP site) and oil and gas activities. Renewable resource projects are planned in the ROI including a wind farm. Non-nuclear and nuclear-related waste disposal activities exist and are the subject of their own environmental and regulatory compliance studies.*

*Land use development for the proposed project and others with federal funding or permitting requirements must meet a legitimate public purpose. In the case of the CISF, safe consolidated interim spent fuel storage would help fulfill the objectives of the Blue Ribbon Commission recommendations (BRC 2012) and the Department of Energy's 2015 establishment of a consent-based siting process to transport, store, and dispose of SNF and HLW. Each project within the ROI must meet applicable land development regulations. The proposed CISF project would contribute to cumulative land use impacts within the ROI. However, these impacts,*


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*combined with past, present, and reasonably foreseeable future impacts based on current research, are not anticipated to result in significant, cumulative, adverse impacts to land use.*

*Table 4.15-1 quantifies land use impacts from various proposed and existing nuclear actions within the 50-mile region of influence. The ROI comprises more than five million acres of land. The table summarizes the total land use of all nuclear-related facilities within the WCS/ISP ROI. These anticipated nuclear related activities total approximately 1,800 acres, which is less than 0.04 percent of land in the ROI. The cumulative impacts to land use would not be statistically significant.*

***Table 4.15-1, Cumulative Impacts – Land Use***

| ***Facility*** | ***Land Use (acres)*** | ***Source*** |
|---|---|---|
| *Proposed WCS CISF* | *330* | *WCS CSIF ER* |
| *Proposed Holtec Hi-STORE CIS* | *330* | *Holtec 2019* |
| *WIPP* | *300* | *DOE 2015* |
| *Urenco (UUSA) NEF* | *200* | *NRC 2005b* |
| *International Isotopes Fluorine Products FEP/DUP* | *640* | *NRC 2012b* |
| ***Total*** | ***1,800*** | |

#### *4.15.2.2.2 Transportation (of Nuclear Materials)*

*With respect to the transport of radioactive materials, no substantial impacts would occur. The analysis incorporated the following factors:*

- *Mode of transportation (truck, rail, or barge) and routes from the originating site to the CISF*
- *Estimated transportation distance from the originating site to the CISF*
- *Treatment and packaging procedures for radioactive wastes*
- *Radiological dose equivalents for public and workers from incident-free scenarios*
- *Potential impacts of operating transportation vehicles on the environment (e.g., fire from equipment sparking)*

*Impacts related to the transport of radioactive materials are addressed in Sections 3.2 and 4.2. The materials that would be transported to and from the CISF are well within the scope of the*



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*environmental impacts previously evaluated by the NRC in its GEIS for continued storage of spent nuclear fuel, NUREG-2157 (NRC 2014a).*

*With regard to transportation of nuclear materials, listed in Table 4.15-2 are the impacts associated with radiological transportation. The table describes impacts from various proposed nuclear actions within the 50-mile region of influence.*

*The anticipated total annual dose to the public from transportation activities would be 6.76 person-sievert (676 person-rem). The cumulative impact from the proposed WCS CISF and other proposed and existing nuclear-related sites would not be statistically significant.*

***Table 4.15-2, Cumulative Impacts – Transportation (Nuclear-related)***

| Facility | Annual Dose to Public (person-Sv) | Source |
|---|---|---|
| *Proposed WCS CISF* | *0.69* | *WCS CSIF ER* |
| *Holtec Hi-STORE CIS* | *1.72* | *Holtec 2019* |
| *WIPP* | *2.50* | *DOE 2016* |
| *Urenco (UUSA) NEF* | *1.67* | *NRC 2005b* |
| *IIFP FEP/DUP* | *1.8** | *NRC 2012b* |
| ***Total*** | ***6.76*** | — |

**NRC 2012b estimated the maximum annual dose from radiological transportation to be 0.18 Sv (18 person-rem). For conservative purposes, this dose is assumed to be public dose.*

### *4.15.2.2.3 Socioeconomics (Positive)*

*The potential socioeconomic impacts to the community have been characterized in Section 4.10, Socioeconomic Impacts and in Appendix A, Socioeconomic Impacts of the Proposed Spent Nuclear Fuel Consolidated Interim Storage Facility Andrews, Texas. No substantial negative impacts are anticipated on the area's:*

- *Population characteristics (e.g., ethnic groups and population density)*
- *Housing, health and social services, or educational and transportation resources*
- *Tax structure and distribution*

*The conclusions of the SIA showed positive direct, indirect, and final demand impacts to the economy for the construction and operation of the CISF. There would be no adverse direct impacts to the nearby communities. There would be minimal demands on local social resources and infrastructure to meet housing and other social infrastructure needs, based on the*


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*anticipated increases in employment for the CISF. Section 7.0 of the ER includes a detailed benefit-cost analysis in terms of savings to the federal government and benefits to the private sector and local workforce, including redevelopment potential at decommissioned plants and several other factors. Overall, the analysis indicates that benefits outweigh the costs.*

*From a socioeconomic perspective, the proposed CISF project would contribute to positive cumulative effects.*

#### *4.15.2.2.4 Public and Occupational Health – Nonradiological (Normal Operations)*

*The potential impacts to public and occupational health for nonradiological sources have been characterized in Section 4.12.1, Nonradiological Impacts. No substantial impacts will exist to:*

- *Members of the public from nonradiological discharge of liquid or gaseous effluents to water or air*
- *Facility workers as a result of occupational exposure to nonradiological chemicals, effluents, or wastes*
- *Public and occupational health from cumulative impacts*

*Impacts to the public and workers from nonradiological gaseous and liquid effluents would be minimal.*

#### *4.15.2.2.5 Public and Occupational Health – Radiological (Normal Operations)*

*The assessment of pathways for exposure along with potential impacts to public and occupational health for radiological sources has been characterized in Section 4.12, Public and Occupational Health Impacts. No substantial impacts exist for the public (as determined by the critical group) or the workforce (based on radiological and chemical exposures) based on the average annual concentration of radioactive and hazardous materials in gaseous and liquid effluents and on reasonably foreseeable (i.e., credible) accidents with the potential to result in environmental releases. Routine operations at the CISF would create only an incremental increase in the potential for radiological and nonradiological public and occupational exposure. Potential radiation exposure would be due to the storage of spent nuclear fuel and the presence of associated fission products onsite. There would be no chemical substances, airborne particulates, or gases or liquid effluents that could contribute to offsite exposure.*

*All credible accident sequences were considered during the Safety Analysis performed for the facility; this information can be found in Section 1.4.3, Accident Analysis, of the WCS CSIF SAR.*

*Table 4.15-3 details present doses to a maximally exposed individual (MEI) from each proposed or existing nuclear related facility in the WCS CISF Region of Interest. The data in Table 4.15-3 represents an assumption that, for conservative purposes, "a single MEI would receive a maximum dose from each of the facilities considered in the cumulative analysis." The doses in the table are low compared to an individual's maximum exposure to naturally-occurring elements.*

***Table 4.15-3, Cumulative Radiological Doses***

| *Facility* | *Cumulative Dose to Maximally Exposed Individual* | | *Source* |
|---|---|---|---|
| | *mrem/yr.* | *mSv/yr.* | |
| *PROPOSED WCS CISF* | *$4.3 \times 10^{-2}$* | *$4.3 \times 10^{-6}$* | *WCS CSIF ER* |
| *HOLTEC HI-STORE CIS* | *2.5* | *$2.5 \times 10^{-3}$* | *Holtec 2019* |
| *WIPP* | *0.24* | *$2.4 \times 10^{-5}$* | *DOE 2015* |
| *URENCO (UUSA) NEF* | *$1.3 \times 10^{-3}$* | *$1.3 \times 10^{-6}$* | *NRC 2005b* |
| *IIFP FEP/DUP* | *$1.4 \times 10^{-2}$* | *$1.4 \times 10^{-5}$* | *NRC 2005* |
| ***Total*** | ***2.8*** | ***$2.8 \times 10^{-3}$*** | — |


All Indicated Changes are in response to RAI CI-1

***Figure 4.2-1***

***Not Used***

***Figure 4.2-2***

***Not Used***

***Figure 4.2-3***

***Not Used***

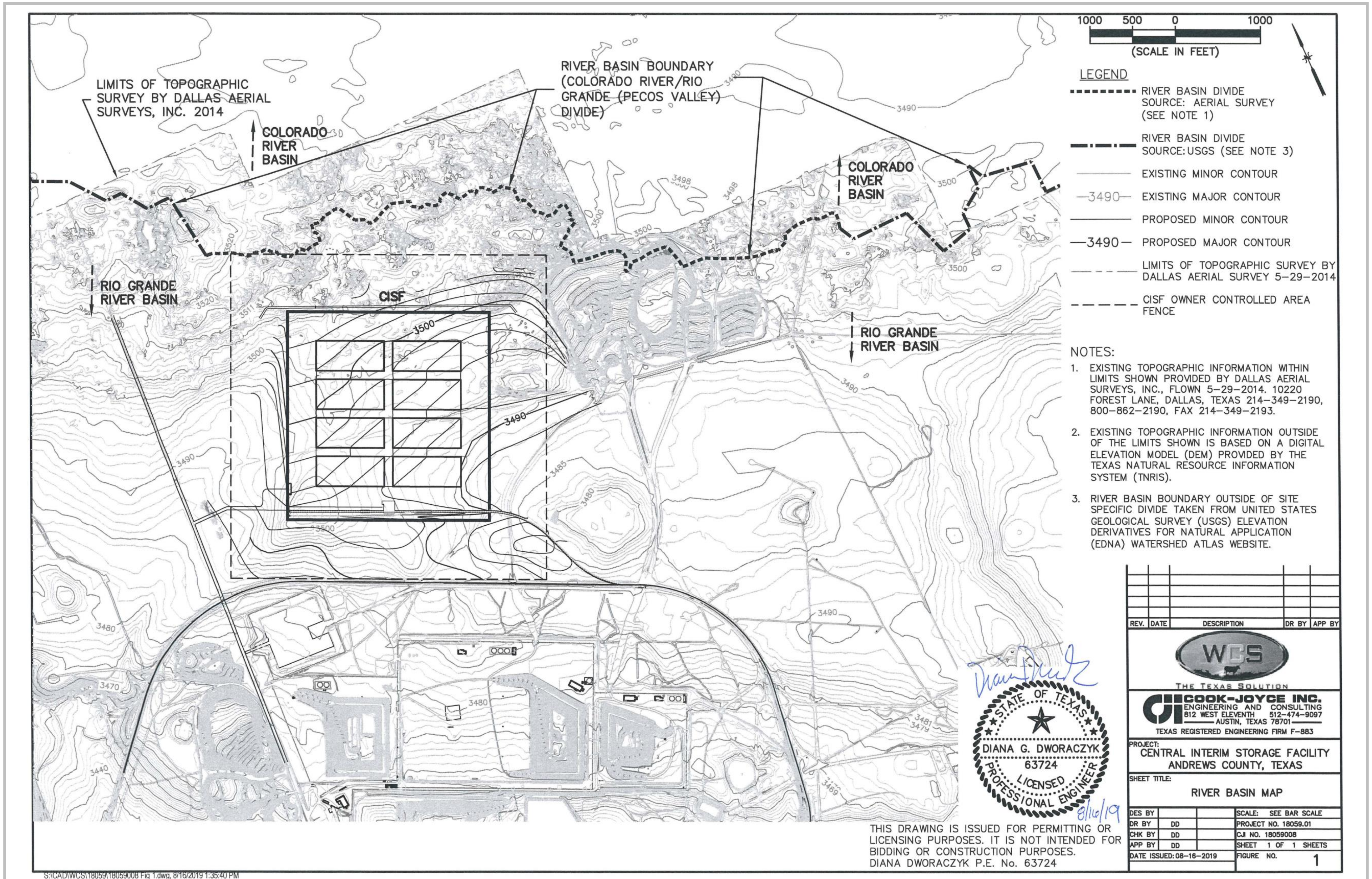
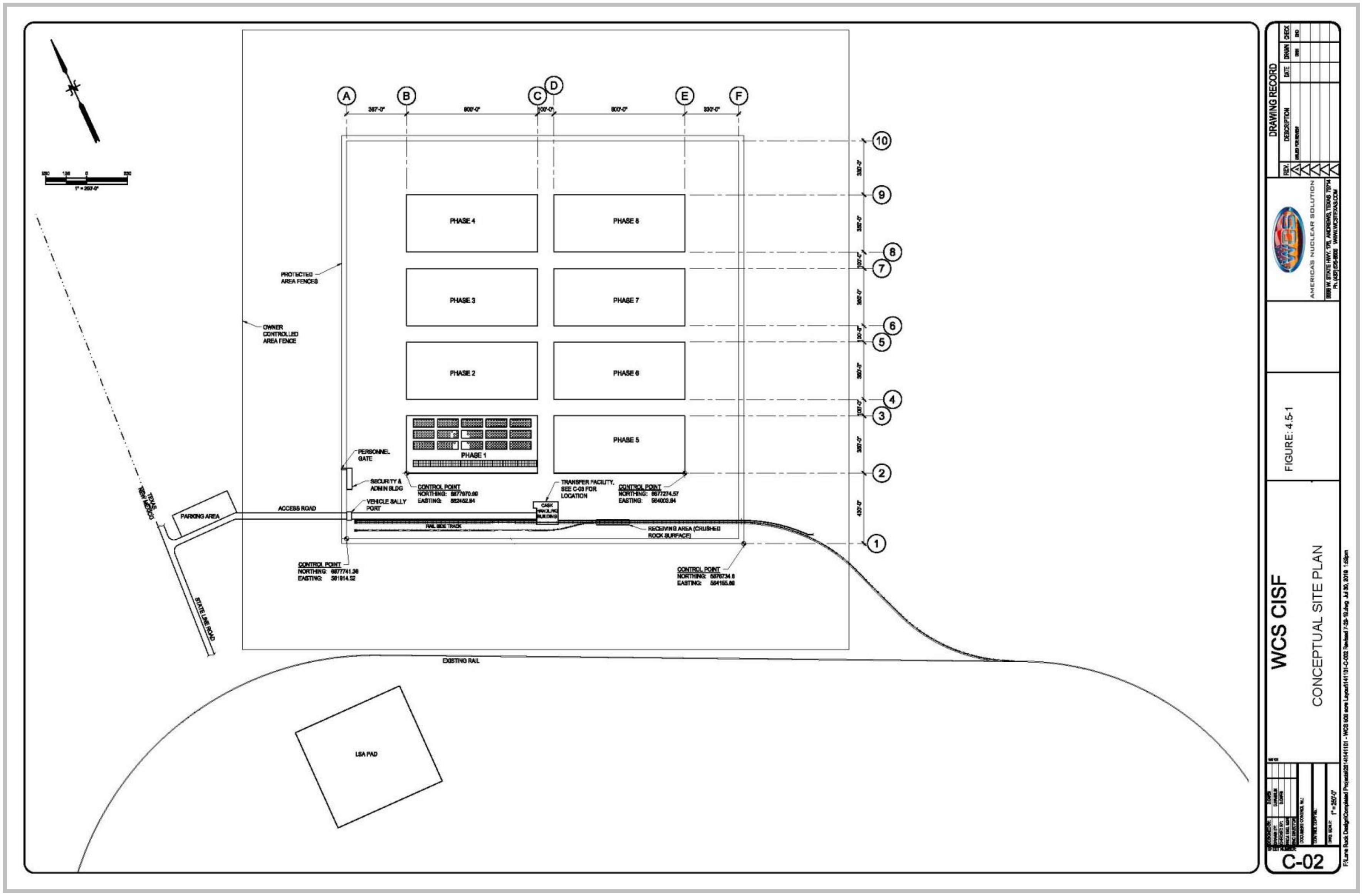



***Figure 4.4-1, River Basis Map***






All Indicated Changes are in response to RAI PA-1

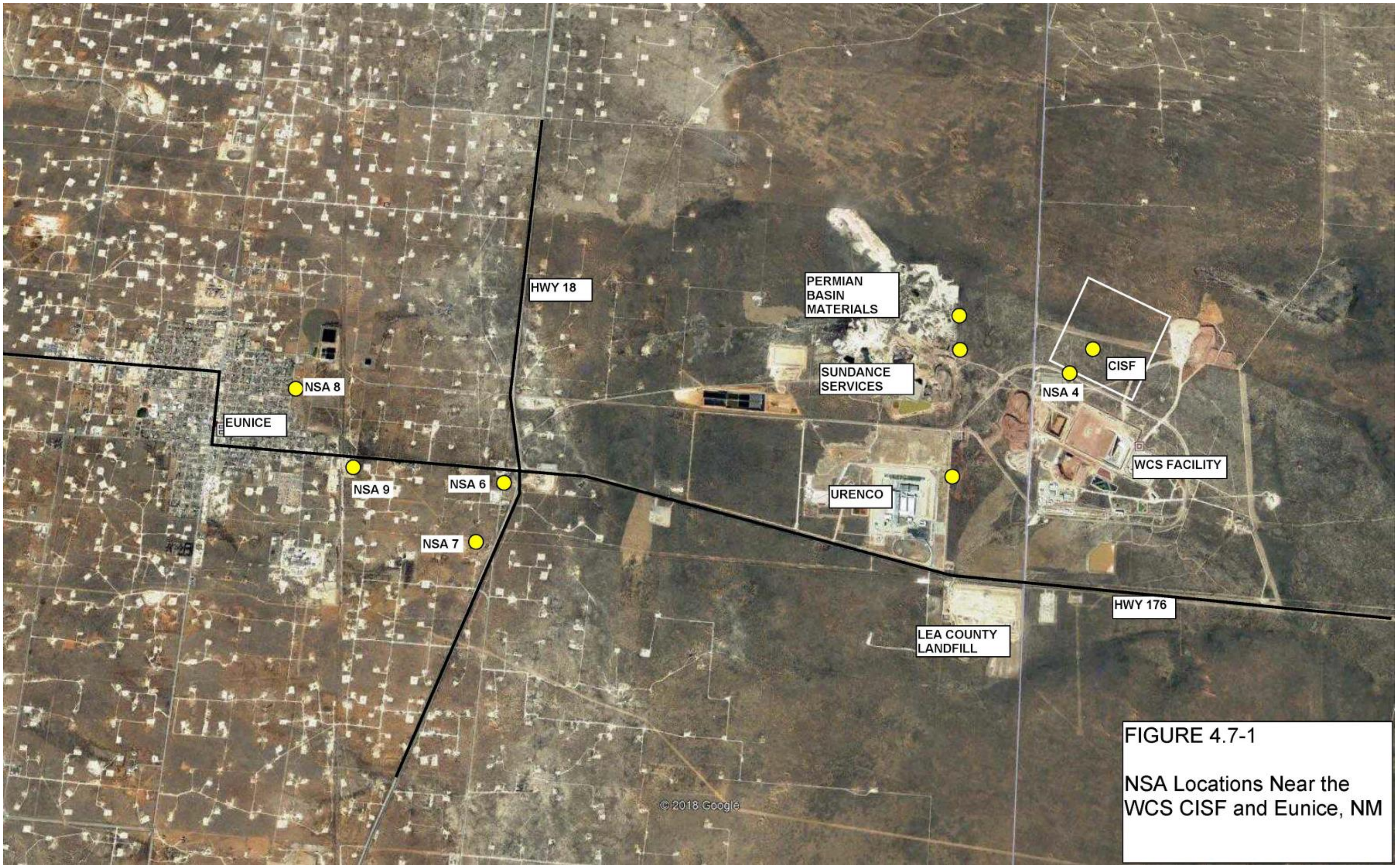



FIGURE 4.7-1

NSA Locations Near the WCS CISF and Eunice, NM


All Indicated Changes are in response to RAI NOI-2

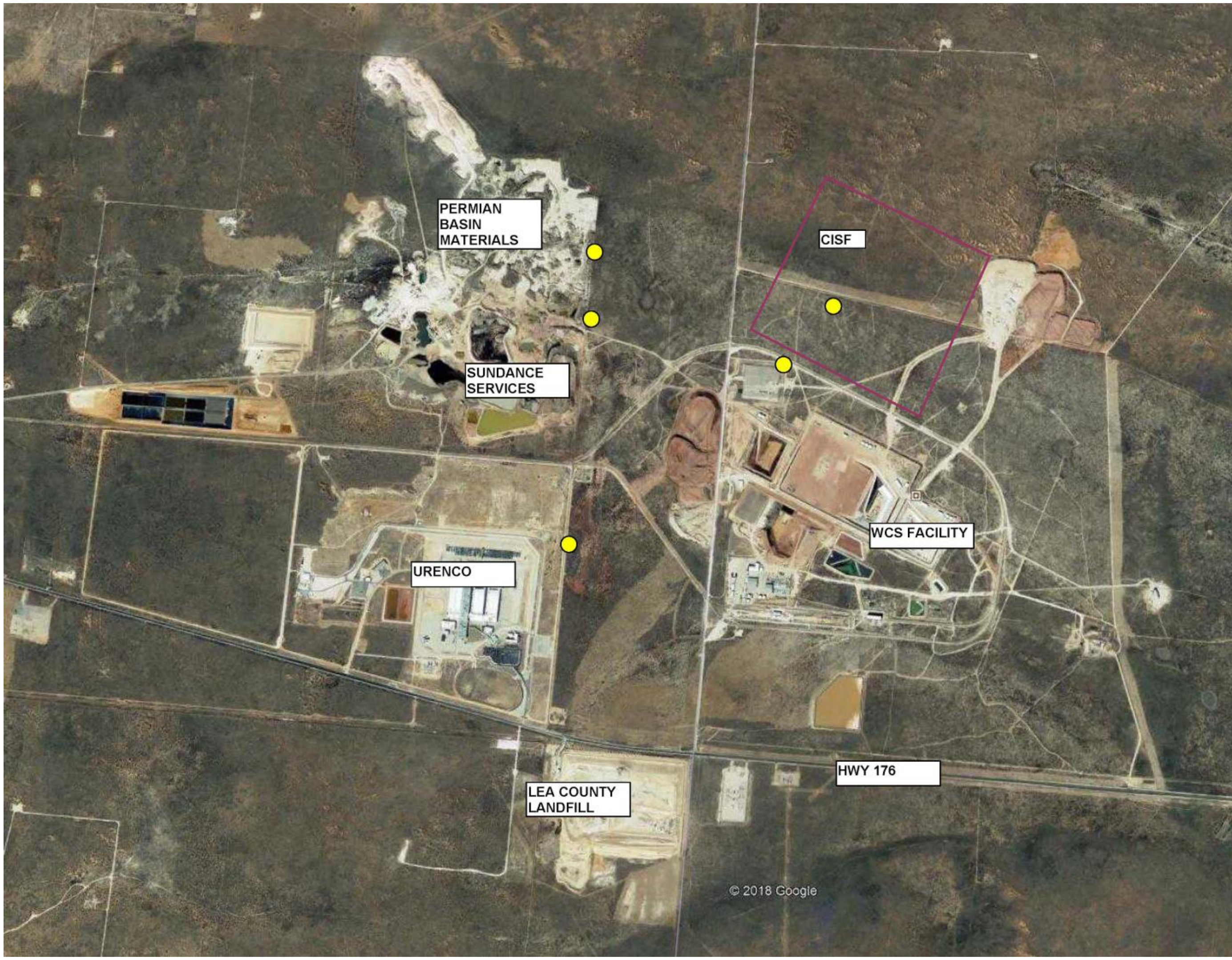



FIGURE 4.7-2

NSA Locations Near the WCS CISF



All Indicated Changes are in response to RAI NOI-2

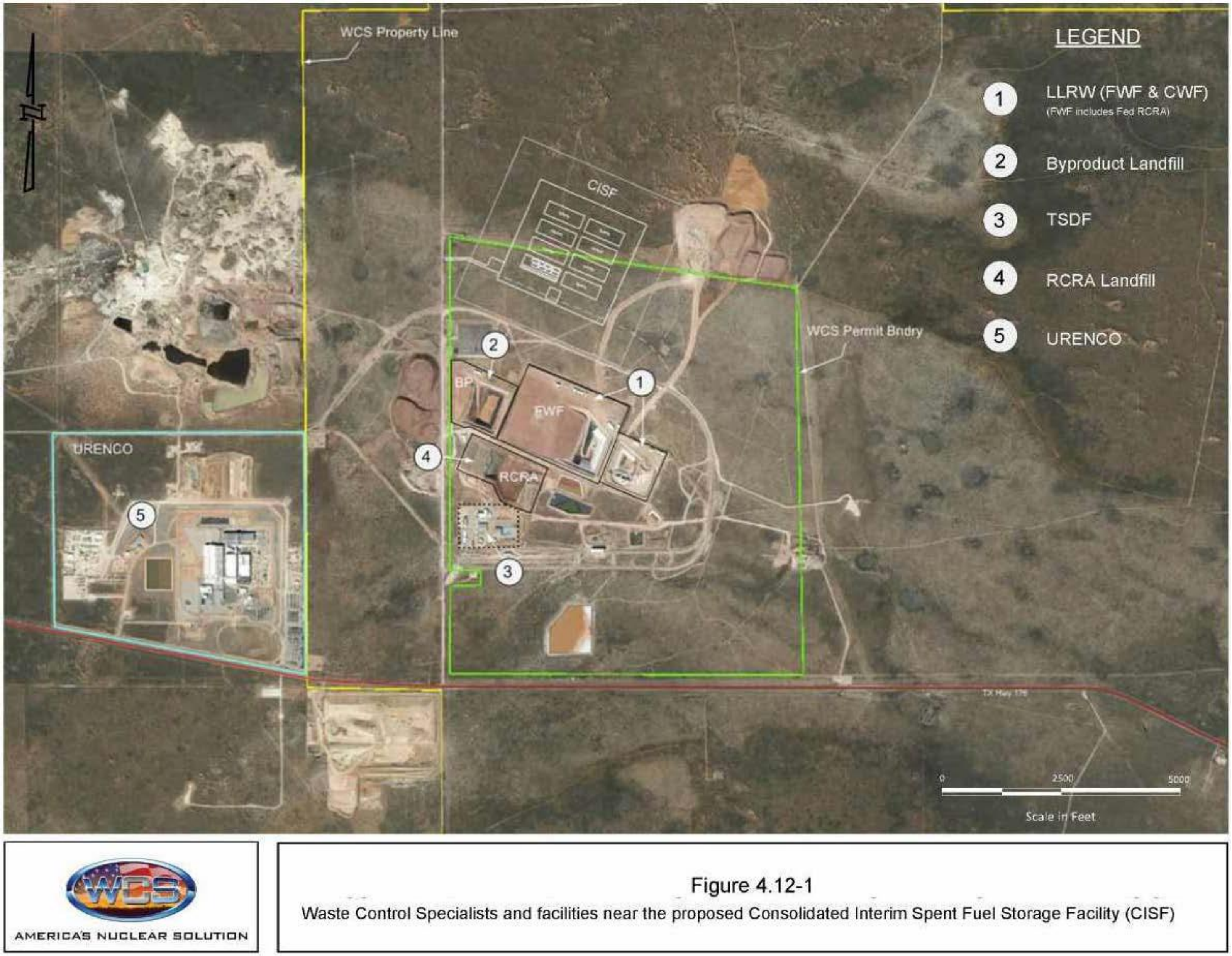



Figure 4.12-1

Waste Control Specialists and facilities near the proposed Consolidated Interim Spent Fuel Storage Facility (CISF)



All Indicated Changes are in response to RAI PA-1


AMERICA'S NUCLEAR SOLUTION

Figure 4.12-7
Air monitoring locations (27 stations in 2014).



All Indicated Changes are in response to RAI PA-1

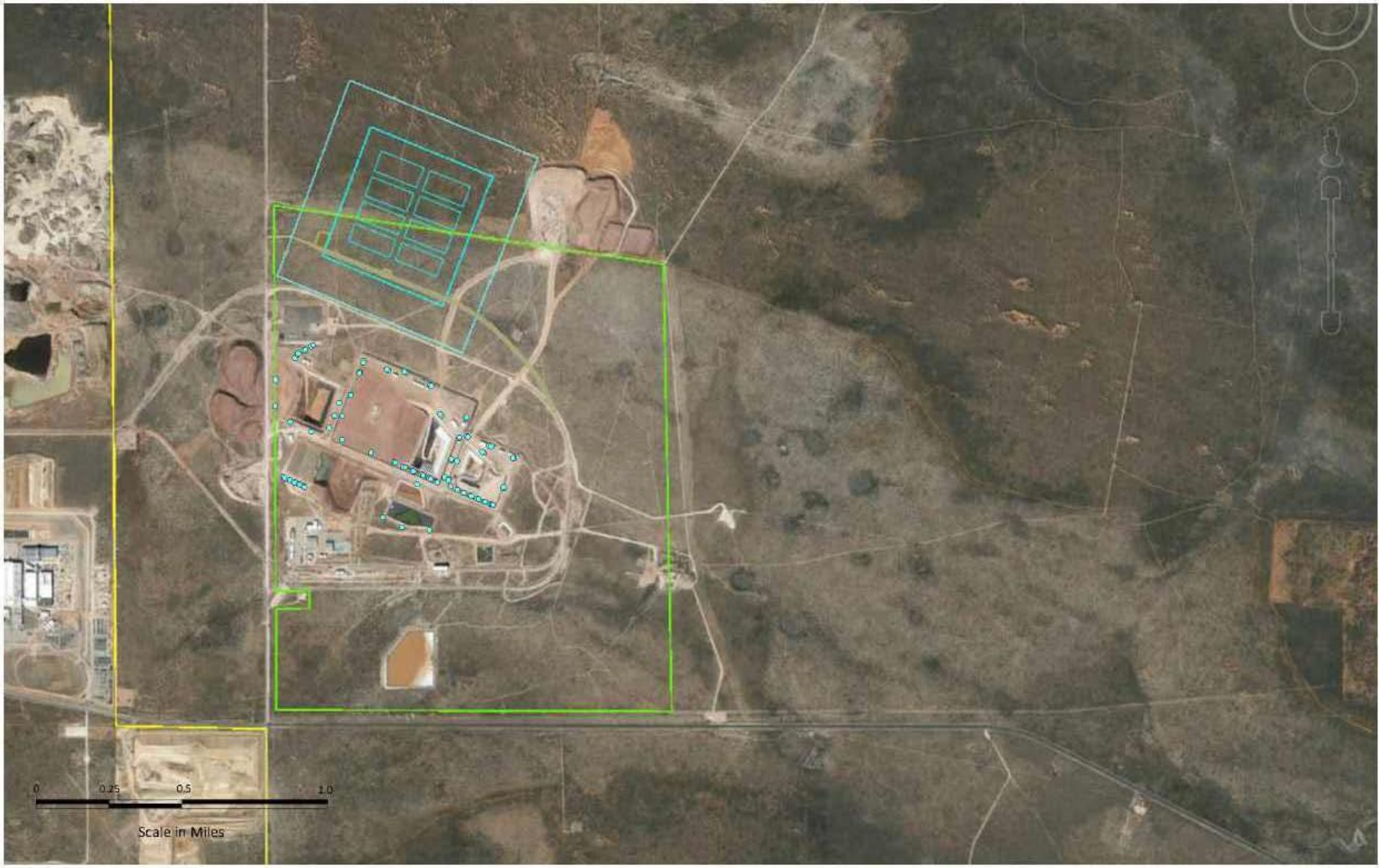



Figure 4.12-8
225-ft Zone REMP groundwater monitoring locations (88 locations in 2014).



All Indicated Changes are in response to RAI PA-1


AMERICA'S NUCLEAR SOLUTION

Figure 4.12-9
Soil monitoring locations (17 locations in 2014).



All Indicated Changes are in response to RAI PA-1


AMERICA'S NUCLEAR SOLUTION

Figure 4.12-10
On-site Thermoluminescent dosimeters (TLDs) or Optically Stimulated Luminescent dosimeters (OSLs) monitoring locations (36 locations in 2014).



All Indicated Changes are in response to RAI PA-1


AMERICA'S NUCLEAR SOLUTION

Figure 4.12-11
Surface water monitoring locations (8 locations in 2014).



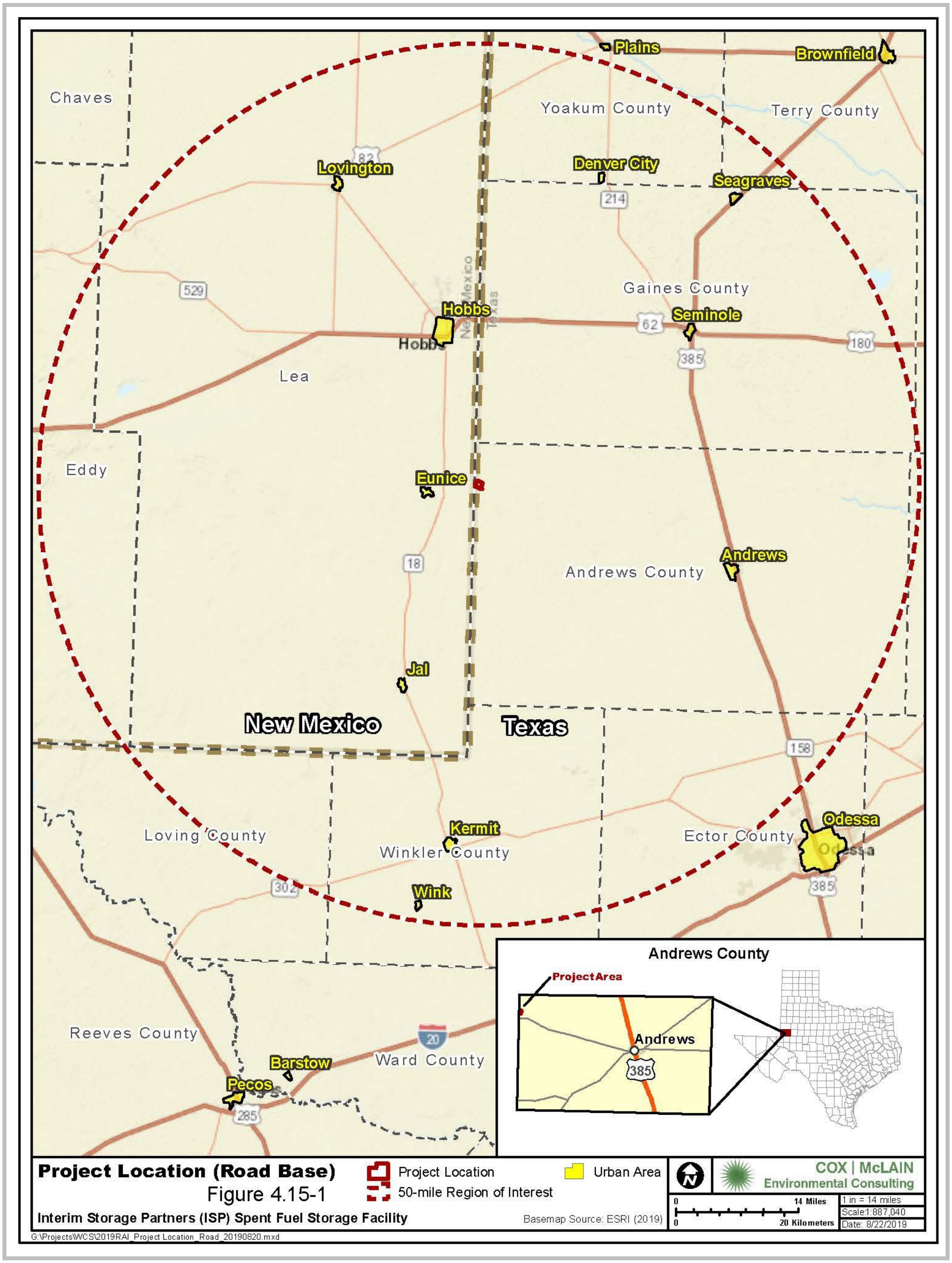
All Indicated Changes are in response to RAI PA-1


AMERICA'S NUCLEAR SOLUTION

Figure 4.12-12
Vegetation monitoring locations (15 locations in 2014).

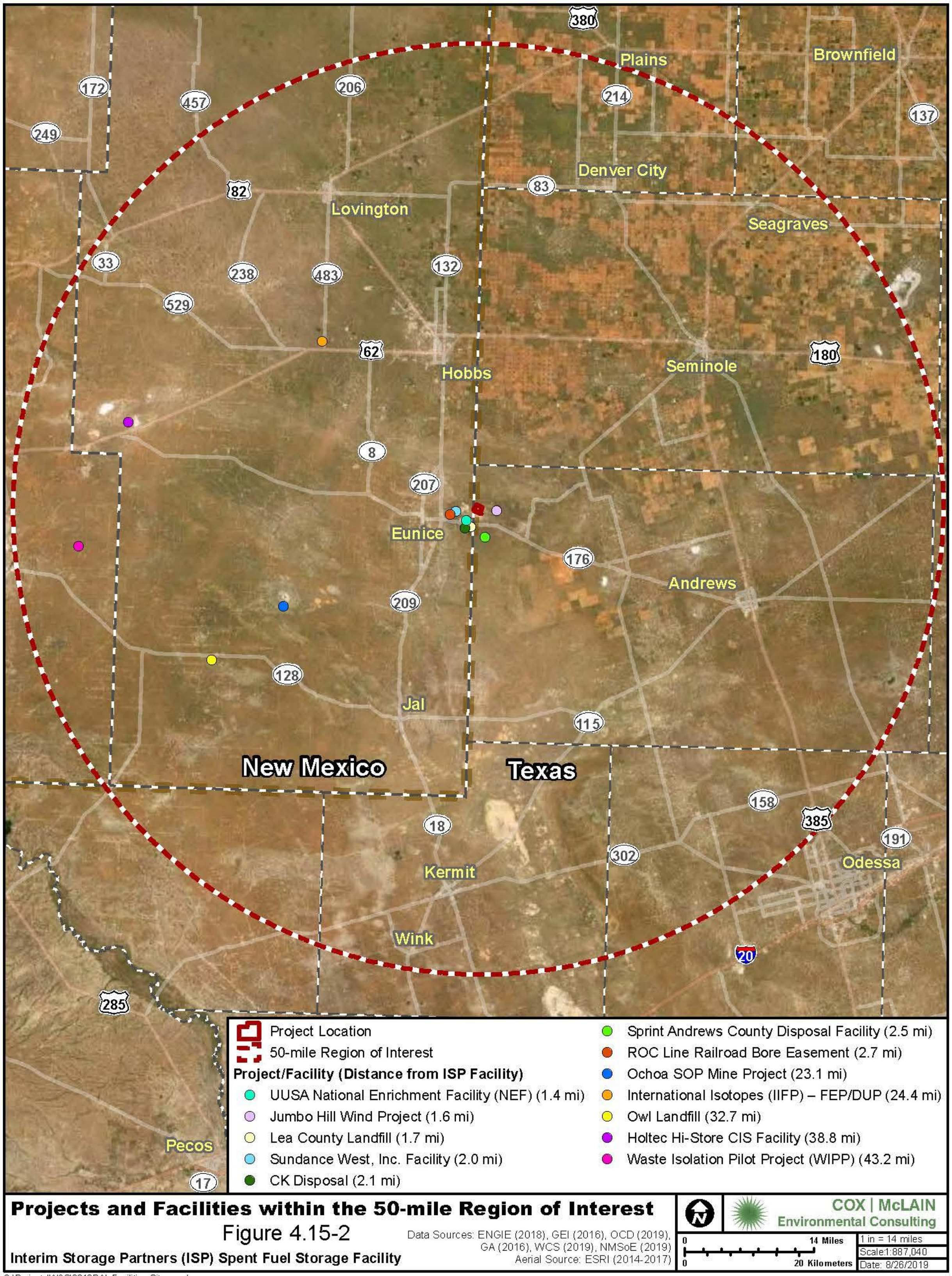


All Indicated Changes are in response to RAI PA-1






All Indicated Changes are in response to RAI CI-1



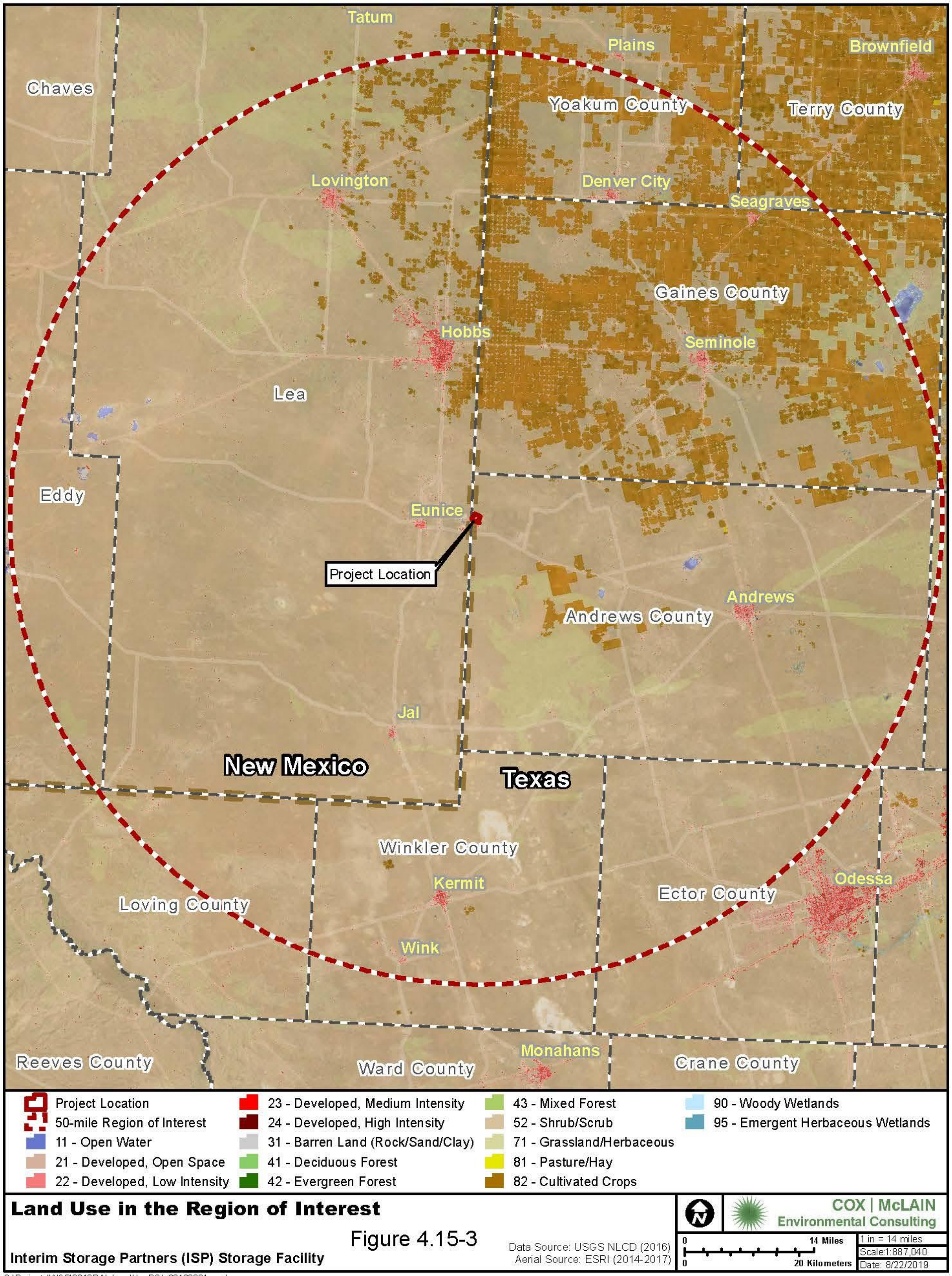

**Projects and Facilities within the 50-mile Region of Interest**

Figure 4.15-2

Interim Storage Partners (ISP) Spent Fuel Storage Facility



All Indicated Changes are in response to RAI CI-1






All Indicated Changes are in response to RAI CI-1

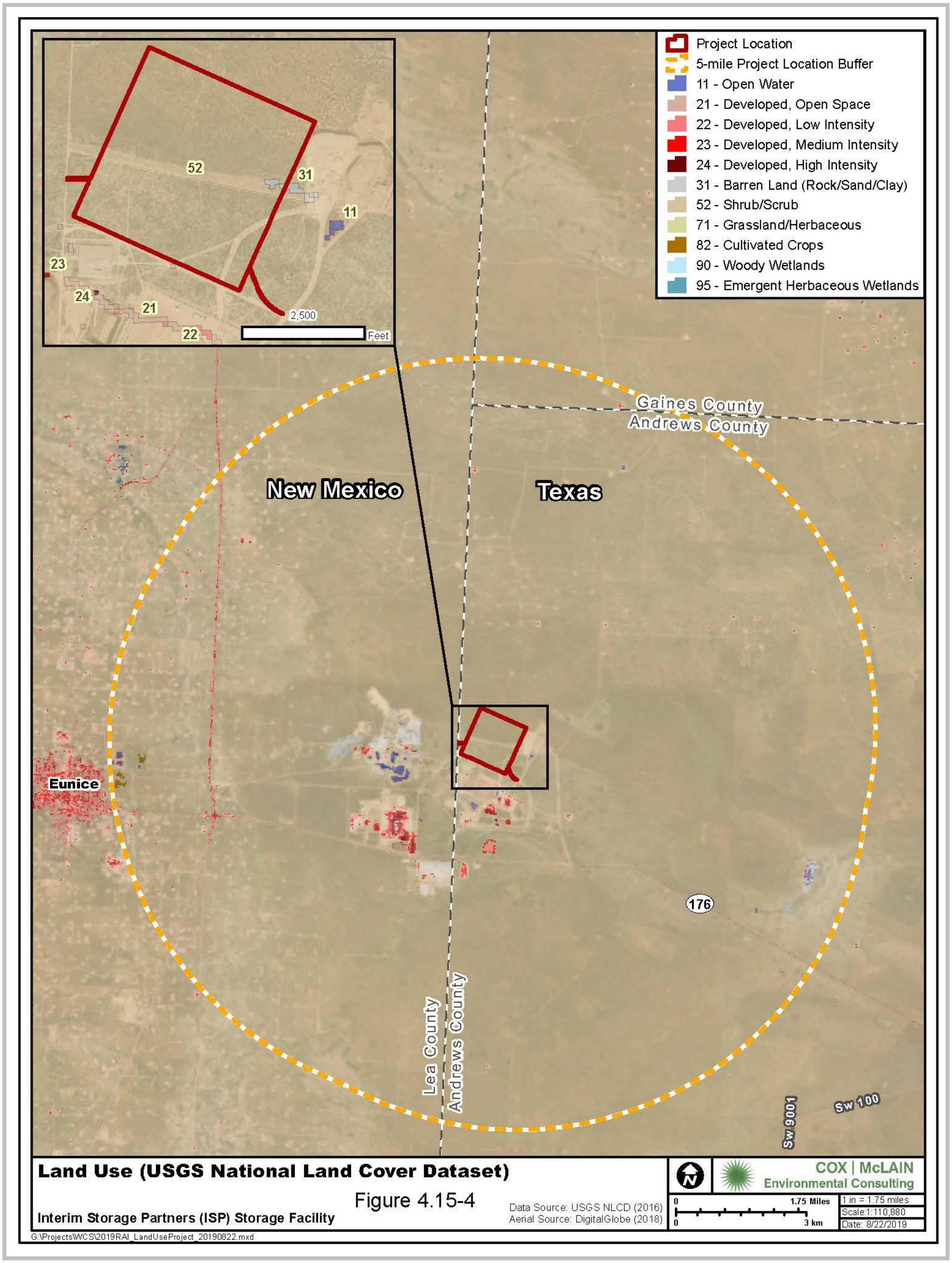



Figure 4.15-4



All Indicated Changes are in response to RAI CI-1

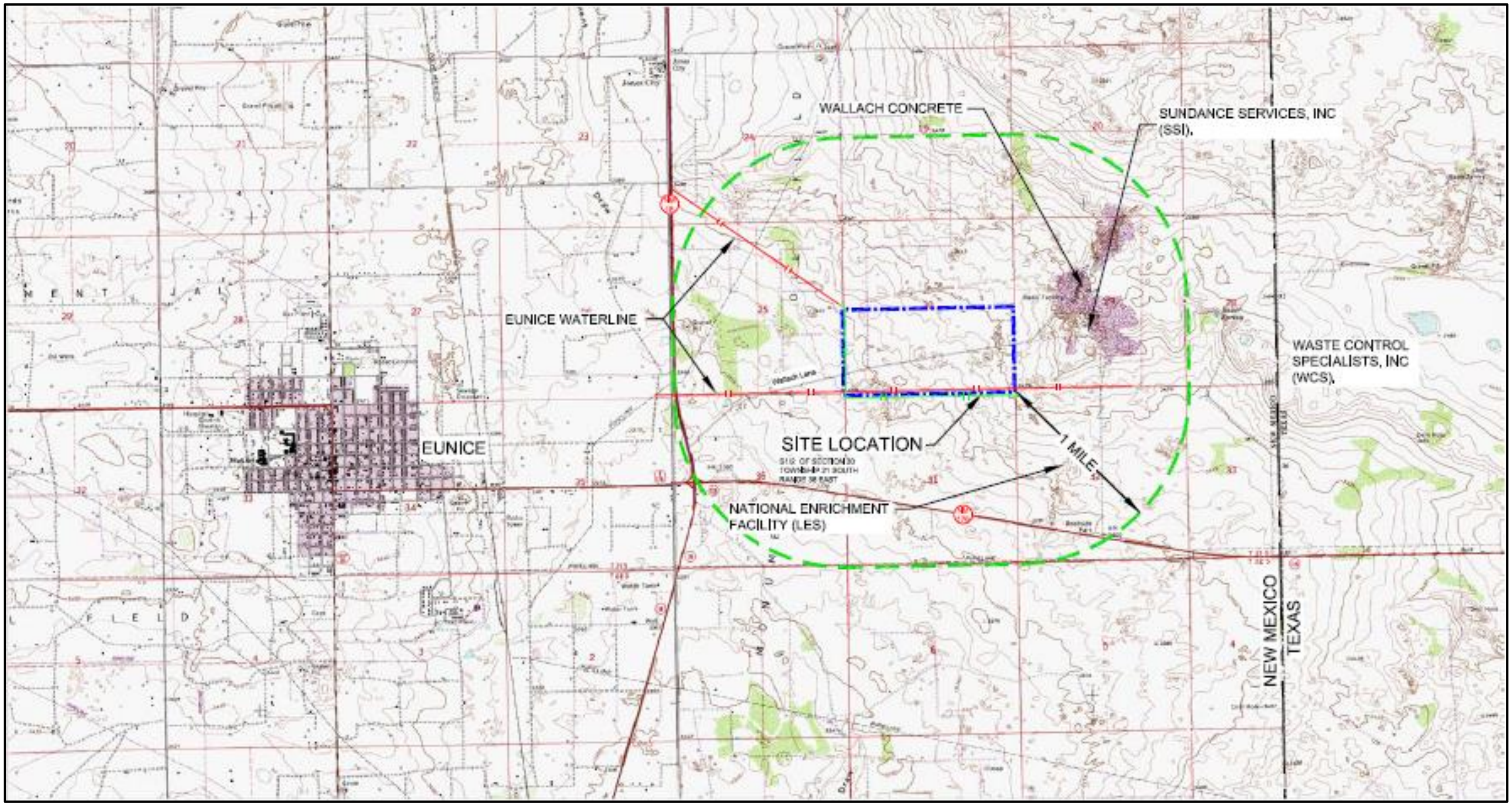



***Figure 4.15-5 Location of Proposed Sundance West Surface Waste Management Facility (GEI 2016)***


All Indicated Changes are in response to RAI CI-1

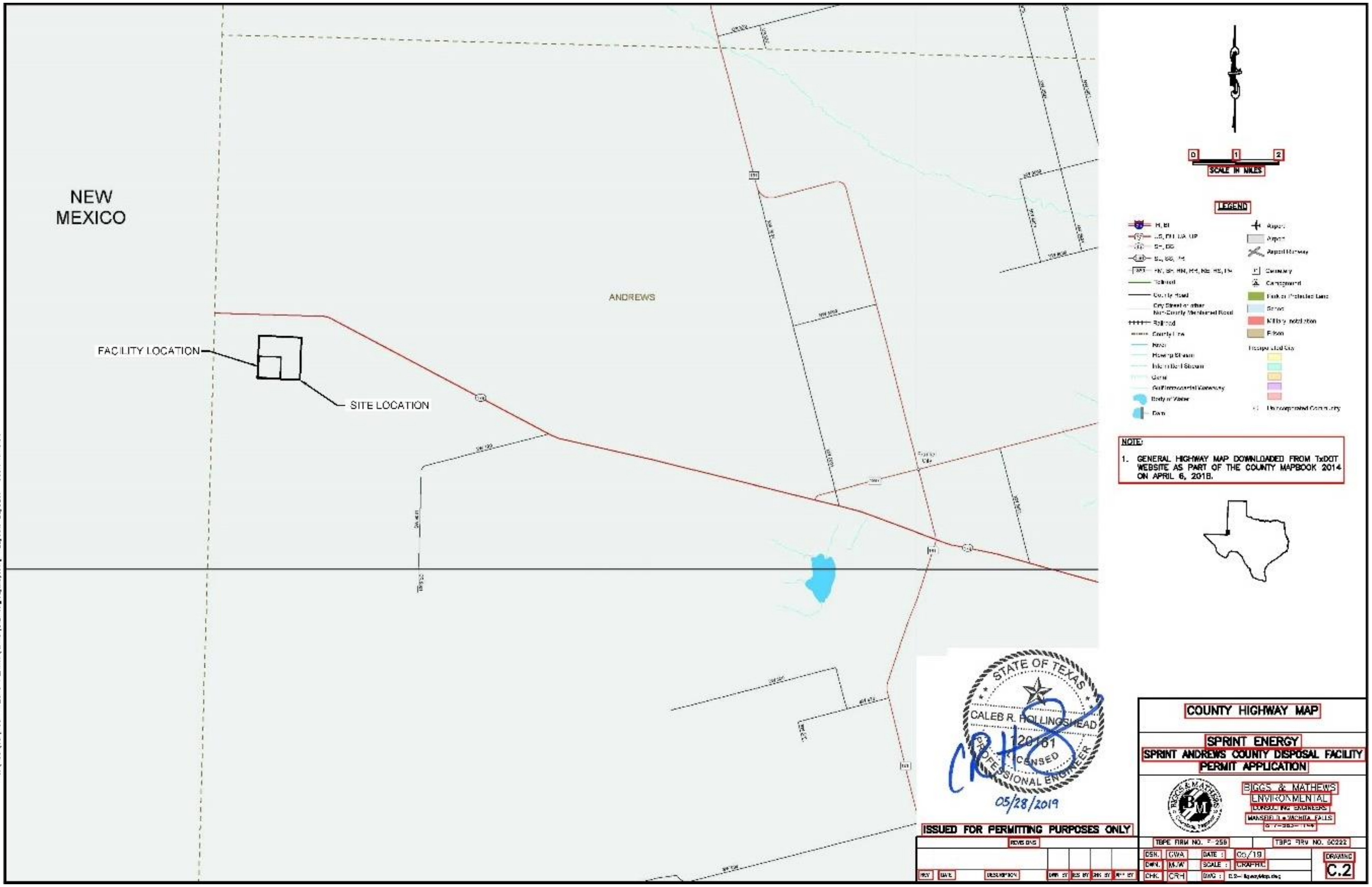



*Figure 4.15-6 Location of Proposed Sprint Andrews County Disposal Facility (BME 2019)*



All Indicated Changes are in response to RAI CI-1

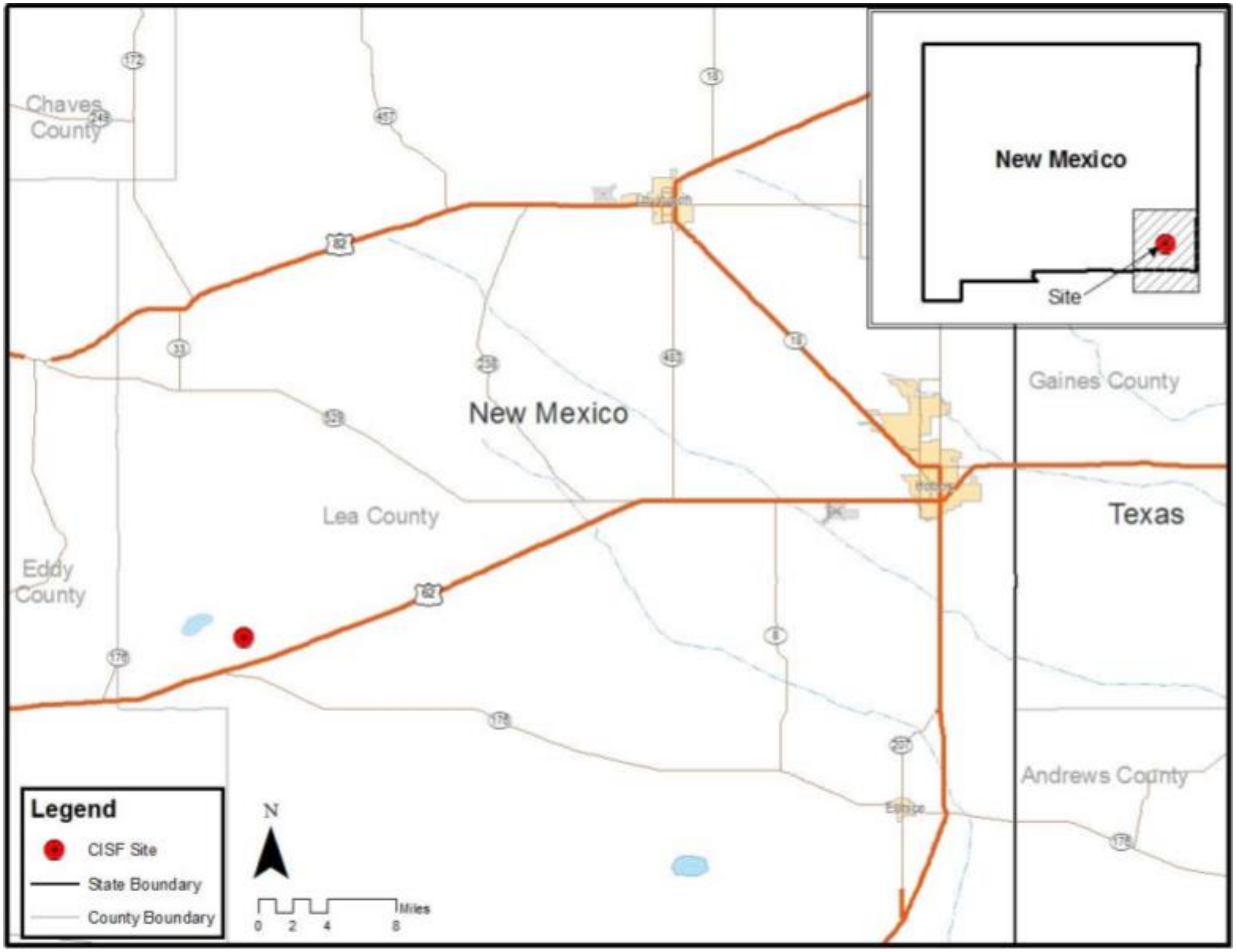



*Figure 4.15-7 Location of Proposed Holtec Hi-Store CIS Facility (Holtec 2019)*

Though no pathways exist for exposures due to liquid effluents, administrative investigation and action levels are established for monitoring surface water runoff as an additional step in the radiation control process. Because the surface water drainage paths are normally dry, it is not possible to monitor runoff in a continuous or batch mode basis. Even if surface water were sampled, the radionuclide levels would likely be so low as to be statistically insignificant. Instead, quarterly soil sampling coupled with weekly/monthly radiological surveys on the casks and storage pad would be conducted.

There are no connections to municipal sewer systems. Onsite sewage would be routed to holding tanks, which are periodically pumped; the sewage would then be sent offsite for disposal in a POTW. Each holding tank would be periodically sampled (prior to pumping) and analyzed for relevant radionuclides.

## 6.3 RADIOLOGICAL MONITORING PROGRAM

The Radiological Monitoring Program includes the collection of data during pre-operational years in order to establish baseline radiological information that would be used in determining and evaluating potential impacts from CISF operations on the local environment. *Due to the fact that half of the CISF will be within the permitted boundary of the current WCS facility, the pre-operational monitoring is basically complete. Combined with the pre-operational data of the three WCS facilities and the current operational data, there is an extensive amount of data to determine any impact from the addition of the CISF.* The Radiological Monitoring Program would be initiated at least one year prior to CISF operations. The early initiation of the Radiological Monitoring Program provides assurance that a sufficient environmental baseline has been established for the CISF before the arrival of the first cask shipment. Radionuclides in environmental media would be identified using *methods of analysis in accordance with EPA SW846 methodology and the requirements of the Department of Energy (DOE) "Environmental Measurement Laboratory Manual" (HASL 300, DOE 1997). Analysis will be performed at an approved NELAC/NELAP laboratory.* Data collected during the operational years would be statistically compared to the baseline generated by the pre-operational data. Such comparisons provide a means of assessing the magnitude of potential radiological impacts on members of the public and in demonstrating compliance with applicable radiation protection standards.

*As discussed in Chapter 4, Section 4.12.2.2, a bounding evaluation of off-site doses for a 40,000 MTU facility loaded in eight phases was conducted. The evaluation looked at two scenarios: 1) eight phases consisting of NUHOMS® HSMs arranged in three rows of 144 back-to-back HSMs containing 5,000 MTU in each phase (See Figure 4.12-4); and 2) eight phases consisting of NAC Vertical Concrete Casks (VCC) arranged in nine 4 x 9 arrays of casks containing 5,000 MTU in each phase (See Figure 4.12-5). The purpose of the dose calculations was to determine the impact to human health from radiation emitted from the HSMs and VCC containing up to 40,000 MTU of SNF and related GTCC waste. The design-basis of the HSMs and VCC, where canisters containing SNF are welded and sealed, prevents the release of radioactive materials into the environment. Accordingly, the only significant radiological exposure pathway impacting human health or the environment at the CISF during normal operations is from external sources of gamma-rays and neutrons resulting from radioactive decay of irradiated fuel. All other radiological pathways such as air, drinking water, soil ingestion, milk, and other foodstuff are not applicable. Additionally, no credible accidents were identified that result in a release of radioactive materials to the environment and thereby expose members of the public as discussed in Chapter 12 of the SAR. Based on the discussion above, the choice of locations, analyses, and frequencies were determined and stated in Chapter 9, Section 9.6.2.4 of the revised SAR.*

Direct radiation in offsite areas emanating from fuel stored on the dry cask storage pad or resulting from cask handling operations is expected to be minimal, see Section 4.12.2 of this ER. However, TLDs or OSLs would be placed strategically around the CISF perimeter to measure these potential exposures and demonstrate regulatory compliance. *Waste Control Specialists uses the Luxel+ Ta (beta/photon/neutron) dosimeter for area monitoring under the radiation safety area monitoring program (minimum of eight locations on the inner fence of the PA) and the Landauer Inlight® Environmental X9 (beta/photon) dosimeter for the perimeter environmental monitoring program at the OCA boundary (for reference, see ER Figure 6.1-1). All dosimeters will be analyzed on a quarterly basis. Environmental boundary air and soil monitoring (i.e., Low Volume air sampling or High Volume air sampling) will be performed at a minimum of two locations on the north OCA boundary (for reference see Figures 4.12-7 and 4.12-9 in ER Chapter 4) in addition to the locations currently performed under the REMP. Analyses will be for gross alpha/beta and gamma spectrometry and performed by a* *certified offsite laboratory. Air samples will be collected monthly for each location and composited for a quarterly analysis. Soil samples will be collected and analyzed annually unless air samples indicate the need to take additional samples.*

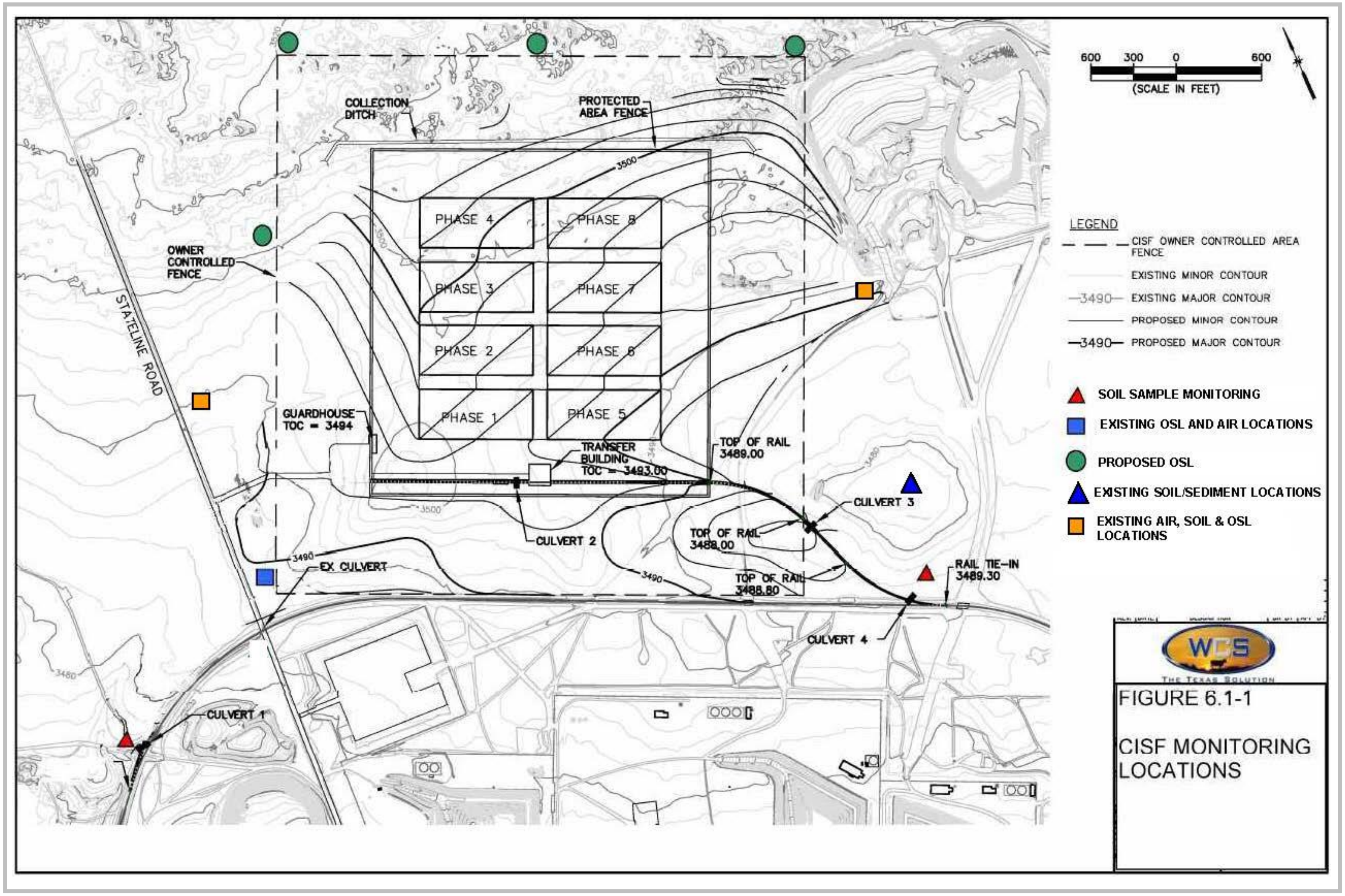
Detection of radionuclide impacts to surface water runoff would be conducted in a two-step process. First, all casks would be checked for surface contamination during *acceptance procedures and surveys, then* all storage pads would be checked for surface contamination during monthly surveys. Second, soil samples would be collected on a*n annual* basis at the culverts leading to the CISF outfalls. *Although not expected due to welded and sealed dry stored canisters, monitored* radioactive contaminants exceeding the action levels, as established in written procedures, would cause an immediate investigation and would require corrective action to protect human health and prevent future recurrences.

During the course of facility operations, revisions to the Radiological Monitoring Program may be necessary and appropriate to assure reliable sampling and collection of environmental data. The rationale and actions behind such revisions to the program would be documented and reported to the NRC and other appropriate regulatory agency, as required. Sampling focuses on locations proximate to the facility, but may also include distant locations as control sites. Potential sample locations have been identified, but are subject to change based on NRC guidance, meteorological information, ISP joint venture member Waste Control Specialists' extensive experience in environmental sampling in the area, and current land use, see figure 6.1-1.

## 6.4 COMPLIANCE WITH REGULATORY REQUIREMENTS

Compliance with 10 CFR §20.1301 is demonstrated using a calculation of the TEDE to the individual who is likely to receive the highest dose in accordance with 10 CFR 20.1302(b)(1). Appropriate models, codes, and assumptions that accurately represent the facility, the site and the surrounding area support the determination of the TEDE by pathway analysis.

Compliance is demonstrated through boundary monitoring and environmental sampling data. If a potential release should occur, then routine operational environmental data would be used to assess the extent of the release.






All Indicated Changes are in response to RAI EMM-1

# CHAPTER 7

# BENEFIT-COST ANALYSIS

## 7.0 BENEFIT-COST ANALYSIS

The proposed action is expected to generate substantial cost savings for the federal government, as well as substantial benefits to the private sector. The analysis in this chapter will focus on estimating the value of benefits and costs from relocating and storing spent nuclear fuel at the proposed CISF. The analysis is performed by using cost data from eight, selected shutdown nuclear power plants in the United States and then extrapolating these data for the CISF's full 40,000 MTU capacity. Section 7.1 provides background information, primarily to explain the economic benefits of the proposed action. Section 7.2 outlines the anticipated benefits of the proposed action and the assumptions used to quantify their economic value. Likewise, Section 7.3 identifies and quantifies the costs of the proposed action. Section 7.4 provides a discussion of the results and summarizes the major findings of the analysis *assuming all eight phases are permitted, as well as two scenarios that assume only permitting Phase 1 of the proposed action*. Section 7.5 discusses the environmental benefits and costs of the proposed action and 7.6 discusses the benefits and costs at evaluated alternative sites. As with NUREG-1714, the individual benefits and costs estimated in this analysis are identified as public or private, as appropriate, but the overall impacts are considered "societal" in nature. The study horizon is a 40-year period that starts with the granting of the site license in *2020*. The values reported are in *Nominal* dollars and have been discounted. *The values reported throughout this chapter, except Section 7.7, are based upon 2018 dollars that were adjusted for future inflation and then calculated at net present value. Section 7.7 provides unadjusted cost estimates in 2018 dollars for comparison purposes.*

## 7.2 BENEFITS ANALYSIS

The primary economic benefit associated with the proposed action would be the net reduction of federal reimbursements to the operators of nuclear power plants for their costs associated with prolonged storage of spent fuel. If there is no action to build a CISF, the DOE's ongoing violation of the NWPA means it will continue to incur substantial and ongoing costs related to litigation, settlements, and unfavorable judgments with each individual power plant's ISFSI. However, even if the proposed action is implemented, the expenditures for storage will continue to accrue until the spent fuel is removed from the plants. The total CISF capacity will be 40,000 MTU and the eight sites listed in Table 7.2-1 collectively contain approximately 3,464 MTU of spent nuclear fuel in 279 dry storage canisters and an additional 17 canisters of Greater-than-Class C (GTCC) waste. These sites were selected because they all use either TN Americas or NAC International dry fuel storage systems and, therefore, would all be candidate sites that could be de-inventoried in the earliest stages of the proposed action. It is also assumed that spent fuel being stored in the dry casks at other decommissioning nuclear power plants across the nation will be removed and sent to the proposed CISF, but those subsequent transfers were not explicitly calculated in this analysis. Rather, the benefits and costs determined from analyzing the initial eight sites were extrapolated through the entire period of the initial site license. Going forward, it was assumed that additional reactor sites would shut down as they reached their End-of-Life or encountered unfavorable economic conditions, and that the CISF would take spent fuel preferentially from these shut down sites. Given the available rolling stock and the 40-year duration of the NRC License, the total number of additional plants that could have their spent fuel removed (assuming *110* canisters per site) was *28,* which equates to an additional ~*36,036* MTU of spent fuel shipped to the site. The value of *110* canisters per shutdown site was conservatively chosen to reflect the fact that future shutdown sites would have had longer operating lives than the initial set of 8 decommissioning plant sites, and would therefore have larger inventories of spent fuel. Therefore, in its 40th year of licensure, the CISF would hold *39,500* MTU of spent fuel from approximately *36* shutdown sites. Other anticipated economic benefits from the proposed action are related to the repurposing of land at most of the plant sites, as well as other benefits that were identified but cannot be readily quantified.

### 7.2.1 Eliminated Storage Costs

The implementation of the proposed action would allow the federal government to eliminate a sizeable portion of its projected payments to the eight referenced shutdown plant operators storing spent nuclear fuel, along with *28* additional plants. These savings would be the primary economic benefit of the proposed action. Table 7.2-2 provides the assumed annual cost of operating an independent spent fuel storage installation (ISFSI) at each shutdown plant. The 2012 Blue Ribbon Commission report estimated the annual cost of an ISFSI to be between $4.5 and $8 million. Another source of information was a 2012 Government Accountability Office (GAO) report, which estimated the annual cost to operate an ISFSI to be between $3 and $7 million (GAO, 2012).

*The assumed costs of storing spent nuclear fuel in this analysis reflect cost estimates found in the U.S. Department of Energy's (DOE) 2016 report, Cost Implications of an Interim Storage Facility in the Waste Management System. This report was prepared for the DOE and led by researchers at the Oak Ridge National Laboratory. In the report, the estimated cost of storing spent nuclear fuel when a plant is operating or immediately after shutdown and in decommissioning mode (i.e., five years after shutdown) is $1 million annually (2014 dollars). In the revised benefits analysis, the value was adjusted to 2018 dollars using the consumer price index (CPI) to $1,060,703. The DOE study's cost estimate for dry cask storage after the initial five-year cooling period was estimated to be $10 million annually, adjusted to $10,607,030 in 2018 dollars.* [ ]

*Two additional scenarios were considered in the analysis: only building Phase 1 of the CISF; and only building Phase 1 of the CISF and assuming that no additional nuclear power plants would be shut down during the licensing period. Under the Phase 1 only scenario, the estimated benefits would be derived from transporting the spent fuel from the original eight shutdown nuclear power plants, as well as one of the generic plants. At present (2019), there are ten shutdown nuclear power plants in the United States. Phase 1 of the CISF has sufficient capacity to store the spent fuel from nine plants, based upon the assumptions of this analysis.*

*To absorb Phase 1's full capacity, it is estimated that 410 canisters of spent nuclear fuel would need to be transported to the CISF. However, there is no financial benefit to the federal government for the CISF to accept a partial inventory of spent fuel from a shutdown plant. Therefore, the practical capacity of the Phase 1 only scenario was assumed to be 406 canisters (which includes 17 GTCC canisters from the eight currently closed power plants) or 4,751 MTU. Under the Proposed Action scenario, it is assumed that once Phase 1 reaches its 5,000 MTU capacity, the licensing for Phase 2 and every subsequent Phase would already be in place to allow the continuous transport and storage of spent fuel (constrained only by rail car availability and inventory of cooled spent fuel). Under the second Phase 1 only scenario, fuel is moved for the same number of shutdown nuclear power plants. Spent fuel from the tenth shutdown power plant is assumed to remain on site and move to dry storage (five years after shutdown) and remain in on site dry storage through the end of the license period. For the remaining, operating plants, the accumulated spent fuel is assumed to be stored on site for the remainder of the licensing period. Both of these scenarios estimate the same potential benefit (assuming another CISF is not opened), because there is no potential for additional cost savings by the federal government beyond the practical capacity of Phase 1 (i.e. 4,751 MTU).*

Table 7.2-2 also shows the estimated federal government expenditures to shutdown plant operators under two scenarios over the CISF's 40-year license: implementing the proposed action and the no action alternative. The first scenario assumes that the proposed action is implemented and begins receiving spent fuel canisters two years after being licensed by the NRC. This two-year period accounts for the time required to build the CISF, as well as completing the required operational readiness reviews. Planning studies for transporting the casks; the procurement of transportation casks, rail rolling stock, and cask moving equipment; the construction of or improvements to transportation infrastructure at the decommissioned plant sites could and should all proceed in parallel with the CISF design and licensing process.

*Under the Phase 1 only scenario, it was assumed that 26 canisters would be transported during the first year (to avoid later stranding a single canister that would extend closure of an ISF) and 90 canisters would be transported during subsequent years, assuming a smaller inventory of rolling stock. The benefit and cost estimates for the proposed action were discounted at a rate of 3.4 percent, which is based upon the December 2018 update to the treasury rates. An inflation rate of 2.4 percent was also applied, based upon the latest Congressional Budget Office (CBO) forecast. These assumptions align with method used in the DOE's 2016 report, Cost Implications study. The analysis did not assume there would be cost escalations that would exceed the rate of inflation.*

*The assumed transportation schedule for spent fuel canisters by year is shown in Table 7.2-3. Under Phase 1, the CISF operator would accept fuel from the original eight plant shutdown sites. The transport of containers to the CISF is assumed to begin in Year 3 with 25 canisters moved during that year and each train with five cask cars. As the inventory of rolling stock is expanded, the number of canisters transported will grow to 100 canisters in Year 4. During Year 5 and for every subsequent year, it is assumed that up to 200 canisters will be moved, based upon the availability of cooled spent nuclear fuel. Throughout the canister transfer period, each train is assumed to have five cask cars, but during the early period, this might leave a single canister stranded at the plant. To avoid these situations, one additional cask car would be added to a train (total six cask cars), if it could eliminate an additional train trip with a single cask car.*

[ [redacted] ] *It is assumed in the analysis that spent nuclear fuel will only be transferred to the CISF from plant locations that will send their entire inventory, since the purpose of the CISF is to close the interim storage facilities (ISFs) at the reactor sites to achieve cost savings for the federal government.* [ [redacted] ]

*The assumed transportation schedule differed for the Phase 1 only scenario and the scenario for Phase 1 only and no additional plant shutdowns. Under both scenarios, it was assumed that only three sets of rail cars would be purchased by ISP, due to the lower volume. As with the Proposed Action scenario, each train was assumed to have five rail cars, with two buffer cars and a crew car. During the first year of moving spent fuel (Year 3 of the license), it was assumed that 26 canisters would be transported during the first year (instead of 25, which would avoid later stranding a single canister that would extend closure of an ISF). During the next year (Year 4 of the license), a total of 90 canisters would be moved, which would be the maximum number of canisters transported each year. As with Proposed Action scenario, the actual number of canisters might vary, due to spent fuel cooling. A total of 406 canisters would be moved over a seven-year period, which would be equal to 4,751 MTU.*

The travel assumptions are based upon Maheras et al.'s (2014) estimations that repositioning the empty cask cars from the CISF to the decommissioned plant could require approximately a month of travel without expedited service and the return trip would take about two weeks, depending upon the distance from the CISF. In this analysis, additional time was assumed for loading and unloading the casks, locomotive and rail car maintenance, and unforeseen delays. The assumed order of canister pick-up (in a generic sense) is shown below in Table *7.2-4.*



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

*The assumptions related to the number of canisters per shipment, number of canisters shipped per year, total number of canisters and shipments over the time used to determine the benefits and costs of transporting spent nuclear fuel in this evaluation are different that those used in the calculations documented in Chapter 4. The assumptions used herein are appropriate and conservative for benefit-cost analysis.*

Typically in a benefit-cost analysis, the valuation of benefits and costs are adjusted to their net present value (NPV) using a discount rate. This practice permits all amounts to be adjusted to a valuation in a common year. However, because there are substantial labor, technological, and regulatory compliance expenditures related to the operation of the CISF and the ISFSIs, it was assumed that these expenses would likely appreciate over time, at least at the rate of inflation. In addition to the ISFSI's annual operating costs, once the canisters exceed 20 years of service life, a site will be required by the NRC to implement an Aging Management Program (AMP). The AMP will involve periodic inspections of a sample population of canisters at each site at regular intervals. Full requirements of the AMP are not yet fully detailed and, due to the general assumptions of this analysis, the benefits estimates did not account for the potential $750,000 of additional annual savings related to the AMP for each ISFSI site.

**Table 7.2-2: *Estimated Net Benefits of the Proposed Action, Discounted***

| *Year* | *No Action SNF Storage Costs* | *Proposed Action SNF Storage Costs* | *Net Benefits of Proposed Action* |
|---|---|---|---|
| *1* | *$114,555,924* | *$114,555,924* | *$0* |
| *2* | *$113,448,033* | *$113,448,033* | *$0* |
| *3* | *$121,713,428* | *$121,713,428* | *$0* |
| *4* | *$120,536,316* | *$120,536,316* | *$0* |
| *5* | *$128,552,940* | *$97,945,097* | *$30,607,843* |
| *6* | *$145,496,779* | *$64,665,235* | *$80,831,544* |
| *7* | *$153,095,257* | *$73,045,449* | *$80,049,808* |
| *8* | *$160,533,153* | *$81,257,522* | *$79,275,631* |
| *9* | *$167,812,864* | *$79,490,304* | *$88,322,560* |
| *10* | *$166,189,916* | *$78,721,539* | *$87,468,377* |
| *11* | *$164,582,663* | *$68,335,492* | *$96,247,171* |
| *12* | *$171,569,426* | *$66,721,444* | *$104,847,982* |
| *13* | *$186,901,162* | *$64,188,278* | *$122,712,884* |
| *14* | *$185,093,607* | *$54,219,340* | *$130,874,267* |
| *15* | *$191,635,513* | *$52,769,199* | *$138,866,314* |
| *16* | *$206,284,969* | *$68,761,656* | *$137,523,313* |
| *17* | *$220,633,146* | *$84,439,846* | *$136,193,300* |
| *18* | *$226,591,932* | *$82,724,039* | *$143,867,893* |
| *19* | *$240,429,129* | *$89,047,826* | *$151,381,303* |
| *20* | *$269,851,082* | *$111,115,151* | *$158,735,931* |
| *21* | *$306,541,495* | *$140,607,352* | *$165,934,143* |
| *22* | *$303,576,877* | *$130,598,600* | *$172,978,277* |
| *23* | *$308,349,672* | *$119,913,761* | *$188,435,911* |
| *24* | *$305,367,567* | *$101,789,189* | *$203,578,378* |
| *25* | *$302,414,303* | *$92,404,370* | *$210,009,933* |
| *26* | *$299,489,599* | *$74,872,400* | *$224,617,199* |
| *27* | *$296,593,182* | *$57,670,896* | *$238,922,286* |
| *28* | *$293,724,776* | *$40,795,108* | *$252,929,668* |
| *29* | *$290,884,111* | *$24,240,343* | *$266,643,768* |
| *30* | *$288,070,918* | *$16,003,940* | *$272,066,978* |
| *31* | *$285,284,932* | *$0* | *$285,284,932* |
| *32* | *$282,525,890* | *$0* | *$282,525,890* |
| *33* | *$279,793,532* | *$0* | *$279,793,532* |
| *34* | *$277,087,598* | *$0* | *$277,087,598* |
| *35* | *$274,407,834* | *$0* | *$274,407,834* |
| *36* | *$271,753,987* | *$0* | *$271,753,987* |
| *37* | *$269,125,805* | *$0* | *$269,125,805* |
| *38* | *$266,523,041* | *$0* | *$266,523,041* |
| *39* | *$263,945,449* | *$0* | *$263,945,449* |
| *40* | *$261,392,785* | *$0* | *$261,392,785* |
| ***TOTAL*** | ***$9,182,360,591*** | ***$2,486,597,077*** | ***$6,695,763,515*** |

*The assumed schedule of plant shutdowns is based upon the expiration date of each plant's existing permit. Although it is recognized that some plants may seek to extend their operating license, it is also likely that other plants will choose to shut down prior to reaching the end of their licensed operating period. Many plants have more than one reactor, so the assumed shutdown date for a plant is when the final operating reactor's permit expires. By Year 3 of the CISF's licensure, which is when it is assumed to be permitted to accept spent nuclear fuel, there will be ten shutdown nuclear power plants, eight of which could immediately send spent nuclear fuel canisters to the CISF.*

***Table 7.2-3: Assumed Plant Shutdown Schedule and Dates of Spent Fuel Removal***

| Plant | Assumed Shutdown Date | Assumed Date of Completed Spent Fuel Removal |
|---|---|---|
| Connecticut Yankee | Shutdown | 2023 |
| Crystal River | Shutdown | 2023 |
| Kewaunee | Shutdown | 2023 |
| La Crosse | Shutdown | 2024 |
| Maine Yankee | Shutdown | 2024 |
| Rancho Seco | Shutdown | 2024 |
| Yankee Rowe | Shutdown | 2024 |
| Zion | Shutdown | 2024 |
| Generic Plant 1 | Shutdown | 2027 |
| Generic Plant 2 | Shutdown | 2029 |
| Generic Plant 3 | 2019 | 2030 |
| Generic Plant 4 | 2019 | 2031 |
| Generic Plant 5 | 2020 | 2031 |
| Generic Plant 6 | 2021 | 2032 |
| Generic Plant 7 | 2022 | 2033 |
| Generic Plant 8 | 2025 | 2036 |
| Generic Plant 9 | 2026 | 2037 |
| Generic Plant 10 | 2026 | 2038 |
| Generic Plant 11 | 2028 | 2039 |
| Generic Plant 12 | 2029 | 2040 |
| Generic Plant 13 | 2029 | 2041 |
| Generic Plant 14 | 2030 | 2041 |
| Generic Plant 15 | 2030 | 2042 |
| Generic Plant 16 | 2031 | 2042 |
| Generic Plant 17 | 2032 | 2043 |
| Generic Plant 18 | 2032 | 2044 |
| Generic Plant 19 | 2033 | 2044 |
| Generic Plant 20 | 2033 | 2045 |
| Generic Plant 21 | 2033 | 2045 |
| Generic Plant 22 | 2033 | 2046 |
| Generic Plant 23 | 2034 | 2046 |
| Generic Plant 24 | 2034 | 2047 |
| Generic Plant 25 | 2034 | 2047 |
| Generic Plant 26 | 2034 | 2048 |
| Generic Plant 27 | 2034 | 2049 |
| Generic Plant 28 | 2036 | 2049 |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-4: Assumed Schedule of SNF Canister Transfers from Plant Site to CISF**

| CISF PHASE | Year | Year | MTUs Stored | Total Canisters Moved | Trains | ISFs Closed | Cumulative Canisters Moved |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2020 | 0 | 0 | 0 | 0 | 0 |
| | 2 | 2021 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 2022 | 293 | 25 | 5 | 0 | 25 |
| | 4 | 2023 | 1,463 | 100 | 20 | 3 | 125 |
| | 5 | 2024 | 3,464 | 171 | 34 | 5 | 296 |
| | 6 | 2025 | 3,464 | 0 | 0 | 0 | 296 |
| | 7 | 2026 | 3,464 | 0 | 0 | 0 | 296 |
| | 8 | 2027 | 4,751 | 110 | 22 | 1 | 406 |
| | 9 | 2028 | 4,751 | 0 | 0 | 0 | 406 |
| 2 | 10 | 2029 | 6,038 | 110 | 22 | 1 | 516 |
| | 11 | 2030 | 8,378 | 200 | 40 | 1 | 716 |
| | 12 | 2031 | 9,899 | 130 | 26 | 2 | 846 |
| 3 | 13 | 2032 | 11,186 | 110 | 22 | 1 | 956 |
| | 14 | 2033 | 12,473 | 110 | 22 | 1 | 1,066 |
| | 15 | 2034 | 12,473 | 0 | 0 | 0 | 1,066 |
| | 16 | 2035 | 12,473 | 0 | 0 | 0 | 1,066 |
| | 17 | 2036 | 13,760 | 110 | 22 | 1 | 1,176 |
| 4 | 18 | 2037 | 16,100 | 200 | 40 | 1 | 1,376 |
| | 19 | 2038 | 16,334 | 20 | 4 | 1 | 1,396 |
| | 20 | 2039 | 17,621 | 110 | 22 | 1 | 1,506 |
| | 21 | 2040 | 19,961 | 200 | 40 | 1 | 1,706 |
| 5 | 22 | 2041 | 22,301 | 200 | 40 | 2 | 1,906 |
| | 23 | 2042 | 24,056 | 150 | 30 | 2 | 2,056 |
| 6 | 24 | 2043 | 26,396 | 200 | 40 | 1 | 2,256 |
| | 25 | 2044 | 28,736 | 200 | 40 | 2 | 2,456 |
| 7 | 26 | 2045 | 31,076 | 200 | 40 | 2 | 2,656 |
| | 27 | 2046 | 33,416 | 200 | 40 | 2 | 2,856 |
| 8 | 28 | 2047 | 35,756 | 200 | 40 | 2 | 3,056 |
| | 29 | 2048 | 38,096 | 200 | 40 | 1 | 3,256 |
| | 30 | 2049 | 39,500 | 120 | 24 | 2 | 3,376 |
| CISF AT CAPACITY | 31 | 2050 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 32 | 2051 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 33 | 2052 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 34 | 2053 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 35 | 2054 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 36 | 2055 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 37 | 2056 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 38 | 2057 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 39 | 2058 | 39,500 | 0 | 0 | 0 | 3,376 |
| | 40 | 2059 | 39,500 | 0 | 0 | 0 | 3,376 |

*Note: The cost analysis accounts for transporting and storing 17 GTCC canisters at facility, but their contents do not count against the licensed MTU capacity.*

The net estimated difference for federal government payments to shutdown sites between the no action alternative and implementing the proposed action (i.e. subtracting the total expenditures shown over the 40-year period in Table 7.2-2 for the proposed action from the total expenditures from the no action scenario) was *$6,695,763,515*. Figure 7.2-1 is a graphical representation of these figures on an annualized basis.

*Additional details behind the estimated costs of spent fuel storage are shown below. Table 7.2-5 serves as a key for reading and identifying the estimated costs of spent fuel storage at the power plants by each period of activity, as enumerated earlier in this section. Table 7.2-6 provides the assumed costs of storing spent fuel at each facility under the "no action" scenario during each year of the proposed 40-year license. Table 7.2-7 shows the assumed spent fuel storage costs under the "proposed action" scenario. Once all spent fuel is removed from a power plant, it is assumed that no additional storage costs are incurred by the federal government. Table 7.2-8 provides the assumed costs of storing spent fuel at each facility under the "no action" scenario, assuming only Phase 1 is permitted. Table 7.2-9 shows the assumed costs under the "proposed action," but only for Phase 1. Table 7.2-10 provides the cost of storing spent fuel under the "no action" scenario, but assuming that all plants that are not currently shutdown will remain operating through the license period. Finally, Table 7.2-11 shows the storage costs under the "proposed action," assuming that no additional power plants are shutdown (from present) and the remaining plants continue to operate through the license period.*

***Table 7.2-5: Storage Cost Assumptions in the Benefit Cost Analysis (2018 $)***

| ***Storage Costs*** | ***Activity*** |
|---|---|
| *$1,060,703* | *Plant in operation* |
| *$1,060,703* | *Last year of power plant operation* |
| *$1,060,703* | *Spent fuel continues to cool in pool,* **[ ]** |
| *$10,607,030* | *Spent fuel transferred to dry storage to continue cooling* **[ ]** |
| *$10,607,030* | *Spent fuel continues to cool in dry storage at ISF, available for removal* |
| *$10,607,030* | *Years with red outline denote period of transporting SNF from ISF to CISF* |
| *$10,607,030* | *Plant shutdown, fuel in ISF dry storage at the power plant, available for transfer* |

***Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted***

*(6 pages)*

| Year | Licensure | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 |
| 2024 | Year 5 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 |
| 2025 | Year 6 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 |
| 2026 | Year 7 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 |
| 2027 | Year 8 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 |
| 2028 | Year 9 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 |
| 2029 | Year 10 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 |
| 2030 | Year 11 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 |
| 2031 | Year 12 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 |
| 2032 | Year 13 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 |
| 2033 | Year 14 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 |
| 2034 | Year 15 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 |
| 2035 | Year 16 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 |
| 2036 | Year 17 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 |
| 2037 | Year 18 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 |
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 |
| | **TOTAL** | **$353,249,648** | **$353,249,648** | **$353,249,648** | **$353,249,648** | **$353,249,648** | **$353,249,648** |

**Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted**

(6 pages)

| Year | Licensure | Yankee Rowe | Zion | Generic Plant 1 | Generic Plant 2 | Generic Plant 3 | Generic Plant 4 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 |
| 2026 | Year 7 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 |
| 2027 | Year 8 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 |
| 2028 | Year 9 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 |
| 2029 | Year 10 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 |
| 2030 | Year 11 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 |
| 2031 | Year 12 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 |
| 2032 | Year 13 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 |
| 2033 | Year 14 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 |
| 2034 | Year 15 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 |
| 2035 | Year 16 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 |
| 2036 | Year 17 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 |
| 2037 | Year 18 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 |
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 |
| | **TOTAL** | **$353,249,648** | **$353,249,648** | **$334,249,318** | **$315,614,723** | **$306,432,370** | **$306,432,370** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted***

*(6 pages)*

| Year | Licensure | Generic Plant 5 | Generic Plant 6 | Generic Plant 7 | Generic Plant 8 | Generic Plant 9 | Generic Plant 10 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $10,006,226 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $9,909,454 | $9,909,454 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $9,813,618 | $9,813,618 | $9,813,618 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $9,718,709 | $9,718,709 | $9,718,709 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $9,624,717 | $9,624,717 | $9,624,717 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $953,163 | $953,163 |
| 2032 | Year 13 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 |
| 2033 | Year 14 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 |
| 2034 | Year 15 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 |
| 2035 | Year 16 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 |
| 2036 | Year 17 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 |
| 2037 | Year 18 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 |
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 |
| | **TOTAL** | **$297,338,821** | **$288,333,218** | **$279,414,709** | **$253,173,370** | **$244,594,899** | **$244,594,899** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted**

(6 pages)

| Year | Licensure | Generic Plant 11 | Generic Plant 12 | Generic Plant 13 | Generic Plant 14 | Generic Plant 15 | Generic Plant 16 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $9,257,754 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $9,168,221 | $9,168,221 | $9,168,221 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $907,955 |
| 2037 | Year 18 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 |
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 |
| | **TOTAL** | **$227,686,045** | **$219,354,067** | **$219,354,067** | **$211,102,668** | **$211,102,668** | **$202,931,070** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted***

*(6 pages)*

| Year | Licensure | Generic Plant 17 | Generic Plant 18 | Generic Plant 19 | Generic Plant 20 | Generic Plant 21 | Generic Plant 22 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 |
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 |
| | **TOTAL** | **$194,838,501** | **$194,838,501** | **$186,824,197** | **$186,824,197** | **$186,824,197** | **$186,824,197** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted**

*(6 pages)*

| Year | Licensure | Generic Plant 23 | Generic Plant 24 | Generic Plant 25 | Generic Plant 26 | Generic Plant 27 | Generic Plant 28 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $873,338 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $864,891 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 |
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 |
| | **TOTAL** | **$178,887,400** | **$178,887,400** | **$178,887,400** | **$178,887,400** | **$178,887,400** | **$163,243,339** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-7: Assumed Storage Costs by Facility of Proposed Action, Discounted**

(6 pages)

| Year | Licensure | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 |
| 2024 | Year 5 | | | | $10,202,614 | $10,202,614 | $10,202,614 |
| 2025 | Year 6 | | | | | | |
| 2026 | Year 7 | | | | | | |
| 2027 | Year 8 | | | | | | |
| 2028 | Year 9 | | | | | | |
| 2029 | Year 10 | | | | | | |
| 2030 | Year 11 | | | | | | |
| 2031 | Year 12 | | | | | | |
| 2032 | Year 13 | | | | | | |
| 2033 | Year 14 | | | | | | |
| 2034 | Year 15 | | | | | | |
| 2035 | Year 16 | | | | | | |
| 2036 | Year 17 | | | | | | |
| 2037 | Year 18 | | | | | | |
| 2038 | Year 19 | | | | | | |
| 2039 | Year 20 | | | | | | |
| 2040 | Year 21 | | | | | | |
| 2041 | Year 22 | | | | | | |
| 2042 | Year 23 | | | | | | |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$41,816,584** | **$41,816,584** | **$41,816,584** | **$52,019,198** | **$52,019,198** | **$52,019,198** |

***Table 7.2-7: Assumed Storage Costs by Facility of Proposed Action, Discounted***

*(6 pages)*

| Year | Licensure | Yankee Rowe | Zion | Generic Plant 1 | Generic Plant 2 | Generic Plant 3 | Generic Plant 4 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | | | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 |
| 2026 | Year 7 | | | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 |
| 2027 | Year 8 | | | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 |
| 2028 | Year 9 | | | | $9,813,618 | $9,813,618 | $9,813,618 |
| 2029 | Year 10 | | | | $9,718,709 | $9,718,709 | $9,718,709 |
| 2030 | Year 11 | | | | | $9,624,717 | $9,624,717 |
| 2031 | Year 12 | | | | | | $9,531,635 |
| 2032 | Year 13 | | | | | | |
| 2033 | Year 14 | | | | | | |
| 2034 | Year 15 | | | | | | |
| 2035 | Year 16 | | | | | | |
| 2036 | Year 17 | | | | | | |
| 2037 | Year 18 | | | | | | |
| 2038 | Year 19 | | | | | | |
| 2039 | Year 20 | | | | | | |
| 2040 | Year 21 | | | | | | |
| 2041 | Year 22 | | | | | | |
| 2042 | Year 23 | | | | | | |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$52,019,198** | **$52,019,198** | **$63,038,491** | **$63,936,222** | **$64,378,586** | **$73,910,221** |

**Table 7.2-7: Assumed Storage Costs by Facility of Proposed Action, Discounted**

(6 pages)

| Year | Licensure | Generic Plant 5 | Generic Plant 6 | Generic Plant 7 | Generic Plant 8 | Generic Plant 9 | Generic Plant 10 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $10,006,226 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $9,909,454 | $9,909,454 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $9,813,618 | $9,813,618 | $9,813,618 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $9,718,709 | $9,718,709 | $9,718,709 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $9,624,717 | $9,624,717 | $9,624,717 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $953,163 | $953,163 |
| 2032 | Year 13 | | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 |
| 2033 | Year 14 | | | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 |
| 2034 | Year 15 | | | | $9,257,754 | $9,257,754 | $9,257,754 |
| 2035 | Year 16 | | | | $9,168,221 | $9,168,221 | $9,168,221 |
| 2036 | Year 17 | | | | $9,079,553 | $9,079,553 | $9,079,553 |
| 2037 | Year 18 | | | | | $8,991,743 | $8,991,743 |
| 2038 | Year 19 | | | | | | $8,904,783 |
| 2039 | Year 20 | | | | | | |
| 2040 | Year 21 | | | | | | |
| 2041 | Year 22 | | | | | | |
| 2042 | Year 23 | | | | | | |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$64,816,672** | **$65,250,522** | **$65,680,175** | **$66,944,364** | **$67,357,636** | **$76,262,419** |

**Table 7.2-7: Assumed Storage Costs by Facility of Proposed Action, Discounted**

(6 pages)

| Year | Licensure | Generic Plant 11 | Generic Plant 12 | Generic Plant 13 | Generic Plant 14 | Generic Plant 15 | Generic Plant 16 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $9,257,754 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $9,168,221 | $9,168,221 | $9,168,221 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $907,955 |
| 2037 | Year 18 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | | | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | | | | | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$68,172,228** | **$68,573,626** | **$77,222,539** | **$68,971,141** | **$77,536,409** | **$69,364,811** |

**Table 7.2-7: Assumed Storage Costs by Facility of Proposed Action, Discounted**

*(6 pages)*

| Year | Licensure | Generic Plant 17 | Generic Plant 18 | Generic Plant 19 | Generic Plant 20 | Generic Plant 21 | Generic Plant 22 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | | | | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | | | | | | $8,238,699 |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$69,754,675** | **$78,155,072** | **$70,140,768** | **$78,459,923** | **$78,459,923** | **$86,698,623** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.2-7: Assumed Storage Costs by Facility of Proposed Action, Discounted***

*(6 pages)*

| Year | Licensure | Generic Plant 23 | Generic Plant 24 | Generic Plant 25 | Generic Plant 26 | Generic Plant 27 | Generic Plant 28 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $873,338 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $864,891 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | | | | $8,080,114 | $8,080,114 | $8,080,114 |
| 2049 | Year 30 | | | | | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$78,782,183** | **$86,944,114** | **$86,944,114** | **$95,027,216** | **$103,032,250** | **$87,383,955** |

**Table 7.2-8: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Discounted**

(2 pages)

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco | Yankee Rowe | Zion | Generic Plant 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $1,050,445 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 |
| 2024 | Year 5 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 |
| 2025 | Year 6 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 |
| 2026 | Year 7 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 |
| 2027 | Year 8 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 |
| 2028 | Year 9 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 |
| 2029 | Year 10 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 |
| 2030 | Year 11 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 |
| 2031 | Year 12 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 |
| 2032 | Year 13 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 |
| 2033 | Year 14 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 |
| 2034 | Year 15 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 |
| 2035 | Year 16 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 |
| 2036 | Year 17 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 |
| 2037 | Year 18 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-8: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Discounted**

(2 pages)

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco | Yankee Rowe | Zion | Generic Plant 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 |
| **SUBTOTAL** | | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** |
| | | | | | | | **COST OF NO ACTION FOR PHASE 1** | | | **$3,160,246,520** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-9: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Discounted**

(2 pages)

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco | Yankee Rowe | Zion | Generic Plant 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $1,050,445 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 |
| 2024 | Year 5 | | | | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 |
| 2025 | Year 6 | | | | | | $10,202,614 | $10,202,614 | $10,202,614 | $10,103,943 |
| 2026 | Year 7 | | | | | | | | | $10,006,226 |
| 2027 | Year 8 | | | | | | | | | $9,909,454 |
| 2028 | Year 9 | | | | | | | | | $9,909,454 |
| 2029 | Year 10 | | | | | | | | | |
| 2030 | Year 11 | | | | | | | | | |
| 2031 | Year 12 | | | | | | | | | |
| 2032 | Year 13 | | | | | | | | | |
| 2033 | Year 14 | | | | | | | | | |
| 2034 | Year 15 | | | | | | | | | |
| 2035 | Year 16 | | | | | | | | | |
| 2036 | Year 17 | | | | | | | | | |
| 2037 | Year 18 | | | | | | | | | |
| 2038 | Year 19 | | | | | | | | | |
| 2039 | Year 20 | | | | | | | | | |
| 2040 | Year 21 | | | | | | | | | |
| 2041 | Year 22 | | | | | | | | | |
| 2042 | Year 23 | | | | | | | | | |
| 2043 | Year 24 | | | | | | | | | |
| 2044 | Year 25 | | | | | | | | | |
| 2045 | Year 26 | | | | | | | | | |
| 2046 | Year 27 | | | | | | | | | |
| 2047 | Year 28 | | | | | | | | | |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-9: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Discounted**

(2 pages)

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco | Yankee Rowe | Zion | Generic Plant 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2048 | Year 29 | | | | | | | | | |
| 2049 | Year 30 | | | | | | | | | |
| 2050 | Year 31 | | | | | | | | | |
| 2051 | Year 32 | | | | | | | | | |
| 2052 | Year 33 | | | | | | | | | |
| 2053 | Year 34 | | | | | | | | | |
| 2054 | Year 35 | | | | | | | | | |
| 2055 | Year 36 | | | | | | | | | |
| 2056 | Year 37 | | | | | | | | | |
| 2057 | Year 38 | | | | | | | | | |
| 2058 | Year 39 | | | | | | | | | |
| 2059 | Year 40 | | | | | | | | | |
| **SUBTOTAL** | | **$41,816,584** | **$41,816,584** | **$41,816,584** | **$52,019,198** | **$52,019,198** | **$62,221,812** | **$62,221,812** | **$62,221,812** | **$72,947,945** |
| | | | | | | **COST OF PROPOSED ACTION FOR PHASE 1** | | | | **$489,101,529** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

*Table 7.2-10: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Discounted*

*(6 pages)*

| Year | Licensure | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 |
| 2024 | Year 5 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 |
| 2025 | Year 6 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 |
| 2026 | Year 7 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 |
| 2027 | Year 8 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 |
| 2028 | Year 9 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 |
| 2029 | Year 10 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 |
| 2030 | Year 11 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 |
| 2031 | Year 12 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 |
| 2032 | Year 13 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 |
| 2033 | Year 14 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 |
| 2034 | Year 15 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 |
| 2035 | Year 16 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 |
| 2036 | Year 17 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 |
| 2037 | Year 18 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 |
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 |
| | **TOTAL** | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** | **$353,249,650** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-10: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Discounted**

(6 pages)

| Year | Licensure | Yankee Rowe | Yankee Rowe | Generic Plant 1 | Generic Plant 2 | Generic Plant 3 | Generic Plant 4 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $10,103,943 | $10,103,943 | $10,103,943 | $10,103,943 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $10,006,226 | $10,006,226 | $10,006,226 | $10,006,226 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $9,909,454 | $9,909,454 | $9,909,454 | $9,909,454 | $990,945 | $990,945 |
| 2028 | Year 9 | $9,813,618 | $9,813,618 | $9,813,618 | $9,813,618 | $981,362 | $981,362 |
| 2029 | Year 10 | $9,718,709 | $9,718,709 | $9,718,709 | $9,718,709 | $971,871 | $971,871 |
| 2030 | Year 11 | $9,624,717 | $9,624,717 | $9,624,717 | $9,624,717 | $962,472 | $962,472 |
| 2031 | Year 12 | $9,531,635 | $9,531,635 | $9,531,635 | $9,531,635 | $953,163 | $953,163 |
| 2032 | Year 13 | $9,439,453 | $9,439,453 | $9,439,453 | $9,439,453 | $943,945 | $943,945 |
| 2033 | Year 14 | $9,348,162 | $9,348,162 | $9,348,162 | $9,348,162 | $934,816 | $934,816 |
| 2034 | Year 15 | $9,257,754 | $9,257,754 | $9,257,754 | $9,257,754 | $925,775 | $925,775 |
| 2035 | Year 16 | $9,168,221 | $9,168,221 | $9,168,221 | $9,168,221 | $916,822 | $916,822 |
| 2036 | Year 17 | $9,079,553 | $9,079,553 | $9,079,553 | $9,079,553 | $907,955 | $907,955 |
| 2037 | Year 18 | $8,991,743 | $8,991,743 | $8,991,743 | $8,991,743 | $899,174 | $899,174 |
| 2038 | Year 19 | $8,904,783 | $8,904,783 | $8,904,783 | $8,904,783 | $890,478 | $890,478 |
| 2039 | Year 20 | $8,818,663 | $8,818,663 | $8,818,663 | $8,818,663 | $881,866 | $881,866 |
| 2040 | Year 21 | $8,733,376 | $8,733,376 | $8,733,376 | $8,733,376 | $873,338 | $873,338 |
| 2041 | Year 22 | $8,648,914 | $8,648,914 | $8,648,914 | $8,648,914 | $864,891 | $864,891 |
| 2042 | Year 23 | $8,565,269 | $8,565,269 | $8,565,269 | $8,565,269 | $856,527 | $856,527 |
| 2043 | Year 24 | $8,482,432 | $8,482,432 | $8,482,432 | $8,482,432 | $848,243 | $848,243 |
| 2044 | Year 25 | $8,400,397 | $8,400,397 | $8,400,397 | $8,400,397 | $840,040 | $840,040 |
| 2045 | Year 26 | $8,319,156 | $8,319,156 | $8,319,156 | $8,319,156 | $831,916 | $831,916 |
| 2046 | Year 27 | $8,238,699 | $8,238,699 | $8,238,699 | $8,238,699 | $823,870 | $823,870 |
| 2047 | Year 28 | $8,159,022 | $8,159,022 | $8,159,022 | $8,159,022 | $815,902 | $815,902 |
| 2048 | Year 29 | $8,080,114 | $8,080,114 | $8,080,114 | $8,080,114 | $808,011 | $808,011 |
| 2049 | Year 30 | $8,001,970 | $8,001,970 | $8,001,970 | $8,001,970 | $800,197 | $800,197 |
| 2050 | Year 31 | $7,924,581 | $7,924,581 | $7,924,581 | $7,924,581 | $792,458 | $792,458 |
| 2051 | Year 32 | $7,847,941 | $7,847,941 | $7,847,941 | $7,847,941 | $784,794 | $784,794 |
| 2052 | Year 33 | $7,772,043 | $7,772,043 | $7,772,043 | $7,772,043 | $777,204 | $777,204 |
| 2053 | Year 34 | $7,696,878 | $7,696,878 | $7,696,878 | $7,696,878 | $769,688 | $769,688 |
| 2054 | Year 35 | $7,622,440 | $7,622,440 | $7,622,440 | $7,622,440 | $762,244 | $762,244 |
| 2055 | Year 36 | $7,548,722 | $7,548,722 | $7,548,722 | $7,548,722 | $754,872 | $754,872 |
| 2056 | Year 37 | $7,475,717 | $7,475,717 | $7,475,717 | $7,475,717 | $747,572 | $747,572 |
| 2057 | Year 38 | $7,403,418 | $7,403,418 | $7,403,418 | $7,403,418 | $740,342 | $740,342 |
| 2058 | Year 39 | $7,331,818 | $7,331,818 | $7,331,818 | $7,331,818 | $733,182 | $733,182 |
| 2059 | Year 40 | $7,260,911 | $7,260,911 | $7,260,911 | $7,260,911 | $726,091 | $726,091 |
| | **TOTAL** | **$353,249,650** | **$353,249,650** | **$334,249,320** | **$315,614,725** | **$35,324,963** | **$35,324,963** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-10: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Discounted**

(6 pages)

| Year | Licensure | Generic Plant 5 | Generic Plant 6 | Generic Plant 7 | Generic Plant 8 | Generic Plant 9 | Generic Plant 10 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 |
| 2041 | Year 22 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 |
| 2042 | Year 23 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 |
| 2043 | Year 24 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 |
| 2044 | Year 25 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 |
| 2045 | Year 26 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 |
| 2046 | Year 27 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 |
| 2047 | Year 28 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 |
| 2048 | Year 29 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 |
| 2049 | Year 30 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 |
| 2050 | Year 31 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 |
| 2051 | Year 32 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 |
| 2052 | Year 33 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 |
| 2053 | Year 34 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 |
| 2054 | Year 35 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 |
| 2055 | Year 36 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 |
| 2056 | Year 37 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 |
| 2057 | Year 38 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 |
| 2058 | Year 39 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 |
| 2059 | Year 40 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 |
| | **TOTAL** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-10: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Discounted**

(6 pages)

| Year | Licensure | Generic Plant 11 | Generic Plant 12 | Generic Plant 13 | Generic Plant 14 | Generic Plant 15 | Generic Plant 16 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 |
| 2041 | Year 22 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 |
| 2042 | Year 23 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 |
| 2043 | Year 24 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 |
| 2044 | Year 25 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 |
| 2045 | Year 26 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 |
| 2046 | Year 27 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 |
| 2047 | Year 28 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 |
| 2048 | Year 29 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 |
| 2049 | Year 30 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 |
| 2050 | Year 31 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 |
| 2051 | Year 32 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 |
| 2052 | Year 33 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 |
| 2053 | Year 34 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 |
| 2054 | Year 35 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 |
| 2055 | Year 36 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 |
| 2056 | Year 37 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 |
| 2057 | Year 38 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 |
| 2058 | Year 39 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 |
| 2059 | Year 40 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 |
| | **TOTAL** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** |

**Table 7.2-10: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Discounted**

(6 pages)

| Year | Licensure | Generic Plant 17 | Generic Plant 18 | Generic Plant 19 | Generic Plant 20 | Generic Plant 21 | Generic Plant 22 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 |
| 2041 | Year 22 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 |
| 2042 | Year 23 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 |
| 2043 | Year 24 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 |
| 2044 | Year 25 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 |
| 2045 | Year 26 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 |
| 2046 | Year 27 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 |
| 2047 | Year 28 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 |
| 2048 | Year 29 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 |
| 2049 | Year 30 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 |
| 2050 | Year 31 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 |
| 2051 | Year 32 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 |
| 2052 | Year 33 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 |
| 2053 | Year 34 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 |
| 2054 | Year 35 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 |
| 2055 | Year 36 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 |
| 2056 | Year 37 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 |
| 2057 | Year 38 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 |
| 2058 | Year 39 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 |
| 2059 | Year 40 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 |
| | **TOTAL** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** |

**Table 7.2-10: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Discounted**

*(6 pages)*

| Year | Licensure | Generic Plant 23 | Generic Plant 24 | Generic Plant 25 | Generic Plant 26 | Generic Plant 27 | Generic Plant 28 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 |
| 2041 | Year 22 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 |
| 2042 | Year 23 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 |
| 2043 | Year 24 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 |
| 2044 | Year 25 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 |
| 2045 | Year 26 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 |
| 2046 | Year 27 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 |
| 2047 | Year 28 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 |
| 2048 | Year 29 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 |
| 2049 | Year 30 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 |
| 2050 | Year 31 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 |
| 2051 | Year 32 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 |
| 2052 | Year 33 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 |
| 2053 | Year 34 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 |
| 2054 | Year 35 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 |
| 2055 | Year 36 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 |
| 2056 | Year 37 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 |
| 2057 | Year 38 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 |
| 2058 | Year 39 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 |
| 2059 | Year 40 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 |
| | **TOTAL** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.2-11: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Discounted***

*(6 pages)*

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 | $10,504,448 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 | $10,402,857 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 | $10,302,249 |
| 2024 | Year 5 | | | | $10,202,614 | $10,202,614 | $10,202,614 |
| 2025 | Year 6 | | | | | | $10,202,614 |
| 2026 | Year 7 | | | | | | |
| 2027 | Year 8 | | | | | | |
| 2028 | Year 9 | | | | | | |
| 2029 | Year 10 | | | | | | |
| 2030 | Year 11 | | | | | | |
| 2031 | Year 12 | | | | | | |
| 2032 | Year 13 | | | | | | |
| 2033 | Year 14 | | | | | | |
| 2034 | Year 15 | | | | | | |
| 2035 | Year 16 | | | | | | |
| 2036 | Year 17 | | | | | | |
| 2037 | Year 18 | | | | | | |
| 2038 | Year 19 | | | | | | |
| 2039 | Year 20 | | | | | | |
| 2040 | Year 21 | | | | | | |
| 2041 | Year 22 | | | | | | |
| 2042 | Year 23 | | | | | | |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$41,816,584** | **$41,816,584** | **$41,816,584** | **$52,019,198** | **$52,019,198** | **$62,221,812** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-11: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Discounted**

(6 pages)

| Year | License | Yankee Rowe | Zion | Generic Plant 1 | Generic Plant 2 | Generic Plant 3 | Generic Plant 4 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $10,504,448 | $10,504,448 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $10,402,857 | $10,402,857 | $10,402,857 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $10,302,249 | $10,302,249 | $10,302,249 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $10,202,614 | $10,202,614 | $10,202,614 | $10,202,614 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $10,202,614 | $10,202,614 | $10,103,943 | $10,103,943 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | | | $10,006,226 | $10,006,226 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | | | $9,909,454 | $9,909,454 | $990,945 | $990,945 |
| 2028 | Year 9 | | | $9,909,454 | $9,813,618 | $981,362 | $981,362 |
| 2029 | Year 10 | | | | $9,718,709 | $971,871 | $971,871 |
| 2030 | Year 11 | | | | $9,624,717 | $962,472 | $962,472 |
| 2031 | Year 12 | | | | $9,531,635 | $953,163 | $953,163 |
| 2032 | Year 13 | | | | $9,439,453 | $943,945 | $943,945 |
| 2033 | Year 14 | | | | $9,348,162 | $934,816 | $934,816 |
| 2034 | Year 15 | | | | $9,257,754 | $925,775 | $925,775 |
| 2035 | Year 16 | | | | $9,168,221 | $916,822 | $916,822 |
| 2036 | Year 17 | | | | $9,079,553 | $907,955 | $907,955 |
| 2037 | Year 18 | | | | $8,991,743 | $899,174 | $899,174 |
| 2038 | Year 19 | | | | $8,904,783 | $890,478 | $890,478 |
| 2039 | Year 20 | | | | $8,818,663 | $881,866 | $881,866 |
| 2040 | Year 21 | | | | $8,733,376 | $873,338 | $873,338 |
| 2041 | Year 22 | | | | $8,648,914 | $864,891 | $864,891 |
| 2042 | Year 23 | | | | $8,565,269 | $856,527 | $856,527 |
| 2043 | Year 24 | | | | $8,482,432 | $848,243 | $848,243 |
| 2044 | Year 25 | | | | $8,400,397 | $840,040 | $840,040 |
| 2045 | Year 26 | | | | $8,319,156 | $831,916 | $831,916 |
| 2046 | Year 27 | | | | $8,238,699 | $823,870 | $823,870 |
| 2047 | Year 28 | | | | $8,159,022 | $815,902 | $815,902 |
| 2048 | Year 29 | | | | $8,080,114 | $808,011 | $808,011 |
| 2049 | Year 30 | | | | $8,001,970 | $800,197 | $800,197 |
| 2050 | Year 31 | | | | $7,924,581 | $792,458 | $792,458 |
| 2051 | Year 32 | | | | $7,847,941 | $784,794 | $784,794 |
| 2052 | Year 33 | | | | $7,772,043 | $777,204 | $777,204 |
| 2053 | Year 34 | | | | $7,696,878 | $769,688 | $769,688 |
| 2054 | Year 35 | | | | $7,622,440 | $762,244 | $762,244 |
| 2055 | Year 36 | | | | $7,548,722 | $754,872 | $754,872 |
| 2056 | Year 37 | | | | $7,475,717 | $747,572 | $747,572 |
| 2057 | Year 38 | | | | $7,403,418 | $740,342 | $740,342 |
| 2058 | Year 39 | | | | $7,331,818 | $733,182 | $733,182 |
| 2059 | Year 40 | | | | $7,260,911 | $726,091 | $726,091 |
| | **TOTAL** | **$62,221,812** | **$62,221,812** | **$72,947,945** | **$315,614,725** | **$35,324,963** | **$35,324,963** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.2-11: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Discounted***

*(6 pages)*

| Year | License | Generic Plant 5 | Generic Plant 6 | Generic Plant 7 | Generic Plant 8 | Generic Plant 9 | Generic Plant 10 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 |
| 2041 | Year 22 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 |
| 2042 | Year 23 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 |
| 2043 | Year 24 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 |
| 2044 | Year 25 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 |
| 2045 | Year 26 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 |
| 2046 | Year 27 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 |
| 2047 | Year 28 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 |
| 2048 | Year 29 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 |
| 2049 | Year 30 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 |
| 2050 | Year 31 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 |
| 2051 | Year 32 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 |
| 2052 | Year 33 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 |
| 2053 | Year 34 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 |
| 2054 | Year 35 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 |
| 2055 | Year 36 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 |
| 2056 | Year 37 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 |
| 2057 | Year 38 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 |
| 2058 | Year 39 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 |
| 2059 | Year 40 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 |
| | **TOTAL** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** |

***Table 7.2-11: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Discounted***

*(6 pages)*

| Year | License | Generic Plant 11 | Generic Plant 12 | Generic Plant 13 | Generic Plant 14 | Generic Plant 15 | Generic Plant 16 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 |
| 2041 | Year 22 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 |
| 2042 | Year 23 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 |
| 2043 | Year 24 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 |
| 2044 | Year 25 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 |
| 2045 | Year 26 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 |
| 2046 | Year 27 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 |
| 2047 | Year 28 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 |
| 2048 | Year 29 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 |
| 2049 | Year 30 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 |
| 2050 | Year 31 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 |
| 2051 | Year 32 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 |
| 2052 | Year 33 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 |
| 2053 | Year 34 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 |
| 2054 | Year 35 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 |
| 2055 | Year 36 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 |
| 2056 | Year 37 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 |
| 2057 | Year 38 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 |
| 2058 | Year 39 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 |
| 2059 | Year 40 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 |
| | **TOTAL** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-11: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Discounted**

(6 pages)

| Year | License | Generic Plant 17 | Generic Plant 18 | Generic Plant 19 | Generic Plant 20 | Generic Plant 21 | Generic Plant 22 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 |
| 2041 | Year 22 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 |
| 2042 | Year 23 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 |
| 2043 | Year 24 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 |
| 2044 | Year 25 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 |
| 2045 | Year 26 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 |
| 2046 | Year 27 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 |
| 2047 | Year 28 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 |
| 2048 | Year 29 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 |
| 2049 | Year 30 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 |
| 2050 | Year 31 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 |
| 2051 | Year 32 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 |
| 2052 | Year 33 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 |
| 2053 | Year 34 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 |
| 2054 | Year 35 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 |
| 2055 | Year 36 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 |
| 2056 | Year 37 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 |
| 2057 | Year 38 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 |
| 2058 | Year 39 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 |
| 2059 | Year 40 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 |
| | **TOTAL** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.2-11: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Discounted**

(6 pages)

| Year | License | Generic Plant 23 | Generic Plant 24 | Generic Plant 25 | Generic Plant 26 | Generic Plant 27 | Generic Plant 28 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 | $1,050,445 |
| 2022 | Year 3 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 | $1,040,286 |
| 2023 | Year 4 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 | $1,030,225 |
| 2024 | Year 5 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 | $1,020,261 |
| 2025 | Year 6 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 | $1,010,394 |
| 2026 | Year 7 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 | $1,000,623 |
| 2027 | Year 8 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 | $990,945 |
| 2028 | Year 9 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 | $981,362 |
| 2029 | Year 10 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 | $971,871 |
| 2030 | Year 11 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 | $962,472 |
| 2031 | Year 12 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 | $953,163 |
| 2032 | Year 13 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 | $943,945 |
| 2033 | Year 14 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 | $934,816 |
| 2034 | Year 15 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 | $925,775 |
| 2035 | Year 16 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 | $916,822 |
| 2036 | Year 17 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 | $907,955 |
| 2037 | Year 18 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 | $899,174 |
| 2038 | Year 19 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 | $890,478 |
| 2039 | Year 20 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 | $881,866 |
| 2040 | Year 21 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 | $873,338 |
| 2041 | Year 22 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 | $864,891 |
| 2042 | Year 23 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 | $856,527 |
| 2043 | Year 24 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 | $848,243 |
| 2044 | Year 25 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 | $840,040 |
| 2045 | Year 26 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 | $831,916 |
| 2046 | Year 27 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 | $823,870 |
| 2047 | Year 28 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 | $815,902 |
| 2048 | Year 29 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 | $808,011 |
| 2049 | Year 30 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 | $800,197 |
| 2050 | Year 31 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 | $792,458 |
| 2051 | Year 32 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 | $784,794 |
| 2052 | Year 33 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 | $777,204 |
| 2053 | Year 34 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 | $769,688 |
| 2054 | Year 35 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 | $762,244 |
| 2055 | Year 36 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 | $754,872 |
| 2056 | Year 37 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 | $747,572 |
| 2057 | Year 38 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 | $740,342 |
| 2058 | Year 39 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 | $733,182 |
| 2059 | Year 40 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 | $726,091 |
| | **TOTAL** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** | **$35,324,963** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

### 7.2.2 Repurposed Land

Once the decommissioning of a nuclear power plant is complete and its license terminated, the NRC places no restrictions on the future use of the land. A nuclear power plant's future uses can include industrial activities, but it can also be used for other commercial or societally-beneficial purposes, such as farming or housing (NRC, 2016). The pace at which a decommissioned site can be reused is, in part, determined by the operator's decommissioning strategy. When a utility decides to shut down a nuclear power plant, it must choose between one of three decommissioning strategies: DECON, SAFSTOR, or ENTOMB. The DECON strategy requires that all parts of the plant (equipment, structures, and other portions of the facility with radioactive contaminants) be removed or decontaminated. When the facility is considered adequately decontaminated, the NRC releases the property and terminates its license. Under the SAFSTOR option, the facility is maintained while the radioactivity decays to lower levels for subsequent decontamination and dismantlement, as with the DECON strategy. The third option is ENTOMB, where all radioactive contaminants are encased in concrete. The facility is monitored and maintained until the radioactivity decays to a level that allows the facility to undergo a restricted release. No NRC-licensed facility has used the ENTOMB strategy to date (NRC, 2015).

The precise value of land at a particular decommissioned nuclear power plant is difficult to estimate. Readapting the land to nature preserves or parks is a frequent consideration for former plant sites. Table *7.2-12* identifies two instances where a former site has been repurposed. The first is the Maine Yankee site, which has 400 acres committed as an industrial park for local economic development. A review of recent aerial photography shows the pace of redevelopment has been limited to date. The second example is 62 acres of the 2,400-acre Rancho Seco site, which will be used for a solar energy facility. Several of the shutdown nuclear power plants are co-located with fossil fuel plants, which are not being decommissioned concurrently with the nuclear reactor. These locations include the former Crystal River and the La Crosse plant sites. Other facilities continue to undergo the process of decommissioning and will not be available on the real estate market for a number of years.

Table *7.2-12* provides a listing of each of the eight facilities covered in this analysis, the number of acres on the site, the plant's decommissioning strategy, its expected date to be released from its license or when it received a release, and the site's current and future land use.

**Table 7.2-12: Site Size, Regulatory Status, and Land Use Potential at Decommissioned Nuclear Power Plants**

| Site | Location | Approximate Site Acreage | License Status | Estimated Closure Date | Site's Current/Future Use |
|---|---|---|---|---|---|
| Connecticut Yankee | Middlesex County, CT | 544 | DECON Completed | 2007 | Vacant, available |
| Crystal River | Citrus County, FL | 4,700 | SAFSTOR In progress | 2074 | Continued use for fossil fuel power plants during decommissioning |
| Kewaunee | Kewaunee County, WI | 900 | SAFSTOR In progress | TBD | Continues to undergo decommissioning |
| La Crosse | Vernon County, WI | 163 | SAFSTOR | TBD | Continued use for fossil fuel power plants |
| Maine Yankee | Lincoln County, ME | 820 | DECON Completed | 2005 | 200 acres donated for conservation and education; 400 acres for economic development |
| Rancho Seco | Sacramento County, CA | 2,400 | DECON In progress | N/A | 62 acres planned for solar facility |
| Yankee Rowe | Franklin County, MA | 2,200 | DECON Completed | 2007 | Vacant, available |
| Zion | Lake County, IL | 257 | DECON In Progress | 2020 | Continues to undergo decommissioning |

Sources: NRC, 2016; Maine Yankee, 2016; Connecticut Yankee, 2016; Content, 2015; Joyce, 2015; Wernau, 2015; Maheras et al., 2014; Abel, 2013; Broncaccio, 2013; Penn, 2013; Friedman and Diskin, 2006; Libow, 2001; and Peyton, 1999.

One of the challenges to reusing the site of a fully decommissioned nuclear power plant is that the facility may retain a public perception of risk, even after the NRC has determined that the site is safe for reuse, Pasqualetti and Pijawka (1996)[1] surveyed residents within eight kilometers of the Humboldt nuclear power plant in 1992 and found that public perceptions of risk remain throughout a plant's decommissioning stage. However, the perceived risks from a decommissioned plant do diminish once its spent fuel is removed from the site. Nonetheless, even if the spent fuel is moved offsite and all parts of the decommissioned plant removed, almost 17 percent of the survey respondents believed the facility still presented a high level of risk. While such fears are not scientifically sound, they can still create some negative impacts on the value of land at a decommissioned site.

Another factor that can affect the value of land at a shutdown nuclear power plant has been the response of some local governments to decommissioning. Nuclear power plants are often located in rural areas that are away from population centers and not always economically robust. In many communities, local governments have been dependent upon the power plants, with their large workforce of well-paid employees and contributions to local governments, to support their local economies. When a facility is shut down and later fully decommissioned, it can lead to substantial loss of jobs and public revenue in the community, especially if the site is not redeveloped soon after its decommissioning.

The closing of the Kewaunee nuclear power plant in Carlton, Wisconsin led to the loss of 550 jobs and $350,000 of revenue for the municipal government (Bosman, 2015). Initially, the town of Carlton appraised the value of the plant's 900-acre tract at $10 million for the 2013 tax roll. However, in 2014, the same 900-acre tract was appraised at $457 million (Yancey, 2015), as local officials try to generate new revenue. The owner of the plant has since sued the town of Carlton to reduce the appraised value. The valuation of the land at the Kewaunee plant is further complicated because the owner has up to 60 years to restore the site (Content, 2015). Situations like these further complicate the valuation of land at a decommissioned site.

The estimated value of the land at shutdown nuclear plants in this analysis was based upon the typical price of brownfield industrial property in the area surrounding the site (see Table *7.2-13*). Unfortunately, none of the listings for industrial properties near the shutdown facilities were

[1] Pasqualetti, Martin J. and K. David Pijawka. 1996. Unsiting Nuclear Power Plants: Decommissioning Risks and Their Land Use Context. Professional Geographer, 48(1), 57-69.

described as brownfield properties, so comparable parcels of industrial property were identified from recent local property listings and the assumed price per acre for this land was discounted by 50 percent. The 50 percent valuation discount is consistent with the findings of several studies of brownfield properties. Page and Rabinowitz (1993) found that the value of brownfield properties had prices that were 10 to 50 percent lower than similar properties. Patchin (1994) found the discounted price of commercial and industrial brownfield land between 21 and 94 percent lower than more pristine property. Finally, Howland (2010) found that parcels with historic uses that gave reasons to suspect contamination sold at an average discount of 65 percent.

**Table *7.2-13*: Estimated Value of Land at Decommissioned Nuclear Power Plants *2018 $***

| ***Site*** | ***Approximate Site Acreage*** | ***Estimated Value per Acre (2018 $)*** | ***Acres Available for Redevelopment*** | ***Estimated Value of Land (2018 $)*** |
|---|---|---|---|---|
| *Connecticut Yankee* | *544* | *$42,766* | *544* | *$23,264,704* |
| *Crystal River* | *4,700* | *—* | *—* | *—* |
| *Kewaunee* | *900* | *$11,072* | *900* | *$9,964,800* |
| *La Crosse* | *163* | *—* | *—* | *—* |
| *Maine Yankee* | *820* | *$10,032* | *620* | *$6,219,840* |
| *Rancho Seco* | *2,400* | *$25,871* | *2,338* | *$60,486,398* |
| *Yankee Rowe* | *2,200* | *$26,610* | *2,200* | *$58,542,000* |
| *Zion* | *257* | *$23,759* | *257* | *$6,106,063* |
| ***Subtotal*** | ***11,984*** | ***—*** | ***6,859*** | ***$164,583,805*** |
| ***Average*** | ***1,498*** | ***$23,352*** | ***1,143*** | ***$27,430,634*** |

*Note: Crystal River, Kewaunee, La Crosse sites are assumed to continue as fossil fuel power plants.*

*Source: Loopnet.com, 2016 and Maine Commercial Association of Realtors, 2016.*

The total estimated value of land returned to the market at 6 of the 8 currently decommissioned plants and the *28* generic plants with their fuel removed was estimated to be $*766.8 million* dollars. The site acreage and the value of land at each generic decommissioned plant was assumed to be equal to the average values of the six decommissioned nuclear power plants that will return land to the market.

*The estimates of land values at closed power plants were revised to identify the assumed year that the land would return to the market. For each facility, it was assumed the land would return to market ten years after the complete removal of spent fuel from the plant site, which would be 20 or more years after the assumed plant shutdown date. Table 7.2-14 provides the discounted value of land at each plant.*

**Table 7.2-14: Total Estimated Value of Land at Decommissioned Nuclear Power Plants Served by the Proposed Action, *Discounted***

| Plant | Assumed Shutdown Date | Assumed Date of Completed Spent Fuel Removal | Assumed Date Returned to Market | Discounted Market Value |
|---|---|---|---|---|
| Connecticut Yankee | Shutdown | 2023 | 2033 | $24,175,100 |
| Crystal River | Shutdown | 2023 | 2033 | $24,175,100 |
| Kewaunee | Shutdown | 2023 | 2033 | $24,175,100 |
| La Crosse | Shutdown | 2024 | 2034 | $23,941,298 |
| Maine Yankee | Shutdown | 2024 | 2034 | $23,941,298 |
| Rancho Seco | Shutdown | 2024 | 2034 | $23,941,298 |
| Yankee Rowe | Shutdown | 2024 | 2034 | $23,941,298 |
| Zion | Shutdown | 2024 | 2034 | $23,941,298 |
| Generic Plant 1 | Shutdown | 2027 | 2037 | $23,253,373 |
| Generic Plant | Shutdown | 2029 | 2039 | $22,805,773 |
| Generic Plant | 2019 | 2030 | 2040 | $22,585,214 |
| Generic Plant | 2019 | 2031 | 2041 | $22,366,788 |
| Generic Plant | 2020 | 2031 | 2041 | $22,366,788 |
| Generic Plant | 2021 | 2032 | 2042 | $22,150,475 |
| Generic Plant | 2022 | 2033 | 2043 | $21,936,254 |
| Generic Plant | 2025 | 2036 | 2046 | $21,305,941 |
| Generic Plant | 2026 | 2037 | 2047 | $21,099,887 |
| Generic Plant | 2026 | 2038 | 2048 | $20,895,826 |
| Generic Plant | 2028 | 2039 | 2049 | $20,693,739 |
| Generic Plant | 2029 | 2040 | 2050 | $20,493,606 |
| Generic Plant | 2029 | 2041 | 2051 | $20,295,409 |
| Generic Plant | 2030 | 2041 | 2051 | $20,295,409 |
| Generic Plant | 2030 | 2042 | 2052 | $20,099,128 |
| Generic Plant | 2031 | 2042 | 2052 | $20,099,128 |
| Generic Plant | 2032 | 2043 | 2053 | $19,904,746 |
| Generic Plant | 2032 | 2044 | 2054 | $19,712,244 |
| Generic Plant | 2033 | 2044 | 2054 | $19,712,244 |
| Generic Plant | 2033 | 2045 | 2055 | $19,521,603 |
| Generic Plant | 2033 | 2045 | 2055 | $19,521,603 |
| Generic Plant | 2033 | 2046 | 2056 | $19,332,806 |
| Generic Plant | 2034 | 2046 | 2056 | $19,332,806 |
| Generic Plant | 2034 | 2047 | 2057 | $19,145,835 |
| Generic Plant | 2034 | 2047 | 2057 | $19,145,835 |
| Generic Plant | 2034 | 2048 | 2058 | $18,960,672 |
| Generic Plant | 2034 | 2049 | 2059 | $18,777,300 |
| Generic Plant | 2036 | 2049 | 2059 | $18,777,300 |
| | | | **TOTAL** | **$766,819,521** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

information on this topic, this analysis incorporates assumptions and cost estimates from the Electric Power Research Institute's (EPRI) 2009 report, Cost Estimate for an Away-From-Reactor Generic Interim Storage Facility (GISF) for Spent Nuclear Fuel adjusting them to *2018* dollars using the CPI and adjusting values where appropriate for the circumstances of the proposed action. In addition to using the information for this discussion, ISP has also relied substantially upon the EPRI figures to develop internal planning information for the project.

### 7.3.1 Planning, Permitting, and Constructing the Proposed Project

The initial planning stage of the project requires various studies to assess the technical feasibility of the project, the consideration of various alternatives, and the impacts of the alternatives on the human and natural environment for the project's environmental report. Additionally, ISP must inform the public about the proposed facility and engage local stakeholders. Prior to the submission of an application for an NRC license, ISP will also develop a preliminary design for the facility and a safety analysis. The estimated cost for these activities is $*21.0* million (See Table 7.3-1, as derived from the 2009 EPRI report).

After the initial submittal of the license application, ISP will pay fees to the NRC to review its application, as well as for the preparation of an environmental impact statement (EIS) and the public hearing process, as necessary. There will also be costs associated with state and local government review of the project. Additionally, it will be necessary for ISP to continue providing public information and engaging stakeholders as the project progresses. During the review of the license application, technical and legal support will be retained and a detailed engineering design will be prepared for the CISF and the site's transportation infrastructure. The total estimated cost for the license application review stage is $*46.7* million, as derived from the 2009 EPRI report.

The initial source of this funding for planning and permitting is ISP and other project team members, including in-kind contributions of time and expertise. However, ISP would seek to recover these costs through a future contract with DOE or the SNF Title Holder(s).

After receiving the license, the CISF's construction will begin to move forward, which will require the services of engineers and construction personnel. As the site is constructed, it will be necessary to ensure and confirm the quality of construction. The total cost for this phase is estimated to be approximately $*10.4* million, as derived from the 2009 EPRI report. As explained in the license application, funding of construction is expected to be primarily through a future contract with DOE or the SNF Title Holder(s).

Overall, the initial phase of developing the CISF is expected to cost approximately $*78.1* million, as derived from the 2009 EPRI report. This expense also includes project management costs and a contingency assumption of 30 percent.

**Table 7.3-1: CISF Design, Engineering, Licensing, and Startup Professional Services, *Discounted***

| ***Cost Category*** | ***Estimated Cost (Millions $)*** |
|---|---|
| ***Pre-Licensing Phase*** | |
| *Project Management* | *$3.48* |
| *Public Information and Stakeholder Involvement* | *$1.74* |
| *Geotechnical Investigations and Environmental Report Development* | *$2.32* |
| *Preliminary Design, Safety Analysis, and Preparation of License Application* | *$8.58* |
| *Subtotal Pre-Licensing Phase* | *$16.12* |
| *Contingency: 30%* | *$4.84* |
| ***Total CISF Pre-License Submittal Phase:*** | ***$20.96*** |
| | |
| ***License Application Review Stage*** | |
| *Project Management* | *$2.90* |
| *Public Information and Stakeholder Involvement* | *$1.74* |
| *NRC Fees for LA Review, EIS, and Hearing Process* | *$18.56* |
| *Technical and Legal Support during LA Review and Hearing Process* | *$6.96* |
| *Detailed Design for CISF Facilities and Transportation Infrastructure* | *$5.22* |
| *State and Local Authority Review* | *$0.58* |
| *Subtotal: CISF License Application Review Phase* | *$35.95* |
| *Contingency: 30%* | *$10.79* |
| ***Total CISF License Application Review Phase*** | ***$46.74*** |
| | |
| ***Initial Construction/Pre-Operations Phase*** | |
| *Project Management* | *$1.62* |
| *Public Information and Stakeholder Involvement* | *$1.74* |
| *Engineering and Legal Support during Construction* | *$2.67* |
| *System Start-up, Dry-Run Testing* | *$1.97* |
| *Subtotal CISF Initial Construction/Pre-Operations Phase* | *$8.00* |
| *Contingency: 30%* | *$2.40* |
| ***Total CISF Initial Construction/Pre-Operations Phase*** | ***$10.40*** |
| | |
| ***Total CISF Design, Engineering, Licensing, and Startup Professional Services*** | ***$78.10*** |

*Source: Derived from EPRI, 2009.*

### 7.3.2 CISF Capital Costs

Under ISP's approach, DOE or the SNF Title Holder(s) would be responsible for transportation, including associated costs. As explained in the license application, funding of construction is expected to be primarily through a future contract with DOE or the SNF Title Holder(s).

#### 7.3.2.1 Transportation Capital Costs

The development of the CISF facility will require transportation improvements and the purchase of rolling stock that will be used to bring the spent fuel from the shutdown nuclear power plants to the CISF. The CISF site is already well served by roads and a rail spur, so fewer transportation improvements will likely be needed than would be assumed at EPRI's generic facility or any of the alternative CISF sites that have been considered. The estimates in Table 7.3-2 reflect adjustments for these conditions. The cost analysis also assumes the purchase of rolling stock for *seven* trains. *This rolling stock includes seven rail escort cars (at $6.4 million each) that will hold personnel (including security), and 35 rail cask cars that will carry the transportation casks (at $1.6 million apiece, plus $6.4 million apiece for 35 transportation casks), as well as 14 rail buffer cars (at $2.1 million apiece). One rail buffer car rides on either side of the group of rail cask cars to protect the crew from radiation.* Locomotives and their crews were assumed to be provided by the railroad providing the service.

**Table 7.3-2: Estimated Costs of Transportation Infrastructure*, Discounted***

| ***Description*** | ***Cost Estimate (Millions $)*** |
|---|---|
| *Access Road Improvements* | *$1.58* |
| *Land Improvements* | *$5.27* |
| *Rail Escort Cars @ $6.4 million: 7* | *$44.01* |
| *Rail Buffer Cars @ $1.6 million: 14* | *$22.00* |
| *Cask Rolling Stock*<br>*Rail Cask Car @ $2.1 million:35*<br>*Transportation Casks @ $6.4 million: 35*<br>*Associated transport equipment (impact limiters, etc.)* | *$292.97* |
| ***Subtotal Transportation Infrastructure*** | ***$365.83*** |
| ***Contingency: 30%*** | ***$109.75*** |
| ***Total Transportation Infrastructure*** | ***$475.58*** |

*Source; Derived from EPRI, 2009.*

### 7.3.2.2 CISF Infrastructure

Development of the CISF will require the construction of various buildings to support activities at the site. The assumed facilities include a combined administrative and security and health physics building and a canister handling building. Maintenance and operations activities will be carried out at existing buildings on the site. It is also assumed, over the 40-year license, that all the equipment and building furnishings will need a one-time replacement. *It is assumed that this replacement will occur during Year 21 of the license period.* The assumed cost for building construction is $*37.2* million, and with a 30 percent contingency, totals costs are estimated to be $*48.4* million (See Table 7.3-3).

**Table 7.3-3: Estimated Costs of CISF Infrastructure*, Discounted***

| ***CISF Capital Cost Elements*** | ***Estimated Costs (Millions $)*** |
|---|---|
| *Administrative, Security, and Health Physics Building* | |
| *Building construction* | *$2.74* |
| *Furnishings, equipment, emergency diesel generator, vehicles (with one-time replacement)* | *$6.76* |
| *Total Administrative, Security, and Health Physics Building* | *$9.50* |
| *Canister Handling Building* | |
| *Building construction* | *$6.22* |
| *Canister transfer cells and equipment: 3* | *$8.75* |
| *Heavy lifting equipment and heavy haul equipment (with one-time replacement)* | *$12.75* |
| *Total Canister Handling Building* | *$27.72* |
| ***Subtotal CISF Infrastructure*** | ***$37.22*** |
| ***Contingency: 30%*** | ***$11.17*** |
| ***Total CISF Infrastructure*** | ***$48.39*** |

### 7.3.2.3 Spent Fuel Storage Facility

Storage of the spent fuel canisters will require the construction of new storage pads and security features. Multiple canisters will sit on large concrete pads that will have an average cost of $*105,945* per canister, along with $*3.5* million expended for site preparation (See Table 7.3-4). *Under the Phase 1 only scenarios, concrete pads would only be constructed for 406 canisters.* For security, the facility is assumed to have a fenced inner and outer perimeter that will cost $1 million. Other security features will include lighting, intrusion detection, close-circuit television, and other types of monitoring equipment. It was estimated that the electronics portion of this expense is approximately $*2.7* million and that it would be replaced four times over the 40-year period to remain in good working order and to take advantage of new technological advances.

*The decennial replacement of electronics results in additional costs during Year 11, Year 21 and Year 31.* All these items will have a collective cost of almost $*324.7* million and, with a $*97.4* million contingency, will total $*422.0* million.

**Table 7.3-4: Spent Fuel Storage Facility Costs*, Discounted***

| ***CISF Fuel Storage Facility Costs*** | ***Estimated Costs (Millions $)*** |
|---|---|
| *Excavation and Grading* | *$3.48* |
| ***Concrete Storage Pads*** | |
| *Large concrete pads estimated to cost $105,945 per canister @ 3,376 canisters stored* | *$299.92* |
| ***Security Fence*** | ***$1.08*** |
| *Inner and outer security fences – 12,400 linear feet* | |
| *Fencing: $87.40/linear foot* | |
| ***Security System*** | |
| *Lighting, intrusion detection, CCTV, monitoring equipment (with four updates to the electronic equipment)* | *$20.17* |
| ***Subtotal Fuel Storage Facility*** | ***$324.65*** |
| ***Contingency 30%*** | ***$97.39*** |
| ***Total Fuel Storage Facility*** | ***$422.64*** |

### 7.3.3 CISF Operating Costs

As explained in the license application, ISP will obtain funds to operate the CISF pursuant to a future contract with DOE or the SNF Title Holder(s). ISP also intends to collect funds for the decommissioning of equipment, facilities, and land at the CISF pursuant to a future contract with DOE.

#### 7.3.3.1 Recurring Administrative Costs

Table 7.3-5 shows estimates of various recurring administrative operating expenses for the proposed action. Travel and living expenses for the security crews who will pick-up the spent fuel canisters is estimated to be approximately $*2.31* million. This expense assumes *675* rail shipments that will remove *3,376* casks of spent fuel. *The Phase 1 only scenarios would* *require 82 rail shipments carrying 406 canisters of spent fuel and GTCC waste.* There will be an annual office expense of $*970,286* (over 40 years that totals $*38.8* million) that includes communications and reproduction, office supplies, office equipment and leases, office equipment maintenance and repair, postage, dues and subscriptions, and insurance. The total expenditure including contingency is $*53.5* million.

**Table 7.3-5: Administrative Operating Costs*, Discounted***

| ***CISF Administrative Operating Costs*** | ***Estimated Costs (Millions $)*** |
|---|---|
| ***Travel and Living Expenses*** | |
| *Security Crew*<br>*675 rail shipments for 3,376 casks*<br>*$4,079 per rail shipment* | *$2.31* |
| ***Annual Office Expenses*** | |
| *Communications and reproduction, office supplies, office equipment and leases, office equipment maintenance and repair, postage, dues and subscriptions, insurance* | *$38.81* |
| ***Subtotal: Annual Administrative Operating Costs*** | ***$41.12*** |
| ***Contingency: 30%*** | ***$12.34*** |
| ***Total Administrative Operating Costs*** | ***$53.46*** |

*Total over the 40-year licensure period*

*Source: Derived from EPRI, 2009.*

### 7.3.3.2 Concrete Overpacks

Upon relocation to the CISF, each shipment will arrive in a dual purpose canister and will need to be placed into a concrete overpack and set on a pad. Each concrete overpack is expected to cost $*233,078* (See Table 7.3-6). The total expenditure for placing all the spent fuel canisters relocated from the eight shutdown plants and the *28* generic plants, including contingency costs, is estimated to be $*857.8* million. *Under the Phase 1 only scenarios, concrete overpacks would only be constructed for 406 canisters for a total cost of $117.5 million.*

**Table 7.3-6: Costs for Concrete Overpack*, Discounted***

| ***Concrete Overpack Costs*** | ***Estimated Costs (Millions $)*** |
|---|---|
| *Concrete Overpack Costs* | |
| *$233,078 per overpack: 3,376 canisters* | *$659.8* |
| *Contingency: 30%* | *$197.9* |
| ***Total Costs*** | ***$857.8*** |

*Source: Derived from EPRI, 2009.*

#### 7.3.3.3 Transportation Planning and Transport at Shutdown Plant Sites

The EPRI study did not discuss the potential costs related to moving the casks from the shutdown nuclear power plants to a railroad transloading location, which in some cases might be within the boundaries of the plant property or for others, many miles away. Reaching these transloading locations could require moving the cask from the plant by barge or heavy-haul truck, depending upon the circumstances. The EPRI study also did not identify costs for the extensive transportation and safety planning that would be necessary along each route between the shutdown plant and the CISF. A detailed discussion of the activities that must occur before and during the transfer of the casks is provided in Maheras et. al. (2014). However, that report does not provide cost estimations for any of these activities. A 2014 GAO report, entitled *Spent Nuclear Fuel Management: Outreach Needed to Help Gain Public Acceptance for Federal Activities that Address Liability*, did give estimates for some of the local transportation costs. Table 7.3-7 shows general approximations of the identified expenditures for all *36* spent fuel sites. *Under the Phase 1 only scenarios, the on-site transportation planning and transport costs reflect the modified and reduced schedule of spent fuel removal.*

**Table 7.3-7: Assumed On-site Transportation Planning and Transport Costs, *Discounted***

| *On-Site Transportation Planning and Transport Costs* | *Estimated Costs (Millions $)* |
|---|---|
| ***Assemble Project Organization*** | |
| *Assemble management teams* | *$68.96* |
| *Identify shutdown site existing infrastructure, constraints, & transportation resource needs and develop interface procedures.* | *$91.95* |
| ***Conduct Preliminary Logistics Analysis and Planning*** | |
| *Develop specs, solicit bids, issue contracts, & initiate preparations for shipping campaigns* | *$11.54* |
| *Revisions to certificates of compliance as may be needed* | *$22.99* |
| ***Conduct Preliminary Logistics Analysis and Planning*** | |
| *Determine fleet size, transport requirements, and modes of transport for shutdown site* | *$9.19* |
| ***Coordinate with Stakeholders*** | |
| *Assess and select routes & modes of transport* | *$13.79* |
| *Support training of emergency response personnel* | *$90.14* |
| ***Develop Campaign Plans*** | |
| *Develop plans, policies, & procedures for at-site operational interfaces, support operations, and in-transit security operations* | *$41.47* |
| ***Conduct Readiness Activities*** | |
| *Assemble & train at-site operations interface team & shutdown site workers* | *$45.97* |
| *Includes readiness reviews, tabletop exercises, and dry run operations* | *$68.96* |
| ***Local Transportation*** | |
| *Portable transportation equipment – 7 sets @ $2.1 million* | *$14.75* |
| *Local transportation improvements – 36 sites @ $1.1 million.* | *$33.06* |
| *Transfer cask to site to railroad - $264,862 per cask: 3,376 casks* | *$749.80* |
| ***Subtotal: On-Site Transportation Planning and Transport Costs*** | ***$1,262.57*** |
| ***Contingency: 30%*** | ***$378.77*** |
| ***Total Transportation Planning and Transport Costs*** | ***$1,641.34*** |

*Note: Values are for all 36 sites.*

*Source: Derived from GAO (2014)*

#### 7.3.3.4 Rail Costs from Shutdown Plants to CISF

For cost and safety reasons, the preferred mode for transporting the casks of spent fuel is rail (DOE, 2013)[4]. In some cases, the locations with spent fuel have an existing rail spur in the facility, which connects to a short line or a regional or Class I railroad. However, in a number of cases, it will be necessary for the cask to be transported by truck or barge to a rail head capable of handling the cargo.

Regardless of which part of the country the casks will be transported from, they will eventually need to travel on the Union Pacific (UP) rail line that is parallel to Interstate Highway (IH) 20, known as the TP Line. In the Texas town of Monahans, the train will interchange with the Texas & New Mexico Railway (TNMR), which is a short line railroad. The TNMR is a modern facility that can handle 286,000 lbs. rail cars and is the same capacity as the UP's TP Line. The TNMR connects to ISP joint venture member Waste Control Specialists's internal rail spur.

Table 7.3-8 shows the estimated distances of rail trips needed to remove the casks from existing, decommissioned facility. In a 2011 MIT Study, it was estimated that the transportation cost of moving a train with three casks was \$75 per mile. That amount was adjusted to \$*87.40*, based upon the change in the CPI. The distance by rail from each facility to the WCS CISF was based upon the shortest route of the train, which considered track weight capacity, but none of the other factors that might influence the routing of the train.

[4] Department of Energy. 2013. Office of Fuel Cycle and Research Development, A Project Concept for Nuclear Fuels Storage and Transportation. FCRD-NFST-2013-000132 Rev. 1 (June 15, 2013).

**Table 7.3-8: Estimated Distances of Rail Transportation to CISF**

| Site | Estimated Distance |
|---|---:|
| Connecticut Yankee | 2,337 |
| Crystal River | 1,672 |
| Kewaunee | 1,509 |
| La Crosse | 1,443 |
| Maine Yankee | 2,435 |
| Rancho Seco | 1,498 |
| Yankee Rowe | 2,293 |
| Zion | 1,404 |
| **AVERAGE** | **1,824** |

Source: Derived from EPRI, 2009.

#### 7.3.3.5 Other Operating Costs

There will be additional recurring expenses to operate the CISF that are shown in Table 7.3-9. The largest expense shown will be the transport of the spent fuel by rail to the CISF, estimated to be approximately $*180.5* million. Other assumed annual expenses include: state inspection fees (estimated at $*38.8* million); equipment, spare parts, and maintenance (estimated at $*74.1* million over the 40-year license); regulatory fees and license fees (estimated at $*28.2* million over the 40-year license); utilities (estimated at $*28.2* million over the 40-year license); and the disposal of low-level nuclear waste (LLW) (estimated at $*2.6* million over the 40-year license). Total expenditures for other operating costs, with contingencies, is approximately $*458.2* million.

**Table 7.3-9: Assumptions for Other Operating Costs*, Discounted***

| ***Assumptions for Other Operating Costs*** | ***Estimated Costs (Millions $)*** |
|---|---|
| *Railroad Freight Fees* | |
| *Estimated cost for 675 shipments of 5 SNF transport casks by dedicated train @ $87.40 per mile round-trip; average trip length 1,824 miles* | *$180.47* |
| *State Inspection Fees* | *$38.81* |
| *Equipment, spare parts, and maintenance* | *$74.09* |
| *Regulatory fees and license fees* | *$28.23* |
| *Utilities* | *$28.23* |
| *LLW Disposal (50 cubic feet per year; $1,500 per cubic foot)* | *$2.65* |
| *Subtotal: Other Operating Costs* | *$352.47* |
| *Contingency: 30%* | *$105.74* |
| ***Total: Other Operating Costs*** | ***$458.21†*** |

*† Total over the 40-year licensure period*

*Source: Derived from EPRI, 2009.*

### 7.3.4 Labor Costs

Labor costs at the proposed facility are likely to be lower than estimated in the EPRI study, since many of the job functions identified for the CISF are currently performed by existing staff at the LLW facility located on the same site. Therefore, it was assumed that the labor requirements for the CISF would be similar to the "caretaker" status, with a reduction made to the number of administrative personnel. However, teams of two workers were included for each reactor site where fuel was being removed. *Thirty-six new employees would be hired to work at the CISF, 20 of whom would work as site security, along with new administrative staff, engineering and technical staff, and maintenance and equipment operating staff. The number of at-reactor crews employed will vary from year-to-year. During some years, there will be no canisters transported because the spent fuel is cooling. Additionally, during the first two years of the license and after Year 30, when the CISF is assumed to be at capacity, at-reactor crews will not be needed.* The estimated payroll, including the 40 percent for fringe benefits and contingency, was $*131.1* million over the 40-year period (See Table 7.3-10).


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.3-10: Assumed CISF Annual Labor Costs *over 40-Year Licensure, Discounted***

| *Labor Categories during Caretaker Period* | *Estimated Annual FTE* | *Average Cost per FTE ($000s)* | *Estimated Costs (Millions $)* |
|---|---|---|---|
| *Administrative Staff: General manager, administrative assistants, public relations, financing and purchasing, accounting and payroll, governmental affairs* | *3* | *$104.0* | *$10.4* |
| *Security staff: assumes 5 staff per shift, 4 shifts, 7 days per week* | *20* | *$64.1* | *$42.7* |
| *Engineering and technical staff: Nuclear and licensing engineers, health physics managers and technicians, quality assurance managers and technicians, transportation specialist, training* | *7* | *$93.2* | *$21.7* |
| *Maintenance and equipment operating staff: Mechanical and electrical maintenance, crane and equipment operators, general plant workers, fire and EMT* | *6* | *$60.4* | *$12.1* |
| *At-reactor loading crews: 2 per site* | *varies* | *$81.6* | *$6.8* |
| ***Subtotal: Labor during Caretaker*** | ***36*** | | *$93.6* |
| ***Fringe benefits and contingency: 40%*** | | | *$37.5* |
| ***Total Annual Labor Costs*** | | | *$131.1* |

*Source: Derived from EPRI, 2009.*

## 7.4 DISCUSSION AND SUMMARY

### 7.4.1 Proposed Action Alternative

Implementation of the proposed action is assumed to create a number of economic benefits, two of which were quantifiable with existing information. The first quantifiable benefit would be the avoided reimbursements to power plant operators for storing spent fuel the government is obligated to dispose of under the NWPA. Because the federal government does not have a storage or disposal facility for spent nuclear fuel, the DOE has been successfully sued by plant operators to reimburse them for their storage costs. The estimated benefit of the proposed action was measured as the cost of continuing to reimburse operators of shutdown plants for storing spent nuclear fuel over the next 40 years under a "no action" scenario and subtracting the reduced reimbursement schedule, if the CISF is built. Based upon the very conservative assumptions in this benefit-cost analysis, the proposed action would create a benefit to the federal government of $*6,695,763,515*, as shown in Table 7.4-1. The second quantifiable benefit was the value of land at shutdown nuclear power plants that is currently undevelopable. The overall value of land that could be returned to an economic use, if the site's spent fuel was removed, was estimated to be worth $*766,819,521*. The total economic benefits from implementing the proposed action are $*7,462,583,036*.

**Table 7.4-1: Summary of Quantified Benefits from CISF over 40-Year Licensure, *Discounted***

| ***Benefit Category*** | ***Cost Estimate (Millions $)*** |
|---|---|
| *Avoided Reimbursements to Utilities for Storing Spent Fuel* | *$6,696* |
| *Value of Land Potentially Returned to Economic Use* | *$767* |
| ***Total Benefit*** | ***$7,463*** |

A summary of the estimated economic costs of the proposed action, which were discussed in Section 7.3 and detailed in Tables 7.3-1 through 7.3-10, is provided in Table 7.4-2. The figures demonstrate various costs to build and operate the CISF facility, as well as to transfer the spent nuclear fuel from the shutdown nuclear power plants. Table 7.4-2 also includes an estimate of the decommissioning costs, which is $*270.9* million. EPRI's cost estimate of site decommissioning is based upon 20 percent of the cost for the fuel storage facility ($*84.4* million) and 20 percent of the cost for the concrete overpacks ($*171.6* million), plus a 30 percent contingency *and discounted from Year 40 of the license*. Cumulatively, over the 40-year license period, the assumed cost of the proposed action was approximately *$4,436,887,589*. *Table 7.4-3 provides the detailed costs estimates for a Phase 1 only facility. The total estimated cost for a Phase 1 facility would be $1,245,559,274 in discounted dollars. It would store 406 canisters or 4,751 MTUs transported over a seven-year period, assuming three operating trains. This number of canisters would remove all SNF from nine shutdown power plants and 17 canisters of existing GTCC waste.*

**Table 7.4-2: Summary of Costs for CISF over 40-Year Licensure, Discounted**

(2 pages)

| Year | Design, Engineering, Licensing and Startup Professional Services | Transport-ation Infra-structure | CISF Infra-structure | Fuel Storage Facility | Admin-istrative Operating Costs | Concrete Overpacks | On-site Transportation Planning and Transportation Costs | Other: Transport-ation, License Fees | Annual Operating Labor Costs | Total Costs for CISF over 40-Year Licensure |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $39,238,739 | $71,962,937 | $25,479,700 | $10,018,343 | $1,515,009 | $0 | $10,894,024 | $6,714,245 | $3,652,592 | $169,475,590 |
| 2 | $38,859,254 | $217,210,816 | $11,457,274 | $13,408,079 | $1,500,357 | $0 | $25,300,146 | $6,649,311 | $3,617,267 | $318,002,504 |
| 3 | $0 | $186,406,267 | $0 | $3,376,925 | $1,511,849 | $7,429,235 | $40,458,644 | $8,617,643 | $3,806,304 | $251,606,868 |
| 4 | $0 | $0 | $0 | $13,377,065 | $1,574,481 | $29,429,543 | $56,268,033 | $14,573,242 | $3,769,492 | $118,991,857 |
| 5 | $0 | $0 | $0 | $22,653,555 | $1,630,659 | $49,837,822 | $56,633,888 | $20,014,138 | $4,392,161 | $155,162,222 |
| 6 | $0 | $0 | $0 | $0 | $1,443,153 | $0 | $11,024,560 | $6,395,791 | $4,567,266 | $23,430,771 |
| 7 | $0 | $0 | $0 | $0 | $1,429,196 | $0 | $12,217,209 | $6,333,937 | $3,445,702 | $23,426,043 |
| 8 | $0 | $0 | $0 | $14,153,740 | $1,524,358 | $31,138,227 | $46,196,699 | $14,792,099 | $3,412,378 | $111,217,499 |
| 9 | $0 | $0 | $0 | $0 | $1,401,686 | $0 | $31,450,736 | $6,212,016 | $3,590,707 | $42,655,144 |
| 10 | $0 | $0 | $0 | $13,881,297 | $1,495,016 | $30,538,853 | $69,039,789 | $14,507,368 | $3,346,693 | $132,809,015 |
| 11 | $0 | $0 | $0 | $28,189,259 | $1,567,163 | $54,988,192 | $86,649,048 | $21,137,211 | $3,521,590 | $196,052,464 |
| 12 | $0 | $0 | $0 | $16,089,388 | $1,485,298 | $35,396,655 | $62,261,329 | $15,718,045 | $3,692,791 | $134,643,506 |
| 13 | $0 | $0 | $0 | $13,482,434 | $1,452,058 | $29,661,354 | $45,231,284 | $14,090,516 | $3,657,077 | $107,574,723 |
| 14 | $0 | $0 | $0 | $13,352,042 | $1,438,015 | $29,374,493 | $33,380,106 | $13,954,244 | $3,420,401 | $94,919,302 |
| 15 | $0 | $0 | $0 | $0 | $1,322,291 | $0 | $10,101,271 | $5,860,154 | $3,387,322 | $20,671,039 |
| 16 | $0 | $0 | $0 | $0 | $1,309,503 | $0 | $29,382,364 | $5,803,480 | $3,157,130 | $39,652,477 |
| 17 | $0 | $0 | $0 | $12,968,387 | $1,396,695 | $28,530,451 | $54,592,523 | $13,553,285 | $3,126,596 | $114,167,937 |
| 18 | $0 | $0 | $0 | $23,350,850 | $1,464,098 | $51,371,869 | $69,971,969 | $19,747,113 | $3,289,991 | $169,195,890 |
| 19 | $0 | $0 | $0 | $2,312,502 | $1,289,682 | $5,087,504 | $34,319,351 | $7,028,665 | $3,449,933 | $53,487,637 |
| 20 | $0 | $0 | $0 | $12,595,755 | $1,356,563 | $27,710,662 | $68,769,242 | $13,163,847 | $3,226,663 | $126,822,731 |
| 21 | $0 | $0 | $11,453,344 | $25,578,663 | $1,422,029 | $49,895,758 | $89,287,623 | $19,179,702 | $3,195,457 | $200,012,576 |
| 22 | $0 | $0 | $0 | $22,460,549 | $1,408,276 | $49,413,207 | $87,301,079 | $18,994,212 | $3,350,803 | $182,928,125 |
| 23 | $0 | $0 | $0 | $16,682,496 | $1,351,838 | $36,701,492 | $77,914,901 | $15,463,340 | $3,502,845 | $151,616,913 |
| 24 | $0 | $0 | $0 | $22,028,209 | $1,381,169 | $48,462,061 | $90,929,003 | $18,628,596 | $3,286,304 | $184,715,341 |
| 25 | $0 | $0 | $0 | $21,815,171 | $1,367,811 | $47,993,375 | $90,049,612 | $18,448,435 | $3,254,521 | $182,928,926 |
| 26 | $0 | $0 | $0 | $21,604,192 | $1,354,583 | $47,529,223 | $89,178,726 | $18,270,017 | $3,402,195 | $181,338,936 |
| 27 | $0 | $0 | $0 | $21,395,254 | $1,341,482 | $47,069,559 | $88,316,263 | $18,093,325 | $3,369,292 | $179,585,174 |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.4-2: Summary of Costs for CISF over 40-Year Licensure, Discounted***

(2 pages)

| Year | Design, Engineering, Licensing and Startup Professional Services | Transport-ation Infra-structure | CISF Infra-structure | Fuel Storage Facility | Admin-istrative Operating Costs | Concrete Overpacks | On-site Transportation Planning and Transportation Costs | Other: Transport-ation, License Fees | Annual Operating Labor Costs | Total Costs for CISF over 40-Year Licensure |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 | $0 | $0 | $0 | $21,188,337 | $1,328,509 | $46,614,341 | $79,928,230 | $17,918,341 | $3,336,707 | $170,314,464 |
| 29 | $0 | $0 | $0 | $20,983,421 | $1,315,660 | $46,163,525 | $63,125,538 | $17,745,049 | $3,304,437 | $152,637,630 |
| 30 | $0 | $0 | $0 | $12,468,292 | $1,238,933 | $27,430,242 | $31,170,729 | $12,570,158 | $3,100,161 | $87,978,513 |
| 31 | $0 | $0 | $0 | $2,630,319 | $1,131,873 | $0 | $0 | $5,016,257 | $3,070,179 | $11,848,628 |
| 32 | $0 | $0 | $0 | $0 | $1,120,927 | $0 | $0 | $4,967,743 | $2,702,484 | $8,791,154 |
| 33 | $0 | $0 | $0 | $0 | $1,110,086 | $0 | $0 | $4,919,700 | $2,676,348 | $8,706,133 |
| 34 | $0 | $0 | $0 | $0 | $1,099,350 | $0 | $0 | $4,872,120 | $2,650,464 | $8,621,935 |
| 35 | $0 | $0 | $0 | $0 | $1,088,718 | $0 | $0 | $4,825,001 | $2,624,831 | $8,538,550 |
| 36 | $0 | $0 | $0 | $0 | $1,078,189 | $0 | $0 | $4,778,338 | $2,599,446 | $8,455,972 |
| 37 | $0 | $0 | $0 | $0 | $1,067,762 | $0 | $0 | $4,732,125 | $2,574,306 | $8,374,193 |
| 38 | $0 | $0 | $0 | $0 | $1,057,435 | $0 | $0 | $4,686,360 | $2,549,410 | $8,293,205 |
| 39 | $0 | $0 | $0 | $0 | $1,047,208 | $0 | $0 | $4,641,038 | $2,524,754 | $8,213,000 |
| 40 | $0 | $0 | $0 | $0 | $1,037,081 | $0 | $0 | $4,596,153 | $2,500,336 | $8,133,570 |
| **Subtotal** | **$78,097,992** | **$475,580,021** | **$48,390,319** | **$422,044,524** | **$53,456,051** | **$857,767,641** | **$1,641,343,919** | **$458,212,359** | **$131,105,332** | **$4,165,998,158** |
| | | | | | | | | **Decommissioning** | | **$270,889,431** |
| | | | | | | | | **COSTS - GRAND TOTAL** | | **$4,436,887,589** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.4-3: Estimated Costs to Operate Phase 1 of the Proposed Action over 40-Year Licensure, Discounted**

(2 pages)

| Year | Design, Engineering, Licensing and Startup Professional Services | Transport-ation Infra-structure | CISF Infra-structure | Fuel Storage Facility | Admin-istrative Operating Costs | Concrete Overpacks | On-site Transportation Planning and Transportation Costs | Other: Transport-ation, License Fees | Annual Operating Labor Costs | Total Costs for CISF over 40-Year Licensure |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $39,238,739 | $71,962,937 | $25,479,700 | $10,018,343 | $1,515,009 | $0 | $5,483,646 | $6,714,245 | $3,652,592 | $164,065,212 |
| 2 | $38,859,254 | $138,101,068 | $11,457,274 | $13,408,079 | $1,500,357 | $0 | $18,890,804 | $6,649,311 | $3,617,267 | $232,483,413 |
| 3 | $0 | $0 | $0 | $3,512,002 | $1,517,050 | $7,726,405 | $31,406,308 | $9,024,171 | $3,806,304 | $56,992,239 |
| 4 | $0 | $0 | $0 | $12,039,359 | $1,564,180 | $26,486,589 | $51,168,170 | $13,768,050 | $4,435,053 | $109,461,400 |
| 5 | $0 | $0 | $0 | $11,922,924 | $1,549,053 | $26,230,432 | $41,586,664 | $13,634,897 | $4,172,453 | $99,096,423 |
| 6 | $0 | $0 | $0 | $11,807,615 | $1,534,072 | $25,976,753 | $38,517,808 | $13,503,031 | $4,132,100 | $95,471,379 |
| 7 | $0 | $0 | $0 | $0 | $1,429,196 | $0 | $12,233,734 | $6,333,937 | $3,445,702 | $23,442,568 |
| 8 | $0 | $0 | $0 | $11,580,332 | $1,504,543 | $25,476,731 | $30,921,382 | $13,243,114 | $3,625,772 | $86,351,874 |
| 9 | $0 | $0 | $0 | $2,548,519 | $1,421,309 | $5,606,742 | $6,371,298 | $7,746,021 | $3,590,707 | $27,284,597 |
| 10 | $0 | $0 | $0 | $0 | $1,388,130 | $0 | $0 | $6,151,938 | $3,346,693 | $10,886,761 |
| 11 | $0 | $0 | $0 | $3,194,627 | $1,374,705 | $0 | $0 | $6,092,442 | $3,314,327 | $13,976,100 |
| 12 | $0 | $0 | $0 | $0 | $1,361,410 | $0 | $0 | $6,033,521 | $3,282,273 | $10,677,204 |
| 13 | $0 | $0 | $0 | $0 | $1,348,243 | $0 | $0 | $5,975,169 | $3,250,530 | $10,573,943 |
| 14 | $0 | $0 | $0 | $0 | $1,335,204 | $0 | $0 | $5,917,382 | $3,219,093 | $10,471,680 |
| 15 | $0 | $0 | $0 | $0 | $1,322,291 | $0 | $0 | $5,860,154 | $3,187,961 | $10,370,407 |
| 16 | $0 | $0 | $0 | $0 | $1,309,503 | $0 | $0 | $5,803,480 | $3,157,130 | $10,270,113 |
| 17 | $0 | $0 | $0 | $0 | $1,296,839 | $0 | $0 | $5,747,353 | $3,126,596 | $10,170,788 |
| 18 | $0 | $0 | $0 | $0 | $1,284,297 | $0 | $0 | $5,691,770 | $3,096,359 | $10,072,425 |
| 19 | $0 | $0 | $0 | $0 | $1,271,876 | $0 | $0 | $5,636,723 | $3,066,413 | $9,975,013 |
| 20 | $0 | $0 | $0 | $0 | $1,259,576 | $0 | $0 | $5,582,210 | $3,036,757 | $9,878,543 |
| 21 | $0 | $0 | $11,453,344 | $2,898,773 | $1,247,394 | $0 | $0 | $5,528,223 | $3,007,388 | $24,135,123 |
| 22 | $0 | $0 | $0 | $0 | $1,235,330 | $0 | $0 | $5,474,759 | $2,978,303 | $9,688,392 |
| 23 | $0 | $0 | $0 | $0 | $1,223,383 | $0 | $0 | $5,421,811 | $2,949,500 | $9,594,694 |
| 24 | $0 | $0 | $0 | $0 | $1,211,552 | $0 | $0 | $5,369,376 | $2,920,974 | $9,501,902 |
| 25 | $0 | $0 | $0 | $0 | $1,199,834 | $0 | $0 | $5,317,448 | $2,892,725 | $9,410,007 |
| 26 | $0 | $0 | $0 | $0 | $1,188,231 | $0 | $0 | $5,266,022 | $2,864,749 | $9,319,002 |
| 27 | $0 | $0 | $0 | $0 | $1,176,739 | $0 | $0 | $5,215,093 | $2,837,044 | $9,228,876 |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.4-3: Estimated Costs to Operate Phase 1 of the Proposed Action over 40-Year Licensure, Discounted**

(2 pages)

| Year | Design, Engineering, Licensing and Startup Professional Services | Transport-ation Infra-structure | CISF Infra-structure | Fuel Storage Facility | Admin-istrative Operating Costs | Concrete Overpacks | On-site Transportation Planning and Transportation Costs | Other: Transport-ation, License Fees | Annual Operating Labor Costs | Total Costs for CISF over 40-Year Licensure |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 | $0 | $0 | $0 | $0 | $1,165,359 | $0 | $0 | $5,164,657 | $2,809,606 | $9,139,622 |
| 29 | $0 | $0 | $0 | $0 | $1,154,088 | $0 | $0 | $5,114,709 | $2,782,434 | $9,051,231 |
| 30 | $0 | $0 | $0 | $0 | $1,142,927 | $0 | $0 | $5,065,243 | $2,755,524 | $8,963,695 |
| 31 | $0 | $0 | $0 | $2,630,319 | $1,131,873 | $0 | $0 | $5,016,257 | $2,728,875 | $11,507,324 |
| 32 | $0 | $0 | $0 | $0 | $1,120,927 | $0 | $0 | $4,967,743 | $2,702,484 | $8,791,154 |
| 33 | $0 | $0 | $0 | $0 | $1,110,086 | $0 | $0 | $4,919,700 | $2,676,348 | $8,706,133 |
| 34 | $0 | $0 | $0 | $0 | $1,099,350 | $0 | $0 | $4,872,120 | $2,650,464 | $8,621,935 |
| 35 | $0 | $0 | $0 | $0 | $1,088,718 | $0 | $0 | $4,825,001 | $2,624,831 | $8,538,550 |
| 36 | $0 | $0 | $0 | $0 | $1,078,189 | $0 | $0 | $4,778,338 | $2,599,446 | $8,455,972 |
| 37 | $0 | $0 | $0 | $0 | $1,067,762 | $0 | $0 | $4,732,125 | $2,574,306 | $8,374,193 |
| 38 | $0 | $0 | $0 | $0 | $1,057,435 | $0 | $0 | $4,686,360 | $2,549,410 | $8,293,205 |
| 39 | $0 | $0 | $0 | $0 | $1,047,208 | $0 | $0 | $4,641,038 | $2,524,754 | $8,213,000 |
| 40 | $0 | $0 | $0 | $0 | $1,037,081 | $0 | $0 | $4,596,153 | $2,500,336 | $8,133,570 |
| **Subtotal** | **$78,097,992** | **$210,064,006** | **$48,390,319** | **$85,560,892** | **$50,870,307** | **$117,503,653** | **$236,579,815** | **$256,081,095** | **$124,491,583** | **$1,207,639,661** |
| | | | | | | | | **Decommissioning** | | **$37,919,613** |
| | | | | | | | | **COSTS - GRAND TOTAL** | | **$1,245,559,274** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

*Considering both the benefits to the federal government in avoiding liability costs and the land value, the net benefit of the proposed action would be $3.0 billion or a benefit-cost (B/C) ratio of 1.68 (see Table 7.4-4). Only implementing Phase 1 of the CISF would produce a net benefit of $1.6 billion and a C/B ratio of 2.32. If only Phase 1 were implemented and it was assumed that no other reactors were shut down, the net benefit of Phase 1 would also be $1.6 billion and the C/B ratio would be 2.32. Table 7.4-5 shows the total benefits, costs, and C/B ratios, if the market value of the land is not assumed in the analysis. Without the benefits from the re-purposed land, the project would still create positive economic benefits and only modestly lower B/C ratios that are well above 1.0.*

***Table 7.4-4: Summary of Benefit Cost Analysis Assuming Market Value of Land, Discounted***

| SCENARIO | BENEFITS | | | Cost of Facility Construction, Operations, and Decommissioning | Benefit/ Cost Ratio |
|---|---|---|---|---|---|
| | Spent Fuel Storage Costs Avoided | Market Value of Land | Total Benefits | | |
| *Phase 1 Only* | *$2,671,144,991* | *$215,485,165* | *$2,886,630,156* | *$1,245,559,274* | *2.32* |
| *Phase 1 Only, No Other Reactors Shut Down* | *$2,671,144,991* | *$215,485,165* | *$2,886,630,156* | *$1,245,559,274* | *2.32* |
| *Proposed Action* | *$6,695,763,515* | *$766,819,521* | *$7,462,583,036* | *$4,436,887,589* | *1.68* |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

*Table 7.4-5: Summary of Benefit Cost Analysis without Including Market Value of Land, Discounted*

| SCENARIO | BENEFITS Spent Fuel Storage Costs Avoided | Cost of Facility Construction, Operations, and Decommissioning | Benefit/ Cost Ratio |
|---|---|---|---|
| *Phase 1 Only* | *$2,671,144,991* | *$1,245,559,274* | *2.14* |
| *Phase 1 Only, No Other Reactors Shut Down* | *$2,671,144,991* | *$1,245,559,274* | *2.14* |
| *Proposed Action* | *$6,695,763,515* | *$4,436,887,589* | *1.51* |

### 7.4.2 Eliminated Alternatives

In addition to the location in Andrews County, three other locations were considered for the proposed CISF, but eliminated as viable alternatives. These locations were in: Loving County, TX; Lea County, NM, and Eddy County, NM. It is assumed that implementing a CISF at one of the three eliminated alternative locations would create the same overall benefits as the proposed alternative and all the same expenses. The eliminated alternatives would also require additional expenditures that would not be required for the proposed alternative. Specifically, these additional costs would be: construction of an operations and maintenance building that was not assumed for the proposed action alternative, because an existing building at the site would be used; a larger number of staff, since there would be no existing staff to handle some tasks; and additional road and rail infrastructure that would be needed for a greenfield facility. The cost of the operations and maintenance building was estimated to be $*12.54* million based upon EPRI estimates, adjusted by the CPI, contingency costs, and assuming that the building's furnishings and equipment would require a one-time replacement over the 40-year license period (See Table *7.4-6*).


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.4-6: Estimated Costs of an Operations and Maintenance Building at an Eliminated Alternative Site, Discounted***

| ***CISF Capital Cost Elements*** | ***Cost Estimate Millions $*** |
|---|---|
| ***Operations and Maintenance Building*** | |
| *Building construction* | *$1.97* |
| *Furnishings, equipment (with one-time replacement)* | *$2.32* |
| *Heavy lifting equipment (with one-time replacement)* | *$5.35* |
| ***Subtotal: Operations and Maintenance Building*** | ***$9.64*** |
| ***Contingency: 30%*** | ***$2.89*** |
| ***Total: Operations and Maintenance Building*** | ***$12.54*** |

*Source: Derived from EPRI, 2009.*

The assumed labor force required to handle activities at the eliminated alternative sites was *67* full-time employees (FTEs) (See Table *7.4-7*). The eliminated alternative sites would require more administrative staff, engineering and technical staff, and maintenance and operating staff than the proposed alternative. *The total discounted labor cost over the 40-year licensure is estimated to be $249.5 million.*

***Table 7.4-7: Assumed CISF Annual Labor Costs for Alternative Locations over 40-Year Licensure, Discounted***

| ***Labor Categories during Caretaker Period*** | ***Estimated Annual FTE*** | ***Average Cost per FTE (Thousands $)*** | ***Estimated Costs (Millions $)*** |
|---|---|---|---|
| *Administrative Staff: General manager, administrative assistants, public relations, financing and purchasing, accounting and payroll, governmental affairs* | *10* | *$104.0* | *$34.6* |
| *Security staff: assumes 5 staff per shift, 4 shifts, 7 days per week* | *20* | *$64.1* | *$42.7* |
| *Engineering and technical staff: Nuclear and licensing engineers, health physics managers and technicians, quality assurance managers and technicians, transportation specialist, training* | *18* | *$93.2* | *$55.9* |
| *Maintenance and equipment operating staff: Mechanical and electrical maintenance, crane and equipment operators, general plant workers, fire and EMT* | *19* | *$60.4* | *$38.2* |
| *At-reactor loading crews: 2 per site* | *Varies* | *$81.6* | *$6.8* |
| ***Subtotal: Labor during Caretaker*** | ***67*** | | ***$178.2*** |
| ***Fringe benefits and contingency: 40%*** | | | ***$71.3*** |
| ***Total Labor Costs*** | | | ***$249.5*** |

Specific sites for the rejected alternative CISFs were not identified, so generic locations were chosen to estimate the costs of transportation infrastructure. Table *7.4-8* shows the assumed distance and the estimated cost of connecting the eliminated alternative sites to the existing rail and road network, as well as constructing the transportation infrastructure within the facility. It assumed that the Loving County and Eddy County facilities would be connected directly to the Union Pacific TP line, while the Lea County facility would likely be connected and located in close proximity to the TNMR.

**Table 7.4-8: Estimated Distances and Costs of Transportation Infrastructure Required for the Eliminated Alternatives, Discounted**

| | Loving County, TX | Lea County, NM | Eddy County, NM |
|---|---|---|---|
| Rail Distance | 35 miles | 4 miles | 56 miles |
| Rail Cost @ $1.59 million per mile and 30% contingency | $72.0 million | $8.2 million | $115.7 million |
| Road Distance | 4 miles | 4 miles | 4 miles |
| | 2 lanes | 2 lanes | 2 lanes |
| Road cost @ $6.36 million per lane and 30% contingency | $66.1 million | $66.1 million | $66.1 million |

The final costs of the eliminated alternatives shown in Table 7.4-9 are moderately higher than the proposed alternative, ranging from $4.64 billion to $4.75 billion.

***Table 7.4-9: Summary of Costs for Eliminated Alternative CISFs over 40-Year Licensure, Discounted***

| Cost Category | Cost Estimate (Millions $) | | |
|---|---|---|---|
| | Loving County, TX | Lea County, NM | Eddy County, NM |
| *Design, Engineering, Licensing and Startup Professional Services* | *$78.10* | *$78.10* | *$78.10* |
| *Transportation Infrastructure* | *$613.38* | *$549.58* | *$656.48* |
| *CISF Infrastructure* | *$60.93* | *$60.93* | *$60.93* |
| *Fuel Storage Facility* | *$422.04* | *$422.04* | *$422.04* |
| *Administrative Operating Costs* | *$53.46* | *$53.46* | *$53.46* |
| *Concrete Overpacks* | *$857.77* | *$857.77* | *$857.77* |
| *On-site Transportation Planning and Transportation Costs* | *$1,641.34* | *$1,641.34* | *$1,641.34* |
| *Other: Transportation, License Fees* | *$458.21* | *$458.21* | *$458.21* |
| *Annual Operating Labor Costs* | *$249.48* | *$249.48* | *$249.48* |
| *Decommissioning* | *$270.89* | *$270.89* | *$270.89* |
| ***Total Costs for CISF over 40-Year Licensure*** | ***$4,705.60*** | ***$4,641.80*** | ***$4,748.70*** |

## *7.7 TABLES OF UNDISCOUNTED VALUES*

*The values reported throughout chapter 7.0, except Section 7.7, are based upon 2018 dollars that were adjusted for future inflation and then calculated at net present value. The Tables in this Section provide unadjusted cost estimates in 2018 dollars for comparison purposes. Table 7.7-1 gives cross-references between the Tables in Section 7.2, 7.3 and 7.4, including Figure 7.2-1, and those included in Section 7.7.*

## Table 7.7-1: Crosswalk for Discounted and Not Discounted Tables in Chapter 7

| Not Discounted Table Number | Discounted Table Number |
|---|---|
| 7.7-2 | Table 7.2-2: Estimated Net Benefits of the Proposed Action, Discounted |
| 7.7-3 | Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted |
| 7.7-4 | Table7.2-7: Assumed Storage Costs by Facility of Proposed Action, Discounted |
| 7.7-5 | Table 7.2-8: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Discounted |
| 7.7-6 | Table 7.2-9: Assumed Storage Costs by Facility of Proposed Action – Phase 1 Only, Discounted |
| 7.7-7 | Table 7-2.10: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Discounted |
| 7.7-8 | Table 7.2-11: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Discounted |
| 7.7-9 | Table 7.2-14: Total Estimated Value of Land at Decommissioned Nuclear Power Plants Served by the Proposed Action, Discounted |
| 7.7-10 | Table 7.3-1: CISF Design, Engineering, Licensing, and Startup Professional Services, Discounted |
| 7.7-11 | Table 7.3-2: Estimated Costs of Transportation Infrastructure, Discounted |
| 7.7-12 | Table 7.3-3: Estimated Costs of CISF Infrastructure, Discounted |
| 7.7-13 | Table 7.3-4: Spent Fuel Storage Facility Costs, Discounted |
| 7.7-14 | Table 7.3-5: Administrative Operating Costs, Discounted |
| 7.7-15 | Table 7.3-6: Costs for Concrete Overpack, Discounted |
| 7.7-16 | Table 7.3-7: Assumed On-site Transportation Planning and Transport Costs, Discounted |
| 7.7-17 | Table 7.3-9: Assumptions for Other Operating Costs, Discounted |
| 7.7-18 | Table 7.3-10: Assumed CISF Annual Labor Cost over 40-Year Licensure, Discounted |
| 7.7-19 | Table 7.4-1: Summary of Quantified Benefits from CISF over 40-Year Licensure, Discounted |
| 7.7-20 | Table 7.4-2: Summary of Costs for CISF over 40-Year Licensure, Discounted |
| 7.7-21 | Table 7.4-3: Estimated Costs to Operate Phase 1 of the Proposed Action over 40-Year Licensure, Discounted |
| 7.7-22 | Table 7.4-4: Summary of Benefit Cost Analysis Assuming Market Value of Land, Discounted |
| 7.7-23 | Table 7.4-5: Summary of Benefit Cost Analysis without Including Market Value of Land, Discounted |
| 7.7-24 | Table 7.4-6: Estimated Costs of an Operations and Maintenance Building at an Eliminated Alternative Site, Discounted |
| 7.7-25 | Table 7.4-7: Assumed CISF Annual Labor Costs for Alternative Locations over 40-Year Licensure, Discounted |
| 7.7-26 | Table 7.4-8: Estimated Distances and Costs of Transportation Infrastructure Required for the Eliminated Alternatives, Discounted |
| 7.7-27 | Table 7.4-9: Summary of Costs for Eliminated Alternative CISFs over 40-Year Licensure, Discounted |
| **Not Discounted Figure Number** | **Discounted Figure Number** |
| 7.7-1 | Figure 7.2-1: Federal Expenditures No Action Scenario vs. Proposed Action Scenario, Discounted |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-2: Estimated Net Benefits of the Proposed Action, Not Discounted (2018 $)***

| Year | No Action SNF Storage Costs | Proposed Action SNF Storage Costs | Net Benefits of Proposed Action |
|---|---|---|---|
| 1 | $114,555,924 | $114,555,924 | $0 |
| 2 | $114,555,924 | $114,555,924 | $0 |
| 3 | $124,102,251 | $124,102,251 | $0 |
| 4 | $124,102,251 | $124,102,251 | $0 |
| 5 | $133,648,578 | $101,827,488 | $31,821,090 |
| 6 | $152,741,232 | $67,884,992 | $84,856,240 |
| 7 | $162,287,559 | $77,431,319 | $84,856,240 |
| 8 | $171,833,886 | $86,977,646 | $84,856,240 |
| 9 | $181,380,213 | $85,916,943 | $95,463,270 |
| 10 | $181,380,213 | $85,916,943 | $95,463,270 |
| 11 | $181,380,213 | $75,309,913 | $106,070,300 |
| 12 | $190,926,540 | $74,249,210 | $116,677,330 |
| 13 | $210,019,194 | $72,127,804 | $137,891,390 |
| 14 | $210,019,194 | $61,520,774 | $148,498,420 |
| 15 | $219,565,521 | $60,460,071 | $159,105,450 |
| 16 | $238,658,175 | $79,552,725 | $159,105,450 |
| 17 | $257,750,829 | $98,645,379 | $159,105,450 |
| 18 | $267,297,156 | $97,584,676 | $169,712,480 |
| 19 | $286,389,810 | $106,070,300 | $180,319,510 |
| 20 | $324,575,118 | $133,648,578 | $190,926,540 |
| 21 | $372,306,753 | $170,773,183 | $201,533,570 |
| 22 | $372,306,753 | $160,166,153 | $212,140,600 |
| 23 | $381,853,080 | $148,498,420 | $233,354,660 |
| 24 | $381,853,080 | $127,284,360 | $254,568,720 |
| 25 | $381,853,080 | $116,677,330 | $265,175,750 |
| 26 | $381,853,080 | $95,463,270 | $286,389,810 |
| 27 | $381,853,080 | $74,249,210 | $307,603,870 |
| 28 | $381,853,080 | $53,035,150 | $328,817,930 |
| 29 | $381,853,080 | $31,821,090 | $350,031,990 |
| 30 | $381,853,080 | $21,214,060 | $360,639,020 |
| 31 | $381,853,080 | $0 | $381,853,080 |
| 32 | $381,853,080 | $0 | $381,853,080 |
| 33 | $381,853,080 | $0 | $381,853,080 |
| 34 | $381,853,080 | $0 | $381,853,080 |
| 35 | $381,853,080 | $0 | $381,853,080 |
| 36 | $381,853,080 | $0 | $381,853,080 |
| 37 | $381,853,080 | $0 | $381,853,080 |
| 38 | $381,853,080 | $0 | $381,853,080 |
| 39 | $381,853,080 | $0 | $381,853,080 |
| 40 | $381,853,080 | $0 | $381,853,080 |
| **TOTAL** | **$11,465,138,727** | **$2,841,623,337** | **$8,623,515,390** |

**Table 7.7-3: Assumed Storage Costs by Facility of No Action, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2024 | Year 5 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2025 | Year 6 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2026 | Year 7 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2027 | Year 8 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2028 | Year 9 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2029 | Year 10 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2030 | Year 11 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2031 | Year 12 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2032 | Year 13 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2033 | Year 14 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2034 | Year 15 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2035 | Year 16 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2036 | Year 17 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2037 | Year 18 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| | **TOTAL** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-3: Assumed Storage Costs by Facility of No Action, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Yankee Rowe | Zion | Generic Plant 1 | Generic Plant 2 | Generic Plant 3 | Generic Plant 4 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2026 | Year 7 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2027 | Year 8 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2028 | Year 9 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2029 | Year 10 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2030 | Year 11 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2031 | Year 12 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2032 | Year 13 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2033 | Year 14 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2034 | Year 15 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2035 | Year 16 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2036 | Year 17 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2037 | Year 18 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| | **TOTAL** | **$424,281,200** | **$424,281,200** | **$405,188,546** | **$386,095,892** | **$376,549,565** | **$376,549,565** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-3: Assumed Storage Costs by Facility of No Action, Not Discounted (2018 $)***

*(6 pages)*

| Year | Licensure | Generic Plant 5 | Generic Plant 6 | Generic Plant 7 | Generic Plant 8 | Generic Plant 9 | Generic Plant 10 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2033 | Year 14 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2034 | Year 15 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2035 | Year 16 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2036 | Year 17 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2037 | Year 18 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| | **TOTAL** | **$367,003,238** | **$357,456,911** | **$347,910,584** | **$319,271,603** | **$309,725,276** | **$309,725,276** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-3: Assumed Storage Costs by Facility of No Action, Not Discounted (2018 $)**

*(6 pages)*

| Year | Licensure | Generic Plant 11 | Generic Plant 12 | Generic Plant 13 | Generic Plant 14 | Generic Plant 15 | Generic Plant 16 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2037 | Year 18 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| | **TOTAL** | **$290,632,622** | **$281,086,295** | **$281,086,295** | **$271,539,968** | **$271,539,968** | **$261,993,641** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-3: Assumed Storage Costs by Facility of No Action, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Generic Plant 17 | Generic Plant 18 | Generic Plant 19 | Generic Plant 20 | Generic Plant 21 | Generic Plant 22 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| | **TOTAL** | **$252,447,314** | **$252,447,314** | **$242,900,987** | **$242,900,987** | **$242,900,987** | **$242,900,987** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-3: Assumed Storage Costs by Facility of No Action, Not Discounted (2018 $)***

*(6 pages)*

| Year | Licensure | Generic Plant 23 | Generic Plant 24 | Generic Plant 25 | Generic Plant 26 | Generic Plant 27 | Generic Plant 28 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| | **TOTAL** | **$233,354,660** | **$233,354,660** | **$233,354,660** | **$233,354,660** | **$233,354,660** | **$214,262,006** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-4: Assumed Storage Costs by Facility of Proposed Action, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2024 | Year 5 | | | | $10,607,030 | $10,607,030 | $10,607,030 |
| 2025 | Year 6 | | | | | | |
| 2026 | Year 7 | | | | | | |
| 2027 | Year 8 | | | | | | |
| 2028 | Year 9 | | | | | | |
| 2029 | Year 10 | | | | | | |
| 2030 | Year 11 | | | | | | |
| 2031 | Year 12 | | | | | | |
| 2032 | Year 13 | | | | | | |
| 2033 | Year 14 | | | | | | |
| 2034 | Year 15 | | | | | | |
| 2035 | Year 16 | | | | | | |
| 2036 | Year 17 | | | | | | |
| 2037 | Year 18 | | | | | | |
| 2038 | Year 19 | | | | | | |
| 2039 | Year 20 | | | | | | |
| 2040 | Year 21 | | | | | | |
| 2041 | Year 22 | | | | | | |
| 2042 | Year 23 | | | | | | |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$53,035,150** | **$53,035,150** | **$53,035,150** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-4: Assumed Storage Costs by Facility of Proposed Action, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Yankee Rowe | Zion | Generic Plant 1 | Generic Plant 2 | Generic Plant 3 | Generic Plant 4 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2026 | Year 7 | | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2027 | Year 8 | | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2028 | Year 9 | | | | $10,607,030 | $10,607,030 | $10,607,030 |
| 2029 | Year 10 | | | | $10,607,030 | $10,607,030 | $10,607,030 |
| 2030 | Year 11 | | | | | $10,607,030 | $10,607,030 |
| 2031 | Year 12 | | | | | | $10,607,030 |
| 2032 | Year 13 | | | | | | |
| 2033 | Year 14 | | | | | | |
| 2034 | Year 15 | | | | | | |
| 2035 | Year 16 | | | | | | |
| 2036 | Year 17 | | | | | | |
| 2037 | Year 18 | | | | | | |
| 2038 | Year 19 | | | | | | |
| 2039 | Year 20 | | | | | | |
| 2040 | Year 21 | | | | | | |
| 2041 | Year 22 | | | | | | |
| 2042 | Year 23 | | | | | | |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$53,035,150** | **$53,035,150** | **$65,763,586** | **$67,884,992** | **$68,945,695** | **$79,552,725** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-4: Assumed Storage Costs by Facility of Proposed Action, Not Discounted (2018 $)***

*(6 pages)*

| *Year* | *Licensure* | *Generic Plant 5* | *Generic Plant 6* | *Generic Plant 7* | *Generic Plant 8* | *Generic Plant 9* | *Generic Plant 10* |
|---|---|---|---|---|---|---|---|
| *2020* | *Year 1* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2021* | *Year 2* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2022* | *Year 3* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2023* | *Year 4* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2024* | *Year 5* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2025* | *Year 6* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2026* | *Year 7* | *$10,607,030* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2027* | *Year 8* | *$10,607,030* | *$10,607,030* | *$1,060,703* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2028* | *Year 9* | *$10,607,030* | *$10,607,030* | *$10,607,030* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2029* | *Year 10* | *$10,607,030* | *$10,607,030* | *$10,607,030* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2030* | *Year 11* | *$10,607,030* | *$10,607,030* | *$10,607,030* | *$1,060,703* | *$1,060,703* | *$1,060,703* |
| *2031* | *Year 12* | *$10,607,030* | *$10,607,030* | *$10,607,030* | *$10,607,030* | *$1,060,703* | *$1,060,703* |
| *2032* | *Year 13* | | *$10,607,030* | *$10,607,030* | *$10,607,030* | *$10,607,030* | *$10,607,030* |
| *2033* | *Year 14* | | | *$10,607,030* | *$10,607,030* | *$10,607,030* | *$10,607,030* |
| *2034* | *Year 15* | | | | *$10,607,030* | *$10,607,030* | *$10,607,030* |
| *2035* | *Year 16* | | | | *$10,607,030* | *$10,607,030* | *$10,607,030* |
| *2036* | *Year 17* | | | | *$10,607,030* | *$10,607,030* | *$10,607,030* |
| *2037* | *Year 18* | | | | | *$10,607,030* | *$10,607,030* |
| *2038* | *Year 19* | | | | | | *$10,607,030* |
| *2039* | *Year 20* | | | | | | |
| *2040* | *Year 21* | | | | | | |
| *2041* | *Year 22* | | | | | | |
| *2042* | *Year 23* | | | | | | |
| *2043* | *Year 24* | | | | | | |
| *2044* | *Year 25* | | | | | | |
| *2045* | *Year 26* | | | | | | |
| *2046* | *Year 27* | | | | | | |
| *2047* | *Year 28* | | | | | | |
| *2048* | *Year 29* | | | | | | |
| *2049* | *Year 30* | | | | | | |
| *2050* | *Year 31* | | | | | | |
| *2051* | *Year 32* | | | | | | |
| *2052* | *Year 33* | | | | | | |
| *2053* | *Year 34* | | | | | | |
| *2054* | *Year 35* | | | | | | |
| *2055* | *Year 36* | | | | | | |
| *2056* | *Year 37* | | | | | | |
| *2057* | *Year 38* | | | | | | |
| *2058* | *Year 39* | | | | | | |
| *2059* | *Year 40* | | | | | | |
| | ***TOTAL*** | ***$70,006,398*** | ***$71,067,101*** | ***$72,127,804*** | ***$75,309,913*** | ***$76,370,616*** | ***$86,977,646*** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-4: Assumed Storage Costs by Facility of Proposed Action, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Generic Plant 11 | Generic Plant 12 | Generic Plant 13 | Generic Plant 14 | Generic Plant 15 | Generic Plant 16 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2037 | Year 18 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | | | | | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$78,492,022** | **$79,552,725** | **$90,159,755** | **$80,613,428** | **$91,220,458** | **$81,674,131** |

***Table 7.7-4: Assumed Storage Costs by Facility of Proposed Action, Not Discounted (2018 $)***

*(6 pages)*

| Year | Licensure | Generic Plant 17 | Generic Plant 18 | Generic Plant 19 | Generic Plant 20 | Generic Plant 21 | Generic Plant 22 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | | | | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | | | | | | $10,607,030 |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$82,734,834** | **$93,341,864** | **$83,795,537** | **$94,402,567** | **$94,402,567** | **$105,009,597** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

*Table 7.7-4: Assumed Storage Costs by Facility of Proposed Action, Not Discounted (2018 $)*

*(6 pages)*

| Year | Licensure | Generic Plant 23 | Generic Plant 24 | Generic Plant 25 | Generic Plant 26 | Generic Plant 27 | Generic Plant 28 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | | | | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | | | | | $10,607,030 | $10,607,030 |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$95,463,270** | **$106,070,300** | **$106,070,300** | **$116,677,330** | **$127,284,360** | **$108,191,706** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-5: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Not Discounted (2018 $)**

(2 pages)

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco | Yankee Rowe | Zion | Generic Plant 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2024 | Year 5 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2025 | Year 6 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2026 | Year 7 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2027 | Year 8 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2028 | Year 9 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2029 | Year 10 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2030 | Year 11 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2031 | Year 12 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2032 | Year 13 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2033 | Year 14 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2034 | Year 15 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2035 | Year 16 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2036 | Year 17 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2037 | Year 18 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-5: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Not Discounted (2018 $)**

(2 pages)

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco | Yankee Rowe | Zion | Generic Plant 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| **SUBTOTAL** | | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$405,188,546** |
| | | | | | | | **COST OF NO ACTION FOR PHASE 1** | | | **$3,799,438,146** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-6: Assumed Storage Costs by Facility of Proposed Action – Phase 1 Only, Not Discounted (2018 $)**

(2 pages)

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco | Yankee Rowe | Zion | Generic Plant 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2024 | Year 5 | | | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2025 | Year 6 | | | | | | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2026 | Year 7 | | | | | | | | | $10,607,030 |
| 2027 | Year 8 | | | | | | | | | $10,607,030 |
| 2028 | Year 9 | | | | | | | | | $10,607,030 |
| 2029 | Year 10 | | | | | | | | | |
| 2030 | Year 11 | | | | | | | | | |
| 2031 | Year 12 | | | | | | | | | |
| 2032 | Year 13 | | | | | | | | | |
| 2033 | Year 14 | | | | | | | | | |
| 2034 | Year 15 | | | | | | | | | |
| 2035 | Year 16 | | | | | | | | | |
| 2036 | Year 17 | | | | | | | | | |
| 2037 | Year 18 | | | | | | | | | |
| 2038 | Year 19 | | | | | | | | | |
| 2039 | Year 20 | | | | | | | | | |
| 2040 | Year 21 | | | | | | | | | |
| 2041 | Year 22 | | | | | | | | | |
| 2042 | Year 23 | | | | | | | | | |
| 2043 | Year 24 | | | | | | | | | |
| 2044 | Year 25 | | | | | | | | | |
| 2045 | Year 26 | | | | | | | | | |
| 2046 | Year 27 | | | | | | | | | |
| 2047 | Year 28 | | | | | | | | | |
| 2048 | Year 29 | | | | | | | | | |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-6: Assumed Storage Costs by Facility of Proposed Action – Phase 1 Only, Not Discounted (2018 $)**

(2 pages)

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco | Yankee Rowe | Zion | Generic Plant 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2049 | Year 30 | | | | | | | | | |
| 2050 | Year 31 | | | | | | | | | |
| 2051 | Year 32 | | | | | | | | | |
| 2052 | Year 33 | | | | | | | | | |
| 2053 | Year 34 | | | | | | | | | |
| 2054 | Year 35 | | | | | | | | | |
| 2055 | Year 36 | | | | | | | | | |
| 2056 | Year 37 | | | | | | | | | |
| 2057 | Year 38 | | | | | | | | | |
| 2058 | Year 39 | | | | | | | | | |
| 2059 | Year 40 | | | | | | | | | |
| **SUBTOTAL** | | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$53,035,150** | **$53,035,150** | **$63,642,180** | **$63,642,180** | **$63,642,180** | **$76,370,616** |
| | | | | | | | **COST OF PROPOSED ACTION FOR PHASE 1** | | | **$500,651,816** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-7: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Not Discounted (2018 $)***

*(6 pages)*

| Year | Licensure | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2024 | Year 5 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2025 | Year 6 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2026 | Year 7 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2027 | Year 8 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2028 | Year 9 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2029 | Year 10 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2030 | Year 11 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2031 | Year 12 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2032 | Year 13 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2033 | Year 14 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2034 | Year 15 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2035 | Year 16 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2036 | Year 17 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2037 | Year 18 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| | **TOTAL** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** | **$424,281,200** |

**Table 7.7-7: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Yankee Rowe | Yankee Rowe | Generic Plant 1 | Generic Plant 2 | Generic Plant 3 | Generic Plant 4 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$424,281,200** | **$424,281,200** | **$405,188,546** | **$386,095,892** | **$42,428,120** | **$42,428,120** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-7: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Generic Plant 5 | Generic Plant 6 | Generic Plant 7 | Generic Plant 8 | Generic Plant 9 | Generic Plant 10 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-7: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Generic Plant 11 | Generic Plant 12 | Generic Plant 13 | Generic Plant 14 | Generic Plant 15 | Generic Plant 16 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-7: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Generic Plant 17 | Generic Plant 18 | Generic Plant 19 | Generic Plant 20 | Generic Plant 21 | Generic Plant 22 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-7: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Not Discounted (2018 $)**

(6 pages)

| Year | Licensure | Generic Plant 23 | Generic Plant 24 | Generic Plant 25 | Generic Plant 26 | Generic Plant 27 | Generic Plant 28 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-8: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Not Discounted (2018 $)***

*(6 pages)*

| Year | License | Connecticut Yankee | Crystal River | Kewaunee | La Crosse | Maine Yankee | Rancho Seco |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 |
| 2024 | Year 5 | | | | $10,607,030 | $10,607,030 | $10,607,030 |
| 2025 | Year 6 | | | | | | $10,607,030 |
| 2026 | Year 7 | | | | | | |
| 2027 | Year 8 | | | | | | |
| 2028 | Year 9 | | | | | | |
| 2029 | Year 10 | | | | | | |
| 2030 | Year 11 | | | | | | |
| 2031 | Year 12 | | | | | | |
| 2032 | Year 13 | | | | | | |
| 2033 | Year 14 | | | | | | |
| 2034 | Year 15 | | | | | | |
| 2035 | Year 16 | | | | | | |
| 2036 | Year 17 | | | | | | |
| 2037 | Year 18 | | | | | | |
| 2038 | Year 19 | | | | | | |
| 2039 | Year 20 | | | | | | |
| 2040 | Year 21 | | | | | | |
| 2041 | Year 22 | | | | | | |
| 2042 | Year 23 | | | | | | |
| 2043 | Year 24 | | | | | | |
| 2044 | Year 25 | | | | | | |
| 2045 | Year 26 | | | | | | |
| 2046 | Year 27 | | | | | | |
| 2047 | Year 28 | | | | | | |
| 2048 | Year 29 | | | | | | |
| 2049 | Year 30 | | | | | | |
| 2050 | Year 31 | | | | | | |
| 2051 | Year 32 | | | | | | |
| 2052 | Year 33 | | | | | | |
| 2053 | Year 34 | | | | | | |
| 2054 | Year 35 | | | | | | |
| 2055 | Year 36 | | | | | | |
| 2056 | Year 37 | | | | | | |
| 2057 | Year 38 | | | | | | |
| 2058 | Year 39 | | | | | | |
| 2059 | Year 40 | | | | | | |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$53,035,150** | **$53,035,150** | **$63,642,180** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-8: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Not Discounted (2018 $)***

*(6 pages)*

| Year | License | Yankee Rowe | Zion | Generic Plant 1 | Generic Plant 2 | Generic Plant 3 | Generic Plant 4 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $10,607,030 | $10,607,030 | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | | | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | | | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | | | $10,607,030 | $10,607,030 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | | | | $10,607,030 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$63,642,180** | **$63,642,180** | **$76,370,616** | **$386,095,892** | **$42,428,120** | **$42,428,120** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-8: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Not Discounted (2018 $)**

(6 pages)

| Year | License | Generic Plant 5 | Generic Plant 6 | Generic Plant 7 | Generic Plant 8 | Generic Plant 9 | Generic Plant 10 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-8: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Not Discounted (2018 $)**

(6 pages)

| Year | License | Generic Plant 11 | Generic Plant 12 | Generic Plant 13 | Generic Plant 14 | Generic Plant 15 | Generic Plant 16 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-8: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Not Discounted (2018 $)***

*(6 pages)*

| Year | License | Generic Plant 17 | Generic Plant 18 | Generic Plant 19 | Generic Plant 20 | Generic Plant 21 | Generic Plant 22 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-8: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Not Discounted (2018 $)***

*(6 pages)*

| Year | License | Generic Plant 23 | Generic Plant 24 | Generic Plant 25 | Generic Plant 26 | Generic Plant 27 | Generic Plant 28 |
|---|---|---|---|---|---|---|---|
| 2020 | Year 1 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2021 | Year 2 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2022 | Year 3 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2023 | Year 4 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2024 | Year 5 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2025 | Year 6 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2026 | Year 7 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2027 | Year 8 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2028 | Year 9 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2029 | Year 10 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2030 | Year 11 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2031 | Year 12 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2032 | Year 13 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2033 | Year 14 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2034 | Year 15 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2035 | Year 16 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2036 | Year 17 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2037 | Year 18 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2038 | Year 19 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2039 | Year 20 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2040 | Year 21 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2041 | Year 22 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2042 | Year 23 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2043 | Year 24 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2044 | Year 25 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2045 | Year 26 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2046 | Year 27 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2047 | Year 28 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2048 | Year 29 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2049 | Year 30 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2050 | Year 31 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2051 | Year 32 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2052 | Year 33 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2053 | Year 34 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2054 | Year 35 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2055 | Year 36 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2056 | Year 37 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2057 | Year 38 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2058 | Year 39 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| 2059 | Year 40 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 | $1,060,703 |
| | **TOTAL** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** | **$42,428,120** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-9: Total Estimated Value of Land at Decommissioned Nuclear Power Plants Served by the Proposed Action, Not Discounted (2018 $)**

| Plant | Assumed Shutdown Date | Assumed Date of Completed Spent Fuel Removal | Assumed Date Returned to Market | Market Value $2018 |
|---|---|---|---|---|
| Connecticut Yankee | Shutdown | 2023 | 2033 | $27,430,634 |
| Crystal River | Shutdown | 2023 | 2033 | $27,430,634 |
| Kewaunee | Shutdown | 2023 | 2033 | $27,430,634 |
| La Crosse | Shutdown | 2024 | 2034 | $27,430,634 |
| Maine Yankee | Shutdown | 2024 | 2034 | $27,430,634 |
| Rancho Seco | Shutdown | 2024 | 2034 | $27,430,634 |
| Yankee Rowe | Shutdown | 2024 | 2034 | $27,430,634 |
| Zion | Shutdown | 2024 | 2034 | $27,430,634 |
| Generic Plant 1 | Shutdown | 2027 | 2037 | $27,430,634 |
| Generic Plant 2 | Shutdown | 2029 | 2039 | $27,430,634 |
| Generic Plant 3 | 2019 | 2030 | 2040 | $27,430,634 |
| Generic Plant 4 | 2019 | 2031 | 2041 | $27,430,634 |
| Generic Plant 5 | 2020 | 2031 | 2041 | $27,430,634 |
| Generic Plant 6 | 2021 | 2032 | 2042 | $27,430,634 |
| Generic Plant 7 | 2022 | 2033 | 2043 | $27,430,634 |
| Generic Plant 8 | 2025 | 2036 | 2046 | $27,430,634 |
| Generic Plant 9 | 2026 | 2037 | 2047 | $27,430,634 |
| Generic Plant 10 | 2026 | 2038 | 2048 | $27,430,634 |
| Generic Plant 11 | 2028 | 2039 | 2049 | $27,430,634 |
| Generic Plant 12 | 2029 | 2040 | 2050 | $27,430,634 |
| Generic Plant 13 | 2029 | 2041 | 2051 | $27,430,634 |
| Generic Plant 14 | 2030 | 2041 | 2051 | $27,430,634 |
| Generic Plant 15 | 2030 | 2042 | 2052 | $27,430,634 |
| Generic Plant 16 | 2031 | 2042 | 2052 | $27,430,634 |
| Generic Plant 17 | 2032 | 2043 | 2053 | $27,430,634 |
| Generic Plant 18 | 2032 | 2044 | 2054 | $27,430,634 |
| Generic Plant 19 | 2033 | 2044 | 2054 | $27,430,634 |
| Generic Plant 20 | 2033 | 2045 | 2055 | $27,430,634 |
| Generic Plant 21 | 2033 | 2045 | 2055 | $27,430,634 |
| Generic Plant 22 | 2033 | 2046 | 2056 | $27,430,634 |
| Generic Plant 23 | 2034 | 2046 | 2056 | $27,430,634 |
| Generic Plant 24 | 2034 | 2047 | 2057 | $27,430,634 |
| Generic Plant 25 | 2034 | 2047 | 2057 | $27,430,634 |
| Generic Plant 26 | 2034 | 2048 | 2058 | $27,430,634 |
| Generic Plant 27 | 2034 | 2049 | 2059 | $27,430,634 |
| Generic Plant 28 | 2036 | 2049 | 2059 | $27,430,634 |
| | | | **TOTAL** | **$987,502,824** |

***Table 7.7-10: CISF Design, Engineering, Licensing, and Startup Professional Services, Not Discounted (2018 $)***

| ***Cost Category*** | ***Estimated Cost (Millions 2018$)*** |
|---|---|
| ***Pre-Licensing Phase*** | |
| *Project Management* | *$3.50* |
| *Public Information and Stakeholder Involvement* | *$1.75* |
| *Geotechnical Investigations and Environmental Report Development* | *$2.33* |
| *Preliminary Design, Safety Analysis, and Preparation of License Application* | *$8.62* |
| *Subtotal Pre-Licensing Phase* | *$16.20* |
| *Contingency: 30%* | *$4.86* |
| ***Total CISF Pre-License Submittal Phase:*** | ***$21.06*** |
| | |
| ***License Application Review Stage*** | |
| *Project Management* | *$2.91* |
| *Public Information and Stakeholder Involvement* | *$1.75* |
| *NRC Fees for LA Review, EIS, and Hearing Process* | *$18.65* |
| *Technical and Legal Support during LA Review and Hearing Process* | *$6.99* |
| *Detailed Design for CISF Facilities and Transportation Infrastructure* | *$5.24* |
| *State and Local Authority Review* | *$0.58* |
| *Subtotal: CISF License Application Review Phase* | *$36.13* |
| *Contingency: 30%* | *$10.84* |
| ***Total CISF License Application Review Phase*** | ***$46.97*** |
| | |
| ***Initial Construction/Pre-Operations Phase*** | |
| *Project Management* | *$1.63* |
| *Public Information and Stakeholder Involvement* | *$1.75* |
| *Engineering and Legal Support during Construction* | *$2.68* |
| *System Start-up, Dry-Run Testing* | *$1.98* |
| *Subtotal CISF Initial Construction/Pre-Operations Phase* | *$8.04* |
| *Contingency: 30%* | *$2.41* |
| ***Total CISF Initial Construction/Pre-Operations Phase*** | ***$10.45*** |
| | |
| ***Total CISF Design, Engineering, Licensing, and Startup Professional Services*** | ***$78.48*** |

*Source: Derived from EPRI, 2009.*


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-11: Estimated Costs of Transportation Infrastructure, Not Discounted (2018 $)**

| ***Description*** | ***Cost Estimate (Millions 2018$)*** |
|---|---|
| *Access Road Improvements* | *$1.59* |
| *Land Improvements* | *$5.30* |
| *Rail Escort Cars @ $6.4 million: 7* | *$44.50* |
| *Rail Buffer Cars @ $1.6 million: 14* | *$22.25* |
| *Cask Rolling Stock*<br>*Rail Cask Car @ $2.1 million:35*<br>*Transportation Casks @ $6.4 million: 35*<br>*Associated transport equipment (impact limiters, etc.)* | *$296.65* |
| ***Subtotal Transportation Infrastructure*** | ***$370.28*** |
| ***Contingency: 30%*** | ***$111.08*** |
| ***Total Transportation Infrastructure*** | ***$481.36*** |

*Source; Derived from EPRI, 2009.*

**Table 7.7-12: Estimated Costs of CISF Infrastructure, Not Discounted (2018 $)**

| *CISF Capital Cost Elements* | *Cost Estimate (Millions 2018$)* |
|---|---|
| *Administrative, Security, and Health Physics Building* | |
| *Building construction* | *$2.75* |
| *Furnishings, equipment, emergency diesel generator, vehicles (with one-time replacement)* | *$7.42* |
| *Total Administrative, Security, and Health Physics Building* | *$10.17* |
| *Canister Handling Building* | |
| *Building construction* | *$6.25* |
| *Canister transfer cells and equipment: 3* | *$8.79* |
| *Heavy lifting equipment and heavy haul equipment (with one-time replacement)* | *$13.98* |
| *Total Canister Handling Building* | *$29.03* |
| ***Subtotal CISF Infrastructure*** | ***$39.20*** |
| ***Contingency: 30%*** | ***$11.76*** |
| ***Total CISF Infrastructure*** | ***$50.96*** |

***Table 7.7-13: Spent Fuel Storage Facility Costs, Not Discounted (2018 $)***

| CISF Fuel Storage Facility Costs | Estimated Costs (Millions 2018$) |
|---|---|
| *Excavation and Grading* | *$3.50* |
| ***Concrete Storage Pads*** | |
| *Large concrete pads estimated to cost $105,945 per canister @ 3,376 canisters stored* | *$357.67* |
| ***Security Fence*** | *$1.08* |
| *Inner and outer security fences – 12,400 linear feet* | |
| *Fencing: $87.40/linear foot* | |
| ***Security System*** | |
| *Lighting, intrusion detection, CCTV, monitoring equipment (with four updates to the electronic equipment)* | *$21.67* |
| ***Subtotal Fuel Storage Facility*** | ***$383.91*** |
| ***Contingency 30%*** | ***$115.17*** |
| ***Total Fuel Storage Facility*** | ***$499.09*** |

***Table 7.7-14: Administrative Operating Costs, Not Discounted (2018 $)***

| ***CISF Administrative Operating Costs*** | ***Estimated Costs (Millions 2018$)*** |
|---|---|
| ***Travel and Living Expenses*** | |
| *Security Crew* | *$2.75* |
| *675 rail shipments for 3,376 casks* | |
| *$4,079 per rail shipment* | |
| ***Annual Office Expenses*** | |
| *Communications and reproduction, office supplies, office equipment and leases, office equipment maintenance and repair, postage, dues and subscriptions, insurance* | *$46.62* |
| ***Subtotal: Annual Administrative Operating Costs*** | ***$49.37*** |
| ***Contingency: 30%*** | ***$14.81*** |
| ***Total Administrative Operating Costs*** | ***$64.18*** |

*Total over the 40-year licensure period in 2015$*

*Source: Derived from EPRI, 2009.*

***Table 7.7-15: Costs for Concrete Overpack, Not Discounted (2018 $)***

| ***Concrete Overpack Costs*** | ***Estimated Costs (Millions 2018$)*** |
|---|---|
| *Concrete Overpack Costs* | |
| *$233,078 per overpack: 3,376 canisters* | *$786.87* |
| *Contingency: 30%* | *$236.06* |
| ***Total Costs*** | ***$1,022.93*** |

*Source: Derived from EPRI, 2009.*

**Table 7.7-16: Assumed On-site Transportation Planning and Transport Costs, Not Discounted (2018 $)**

| On-Site Transportation Planning and Transport Costs | Estimated Costs (Millions 2018$) |
|---|---|
| ***Assemble Project Organization*** | |
| *Assemble management teams* | *$81.0* |
| *Identify shutdown site existing infrastructure, constraints, & transportation resource needs and develop interface procedures.* | *$108.1* |
| ***Conduct Preliminary Logistics Analysis and Planning*** | |
| *Develop specs, solicit bids, issue contracts, & initiate preparations for shipping campaigns* | *$13.6* |
| *Revisions to certificates of compliance as may be needed* | *$27.0* |
| ***Conduct Preliminary Logistics Analysis and Planning*** | |
| *Determine fleet size, transport requirements, and modes of transport for shutdown site* | *$10.8* |
| ***Coordinate with Stakeholders*** | |
| *Assess and select routes & modes of transport* | *$16.2* |
| *Support training of emergency response personnel* | *$105.9* |
| ***Develop Campaign Plans*** | |
| *Develop plans, policies, & procedures for at-site operational interfaces, support operations, and in-transit security operations* | *$48.7* |
| ***Conduct Readiness Activities*** | |
| *Assemble & train at-site operations interface team & shutdown site workers* | *$54.0* |
| *Includes readiness reviews, tabletop exercises, and dry run operations* | *$81.0* |
| ***Local Transportation*** | |
| *Portable transportation equipment – 7 sets @ $2.1 million* | *$14.8* |
| *Local transportation improvements – 36 sites @ $1.1 million.* | *$38.1* |
| *Transfer cask to site to railroad - $264,862 per cask: 3,376 casks* | *$894.2* |
| ***Subtotal: On-Site Transportation Planning and Transport Costs*** | ***$1,493.6*** |
| ***Contingency: 30%*** | ***$448.1*** |
| ***Total Transportation Planning and Transport Costs*** | ***$1,941.7*** |

*Note: Values are for all 36 sites.*

*Source: Derived from GAO (2014)*

***Table 7.7-17: Assumptions for Other Operating Costs, Not Discounted (2018 $)***

| ***Assumptions for Other Operating Costs*** | ***Estimated Costs (Millions 2018$)*** |
|---|---|
| *Railroad Freight Fees* | |
| *Estimated cost for 673 shipments of 5 SNF transport casks by dedicated train @ $87.40 per mile round-trip; average trip length 1,824 miles* | *$215.22* |
| *State Inspection Fees* | *$46.62* |
| *Equipment, spare parts, and maintenance* | *$88.99* |
| *Regulatory fees and license fees* | *$33.90* |
| *Utilities* | *$33.90* |
| *LLW Disposal (50 cubic feet per year; $1,500 per cubic foot)* | *$3.18* |
| *Subtotal: Other Operating Costs* | *$421.82* |
| *Contingency: 30%* | *$126.55* |
| ***Total: Other Operating Costs*** | ***$548.36*** |

*† Total over the 40-year licensure period in 2018$*

*Source: Derived from EPRI, 2009.*


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-18: Assumed CISF Annual Labor Cost over 40-Year Licensure, Not Discounted (2018 $)***

| Labor Categories during Caretaker Period | Estimated Annual FTE | Average Cost per FTE ($000s) | Estimated Costs (Millions 2018$) |
|---|---|---|---|
| *Administrative Staff: General manager, administrative assistants, public relations, financing and purchasing, accounting and payroll, governmental affairs* | *3* | *$104.0* | *$12.5* |
| *Security staff: assumes 5 staff per shift, 4 shifts, 7 days per week* | *20* | *$64.1* | *$51.3* |
| *Engineering and technical staff: Nuclear and licensing engineers, health physics managers and technicians, quality assurance managers and technicians, transportation specialist, training* | *7* | *$93.2* | *$26.1* |
| *Maintenance and equipment operating staff: Mechanical and electrical maintenance, crane and equipment operators, general plant workers, fire and EMT* | *6* | *$60.4* | *$14.5* |
| *At-reactor loading crews: 2 per site* | *Varies* | *$81.6* | *$8.0* |
| ***Subtotal: Labor during Caretaker*** | ***36+*** | | ***$112.4*** |
| ***Fringe benefits and contingency: 40%*** | | | ***$44.9*** |
| ***Total Annual Labor Costs*** | | | ***$157.3*** |

*Source: Derived from EPRI, 2009.*


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-19: Summary of Quantified Benefits from CISF over 40-Year Licensure, Discounted (2018 $)***

| ***Benefit Category*** | ***Cost Estimate (Millions 2018$)*** |
|---|---|
| *Avoided Reimbursements to Utilities for Storing Spent Fuel* | *$8,624* |
| *Value of Land Potentially Returned to Economic Use* | *$988* |
| ***Total Benefit*** | ***$9,612*** |

**Table 7.7-20: Summary of Costs for CISF over 40-Year Licensure, Not Discounted (2018 $)**

(2 pages)

| Year | Design, Engineering, Licensing and Startup Professional Services | Transport-ation Infra-structure | CISF Infra-structure | Fuel Storage Facility | Admin-istrative Operating Costs | Concrete Overpacks | On-site Transportation Planning and Transportation Costs | Other: Transport-ation, License Fees | Annual Operating Labor Costs | Total Costs for CISF over 40-Year Licensure |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $39,238,739 | $71,962,937 | $25,479,700 | $10,018,343 | $1,515,009 | $0 | $10,894,024 | $6,714,245 | $3,652,592 | $169,475,590 |
| 2 | $39,238,739 | $219,332,015 | $11,569,161 | $13,539,018 | $1,515,009 | $0 | $25,547,218 | $6,714,245 | $3,652,592 | $321,107,997 |
| 3 | $0 | $190,064,792 | $0 | $3,443,203 | $1,541,522 | $7,575,046 | $41,252,710 | $8,786,778 | $3,881,009 | $256,545,059 |
| 4 | $0 | $0 | $0 | $13,772,811 | $1,621,060 | $30,300,184 | $57,932,661 | $15,004,376 | $3,881,009 | $122,512,101 |
| 5 | $0 | $0 | $0 | $23,551,507 | $1,695,295 | $51,813,315 | $58,878,767 | $20,807,467 | $4,566,259 | $161,312,610 |
| 6 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $11,573,486 | $6,714,245 | $4,794,676 | $24,597,416 |
| 7 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $12,950,767 | $6,714,245 | $3,652,592 | $24,832,613 |
| 8 | $0 | $0 | $0 | $15,150,092 | $1,631,665 | $33,330,203 | $49,448,716 | $15,833,389 | $3,652,592 | $119,046,656 |
| 9 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $33,993,468 | $6,714,245 | $3,881,009 | $46,103,731 |
| 10 | $0 | $0 | $0 | $15,150,092 | $1,631,665 | $33,330,203 | $75,350,249 | $15,833,389 | $3,652,592 | $144,948,190 |
| 11 | $0 | $0 | $0 | $31,066,297 | $1,727,110 | $60,600,368 | $95,492,577 | $23,294,506 | $3,881,009 | $216,061,868 |
| 12 | $0 | $0 | $0 | $17,904,654 | $1,652,875 | $39,390,239 | $69,285,888 | $17,491,415 | $4,109,425 | $149,834,497 |
| 13 | $0 | $0 | $0 | $15,150,092 | $1,631,665 | $33,330,203 | $50,825,997 | $15,833,389 | $4,109,425 | $120,880,771 |
| 14 | $0 | $0 | $0 | $15,150,092 | $1,631,665 | $33,330,203 | $37,875,230 | $15,833,389 | $3,881,009 | $107,701,587 |
| 15 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $11,573,486 | $6,714,245 | $3,881,009 | $23,683,749 |
| 16 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $33,993,468 | $6,714,245 | $3,652,592 | $45,875,314 |
| 17 | $0 | $0 | $0 | $15,150,092 | $1,631,665 | $33,330,203 | $63,776,764 | $15,833,389 | $3,652,592 | $133,374,704 |
| 18 | $0 | $0 | $0 | $27,545,622 | $1,727,110 | $60,600,368 | $82,541,811 | $23,294,506 | $3,881,009 | $199,590,426 |
| 19 | $0 | $0 | $0 | $2,754,562 | $1,536,219 | $6,060,037 | $40,879,873 | $8,372,271 | $4,109,425 | $63,712,389 |
| 20 | $0 | $0 | $0 | $15,150,092 | $1,631,665 | $33,330,203 | $82,715,195 | $15,833,389 | $3,881,009 | $152,541,552 |
| 21 | $0 | $0 | $13,910,539 | $31,066,297 | $1,727,110 | $60,600,368 | $108,443,344 | $23,294,506 | $3,881,009 | $242,923,174 |
| 22 | $0 | $0 | $0 | $27,545,622 | $1,727,110 | $60,600,368 | $107,066,063 | $23,294,506 | $4,109,425 | $224,343,096 |
| 23 | $0 | $0 | $0 | $20,659,217 | $1,674,085 | $45,450,276 | $96,488,006 | $19,149,441 | $4,337,842 | $187,758,867 |
| 24 | $0 | $0 | $0 | $27,545,622 | $1,727,110 | $60,600,368 | $113,704,020 | $23,294,506 | $4,109,425 | $230,981,052 |
| 25 | $0 | $0 | $0 | $27,545,622 | $1,727,110 | $60,600,368 | $113,704,020 | $23,294,506 | $4,109,425 | $230,981,052 |
| 26 | $0 | $0 | $0 | $27,545,622 | $1,727,110 | $60,600,368 | $113,704,020 | $23,294,506 | $4,337,842 | $231,209,469 |
| 27 | $0 | $0 | $0 | $27,545,622 | $1,727,110 | $60,600,368 | $113,704,020 | $23,294,506 | $4,337,842 | $231,209,469 |
| 28 | $0 | $0 | $0 | $27,545,622 | $1,727,110 | $60,600,368 | $103,909,658 | $23,294,506 | $4,337,842 | $221,415,107 |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-20: Summary of Costs for CISF over 40-Year Licensure, Not Discounted (2018 $)**

*(2 pages)*

| Year | Design, Engineering, Licensing and Startup Professional Services | Transport-ation Infra-structure | CISF Infra-structure | Fuel Storage Facility | Admin-istrative Operating Costs | Concrete Overpacks | On-site Transportation Planning and Transportation Costs | Other: Transport-ation, License Fees | Annual Operating Labor Costs | Total Costs for CISF over 40-Year Licensure |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | $0 | $0 | $0 | $27,545,622 | $1,727,110 | $60,600,368 | $82,866,957 | $23,294,506 | $4,337,842 | $200,372,406 |
| 30 | $0 | $0 | $0 | $16,527,373 | $1,642,270 | $36,360,221 | $41,318,433 | $16,662,402 | $4,109,425 | $116,620,124 |
| 31 | $0 | $0 | $0 | $3,520,675 | $1,515,009 | $0 | $0 | $6,714,245 | $4,109,425 | $15,859,355 |
| 32 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 33 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 34 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 35 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 36 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 37 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 38 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 39 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 40 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| **Subtotal** | **$78,477,477** | **$481,359,744** | **$50,959,401** | **$499,089,484** | **$64,179,578** | **$1,022,934,219** | **$1,941,690,895** | **$548,361,715** | **$157,296,096** | **$4,844,348,609** |
| | | | | | | | | **Decommissioning** | | **$395,726,163** |
| | | | | | | | | **COSTS - GRAND TOTAL** | | **$5,240,074,771** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-21: Estimated Costs to Operate Phase 1 of the Proposed Action over 40-Year Licensure, Not Discounted (2018 $)**

(2 pages)

| Year | Design, Engineering, Licensing and Startup Professional Services | Transport-ation Infra-structure | CISF Infra-structure | Fuel Storage Facility | Admin-istrative Operating Costs | Concrete Overpacks | On-site Transportation Planning and Transportation Costs | Other: Transport-ation, License Fees | Annual Operating Labor Costs | Total Costs for CISF over 40-Year Licensure |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $39,238,739 | $71,962,937 | $25,479,700 | $10,018,343 | $1,515,009 | $0 | $5,483,646 | $6,714,245 | $3,652,592 | $164,065,212 |
| 2 | $39,238,739 | $139,449,711 | $11,569,161 | $13,539,018 | $1,515,009 | $0 | $19,075,284 | $6,714,245 | $3,652,592 | $234,753,759 |
| 3 | $0 | $0 | $0 | $3,580,931 | $1,546,824 | $7,878,048 | $32,022,708 | $9,201,284 | $3,881,009 | $58,110,804 |
| 4 | $0 | $0 | $0 | $12,395,530 | $1,610,455 | $27,270,166 | $52,681,924 | $14,175,363 | $4,566,259 | $112,699,696 |
| 5 | $0 | $0 | $0 | $12,395,530 | $1,610,455 | $27,270,166 | $43,235,095 | $14,175,363 | $4,337,842 | $103,024,450 |
| 6 | $0 | $0 | $0 | $12,395,530 | $1,610,455 | $27,270,166 | $40,435,654 | $14,175,363 | $4,337,842 | $100,225,010 |
| 7 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $12,968,284 | $6,714,245 | $3,652,592 | $24,850,131 |
| 8 | $0 | $0 | $0 | $12,395,530 | $1,610,455 | $27,270,166 | $33,098,093 | $14,175,363 | $3,881,009 | $92,430,615 |
| 9 | $0 | $0 | $0 | $2,754,562 | $1,536,219 | $6,060,037 | $6,886,406 | $8,372,271 | $3,881,009 | $29,490,504 |
| 10 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 11 | $0 | $0 | $0 | $3,520,675 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $15,402,521 |
| 12 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 13 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 14 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 15 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 16 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 17 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 18 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 19 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 20 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 21 | $0 | $0 | $13,910,539 | $3,520,675 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $29,313,060 |
| 22 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 23 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 24 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 25 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 26 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

**Table 7.7-21: Estimated Costs to Operate Phase 1 of the Proposed Action over 40-Year Licensure, Not Discounted (2018 $)**

(2 pages)

| Year | Design, Engineering, Licensing and Startup Professional Services | Transport-ation Infra-structure | CISF Infra-structure | Fuel Storage Facility | Admin-istrative Operating Costs | Concrete Overpacks | On-site Transportation Planning and Transportation Costs | Other: Transport-ation, License Fees | Annual Operating Labor Costs | Total Costs for CISF over 40-Year Licensure |
|---|---|---|---|---|---|---|---|---|---|---|
| 27 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 28 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 29 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 30 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 31 | $0 | $0 | $0 | $3,520,675 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $15,402,521 |
| 32 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 33 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 34 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 35 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 36 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 37 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 38 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 39 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| 40 | $0 | $0 | $0 | $0 | $1,515,009 | $0 | $0 | $6,714,245 | $3,652,592 | $11,881,846 |
| **Subtotal** | **$78,477,477** | **$211,412,649** | **$50,959,401** | **$90,036,997** | **$61,035,176** | **$123,018,748** | **$245,887,095** | **$302,559,349** | **$149,073,092** | **$1,312,459,984** |
| | | | | | | | | **Decommissioning** | | **$55,394,494** |
| | | | | | | | | **COSTS - GRAND TOTAL** | | **$1,367,854,478** |



All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-22: Summary of Benefit Cost Analysis Assuming Market Value of Land, Discounted (2018 $)***

| SCENARIO | BENEFITS | | | Cost of Facility Construction, Operations, and Decommissioning | Benefit/ Cost Ratio |
|---|---|---|---|---|---|
| | Spent Fuel Storage Costs Avoided | Market Value of Land | Total Benefits | | |
| *Phase 1 Only* | *$3,298,786,330* | *$246,875,706* | *$3,545,662,036* | *$1,367,854,478* | ***2.59*** |
| *Phase 1 Only, No Other Reactors Shut Down* | *$3,298,786,330* | *$246,875,706* | *$3,545,662,036* | *$1,367,854,478* | ***2.59*** |
| *Proposed Action* | *$8,623,515,390* | *$987,502,824* | *$9,611,018,214* | *$5,240,074,771* | ***1.83*** |


All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Table 7.7-23: Summary of Benefit Cost Analysis without Including Market Value of Land, Discounted (2018 $)***

| ***SCENARIO*** | ***BENEFITS Spent Fuel Storage Costs Avoided*** | ***Cost of Facility Construction, Operations, and Decommissioning*** | ***Benefit/ Cost Ratio*** |
|---|---|---|---|
| *Phase 1 Only* | *$3,298,786,330* | *$1,367,854,478* | ***2.41*** |
| *Phase 1 Only, No Other Reactors Shut Down* | *$3,298,786,330* | *$1,367,854,478* | ***2.41*** |
| *Proposed Action* | *$8,623,515,390* | *$5,240,074,771* | ***1.65*** |

***Table 7.7-24: Estimated Costs of an Operations and Maintenance Building at an Eliminated Alternative Site, Not Discounted (2018 $)***

| ***CISF Capital Cost Elements*** | ***Cost Estimate Millions (2018$)*** |
|---|---|
| ***Operations and Maintenance Building*** | |
| *Building construction* | *$1.98* |
| *Furnishings, equipment (with one-time replacement)* | *$3.03* |
| *Heavy lifting equipment (with one-time replacement)* | *$6.99* |
| ***Subtotal: Operations and Maintenance Building*** | ***$12.00*** |
| ***Contingency: 30%*** | ***$3.60*** |
| ***Total: Operations and Maintenance Building*** | ***$15.60*** |

*Source: Derived from EPRI, 2009.*

**Table 7.7-25: Assumed CISF Annual Labor Costs for Alternative Locations over 40-Year Licensure, Not Discounted (2018 $)**

| *Labor Categories during Caretaker Period* | *Estimated Annual FTE* | *Average Cost per FTE (Thousands $)* | *Estimated Costs (Millions $)* |
|---|---|---|---|
| *Administrative Staff: General manager, administrative assistants, public relations, financing and purchasing, accounting and payroll, governmental affairs* | *10* | *$104.0* | *$41.6* |
| *Security staff: assumes 5 staff per shift, 4 shifts, 7 days per week* | *20* | *$64.1* | *$51.3* |
| *Engineering and technical staff: Nuclear and licensing engineers, health physics managers and technicians, quality assurance managers and technicians, transportation specialist, training* | *18* | *$93.2* | *$67.1* |
| *Maintenance and equipment operating staff: Mechanical and electrical maintenance, crane and equipment operators, general plant workers, fire and EMT* | *19* | *$60.4* | *$45.9* |
| *At-reactor loading crews: 2 per site* | *Varies* | *$81.6* | *$8.0* |
| ***Subtotal: Labor during Caretaker*** | ***67+*** | | ***$213.9*** |
| ***Fringe benefits and contingency: 40%*** | | | ***$85.6*** |
| ***Total Annual Labor Costs*** | | | ***$299.5*** |

*Source: Derived from EPRI, 2009.*

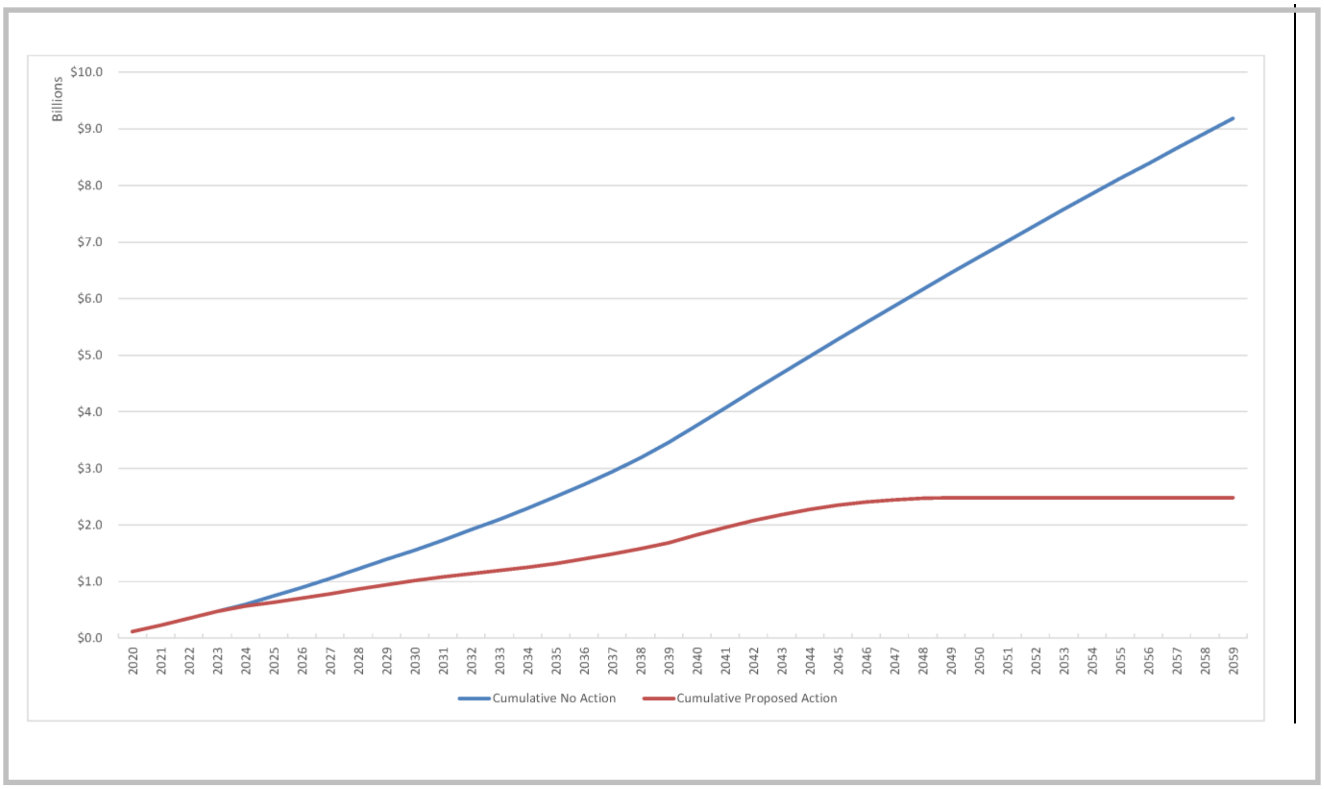
***Table 7.7-26: Estimated Distances and Costs of Transportation Infrastructure Required for the Eliminated Alternatives, Not Discounted (2018 $)***

| | ***Loving County, TX*** | ***Lea County, NM*** | ***Eddy County, NM*** |
|---|---|---|---|
| *Rail Distance* | *35 miles* | *4 miles* | *56 miles* |
| *Rail Cost @ $1.59 million per mile and 30% contingency* | *$72.3 million* | *$8.3 million* | *$115.7 million* |
| *Road Distance* | *4 miles* | *4 miles* | *4 miles* |
| | *2 lanes* | *2 lanes* | *2 lanes* |
| *Road cost @ $6.36 million per lane and 30% contingency* | *$66.1 million* | *$66.1 million* | *$66.1 million* |

***Table 7.7-27: Summary of Costs for Eliminated Alternative CISFs over 40-Year Licensure, Not Discounted (2018 $)***

| Cost Category | Cost Estimate (Millions 2018$) | | |
|---|---|---|---|
| | Loving County, TX | Lea County, NM | Eddy County, NM |
| *Design, Engineering, Licensing and Startup Professional Services* | *$78.48* | *$78.48* | *$78.48* |
| *Transportation Infrastructure* | *$618.17* | *$554.17* | *$661.57* |
| *CISF Infrastructure* | *$66.56* | *$66.56* | *$66.56* |
| *Fuel Storage Facility* | *$499.09* | *$499.09* | *$499.09* |
| *Administrative Operating Costs* | *$64.18* | *$64.18* | *$64.18* |
| *Concrete Overpacks* | *$1,022.93* | *$1,022.93* | *$1,022.93* |
| *On-site Transportation Planning and Transportation Costs* | *$1,941.69* | *$1,941.69* | *$1,941.69* |
| *Other: Transportation, License Fees* | *$548.36* | *$548.36* | *$548.36* |
| *Annual Operating Labor Costs* | *$299.47* | *$299.47* | *$299.47* |
| *Decommissioning* | *$395.73* | *$395.73* | *$395.73* |
| ***Total Costs for CISF over 40-Year Licensure*** | ***$5,534.67*** | ***$5,470.67*** | ***$5,578.07*** |

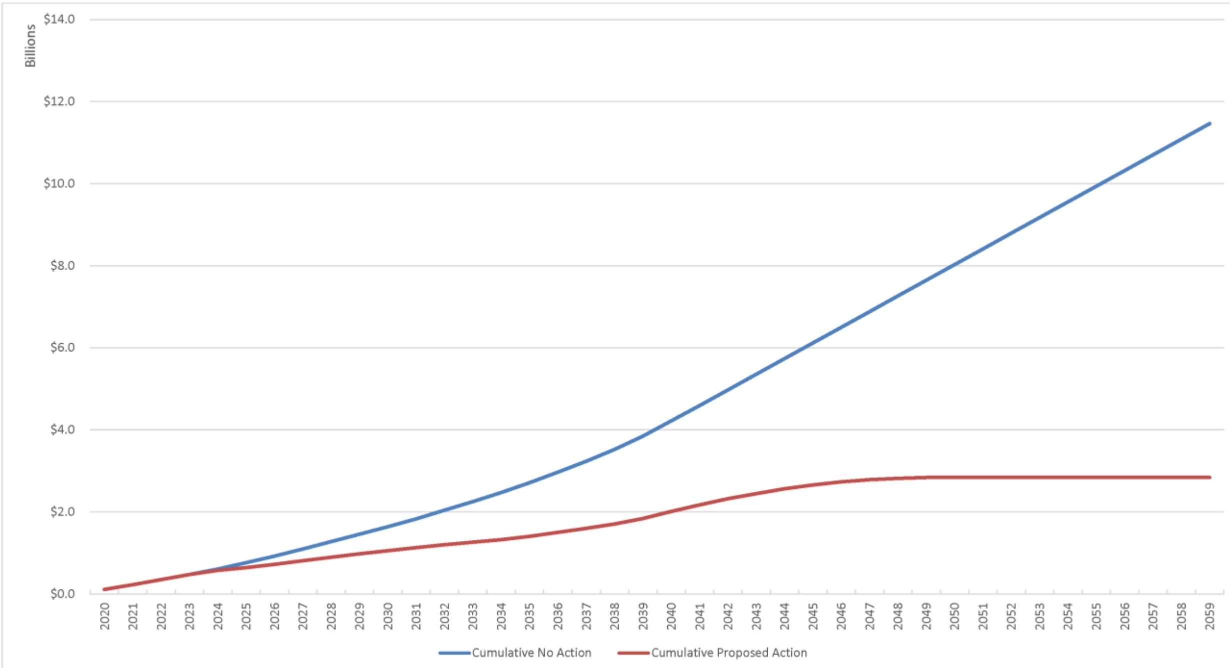
**Figure 7.2-1: Comparison of Cumulative Federal Expenditures for Spent Fuel Storage Liabilities at Stranded Sites between the Proposed Action and the No Action Scenarios**





All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

***Figure 7.7-1: Federal Expenditures No Action Scenario vs. Proposed Action Scenario, Discounted (2018 $)***





All Indicated Changes are in response to RAIs CB-1, CB-2, CB-3, and CB-4

Though greenhouse gas emissions of the CISF proposal would be very small, those emissions could contribute to long-term impacts associated with climate change . *Emission estimates of the greenhouse gas (GHG) carbon dioxide ($CO_2$) have been quantified for construction and operations at the CISF site. Peak $CO_2$ emissions are estimated to occur during Phase 1 of the construction process and are not expected to exceed 7,849.33 tpy, well below the threshold of 75,000 tpy $CO_{2e}$. Emissions of GHGs are considered to be a minimal contribution to the overall emissions of the site, and therefore no mitigation, project design, or adaptation measures are included with this project as existing engine manufacturer design and controls provide sufficient reductions to minimize emissions. Emission estimates are based on factors found in EPA's AP-42 Chapter 3.3 and may be found in ER Section 4.6.*

# CHAPTER 9

# LIST OF REFERENCES

## 9.0 LIST OF REFERENCES

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# ATTACHMENT 3-3
# AGENCY CONSULTATION

**DEPARTMENT OF THE ARMY**
U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

June 24, 2019

Regulatory Division

SUBJECT: Project Number SWF-2019-00145, Consolidated Interim Storage Facility

Mr. Jay Britten
Interim Storage Partners
Waste Control Specialists LLC
9998 W. Highway 176
Andrews, Texas 79714

Dear Mr. Britten:

This letter is in regard to the information received April 15, 2019, and subsequent submittal dated May 16, 2019, concerning the proposed by Interim Storage Partners to construct an interim storage facility adjacent to Waste Control Specialists, LLC facilities located in Andrews County, Texas. This project has been assigned Project Number SWF-2019-00145. Please include this number in all future correspondence concerning this project.

We have reviewed the site in question in accordance with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Under Section 404, the USACE regulates the discharge of dredged and fill material into waters of the United States, including wetlands. Our responsibility under Section 10 is to regulate any work in, or affecting, navigable waters of the United States.

Based on the report that you submitted, and other information available to us, waters of the United States under Section 404 do not exist on the site. We concur with the delineation of waters that is made in the above referenced report. This approved jurisdictional determination (JD) is valid for a period of no more than five years from the date of this letter unless new information warrants revision of the delineation before the expiration date.

This determination does not convey any property rights, either in real estate or material or any exclusive privileges, nor does it authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations. This determination does not eliminate the requirements to obtain State or local permits or approvals as needed.

Department of the Army authorization would be required for the discharge of dredged or fill material into any areas identified as waters of the United States. If you anticipate a discharge, please provide us with a detailed description of the proposed project, a suitable map of the proposed project area showing the location of proposed discharges, the type and amount of material (temporary or permanent), if any, to be discharged, and plan and cross-section views of the proposed project. Please note that it is unlawful to start work without a Department of the Army permit if one is required.

The Applicant may accept or appeal this approved JD or provide new information in accordance with the enclosed Notification of Administration Appeal Options and Process and Request for Appeal (NAAOP-RFA). If the Applicant elects to appeal this approved JD, the Applicant must complete Section II (Request for Appeal or Objections to an Initial Proffered Permit) of the enclosure and return it to the Division Engineer, ATTN: CESWD-PD-O Appeals Review Officer, U.S. Army Corps of Engineers, 1100 Commerce Street, Dallas, Suite 831, Texas 75242-0216 within 60 days of the date of this notice. Failure to notify the USACE within 60 days of the date of this notice means you accept the approved JD in its entirety and waive all rights to appeal the approved JD.

Thank you for your interest in our nation's water resources. If you have any questions concerning our regulatory program please refer to our website at http://www.swf.usace.army.mil/Missions/Regulatory or contact Ms. Katie Roeder at telephone (817) 886-1740 and refer to your assigned project number.

Please help the regulatory program improve its service by completing the survey on the following website: http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey

Sincerely,

for Stephen L Brooks
Chief, Regulatory Division

Enclosures

Copies furnished (without enclosures):

Mr. Ryan Blankenship
Cox McLain Environmental Consulting, Inc.
600 E. John Carpenter Freeway Suite 186
Irving, Texas 75062

All Indicated Changes are in response to RAI WR-1

## NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

| Applicant: Jay Britten | | File Number: SWF-2019-00145 | Date: 06-24-2019 |
|---|---|---|---|
| Attached is: | | | See Section below |
| | INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission) | | A |
| | PROFFERED PERMIT (Standard Permit or Letter of permission) | | B |
| | PERMIT DENIAL | | C |
| x | APPROVED JURISDICTIONAL DETERMINATION | | D |
| | PRELIMINARY JURISDICTIONAL DETERMINATION | | E |

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

All Indicated Changes are in response to RAI WR-1

## SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

## POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

| If you have questions regarding this decision and/or the appeal process you may contact: | If you only have questions regarding the appeal process you may also contact: |
|---|---|
| Katie Roeder<br>Regulatory Specialist, Evaluation Branch Regulatory<br>Division U.S. Army Corps of Engineers Ft. Worth District<br>819 Taylor Street<br>Fort Worth, Texas 76102-00300<br>Phone: 817-886-1740 | Mr. Elliott Carman<br>Administrative Appeals Review Officer (CESWD-PD-O)<br>U.S. Army Corps of Engineers<br>1100 Commerce Street, Suite 831<br>Dallas , Texas 75242-1317<br>469-487-7061 |

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

| | | |
|---|---|---|
| _______________________________<br>Signature of appellant or agent. | Date: | Telephone number: |

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**APPROVED JURISDICTIONAL DETERMINATION FORM**
**U.S. Army Corps of Engineers**

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

## SECTION I: BACKGROUND INFORMATION

**A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): April 11, 2019**

**B. DISTRICT OFFICE, FILE NAME, AND NUMBER: SWF-2019-00145**

**C. PROJECT LOCATION AND BACKGROUND INFORMATION:**

State: Texas County/parish/borough: Andrews City: N/A
Center coordinates of site (lat/long in degree decimal format): Lat. 32.44558° N, Long. -103.04298° W.
Universal Transverse Mercator:
Name of nearest waterbody: Monument Draw

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: None
Name of watershed or Hydrologic Unit Code (HUC): HUC 13070007
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

**D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):**

☒ Office (Desk) Determination. Date: May 8, 2018
☐ Field Determination. Date(s):

## SECTION II: SUMMARY OF FINDINGS

**A. RHA SECTION 10 DETERMINATION OF JURISDICTION.**

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

**B. CWA SECTION 404 DETERMINATION OF JURISDICTION.**

There **Are no** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      - ☐ TNWs, including territorial seas
      - ☐ Wetlands adjacent to TNWs
      - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      - ☐ Non-RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      - ☐ Impoundments of jurisdictional waters
      - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: 0 linear feet: 0 width (ft) and/or 0.00 acres.
      Wetlands: 0.00 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Not A licable.**
      Elevation of established OHWM (if known): .

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By__________

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **A delineation of waters of the U.S., including wetlands, was conducted for the approximately 1,534-acre project area in February 2019. The proposed project area includes three classifications of aquatic features. A series of upland man-made drainage ditches, a series of non-wetland vegetated swales, and three playa lakes are located within the project area. None of the aquatic features within the project area are considered waters of the U.S. since all**

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

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features are isolated and do not have a direct hydrologic connection to any other identified downstream water. The results of the wetland delineation indicate that no waters of the U.S., including wetlands, are located within the project area.

The upland man-made drainage ditches located within the project area would not be considered waters of the U.S. since they are located entirely within uplands and drain only uplands. These features are a result of excavation by WCS to facilitate operation of their facility.

The non-wetland vegetated swales observed within the project area would not be considered waters of the U.S. since they lacked an observable OHWM, clearly defined bed and banks, and wetland indictors, and do not appear to convey sufficient surface flows to create a hydrologic connection to other downstream aquatic features.

The three playas located within the project area (northern playa, eastern playa, and southern playa) are naturally occurring topographic features that collect local rainfall. They are closed depressions and do not have a clear surface hydrologic connection to any other identified aquatic feature.

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## SECTION III: CWA ANALYSIS

### A. TNWs AND WETLANDS ADJACENT TO TNWs

**The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.**

1. **TNW**
   Identify TNW: N/A.

   Summarize rationale supporting determination: N/A.

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": N/A.

### B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

**This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.**

**The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.**

**A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.**

**If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.**

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   **(i) General Area Conditions:**
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   **(ii) Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

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[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

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(b) General Tributary Characteristics (check all that apply):

**Tributary** is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

**Tributary** properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

**(iii) Chemical Characteristics:**
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

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[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

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(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

**2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

**(i) Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

**(ii) Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

**(iii) Biological Characteristics. Wetland supports (check all that apply):**

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

**3. Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

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For each wetland, specify the following:

Directly abuts? (Y/N) Size (in acres) Directly abuts? (Y/N) Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

## C. SIGNIFICANT NEXUS DETERMINATION

**A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.**

**Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:**

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

**Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:**

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

## D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

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Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

**E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

**Identify water body and summarize rationale supporting determination:** .

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[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

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Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

**F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):**
☒ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☒ Non-wetland waters (i.e., rivers, streams): **16,718** linear feet **N/A** width (ft).
☐ Lakes/ponds: acres.
☒ Other non-wetland waters: 7.7 acres. List type of aquatic resource: Playa.
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

## SECTION IV: DATA SOURCES.

**A. SUPPORTING DATA. Data reviewed for JD (check all that apply -** checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:Aerial (NAIP, 2016).
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:1:2,000 Eunice NE (1983).
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:NRCS (2018).
☒ National wetlands inventory map(s). Cite name:NWI (2018).
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date):NAIP (2016).
or ☒ Other (Name & Date):Site Visit, February 5, 2019.
☒ Previous determination(s). File no. and date of response letter:SWF-2007-173. August 29, 2007.
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

**B. ADDITIONAL COMMENTS TO SUPPORT JD:** The proposed project area includes three classifications of aquatic features. A series of upland man-made drainage ditches, a series of non-wetland vegetated swales, and three playa lakes are located within the project area. None of the aquatic features within the project area are considered waters of the U.S. since all features are isolated and do not have a direct hydrologic connection to any other identified downstream water.

All Indicated Changes are in response to RAI WR-1

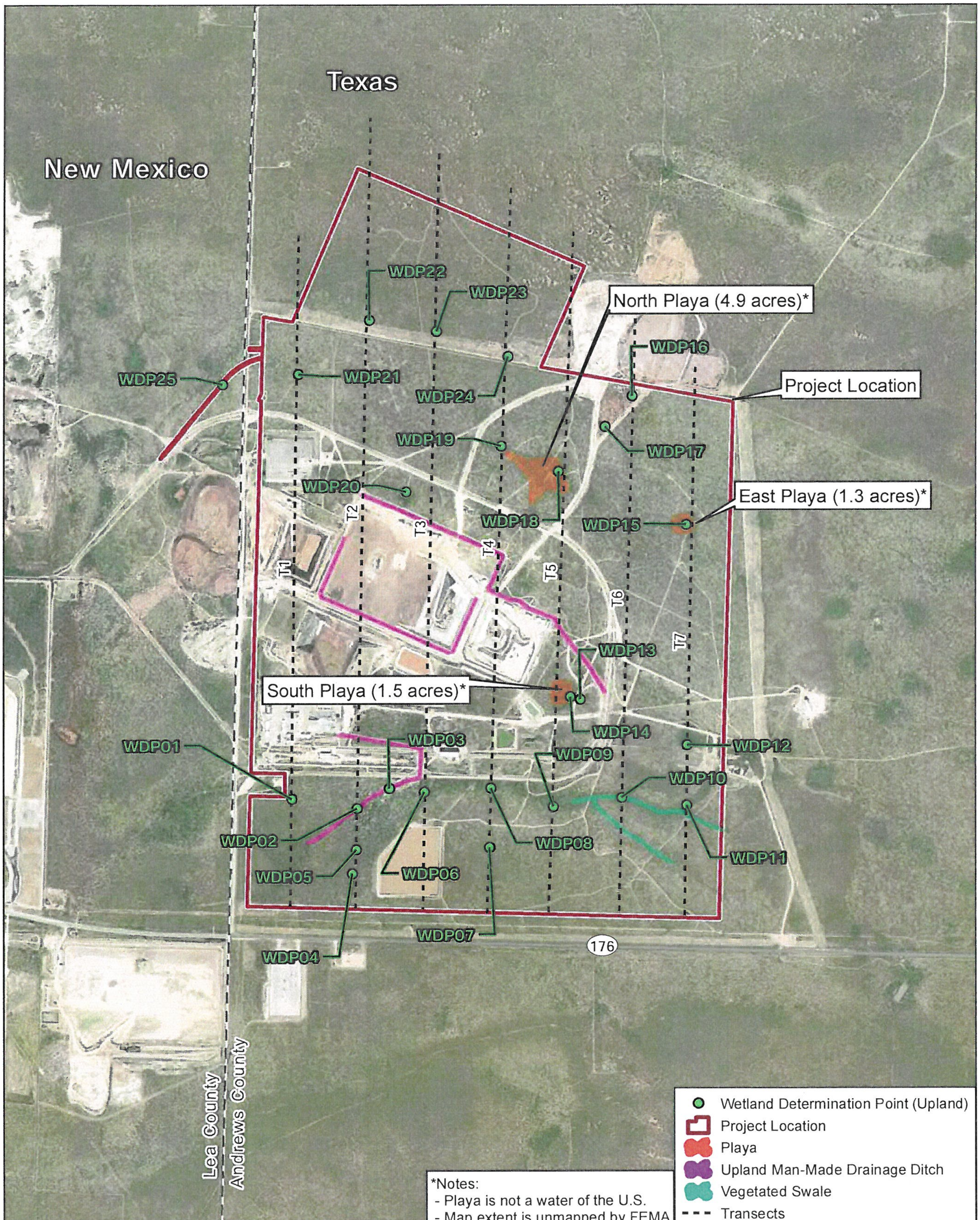


Figure 7

Potential Waters of the U.S.

Interim Storage Partners, Consolidated Interim Storage Facility, SWF-2007-173

Data Sources: CMEC (2019)
Aerial Source: ESRI (2017)

COX | McLAIN Environmental Consulting

0 2,000 Feet
0 600 Meters

1 in = 2,000 feet
Scale: 1:24,000
Date: 3/5/2019

G:\Projects\WCS\InterimStoragePartners\Figure 7_Potential_Waters_Of_US_20190214.mxd

All Indicated Changes are in response to RAI WR-1

Table 1: Summary of Aquatic Features within the Project Area

| Feature Number | Name of Water | Resource Type | Ordinary High Water Mark Width | Amount of Aquatic Resource (linear feet/acres) | Water of the U.S.? (Yes/No) |
|---|---|---|---|---|---|
| 1 | Upland Man-made Drainage Ditches | Upland Man-made Drainage Ditch | n/a | 12,841 linear feet | No |
| 2 | Non-wetland Vegetated Swales | None-wetland Vegetated Swale | n/a | 3,877 linear feet | No |
| 3 | Southern Playa | Playa | n/a | 1.5 acres | No |
| 4 | Eastern Playa | Playa | n/a | 1.3 acres | No |
| 5 | Northern Playa | Playa | n/a | 4.9 acres | No |
| Total | | | | 16,718 linear feet/ 7.7 acres | |

All Indicated Changes are in response to RAI WR-1

# ATTACHMENT 3-4

# INTENSIVE ARCHEOLOGICAL SURVEY OF THE PROPOSED WASTE CONTROL SPECIALISTS SPENT NUCLEAR FUEL CONSOLIDATED INTERIM STORAGE FACILITY, ANDREWS COUNTY, TEXAS


Attachment 3-4 added in response to RAI CHR-2

Proprietary Information in Attachment 3-4 (22 pages)
Withheld Pursuant to 10 CFR 2.390.

# ATTACHMENT 3-5

# CULTURAL RESOURCE SURVEY OF A PROPOSED WASTE FACILITY, ANDREWS COUNTY, TX (1994) AND TEXAS HISTORIC COMMISSION "NO EFFECT" CONFIRMATION LETTERS (1994 AND 2004)


Attachment 3-5 added in response to RAI CHR-2

# ATTACHMENT 2: JUNE 2004 TEXAS HISTORIC PRESERVATION "NO EFFECT" CONFIRMATION LETTER


Attachment 3-5 added in response to RAI CHR-2

URS

RECEIVED

JUN 21 2004

TEXAS HISTORICAL COMMISSION

June 15, 2004

Mr. Mark Denton
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711

Re: Waste Control Specialists- No Effect Confirmation

Dear Mr. Denton:

As a follow up to our recent telephone conversation on June 10, 2004, this letter is being submitted to receive an updated stamp of the "No Effect" determination for the Waste Control Specialists (WCS) site located in Andrews County. Enclosed is a copy of the cover letter stamped by Dr. James Bruseth in 1994 for the WCS site. WCS is planning to expand operations located within the same area (approximately 1300 acres) included in the original evaluation of the site and is not proposing any activities that would be located outside the area previously considered.

If you have any questions or require any additional information, please contact me at 801-904-4019. Thank you for your assistance.

Sincerely,

Jeff Linn
URS Corporation

NO HISTORIC
PROPERTIES AFFECTED
PROJECT MAY PROCEED
F. Lawerence Oaks
State Historic Preservation Officer
6-25-04

URS Corporation
756 East Winchester Street, Suite 400
Salt Lake City, Utah 84107
Tel: 801.904.4000
Fax: 801.904.4100
www.urscorp.com

# ATTACHMENT 3: AUGUST 1994 TEXAS HISTORIC PRESERVATION "NO EFFECT" CONFIRMATION LETTER

ENVIRONMENTAL

RECEIVED
... 1 4 1994
TEXAS HISTORICAL COMMISSION

August 12, 1994 Hand Delivered

Mr. James E. Bruseth, Ph.D.
Deputy State Historic Preservation Officer
TEXAS HISTORICAL COMMISSION
P.O. Box 12276
Austin, Texas 78711

Attn.: Timothy K. Perttula, Ph.D.

Re: Waste Control Specialists
TNRCC Permit No. 50358

Dear Mr. Bruseth:

Enclosed is one copy of the report prepared by Galván Eling Associates, Inc. entitled "Cultural Resource Survey of A Proposed Waste Facility Andrews County, Texas". This report provides the results of the cultural resource survey as requested by your letter of 18 July 1994 and as agreed during our meeting of 26 July 1994. The report concludes that the study area offered few enticements to prehistoric people or early settlers and that no evidence of their use of this tract was found and no cultural resources stand as an impediment to construction of this waste facility.

We look forward to your timely approval of the report. If you have any questions or need additional information in the intervening time, please call me at (512) 327-5775.

Sincerely,

Allen Messenger, P.E.

enclosure

NO EFFECT
On National Register-eligible or listed properties
or State Archeological Landmarks
PROJECT MAY PROCEED
BY
James E. Bruseth, Ph.D., DSHPO
Date 8/12/94

cc: K. N. Bigham, WCS, Pasadena
Mike Woodward, Woodward & Stewart, Austin

1016 Mopac Circle, # 101 Austin, Texas 78746 (512) 327-5775 Fax 327-4570

# ATTACHMENT 4: CULTURAL RESOURCE SURVEY OF A PROPOSED WASTE FACILITY, ANDREWS COUNTY, TX


Attachment 3-5 added in response to RAI CHR-2

# Cultural Resource Survey of A Proposed Waste Facility
# Andrews County, Texas

Submitted to:
AM Environmental, Inc.
Austin, Texas

Galván Eling Associates, Inc.
3200 Breeze Terrace
Austin, Texas 78722

August, 1994

## Abstract

On August 4, 1994, Galván Eling Associates, Inc. assessed the cultural resource potential of a 150-acre tract in Andrews County, Texas for AM Environmental, Inc. of Austin. The absence of prehistoric or significant historic occupation or exploitation of this tract can be attributed to the lack of essential resources. Cultural resources do not stand as an impediment to construction of a waste facility on this property.

## Table of Contents



## List of Figures

## Introduction

At the request of AM Environmental Inc., Galván Eling Associates, Inc. conducted a cultural resources assessment of a 150-acre waste control facility site in Andrews County, Texas (Figure 1). The survey area is on the Flying W Diamond Ranch, 30 miles northwest of Andrews, immediately east of the New Mexico-Texas state line and north of Texas Hwy 176. The field work was accomplished by Carole Medlar, Frank Garcia, and Kelly Scott on August 4, 1994.

## Methods

The survey tract was inspected by pedestrian transects walked at intervals ranging from 10 to 30 meters, depending upon the local topography. Close interval transects paralleled the only ephemeral drainage on the survey tract and encircled as well as crosscut the five depressions, or buffalo wallows, that were considered to hold some, albeit minor, potential for prehistoric or early historic exploitation. Photographs were taken to document the general topography and vegetation.

## Natural Environment

Application for a hazardous waste permit requires exhaustive and complete environmental analysis. The environmental information pertinent to the potential for archeological resources on the tract is detailed in volume 4 of AM Environmental, Inc.'s (1993) permit application and is only summarized here.

The survey area is in the southern portion of the North American Great Plains physiocgraphic zone on the southwestern edge of the Southern High Plains or Llano Estacado. The region is bounded by the Pecos River plain to the south and west, Mescalero Ridge to the northwest, Monument Draw (New Mexico) and Rattlesnake Ridge to the west, and the Llano Estacado to the north and east. The waste facility will be built in an area where the caliche sediments of the Tertiary Ogallala Formation lay unconformably on Triassic red bed clay of the Dockham Group (Bureau of

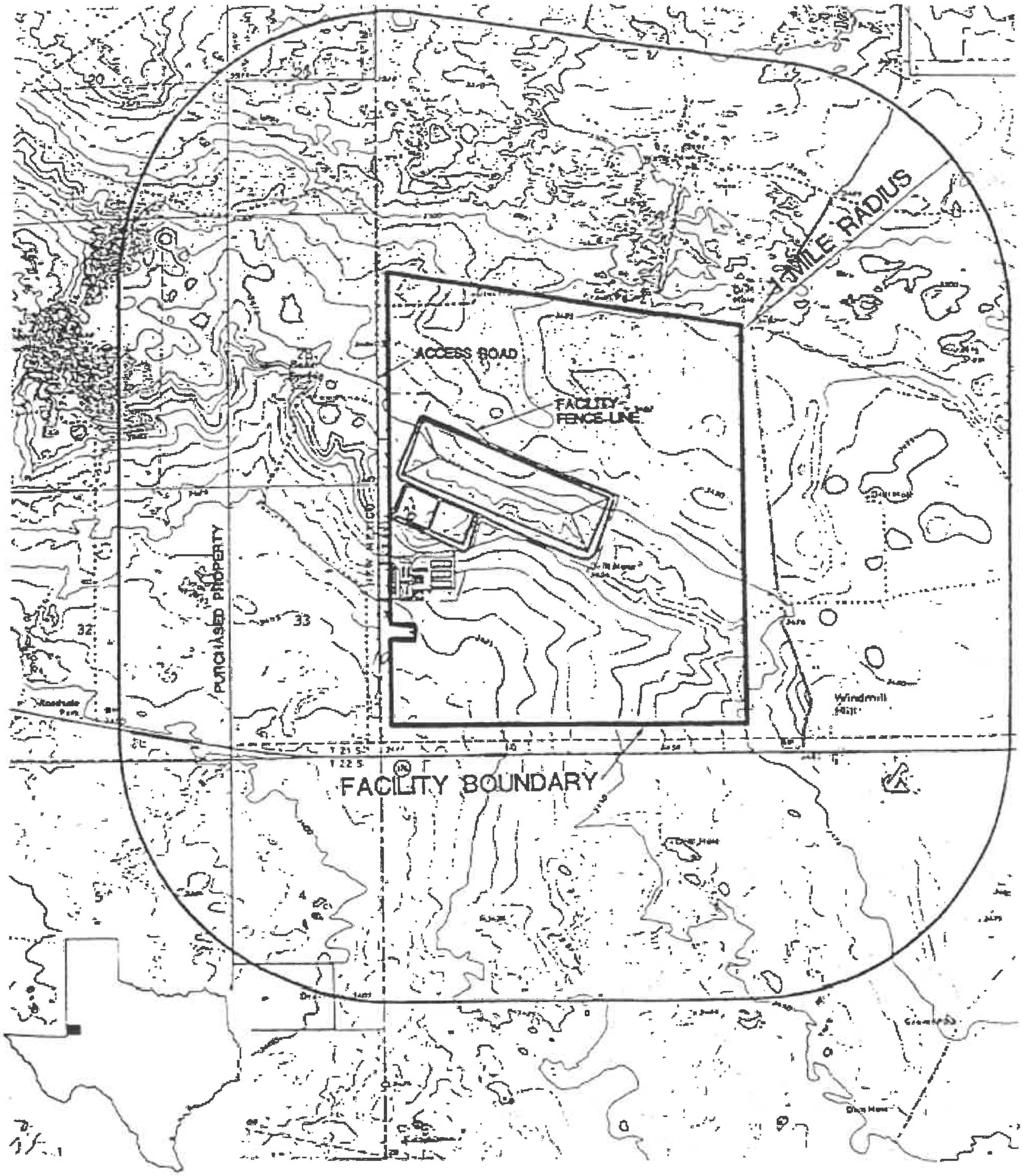


FIGURE 1. Map of study area.

2

Economic Geology 1976). In the survey tract, the windblown sands that caused Ferguson (1986) to call this area the "Seminole Sand Sheet" are a thin veneer overlying shallow brown silty sandy sediments broken by outcrops of the underlying caliche. Sand, gravel, and highly cemented caliche are quarried less than a mile west of the state line and the western boundary of the waste facility tract.

The nearest major drainage is Monument Draw, southwest of the study area in New Mexico (not to be confused with Texas' Monument Draw that flows east through northern Andrews County). Baker Spring, 650 meters west of the facility, was a seasonal seep emanating from an outcrop of the Ogallala Formation but flow ceased some 7 years ago. Water is sometimes found at the base of the Ogallala Formation in isolated gravel beds under slight depressions, locally called buffalo wallows. Thus, these topographic features influence human and animal exploitation of the arid plains.

The climate is temperate and arid, averaging 14.5 inches of annual precipitation . About 70% of the rain falls between May and October and the annual evaporation rate exceeds precipitation by 58 inches. The mean annual high temperature is 77.4 degrees F; the minimum is 49.4 degrees F. (Bomar 1983).

The plains were described as a sea of grass that supported huge herds of grazing animals, the mainstay of the native economies (Hughes 1989). Modern land use has been solely cattle pasture and the resident fauna are now coyotes, jack rabbits, field rodents, snakes and other reptiles, and a varied bird population. The vegetation of the study area is low grasses broken by scrub mesquite that grows more thickly in the five slight depressions that pock the generally level terrain (Figure 2a). Elevation ranges from 3,487 to 3,422 feet AMSL and the relief does not vary by more than 3 or 4 feet at maximum. Two "ridges" rise about 1 or 2 feet above the plain; the deepest of the depressions does not exceed 4 feet in depth (AM Environmental, Inc. 1993).

Prehistoric environmental changes in the region generally correlate with the Antevs (1955) model, and consist of a post-Pleistocene, cool and moist Anathermal (10,000-7500 B.P.), a warm and dry Altithermal (7500-4000 B.P.) and a moderate Medithermal (4000 B.P. to present). These periods correlate to documented heavy occupation of the Llano Estacado in the Paleoindian period, from 14,000 to 7000 B.P., a dearth of occupation between 7000-4000 B.P., the Early and Middle Archaic periods, and the resumption of aboriginal occupation around 4000 B.P., a presence which was sustained until Historic times (Hughes 1989).


Attachment 3-5 added in response to RAI CHR-2

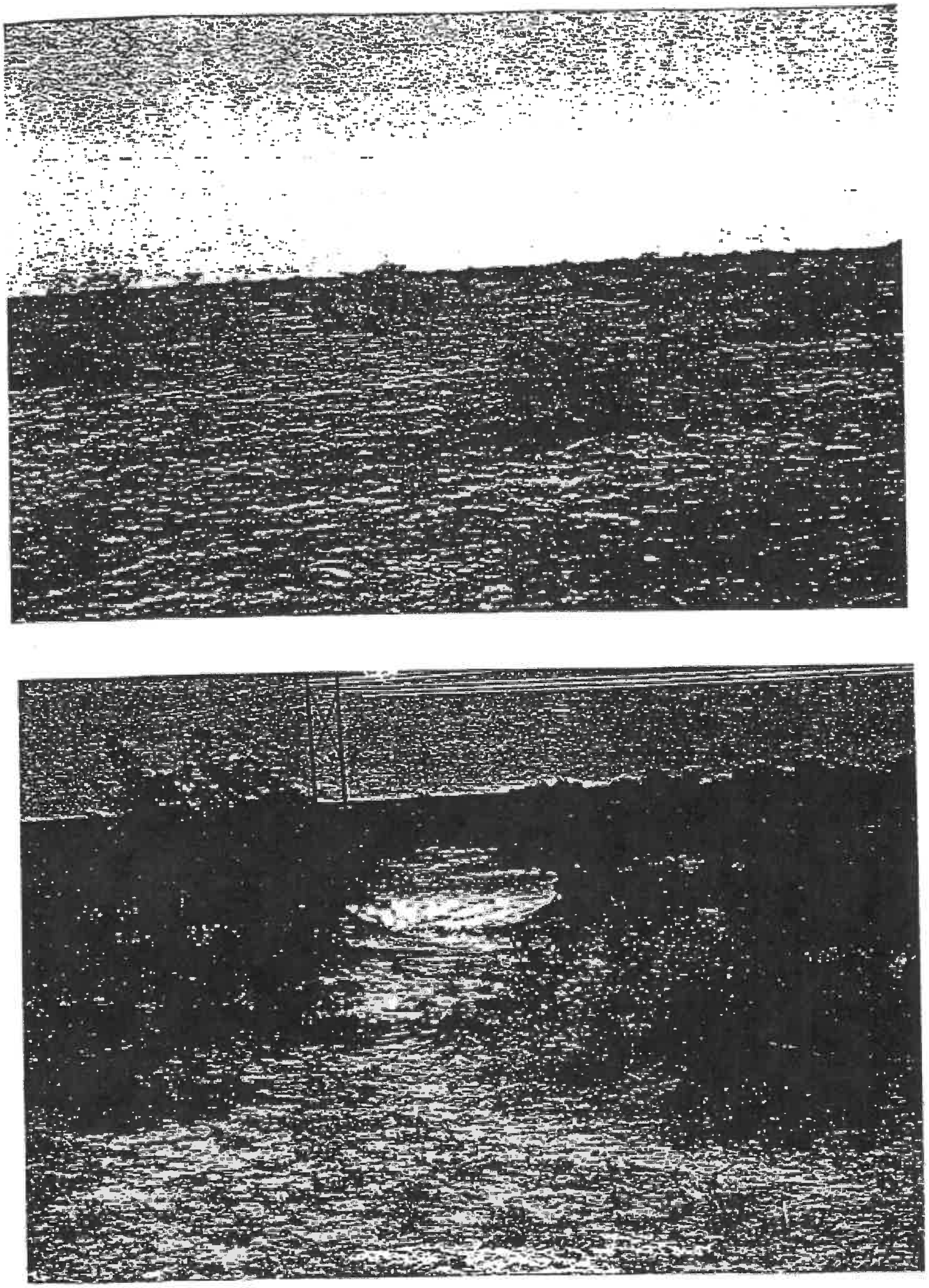

FIGURE 2. Environmental setting. a) topography and vegetation in the study area; b) slight depression in ephemeral drainway, trampled by cattle.

## Cultural Background

Hughes (1989) summarized prehistoric cultural developments on the High Plains, including the South Plains or Llano Estacado. Ignoring variability introduced by ethnic diversity and the influences radiating from more complex nieghboring societies, the long span of prehistory was divided into Paleoindian, Archaic, and Neoindian stages, with the latter two further subdivided into Early and Late substages. The Historic period begins with Coronado's expedition in 1540 but the area remained largely under the control of Plains Indians until the mid-1870s. Andrews County, named for a Texas revolutionary, was formed from Bexar County in 1876 and organized in 1910 (Conner, et al. 1974). In 1890, only 24 people lived in the county. Oil was struck in 1929. The modern economy is dominated by cattle ranching and energy production, both evidenced on the Flying W Diamond Ranch.

The majority of the 52 recorded sites in Andrews County were recorded as part of the permitting process for oil and gas pipelines. Most are burned rock or burned caliche features or scatters with few other artifacts found in dune blowouts with no apparent nearby water source; a lesser number were on dunes or eroded uplands next to playas (see Kibler 1991 for a discussion of site distributions in this region). The dominant period of occupation, when determinable, was during the Late Archaic and Late Prehistoric periods. One site recorded by a local amateur archeologist, 41AD42, contained three Paleoindian points (Scottsbluff, Milnesand and Eden).

The only systematic archeological study in the county that exceeded the survey level of investigation was accomplished by Collins (1968) who documented the Andrews Lake site complex. Eight sites, ranging in age from Paleoindian to Historic, and featuring masonry foundations of several dwellings, clay and stone-lined hearths, burned rock hearths, numerous burials, caches and stone walls, were apparently supported by semi-permanent water in Andrews Lake, east of the current survey area.

## Results of the Survey

Despite the special attention paid to the one subtle drainage feature and the slight depressions that had some limited potential for prehistoric exploitation, no cultural remains worthy of site designation were found by this survey. Six pieces of burned caliche, averaging less than 3.5 cm in maximum dimension, were noted on the northeast side of the drainway, next to a slight depression that had been heavily trampled by cattle (Figure 2b). Two clusters of three pieces, linearly distributed over an area about 1 meter long, were found 20 meters apart, separated by a barren stretch of hard packed shallow sediments littered with unburned lumps of caliche. The area was subjected to intensive scrutiny, including cutting a profile into one of the nearby remnant hummocks of soil, but no evidence bearing upon the age or origin of the burned caliche was produced. This drainway lacks both gathering and retentive capability and probably holds water for less than a day after a heavy rain.

Two of the five slight depressions in the study area are shown as playas on the USGS Eunice NE 7.5' quadrangle map but none of these "buffalo wallows" have much water retention capacity. According to the geologic reports, they lack the impermeable clay linings that inhibit rainfall absorption in true playas. No evidence of historic or prehistoric use of this features was found beyond the intensified grazing of cattle drawn to the grasses that grow in the bottoms of these depressions.

Comparative data were obtained by a visit to Baker Spring, shown on the USGS maps less than 400 meters west of the state line that is the western boundary of the study area. According to local informants, spring flow ceased about 7 years ago, a fact they attribute to blasting at the adjacent quarry. Historic debris, reportedly the remains of early ranch buildings, was abundant but prehistoric material consisted solely of less than 10 chert flakes and one thin end scraper. This site is in New Mexico and was not recorded but it serves as a standard for judging the low intensity of prehistoric use of the immediate area.

The study area offered few enticements to prehistoric people or early settlers. It is not surprising that no evidence of their use of this tract was found and no cultural resources stand as an impediment to construction of this waste facility.

## References Cited

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1955 Geologic Climate Dating in the West. *American Antiquity* 20(4):317-335.

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1974 *Soil Survey of Andrews County*. United States Department of Agriculture, Soil Conservation Service.

Ferguson, K.
1986 *The Texas Landscape: The Geographic Provinces of Texas*. Texas Mosaics, Austin.

Collins, M.B.
1968 The Andrews Lake Locality: New Archeological Data from the Southern Llano Estacado, Texas. Master's thesis, Department of Anthropology, University of Texas, Austin.

1971 A Review of Llano Estacado Archeology and Ethnohistory. *Plains Anthropologist* 16:85-104.

Hughes, J. T.
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Kibler, K. W.
1991 Surface Distributions of Sites and Survey Strategies for Draws on the Southern Llano Estacado. Master's thesis, Department of Anthropology, University of Texas, Austin.

# ATTACHMENT 3-6

# INTERIM STORAGE PARTNERS (ISP), WASTE CONTROL SPECIALISTS (WCS): ECOLOGICAL RESOURCES REPORT



Attachment 3-4 added in response to RAI ECO-1

Proprietary Information in Attachment 3-6 (114 pages)
Withheld Pursuant to 10 CFR 2.390.

# APPENDIX A
# SOCIOECONOMIC IMPACT ANALYSIS

# Socioeconomic Impacts of the Proposed Spent Nuclear Fuel Consolidated Interim Storage Facility Andrews County, Texas

**Interim Storage Partners**

Prepared by:


Cox|McLain Environmental Consulting, Inc.
8401 Shoal Creek Blvd., Suite 100
Austin, Texas 78747


October 2019

Revision 4

Appendix A has been revised in response to RAI SOC-1

## Contents





Appendix A has been revised in response to RAI SOC-1

Page





Appendix A has been revised in response to RAI SOC-1

## Figures



## Tables





Appendix A has been revised in response to RAI SOC-1

## Tables, cont'd





Appendix A has been revised in response to RAI SOC-1

## Acronyms and Abbreviations

| | |
|---|---|
| ACS | American Community Survey |
| AIF | Andrews Industrial Foundation |
| APE | Area of Potential Effects |
| ARMS | Archeological Records Management Section |
| BLM | Bureau of Land Management |
| CISF | Consolidated Interim Spent Fuel Storage Facility |
| DHHS | U.S. Department of Health and Human Services |
| DOI | Department of Interior |
| EDCLC | Economic Development Corporation of Lea County |
| EJ | Environmental Justice |
| ISFS | Interim Spent Fuel Storage Facility |
| LEP | Limited English Proficiency |
| NCHS | National Center for Health Statistics |
| NHPA | National Historic Preservation Act |
| NMCRIS | New Mexico Cultural Resources Information System |
| NMDH | New Mexico Department of Health |
| NM-EPHT | New Mexico's Environmental Public Health Tracking Network |
| NMHPD | New Mexico Historic Preservation Division |
| NM-IBIS | New Mexico Indicator-Based Information System |
| NRC | Nuclear Regulatory Commission |
| NRHP | National Register of Historic Places |
| PRCC | Permian Residential Care Center |
| ROI | Region of Interest |
| RTHL | Recorded Texas Historic Landmarks |
| SAL | State Antiquities Landmark |
| SHPO | State Historic Preservation Officer |
| TARL | Texas Archeological Research Laboratory |
| THC | Texas Historical Commission |
| USDA | U.S. Department of Agriculture |
| WCS | Waste Control Specialists LLC |


Appendix A has been revised in response to RAI SOC-1

## Introduction and Background

### Introduction

Waste Control Specialists LLC (WCS) has an existing waste disposal facility with various licenses in Andrews County, Texas, near the border of Lea County, New Mexico, on State Highway 176. The site is approximately 30 miles northwest of the county seat of the city of Andrews (see **Figure 1a, Project Location Road Base,** and **Figure 1b, Project Location Aerial Base)**. Photographs of the current facility and proposed project site are in **Appendix A.**

### Background

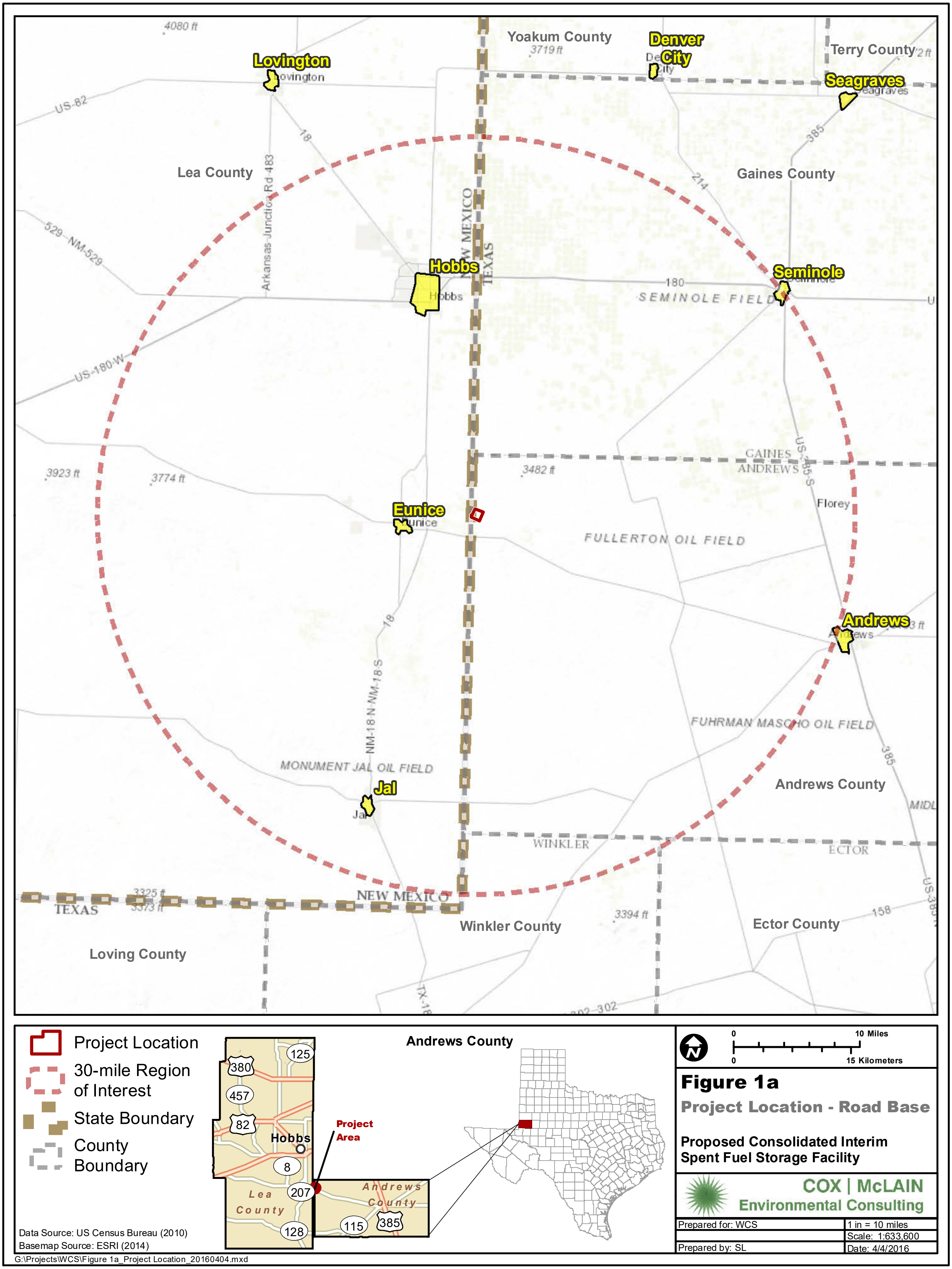
Since 1997, WCS has been licensed and authorized to store, process, and dispose of certain types of radioactive materials at its facilities located in Andrews County, Texas. WCS is authorized to dispose of Class A, B, and C Low-Level Radioactive Waste at the Texas Compact Waste Disposal Facility and the Federal Waste Disposal Facility. WCS is also authorized to dispose of 11e (2) byproduct materials at its Byproduct Material Disposal Facility. These activities are regulated by the Texas Commission on Environmental Quality (TCEQ) governed by regulations determined to be compatible, pursuant to Section 274 of the Atomic Energy Act of 1954, as amended in NUREG-0980 wherein the Nuclear Regulatory Commission (NRC) could delegate some licensing authority to the state level.

In January 20I0, President Barack Obama established the Blue Ribbon Commission on America's Nuclear Future. They were directed by the Secretary of Energy to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle and recommend a new strategy. On January 26, 2012, the Blue Ribbon Commission issued a final report making recommendations consisting of eight key elements. Of paramount importance to this licensing action was the Blue Ribbon Commission's recommendation to adopt a new consent-based approach to siting future nuclear waste management facilities in order to initiate prompt efforts to develop one or more consolidated storage facilities (Blue Ribbon Commission 2012).

Development of a spent nuclear fuel Consolidated Interim Storage Facility (CISF) has strong support from the state, regional, and local communities located in West Texas. In April 2014, Texas Governor Rick Perry called for a Texas solution for spent nuclear fuel generated at two reactor sites located in the state. On September 19, 2014, the Texas Radiation Advisory Board also issued a position stating it is in the state's best interest to request that the Federal Government consider Texas as a CISF site. On January 20, 2015, the Andrews County Commissioners unanimously approved a resolution in support of establishing a site in Andrews County, Texas, for the consolidated interim storage of spent nuclear fuel and high level radioactive waste (see **Appendix B**).

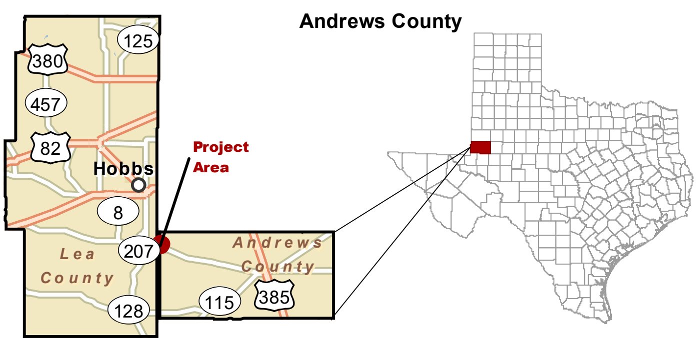


Appendix A has been revised in response to RAI SOC-1




Appendix A has been revised in response to RAI SOC-1


Project Location
30-mile Region of Interest
State Boundary
County Boundary




0 10 Miles
0 15 Kilometers

**Figure 1b**

**Project Location - Aerial Base**

**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN
Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 10 miles |
| | Scale: 1:633,600 |
| Prepared by: SL | Date: 4/4/2016 |

Data Source: US Census Bureau (2010)
Aerial Source: NAIP (2014)

G:\Projects\WCS\Figure 1b_Project Location_aerial_20160404.mxd

Appendix A has been revised in response to RAI SOC-1

## Approach

WCS has prepared an Environmental Report (to which this document is attached) to evaluate the radiological and non-radiological impacts associated with the construction and operation of a CISF for spent nuclear fuel in Andrews County, Texas. This Environmental Report was prepared to support a License Application for review and approval by the NRC pursuant to the requirements specified in Title 10 of the *Code of Federal Regulations* (CFR), Part 72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste.

WCS prepared the Environmental Report consistent with the guidance provided in:

- Regulatory Guide 3.50, Standard Format and Content for A Specific License Application for an Independent Spent Fuel Storage Installation or Monitored Retrievable Storage Facility;
- NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with Nuclear Material Safety and Safeguards (NMSS) Programs; and
- The National Environmental Policy Act (NEPA) (42 U.S. Code [U.S.C.] Sections 4321–4375) and implementing regulations promulgated by the Council on Environmental Quality (CEQ, 40 Code of Federal Regulations [CFR] Part 1500).

Other documents were reviewed in the development of this report:

- NUREG-1790, Louisiana Energy Services National Enrichment Facility License Application – Environmental Report (Revision 5, 2005);
- Waste Control Specialists LLC, 2007. Socioeconomic Impacts of the Waste Control Specialists Proposed Low-Level Radioactive Waste Disposal Facility, Andrews County, Texas, March 16, 2007; and
- Waste Control Specialists LLC, 2008. Socioeconomic Impacts of the Waste Control Specialists Radioactive Material Storage and Processing Facility, Andrews County, Texas for the Renewal of License No. R04971, July 3, 2008.

WCS is in the process of submitting the license application to construct and operate a CISF. WCS anticipates that the NRC may issue the Final Environmental Impact Statement and License within the next five years. WCS is planning for receipt and storage of spent nuclear fuel until the expiration of the license. Moreover, WCS anticipates continued storage for approximately up to 60 years or until a final geologic repository is licensed and operating in accordance with the Nuclear Waste Policy Act of 1982, as amended.

WCS has hired Cox|McLain Environmental Consulting, Inc. (CMEC) to conduct a socioeconomic impact assessment of the proposed CISF activities at the existing WCS facility. This assessment includes (1) background demographic, social, economic, and cultural resources information about the Region of Interest (ROI); (2) a focused assessment within a four-mile radius around the proposed


Appendix A has been revised in response to RAI SOC-1

facility for Environmental Justice analysis; and (3) a social and economic impact assessment including sections on potential impacts from transportation and cumulative impacts.

CMEC utilized two general study areas for this analysis: a 30-mile ROI radius centered on the proposed site within the WCS property and a four-mile radius for the Environmental Justice Analysis. Study areas are discussed in the NRC's Environmental Justice Policy Statement (2003). Whereas NUREG-1748 uses 0.6 mile for analysis if the center of the site is in an urban area, and whereas the Office of Nuclear Reactor Regulation (NRR) uses an analysis area of a 50-mile radius for regulatory actions involving power reactors, the current analysis includes 30 miles since it encompasses both the nearby community of Eunice, New Mexico and the county seat and center of many business operations related to the WCS activities in the city of Andrews, Texas. In the comment and response period on the NRC's proposed policy statement (2003) on Environmental Justice, NRC stated that "this policy statement does not address site-specific concerns. In accordance with NEPA, and consistent with Commission practice, the geographic area assessed for NEPA purposes will be commensurate with the potential impact area of the proposed activity" and "should include a sample of the surrounding population because the goal is to evaluate the communities, neighborhoods, and areas that may be disproportionately impacted." Therefore, the 30-mile ROI includes census geographies and political geographies such as county boundaries in order to provide a clear picture of the communities that would host the proposed disposal activities, and that would house workers who may be involved with construction or operation phases of the proposed CISF activities. The four-mile study area directly addresses the recommended analysis area for Environmental Justice considerations.

**Project Description**

WCS is requesting authorization to construct and operate a CISF in Andrews County, Texas. The CISF will be located on approximately 100 acres of land (owner-controlled area) just north and adjacent to the WCS Low-Level Radioactive Waste Disposal facilities licensed by the TCEQ in accordance with Texas Radioactive Material License (RML) No. R04100.

Additionally, WCS is requesting authorization to store up to 40,000 metric tons of uranium (MTU). Approval to store up to 40,000 MTU at the CISF will not only accommodate complete decommissioning of the ten shutdown commercial reactors, but also provide a regulatory path forward to ultimately allow a transition for storing additional spent nuclear fuel from other reactors that may initiate decommissioning in the future.

WCS will use existing dry cask storage systems currently used at several operating commercial nuclear power plants in the United States and abroad. These dry cask storage systems store spent nuclear fuel inside of sealed canisters as opposed to a spent fuel pool. These dry cask storage systems are safe and confine radioactive materials thereby, minimizing the potential for the release of radioactive contamination into the environment. More information on the disposal methods can be found in the full license application.


Appendix A has been revised in response to RAI SOC-1

The CISF project will consist of a total of eight phases with capacity for 500 metric tons of waste in each phase. Construction on Phase 1 is expected to start in 2018 and is scheduled to be completed by the end of 2020. Phase 1 construction will consist of: the first storage pad, site infrastructure, utilities, a rail line, and support buildings, including Administration, Radiation Safety, Security, and Offload/ Transfer buildings. Phase 1 is expected to provide capacity for approximately five years of operations. Phase 2 construction will begin so that it will come online just before Phase 1 reaches full capacity. The remaining phases are expected to follow the same 5-year pattern (see **Figure 1c, Conceptual Layout** and **Figure 1d, Potential Storage Facility Site Design Renderings**).

## Social and Economic Background of the Region

The site for the proposed CISF is located in Andrews County, Texas, which is in the northwestern portion of the state, bordered on the north by Gaines County; on the east by Martin County; on the south by Winkler, Ector and Midland Counties; and on the west by the State of New Mexico (Lea County). The CISF will be located in the High Plains region, which is part of the central Great Plains. The nearest neighbor to the WCS facility is approximately 3.8 miles west along State Highway 176 toward Eunice, New Mexico. The surrounding land is primarily used for stock grazing and supports an active oil and natural gas industry.

Outside of the WCS footprint, industries include gravel and caliche mining, oil and gas production, landfill operations, cattle and ranching. Louisiana Energy Services (LES) operates the National Enrichment Facility as URENCO, USA, about one mile southwest of the site, under license by the Nuclear Regulatory Commission. The majority of the land within five miles of the Site is used for grazing and ranching activities. Other businesses in proximity to the WCS property include Wallach Quarry, Sundance, Inc., and DD Landfarm located about one mile northwest and west of the proposed CISF. The remaining land in the vicinity of the proposed CISF is used for livestock grazing, oil and gas production or is unused land. The Lea County, New Mexico Landfill occupies approximately 40 acres and is located about 1.25 miles south southwest of the proposed CISF.

The ROI (defined as a 30-mile radius around the WCS facility) is entirely situated within the southern part of the Llano Estacado of Texas and New Mexico. The Llano Estacado (Staked Plains), the southern extension of the High Plains of North America, lies south of the Canadian River in northwest Texas and east New Mexico.

According to the WCS Socioeconomic Impact Assessment completed for the Byproduct Materials License (2008), social and economic development of the Llano Estacado did not begin until the 1870s. By the end of 1886, the area and adjacent lands had at least 30 large ranches recognized by name and cattle brand, grazing thousands of cattle on free grass and water on mostly unappropriated public lands. Some of the larger ranches were the Quarter Circle T, JA, Rocking Chair, LX, Turkey Track, T Anchor, Shoe Bar, Frying Pan, and Matador. Most of the largest ranches


Appendix A has been revised in response to RAI SOC-1

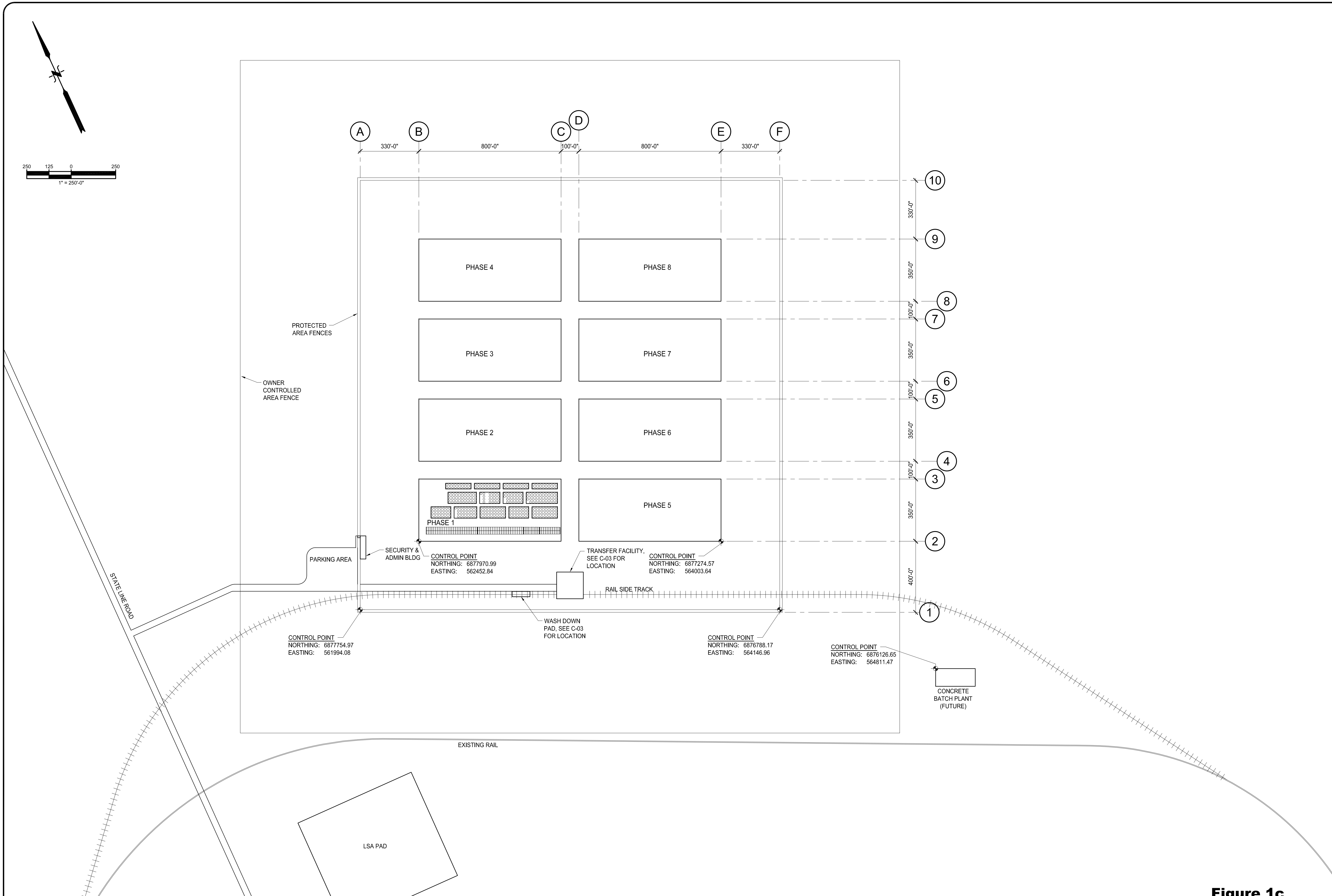



**Figure 1c**
**Conceptual Site Plan**

Appendix A has been revised in response to RAI SOC-1

DRAWING RECORD

| REV. | DESCRIPTION | DATE | DRAWN | CHECK |
|---|---|---|---|---|
| | ISSUED FOR REVIEW | | GWH | DHO |

AMERICAS NUCLEAR SOLUTION
9998 W. STATE HWY. 176, ANDREWS, TEXAS 79714
Ph. (432) 525-8500 WWW.WCSTEXAS.COM

WCS CISF
WASTE CONTROL SPECIALISTS, ANDREWS TEXAS
CONCEPTUAL SITE PLAN

141101

DESIGNED BY: D.OWEN
DRAWN BY: G.HAMBLIN
CHECKED BY: D.OWEN
PROJ. ENG. MGR.:
ENG DIRECTOR:
DOCUMENT CONTROL No.:
CONTROL COPY No.:
DWG. SCALE: 1" = 250'-0"
SHEET NUMBER: C-02

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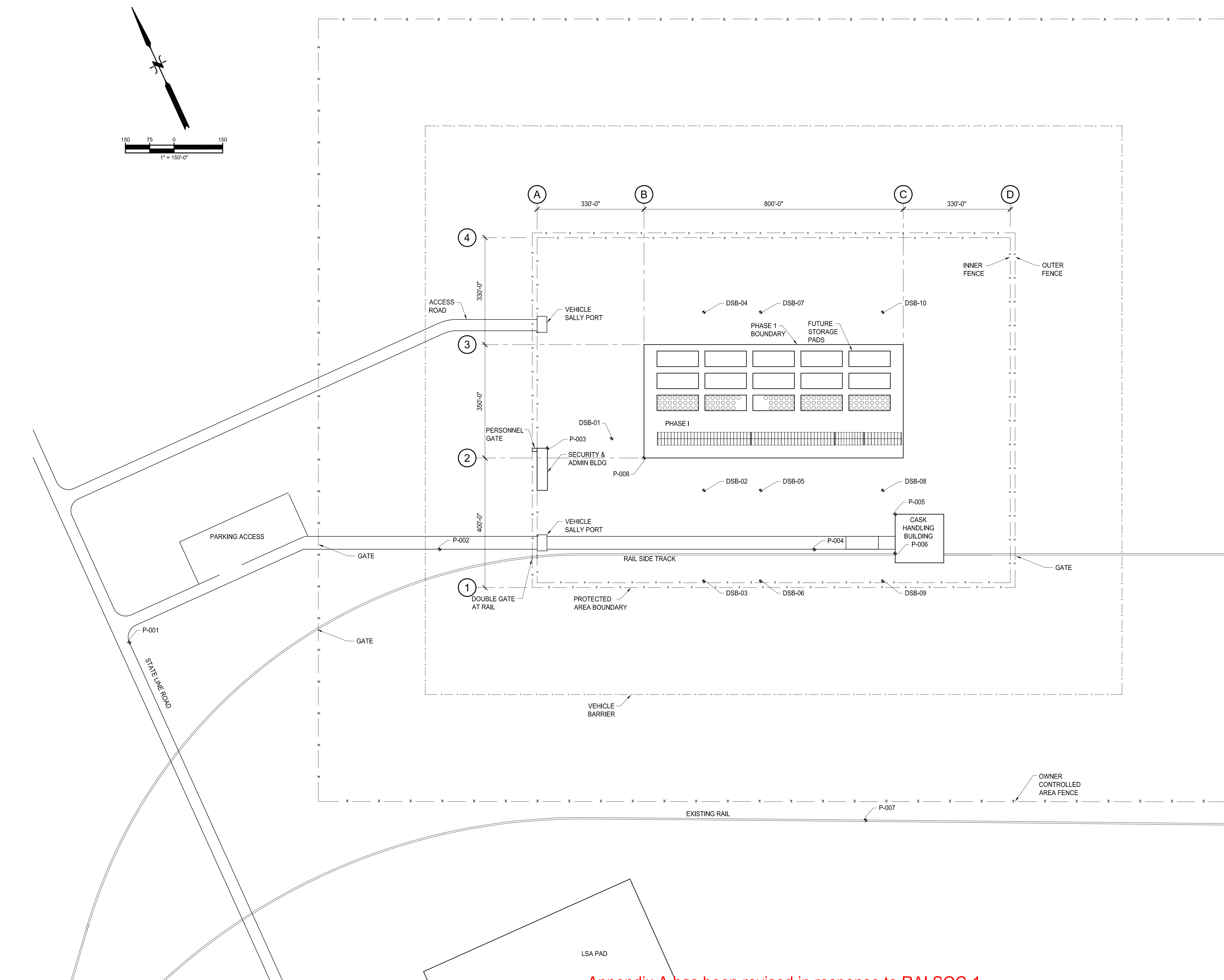


FACILITY POINTS

| POINT NO. | NORTHING | EASTING | LAT: | LONG: |
|---|---|---|---|---|
| P-001 | 560770.85 | 6878102.44 | | |
| P-002 | 561762.03 | 6877972.59 | | |
| P-003 | 562193.28 | 6878120.44 | | |
| P-004 | 562816.16 | 6877498.49 | | |
| P-005 | 563088.75 | 6877495.24 | | |
| P-006 | 563039.04 | 6877384.55 | | |
| P-007 | 562618.87 | 6876671.78 | | |
| P-008 | 562452.84 | 6877970.99 | 32d 27' 37.90782" N | 103d 03' 34.87356" W |

DETECTORS ALONG SECURITY BARRIERS

| POINT NO. | NORTHING | EASTING |
|---|---|---|
| DSB-01 | 562386.26 | 6878066.83 |
| DSB-02 | 562580.56 | 6877804.00 |
| DSB-03 | 562465.86 | 6877548.58 |
| DSB-04 | 562805.88 | 6878305.73 |
| DSB-05 | 562740.16 | 6877732.33 |
| DSB-06 | 562625.45 | 6877476.91 |
| DSB-07 | 562965.47 | 6878234.06 |
| DSB-08 | 563083.74 | 6877578.04 |
| DSB-09 | 562969.03 | 6877322.61 |
| DSB-10 | 563309.05 | 6878079.77 |

Appendix A has been revised in response to RAI SOC-1

**Figure 1c**

**Conceptual Site Plan**

DRAWING RECORD

| REV. | DESCRIPTION | DATE | DRAWN | CHECK |
|---|---|---|---|---|
| A | ISSUED FOR REVIEW | | GWH | DHO |

AMERICA'S NUCLEAR SOLUTION

9998 W. STATE HWY. 176, ANDREWS, TEXAS 79714
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# WCS CISF

WASTE CONTROL SPECIALISTS, ANDREWS TEXAS

CONCEPTUAL SITE PLAN

141101

DESIGNED BY: D.OWEN
DRAWN BY: G.HAMBLIN
CHECKED BY: D.OWEN
PROJ. ENG. MGR:
ENG DIRECTOR:
DOCUMENT CONTROL No.:
CONTROL COPY No.:
DWG. SCALE: 1" = 150'-0"
SHEET NUMBER: C-03

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**Figure 1c**
**Conceptual Site Plan**

Appendix A has been revised in response to RAI SOC-1

DRAWING RECORD

| REV. | DESCRIPTION | DATE | DRAWN | CHECK |
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| A | ISSUED FOR REVIEW | | GWH | DHO |
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# WCS CISF

WASTE CONTROL SPECIALISTS, ANDREWS TEXAS

CONCEPTUAL SITE PLAN

141101

| | |
|---|---|
| DESIGNED BY: | D.OWEN |
| DRAWN BY: | G.HAMBLIN |
| CHECKED BY: | D.OWEN |
| PROJ. ENG. MGR. | |
| ENG DIRECTOR: | |
| DOCUMENT CONTROL No.: | |
| CONTROL COPY No.: | |
| DWG. SCALE: | 1" = 250'-0" |

SHEET NUMBER:
C-05

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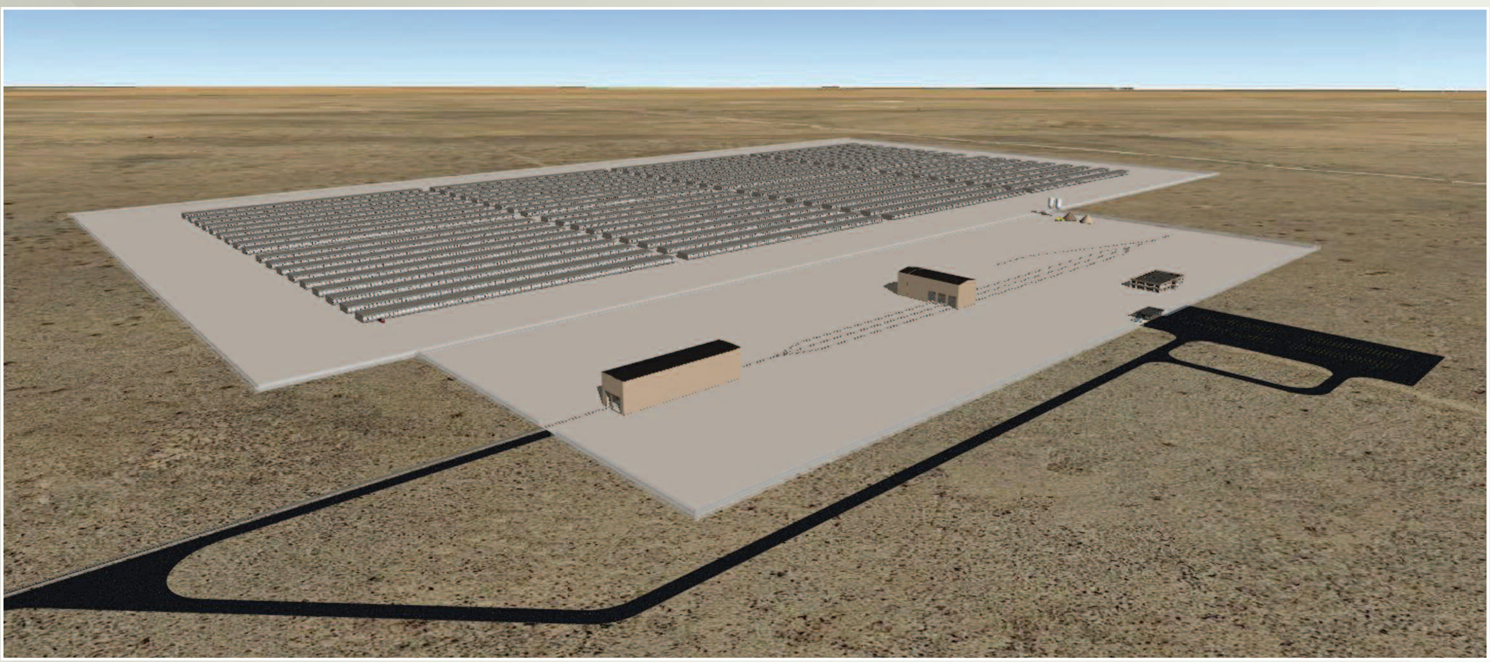
AMERICA'S NUCLEAR SOLUTION

# POTENTIAL ISFSI SITE RENDERINGS



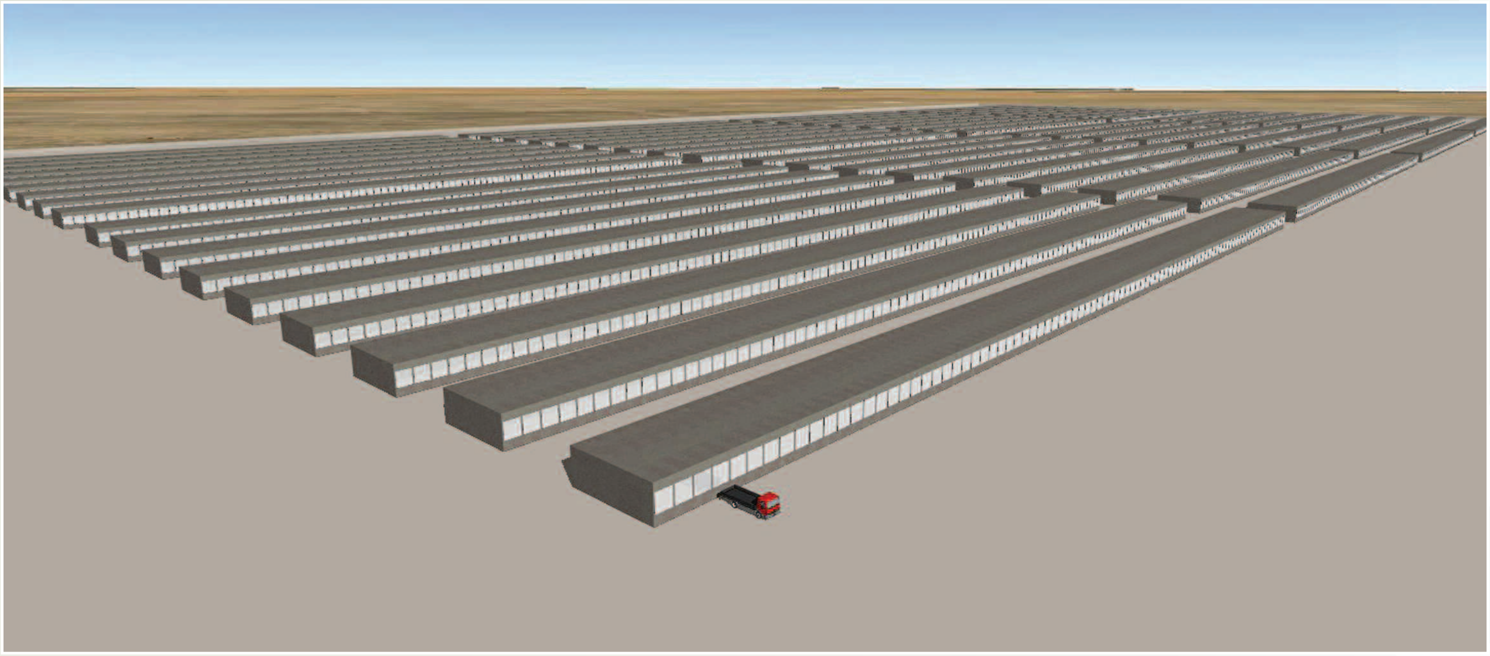


**Figure 1d**

**Potential Storage Facility Site Design Renderings**

Appendix A has been revised in response to RAI SOC-1

were broken up by 1920, and much of the land came under the control of land developers and speculators who promoted active and successful campaigns to bring new settlers to West Texas. Innovative farmers learned techniques to make the rich, dry land productive; they also drilled into the Ogallala Aquifer. Development of animal, windmill, and engine-powered pumps led to massive irrigation programs. Cotton, corn, wheat, sorghum, and a great variety of melons and vegetables are now grown on the Llano Estacado.

Natural gas was discovered in Potter County in 1917 and oil in Carson County in 1921. These initial discoveries led to the development of the vast West Texas oilfields, which by 1981 had yielded approximately 46.7 billion barrels of crude oil. The discovery and development of the oil and gas fields brought large-scale industry to the Llano area in the 1930s. Thus within a relatively short period the Llano witnessed the most rapid development of any section of the state, progressing from an economy based on unfenced public grazing land to a modern industrial economy within half a century (WCS 2008).

The Permian Basin is a large oil and natural gas producing area largely contained in west Texas. It is so named because it has one of the world's thickest deposits of rocks from the Permian geologic period. Ranching, both sheep and cattle, was the mainstay of the economy in this region of the Permian Basin from the mid-1880's through 1927. During this forty-year period, the basic entities of the community were formed. Churches were founded almost immediately with congregations being served by the circuit preachers and laymen. Services were held at the courthouse, in homes or under the trees. Schools, social organizations, commercial businesses and political clubs soon followed (WCS 2008).

Subsurface petroleum product exploration and production have been conducted in the area of the Central Basin Platform for over 75 years. The local area has been heavily explored for oil and gas reserves over the last 35 years. Most of the oil wells in the vicinity of the CISF site have been abandoned. The absence of oil wells on the site supports the absence of favorable conditions for oil production. Oil and gas wells are also located to the west in New Mexico and to the north in Texas, XTO is currently drilling a well two miles north of the current permitted area.

Residents of the ROI's communities take pride that their society and economy have been able to withstand the "boom" and "bust" cycles throughout its history, including the period in the 2000s during which the “peak oil” debate was occurring. Periodic fluctuations in the price of oil and resulting variability in the ROI's output, employment and income, however, have given rise to the belief that the ROI needs to continue diversifying its economic base beyond oil and natural gas production and processing. As demonstrated through their cooperative relationship, both WCS and the local community are aligned in their goal to address the national problem of locating a safe interim disposal site for spent fuel until a permanent location is identified. Lea and Eddy Counties in New Mexico have formed an alliance to pursue an interim storage site approximately 40 miles west of the site outside the ROL.


Appendix A has been revised in response to RAI SOC-1

**Current Social and Economic Conditions, Including Baseline Socioeconomic Data for the Region of Interest**

This section describes the current social and economic characteristics of the ROI surrounding the WCS complex. Information is provided on population, including minority and low-income areas, economic trends, housing, and community services in the areas of education, health, public safety, and transportation.

The primary labor markets for the operation of the processing and storage facility will be Andrews County, Texas, and Lea County, New Mexico. The Andrews County seat is located in the City of Andrews, about 30 miles east- southeast of the facility. There are no population centers in Andrews County closer to the processing and storage facility. The surrounding area is very rural and semi-arid, with commerce in livestock production, agriculture (cotton, sorghum), and substantial oil and gas production, which represents most of the county's wealth and income. Andrews County ranked sixth in oil producing counties in Texas in April 2014 (Railroad Commission of Texas 2015 http://www.rrc.state.tx.us/oil-gas/research-and-statistics/). Andrews County covers 1,501 square miles and in 2010 its population density was 9.9 persons per square mile compared to Texas, which had 96.3 persons per square mile.

The City of Andrews has been in a period of large economic activity triggered by major industry investments, which have brought in hundreds of high-paying jobs and additional construction activity. Recent examples of new infrastructure and investments include (among others): Performance Center; two new elementary schools; City of Andrews Business and Technology Center; a Senior Citizens Activity Center, a new 90-bed Residential Care Facility; two new business parks (energy industry driven), County Special Events Center, Andrews downtown streetscape improvements and a new campus for the Permian Regional Medical Center. One library, two banks, three credit unions, and a biweekly newspaper serve the city of Andrews. Fraternal and civil organizations include the Lions Club, Rotary Club, United Way of Andrews, Knights of Columbus, and Girl Scouts of America. Local facilities serving the community of Andrews include 39 churches, a municipal swimming pool, golf course, tennis courts, youth club/center/parks, and athletic fields.

The current socioeconomic conditions for Lea County are similar in most respects to Andrews County. Lea County is relatively large, covering 4,391 square miles in southeastern New Mexico. The county population density is 14.7 persons per square mile compared to 17 persons per square mile in New Mexico. The Lea County community was initially agriculturally based, but the discovery of oil and gas in the mid-1920s has had a significant impact on the region. Today the county's agricultural heritage continues to have underlying influences on the county's development with farming and ranching. The oil and gas industry still has a strong effect on the local economy, in addition to a growing manufacturing sector. Five libraries, nine financial institutions, and two daily newspapers serve Lea County. Cities in Lea County that are within the ROI include Hobbs, Eunice and Jal.



Appendix A has been revised in response to RAI SOC-1

In Lea County, there are five public school districts and four private schools. The closest school district is in Eunice, located six miles to the west, with the other districts located in Hobbs, Jal, Lovington, and Tatum. The main campus of the University of the Southwest (USW) and New Mexico Junior College (NMJC) are located in and near Hobbs, New Mexico. NMJC's Training and Outreach Facility provides workforce training, online courses, and a center for legal studies.

There are two hospitals in Lea County, New Mexico. The Lea Regional Medical Center is located in Hobbs, New Mexico, about 20 miles north of the WCS facility. In Lovington, New Mexico, 39 miles north-northwest of the facility, Covenant Medical Systems manages Nor-Lea Hospital, a 25-bed Medicare-certified Critical Access Hospital serving southeastern New Mexico.


Appendix A has been revised in response to RAI SOC-1

# 1.0 CURRENT SOCIAL AND ECONOMIC CONDITIONS, INCLUDING BASELINE SOCIOECONOMIC DATA FOR THE REGION OF INTEREST

## 1.1 DEMOGRAPHIC PROFILE IN THE REGION OF INTEREST (ROI)

The existing WCS processing, storage, and disposal facility is in Andrews County, Texas, near the border of Lea County, New Mexico. Andrews, Texas, and Eunice, New Mexico, are the closest communities to the site at distances of approximately 32 miles southeast and six miles west, respectively. Population centers (more than 25,000 persons) and communities (less than 25,000 persons) are shown below with distance from the site and 2010 census population (see **Figure 1a**):

- Andrews, Andrews County, Texas: 32 miles southeast: 11,088 persons
- Eunice, Lea County, New Mexico: 6 miles west: 2,922 persons
- Hobbs, Lea County, New Mexico: 20 miles north; 34,122 persons
- Jal, Lea County, New Mexico: 23 miles south; 2,047 persons
- Lovington, Lea County, New Mexico: 39 miles north-northwest: 11,009 persons
- Seminole, Gaines County, Texas: 32 miles east-northeast: 6,430 persons
- Denver City, Gaines County, Texas: 40 miles north-northeast: 4,479 persons.

### Population and Population Projections in the Region of Interest

Aside from these communities, the population density around the site is low. A majority of the ROI is in Andrews and Gaines Counties, Texas, with a large portion in Lea County, New Mexico. Small portions of the ROI fall in Winkler County and Ector County, Texas, so they are also included. **Table 1-1** shows the historical population of Texas and New Mexico Counties in the ROI from 1970 to 2010. All counties grew between 1970 and 2010 with the exception of Winkler County, which experienced population decline (26 percent) over the 40-year period. Andrews County grew by 43 percent between 1970 and 2010, while Gaines County grew 51 percent and Ector County (though the county's largest population center, Odessa, does not fall in the ROI) grew by 49 percent. The population in Lea County, New Mexico, grew by 22 percent.

**Table 1-1: Historical Population of Counties in the Region of Interest, 1970–2010**

| Year | Andrews Co., TX | Gaines Co., TX | Winkler Co., TX | Ector Co., TX | Lea Co., NM* |
|---|---|---|---|---|---|
| 1970 | 10,372 | 11,593 | 9,640 | 91,805 | 49,554 |
| 1980 | 13,323 | 13,150 | 9,944 | 115,374 | 55,993 |
| 1990 | 14,338 | 14,123 | 8,626 | 118,934 | 55,765 |
| 2000 | 13,004 | 14,467 | 7,173 | 121,125 | 55,511 |
| 2010 | 14,786 | 17,526 | 7,110 | 137,130 | 60,702 |
| Percent change 1970 to 2010 | 43% | 51% | -26% | 49% | 22% |

Source: Texas Almanac, Population of Texas Counties 1850–2010.

*Lea County, New Mexico, data from U.S. Census (from WCS Socioeconomic Impact Assessment, 2008).


Appendix A has been revised in response to RAI SOC-1

Population projections are available from the Texas Water Development Board for Texas counties from 2020 to 2070. In this 50-year timeframe, all Texas counties in the ROI are expected to grow by varying degrees. Andrews is projected to grow by 107.3 percent, while Gaines is expected to grow by 120 percent. Winkler is expected to experience the least population growth (39.2 percent) and Ector would grow by 68.6 percent. Together, the Texas counties in the ROI are expected to grow by 56.3 percent, slightly less as a region than the state of Texas, which is projected to grow by 73.0 percent. These data are shown in **Table 1-2**.

**Table 1-2: Texas Water Board Population Projections for Texas Counties in the Region of Interest**

| Year | Andrews | Gaines | Winkler | Ector | Texas Counties in the Region of Interest | Texas |
|---|---|---|---|---|---|---|
| 2020 | 19,089 | 21,316 | 8,033 | 156,957 | 247,322 | 29,510,184 |
| 2030 | 22,847 | 25,746 | 8,817 | 177,157 | 274,737 | 33,628,653 |
| 2040 | 26,246 | 30,997 | 9,459 | 198,446 | 302,648 | 37,736,338 |
| 2050 | 30,111 | 36,654 | 10,147 | 220,268 | 330,815 | 41,928,264 |
| 2060 | 34,526 | 41,666 | 10,702 | 242,371 | 358,485 | 46,354,818 |
| 2070 | 39,574 | 46,886 | 11,181 | 264,646 | 386,459 | 51,040,173 |
| Percent change 2020 - 2070 | 107.3% | 120.0% | 39.2% | 68.6% | 56.3% | 73.0% |

Source: Texas Water Development Board, 2016 Regional Water Plan Projections for 2020–2070.

The Texas Water Development Board projections utilize estimates from the Texas State Data Center (TSDC). The TSDC projections utilize the “0.5” growth rate scenario, one of several scenarios developed by the TSDC to project population growth in Texas. This scenario assumes rates of net migration one-half of those of the 1990s; the TSDC believes that many counties in the state are unlikely to continue to experience the overall levels of relatively extensive growth of the 1990s. The TSDC considers the 0.5 scenario to be the most appropriate scenario for most counties for use in long-term planning.

Population projections by race for Andrews County show that between 2010 and 2050, the total population is expected to grow by 60.1 percent with the Anglo population growing by four percent, the Black population remaining the same, the Hispanic population growing 116.1 percent, and Other races growing by 82.8 percent (**Table 1-3**).

As shown in **Table 1-4**, population projections by race for Gaines County show that between 2010 and 2050, the total population is expected to grow by 89.1 percent, with the Anglo population growing by 82.4 percent, the Black population growing by 14.6 percent, the Hispanic population growing 104.3 percent, and Other races growing by 60.7 percent.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| Table 1-3: Projected Populations 2010–2050 by Race/Ethnicity for Andrews County | | | | | |
|---|---|---|---|---|---|
| Year | Total | Anglo | Black | Hispanic | Other |
| 2010 | 14,786 | 7,083 | 199 | 7,195 | 309 |
| 2015 | 15,875 | 7,197 | 202 | 8,137 | 339 |
| 2020 | 16,987 | 7,288 | 208 | 9,118 | 373 |
| 2025 | 18,123 | 7,357 | 217 | 10,136 | 413 |
| 2030 | 19,224 | 7,398 | 220 | 11,155 | 451 |
| 2035 | 20,369 | 7,455 | 222 | 12,216 | 476 |
| 2040 | 21,482 | 7,464 | 214 | 13,305 | 499 |
| 2045 | 22,585 | 7,425 | 207 | 14,413 | 540 |
| 2050 | 23,676 | 7,364 | 199 | 15,548 | 565 |
| Percent Change 2010–2050 | 60.1% | 4% | 0% | 116.1% | 82.8% |

Source: Texas Data Center 2014 projections at 1/2 Migration Rate (2000–2010) for all ages.

| Table 1-4: Projected Populations 2010–2050 by Race/Ethnicity for Gaines County | | | | | |
|---|---|---|---|---|---|
| Year | Total | Anglo | Black | Hispanic | Other |
| 2010 | 17,526 | 10,628 | 261 | 6,413 | 224 |
| 2015 | 19,120 | 11,461 | 274 | 7,143 | 242 |
| 2020 | 20,805 | 12,340 | 287 | 7,911 | 267 |
| 2025 | 22,611 | 13,308 | 290 | 8,718 | 295 |
| 2030 | 24,602 | 14,459 | 298 | 9,526 | 319 |
| 2035 | 26,754 | 15,759 | 312 | 10,336 | 347 |
| 2040 | 28,832 | 16,959 | 316 | 11,203 | 354 |
| 2045 | 30,943 | 18,150 | 313 | 12,124 | 356 |
| 2050 | 33,144 | 19,384 | 299 | 13,101 | 360 |
| Percent Change 2010–2050 | 89.1% | 82.4% | 14.6% | 104.3% | 60.7% |

Source: Texas Data Center 2014 projections at 1/2 Migration Rate (2000–2010) for all ages.

Population projections by race for Winkler County (**Table 1-5**) show that between 2010 and 2050, the total population is expected to grow by 43.6 percent, with the Anglo population declining by 0.6 percent, the Black population growing by 4.7 percent, the Hispanic population growing 79.8 percent, and Other races growing by 45.1 percent.


Appendix A has been revised in response to RAI SOC-1

| Table 1-5: Projected Populations 2010–2050 by Race/Ethnicity for Winkler County | | | | | |
|---|---|---|---|---|---|
| Year | Total | Anglo | Black | Hispanic | Other |
| 2010 | 7,110 | 3,024 | 129 | 3,824 | 133 |
| 2015 | 7,567 | 3,093 | 129 | 4,208 | 137 |
| 2020 | 8,039 | 3,140 | 134 | 4,618 | 147 |
| 2025 | 8,486 | 3,151 | 141 | 5,036 | 158 |
| 2030 | 8,857 | 3,130 | 146 | 5,414 | 167 |
| 2035 | 9,213 | 3,104 | 149 | 5,782 | 178 |
| 2040 | 9,528 | 3,061 | 145 | 6,136 | 186 |
| 2045 | 9,858 | 3,038 | 141 | 6,489 | 190 |
| 2050 | 10,209 | 3,005 | 135 | 6,876 | 193 |
| Percent Change 2010–2050 | 43.6% | -0.6% | 4.7% | 79.8% | 45.1% |

Source: Texas Data Center 2014 projections at 1/2 Migration Rate (2000–2010) for all ages.

For Ector County, population projections by race show that between 2010 and 2050, the total population is expected to grow by 60.4 percent, with the Anglo population declining by 21.9 percent, the Black population growing by 33.6 percent, the Hispanic population growing 125.5 percent, and Other races growing by 87.2 percent (**Table 1-6**).

| Table 1-6: Projected Populations 2010–2050 by Race/Ethnicity for Ector County | | | | | |
|---|---|---|---|---|---|
| Year | Total | Anglo | Black | Hispanic | Other |
| 2010 | 137,130 | 56,306 | 5,596 | 72,331 | 2,897 |
| 2015 | 147,179 | 56,021 | 5,918 | 82,030 | 3,210 |
| 2020 | 157,045 | 55,117 | 6,155 | 92,259 | 3,514 |
| 2025 | 167,067 | 53,771 | 6,378 | 103,066 | 3,852 |
| 2030 | 177,335 | 52,089 | 6,636 | 114,416 | 4,194 |
| 2035 | 187,862 | 50,317 | 6,896 | 126,130 | 4,519 |
| 2040 | 198,503 | 48,343 | 7,145 | 138,175 | 4,840 |
| 2045 | 209,095 | 46,189 | 7,304 | 150,468 | 5,134 |
| 2050 | 220,012 | 43,979 | 7,475 | 163,135 | 5,423 |
| Percent Change 2010–2050 | 60.4% | -21.9% | 33.6% | 125.5% | 87.2% |

Source: Texas Data Center 2014 projections at 1/2 Migration Rate (2000–2010) for all ages.

Data for the State of Texas (**Table 1-7**) show that there are similarities for projections by race within the ROI, especially with regard to the substantial anticipated growth of the Hispanic population. Statewide, the total population is expected to grow by 61.1 percent between 2010 and 2050, with the Anglo population declining by 1.2 percent; the Black population expected to grow by 40.8 percent; the Hispanic population projected to grow by 127.4 percent and the Other population to increase by 161 percent.


Appendix A has been revised in response to RAI SOC-1

| Table 1-7: Projected Populations 2010–2050 by Race/Ethnicity for Texas | | | | | |
|---|---|---|---|---|---|
| Year | Total | Anglo | Black | Hispanic | Other |
| 2010 | 25,145,561 | 11,397,345 | 2,886,825 | 9,460,921 | 1,400,470 |
| 2015 | 26,947,116 | 11,585,146 | 3,083,970 | 10,659,352 | 1,618,648 |
| 2020 | 28,813,282 | 11,723,184 | 3,274,738 | 11,963,951 | 1,851,409 |
| 2025 | 30,734,321 | 11,796,414 | 3,454,116 | 13,384,050 | 2,099,741 |
| 2030 | 32,680,217 | 11,792,588 | 3,616,745 | 14,900,906 | 2,369,978 |
| 2035 | 34,616,890 | 11,717,771 | 3,757,614 | 16,475,644 | 2,665,861 |
| 2040 | 36,550,595 | 11,593,202 | 3,876,830 | 18,095,574 | 2,984,989 |
| 2045 | 38,499,538 | 11,434,587 | 3,977,772 | 19,769,879 | 3,317,300 |
| 2050 | 40,502,749 | 11,265,371 | 4,065,757 | 21,516,362 | 3,655,259 |
| Percent Change 2010–2050 | 61.1% | -1.2% | 40.8% | 127.4% | 161% |

Source: Texas Data Center 2014 projections at 1/2 Migration Rate (2000–2010) for all ages.

Data were not available for population projections by race in Lea County or New Mexico. Overall, the population in Lea County is projected to grow by 71 percent between 2010 and 2040 (**Table 1-8**). The population in New Mexico is projected to grow by 36.9 percent between 2010 and 2040 (**Table 1-9**).

| Table 1-8: Projected Lea County Populations: 2010–2040 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Population** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **Percent Change 2010–2040** |
| Lea County | 64,727 | 71,465 | 78,407 | 85,773 | 93,712 | 102,090 | 110,661 | 71% |

Source: New Mexico County Population Projections July 1, 2010, to July 1, 2040, Geospatial and Population Studies Group, University of New Mexico. Released November 2012.

| Table 1-9: Projected New Mexico State Populations: 2010–2040 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Population** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **Percent Change 2010–2040** |
| New Mexico | 2,065,826 | 2,208,450 | 2,351,724 | 2,487,227 | 2,613,332 | 2,727,118 | 2,827,692 | 36.9% |

Source: New Mexico County Population Projections July 1, 2010, to July 1, 2040, Geospatial and Population Studies Group, University of New Mexico. Released November 2012.


Appendix A has been revised in response to RAI SOC-1

**Age Distribution**

The various counties within the ROI vary substantially in terms of total population, with Ector County (only a small portion of which falls within the ROI) having approximately 137,130 persons compared to Winkler County, which has only 7,110 persons. Lea County, New Mexico, has 64,727 persons and Andrews County has 14,786 persons. Nonetheless, there are numerous similarities regarding the breakdown of males and females within various age groups, and the largest population sectors in terms of age. The data for the ROI are similar to the data for Texas and New Mexico in terms of percentages. The percentage of individuals aged 20 to 44 years within the ROI (33.7 percent) is very similar to that of the states of Texas (35.3 percent) and New Mexico (32 percent). For all age groups except over 65 years, males and females each make up approximately half the population (with males and females typically making up between 49 and 51 percent of the population depending on the geographic area, with minor exceptions). For populations over 65, the number of females typically exceeds the number of males, with female population percentages ranging from 54 to 57 percent and males ranging from 43 to 46 percent of the population. Within the ROI, females over 65 constitute 56 percent of the population and males constituting 44 percent of the population. This distribution is the same as the state of Texas as a whole; in New Mexico, 55 percent of persons over 65 were female and 45 percent were male (**Table 1-10**).

## 1.1.1 Education Levels

The most common level of educational attainment for the cities and counties in the ROI is a high school diploma (26.7 to 30.3 percent of the population), followed by persons who had some college and no degree (ranging from 14.3 to 25.5 percent of the population). The least common level of educational attainment for the ROI is graduate or professional degrees, which have been earned by 2.4 to 4.9 percent of the population (**Table 1-11**).

## 1.1.2 Health Characteristics by Race/Ethnicity, Income, Including Births, Deaths, Average Life Span, Infant Mortality Rate, Child Mortality Rate, Morbidity, and Mortality by Type of Disease

According to the Texas Department of State Health Services, the average life span for Texas residents is 78.3 years. The number of births in Texas for 2012 was 382,438 with Hispanics or Latinos having the most births (182,855 or 47.8 percent of all births) (see **Table 1-12**). The number of births for the White population was 132,288 or 34.6 percent followed by the Black or African American population with 43,100 births and other races with 24,195 births.

Based on data shown in **Table 1-12**, the number of deaths in Texas in 2012 was 173,935 of which 115,089 or 66.2 percent were within the White population. Hispanic or Latino deaths were 34,756 or 20.0 percent, followed by Black or African American deaths (20,560) and other races (3,530 deaths).


Appendix A has been revised in response to RAI SOC-1

| Table 1-10: Age in the Region of Interest (2010) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | Lea County, NM | *% M or F w/in age group* | Andrews County, TX | *% M or F w/in age group* | Ector County, TX | *% M or F w/in age group* | Gaines County, TX | *% M or F w/in age group* | Winkler County, TX | *% M or F w/in age group* | Region of Interest | *% M or F w/in age group* | New Mexico | *% M or F w/in age group* | Texas | *% M or F w/in age group* |
| Total: | 64,727 | | 14,786 | | 137,130 | | 17,526 | | 7,110 | | 241,279 | | 2,059,179 | | 25,145,561 | |
| Under 5 | 5,909 | | 1,226 | | 12,075 | | 1,819 | | 633 | | 21,662 | | 144,981 | | 1,928,473 | |
| Male | 2,985 | *51%* | 658 | *54%* | 6,164 | *51%* | 913 | *50%* | 322 | *51%* | 11,042 | *51%* | 74,078 | *51%* | 984,149 | *51%* |
| Female | 2,924 | *49%* | 568 | *46%* | 5,911 | *49%* | 906 | *50%* | 311 | *49%* | 10,620 | *49%* | 70,903 | *49%* | 944,324 | *49%* |
| *<5 % of Total* | *9.1%* | | *8.3%* | | *8.8%* | | *10.4%* | | *8.9%* | | *9.0%* | | *7.0%* | | *7.7%* | |
| 5 to 19 | 15,068 | | 3,500 | | 32,191 | | 4,861 | | 1,659 | | 57,279 | | 434,860 | | 5,693,241 | |
| Male | 7,695 | *51%* | 1,812 | *52%* | 16,364 | *51%* | 2,479 | *51%* | 867 | *52%* | 29,217 | *51%* | 221,549 | *51%* | 2,915,366 | *51%* |
| Female | 7,373 | *49%* | 1,688 | *48%* | 15,827 | *49%* | 2,382 | *49%* | 792 | *48%* | 28,062 | *49%* | 213,311 | *49%* | 2,777,875 | *49%* |
| *5-19 % of Total* | *23.3%* | | *23.7%* | | *23.5%* | | *27.7%* | | *23.3%* | | *23.7%* | | *21.1%* | | *22.6%* | |
| 20 to 44 | 21,866 | | 4,742 | | 47,023 | | 5,625 | | 2,121 | | 81,377 | | 658,138 | | 8,888,934 | |
| Male | 11,530 | *53%* | 2,362 | *50%* | 23,481 | *50%* | 2,816 | *50%* | 1,031 | *49%* | 41,220 | *51%* | 332,620 | *51%* | 4,477,210 | *50%* |
| Female | 10,336 | *47%* | 2,380 | *50%* | 23,542 | *50%* | 2,809 | *50%* | 1,090 | *51%* | 40,157 | *49%* | 325,518 | *49%* | 4,411,724 | *50%* |
| *20-44 % of Total* | *33.8%* | | *32.1%* | | *34.3%* | | *32.1%* | | *29.8%* | | *33.7%* | | *32.0%* | | *35.3%* | |
| 45 to 59 | 12,078 | | 2,998 | | 25,908 | | 3,025 | | 1,494 | | 45,503 | | 428,808 | | 4,858,260 | |
| Male | 6,303 | *52%* | 1,492 | *50%* | 12,759 | *49%* | 1,545 | *51%* | 784 | *52%* | 22,883 | *50%* | 208,369 | *49%* | 2,394,071 | *49%* |
| Female | 5,775 | *48%* | 1,506 | *50%* | 13,149 | *51%* | 1,480 | *49%* | 710 | *48%* | 22,620 | *50%* | 220,439 | *51%* | 2,464,189 | *51%* |
| *45-59 % of Total* | *18.7%* | | *20.3%* | | *18.9%* | | *17.3%* | | *21.0%* | | *18.9%* | | *20.8%* | | *19.3%* | |
| 60 to 64 | 2,815 | | 657 | | 5,979 | | 619 | | 363 | | 10,433 | | 120,137 | | 1,174,767 | |
| Male | 1,385 | *49%* | 320 | *49%* | 2,944 | *49%* | 326 | *53%* | 179 | *49%* | 5,154 | *49%* | 58,201 | *48%* | 565,820 | *48%* |
| Female | 1,430 | *51%* | 337 | *51%* | 3,035 | *51%* | 293 | *47%* | 184 | *51%* | 5,279 | *51%* | 61,936 | *52%* | 608,947 | *52%* |
| *60-64 % of Total* | *4.3%* | | *4.4%* | | *4.4%* | | *3.5%* | | *5.1%* | | *4.3%* | | *5.8%* | | *4.7%* | |
| 65 and over | 6,991 | | 1,663 | | 13,954 | | 1,577 | | 840 | | 25,025 | | 272,255 | | 2,601,886 | |
| Male | 3,147 | *45%* | 724 | *44%* | 5,974 | *43%* | 719 | *46%* | 367 | *44%* | 10,931 | *44%* | 122,604 | *45%* | 1,135,664 | *44%* |
| Female | 3,844 | *55%* | 939 | *56%* | 7,980 | *57%* | 858 | *54%* | 473 | *56%* | 14,094 | *56%* | 149,651 | *55%* | 1,466,222 | *56%* |
| *65> % of Total* | *10.8%* | | *11.2%* | | *10.2%* | | *9.0%* | | *11.8%* | | *10.4%* | | *13.2%* | | *10.3%* | |

Source: U.S. Census Bureau, 2010 Census Table P12.



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| Table 1-11: Educational Attainment in the Region of Interest (2009–2013) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Educational Attainment for Population 25 Years and Older** | **Lea County, NM** | **Andrews County, TX** | **Gaines County, TX** | **Winkler County, TX** | **Ector County, TX** | **Andrews City, TX** | **Seminole City, TX** | **New Mexico** | **Texas** |
| Less than 9th grade | 13.2% | 15.6% | 27.2% | 18.2% | 13.2% | 15.9% | 15.4% | 7.3% | 9.4% |
| 9th to 12th grade, no diploma | 15.5% | 10.8% | 13.4% | 11.6% | 13.9% | 10.1% | 17.8% | 9.0% | 9.4% |
| High school graduate (includes equivalency) | 28.9% | 30.3% | 26.7% | 29.8% | 28.6% | 28.9% | 26.9% | 26.4% | 25.3% |
| Some college, no degree | 21.6% | 24.8% | 14.3% | 25.5% | 25.3% | 26.4% | 17.7% | 23.9% | 22.7% |
| Associate's degree | 7.4% | 4.4% | 6.4% | 5.2% | 5.5% | 5.4% | 7.9% | 7.5% | 6.5% |
| Bachelor's degree | 8.4% | 10.4% | 9.3% | 7.2% | 9.7% | 9.4% | 10.4% | 14.7% | 17.7% |
| Graduate or professional degree | 4.9% | 3.8% | 2.6% | 2.4% | 3.8% | 3.8% | 3.8% | 11.1% | 8.9% |
| **Population 25 years and over** | 39,728 | 9,392 | 9,992 | 4,432 | 84,299 | 7,092 | 3,876 | 1,347,229 | 16,080,307 |

Source: American Community Survey (ACS) 2009–2013 Table S1501.

| Table 1-12: Health Characteristics and Vital Statistics in the Region of Interest | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Race/Age** | **Lea County, NM** | **Andrews County, TX** | **Andrews, TX** | **Gaines County, TX** | **Seminole, TX** | **Winkler County, TX** | **Ector County, TX** | **New Mexico** | **Texas** |
| **Average Life Span** | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 78.3 |
| White | - | - | - | - | - | - | - | - | 78.3 |
| Black or African American | - | - | - | - | - | - | - | - | 74.7 |
| Hispanic or Latino | - | - | - | - | - | - | - | - | 79.5 |
| **Birth by Race** | | | | | | | | | |
| White | - | 106 | 76 | 189 | 68 | 42 | 850 | 8.8 | 132,288 |
| Black or African American | - | 4 | 4 | 6 | 1 | 2 | 94 | 10.6 | 43,100 |
| Hispanic or Latino | - | 204 | 162 | 150 | 57 | 87 | 1,760 | 14.5 | 182,855 |
| Other Races | - | 3 | 1 | 3 | 2 | 1 | 51 | | 24,195 |
| **All Births (2012)** | **1,200** | **317** | **243** | **348** | **128** | **132** | **2,755** | **26,242** | **382,438** |
| **Death by Race** | | | | | | | | | |
| White | - | 102 | 76 | 90 | 46 | 59 | 759 | - | 115,089 |
| Black or African American | - | 1 | 1 | 2 | 1 | 0 | 56 | - | 20,560 |
| Hispanic or Latino | - | 35 | 31 | 29 | 20 | 23 | 332 | - | 34,756 |
| Other Races | - | 1 | 1 | 0 | 0 | 0 | 5 | - | 3,530 |
| **All Deaths (2012)** | **435** | **139** | **109** | **121** | **67** | **82** | **1,152** | **16,780** | **173,935** |
| **Death by Age** | | | | | | | | | |
| Age - Under 1 | - | 1 | - | 1 | - | 1 | 17 | - | 2,224 |
| Age - 1 to 4 | - | 1 | - | 1 | - | 0 | 2 | - | 449 |
| Age - 5 to 14 | - | 0 | - | 4 | - | 0 | 8 | - | 505 |
| Age - 15 and Over | - | 137 | - | 115 | - | 81 | 1,125 | - | 170,055 |

Source: Texas Department of State Health Services, Vital Statistics Annual Report. Tables 9a, 9b, 9T, 15, 15a, 15b, and 25.

Texas Health Data: Birth Statistics for the State of Texas (By Race): 2012. Birth Statistics for the State of Texas (By County and Race): 2012. Death Statistics for the State of Texas (By County and Race): 2012. Death Statistics for the State of Texas (Ector County by Age): 2012. Death Statistics for the State of Texas (By County and Age): 2012. Death Statistics for the State of Texas (by Age): 2012. Death Statistics for the State of Texas (by Race): 2012. Death Statistics for the State of Texas (by Race and County): 2012.

* Birth and death data not available for Eunice, New Mexico; Hobbs, New Mexico; and Jal, New Mexico. Average life span only available for the State of Texas; Births and deaths by race and age, as well as cause of death only available for Texas.

Deaths in Texas were primarily concentrated within the age group of 15 and over. Only one death under the age of one occurred in Andrews, Gaines and Winkler Counties, though Ector County had 17 deaths under the age of one in 2012. The cause of death for those under the age of one, in all instances within Andrews, Winkler, and Gaines counties, being certain conditions originating in the perinatal period. Seven deaths were reported in Ector County under the age of one caused by certain conditions originating in the perinatal period, seven were congenital malformations, deformations and chromosomal abnormalities, and three other diseases for a total of 17 (TSDHS 2012).

For 2013, New Mexico residents reported 143 infant deaths and the rate of infant mortality was 5.4 infant deaths per 1,000 live births. This was a decrease from 2012 (6.9 deaths per 1,000 live births), and the 2013 infant mortality rate was lower than the United States rate. From a historical perspective, rates have decreased considerably since the 1930s in New Mexico, when they were above 145 deaths per 1,000 live births (NMDH 2013). The rate of infant death in Lea County, New Mexico, was 7.5 deaths per 1,000 live births in 2012 (Public Records 2015), which was slightly higher than the state rate for that same year.

The infant mortality rate in Texas was 5.8 per 1,000 live births in 2012. The rate for Andrews County in 2012 was 3.5, with the city of Andrews, Texas, at 4.1 percent. The infant mortality rate per 1,000 live births was 6.2 for Ector County, 2.9 for Gaines County, 7.8 for the city of Seminole, Texas, and 7.6 for Winkler County (TDSHS 2012, Table T28). Ector County, Seminole, Texas, and Winkler County were above the state rate for 2012.

The incidence of cancer by county of residence in Texas for the years 2008 through 2012 is tracked by the Texas Cancer Registry in cooperation with the National Program of Cancer Registries through the Centers for Disease Control and Prevention. The state of Texas during this timeframe had a rate of 395.3 occurrences per 100,000 population. Andrews County and Winkler County exhibited slightly lower rates than the state rate at 383.6 and 392.0 occurrences, respectively. Ector County and Winkler County had 394.7 occurrences and Gaines County had 280.1 occurrences, both below the state rate in 2012 (TDSHS Texas Cancer Registry 2015).

The following tables compare the rate per 100,000 persons of various causes of death for Lea County and the State of New Mexico for the year 2013. The data are included for males and females, regardless of race. With the exception of intentional self-harm (suicide), the number of deaths related to firearms, alcohol and drugs, injuries at work, and homicides were all higher in Lea County, New Mexico, compared with the state. Rates for male deaths were all higher than female deaths in all causes. The highest rates for causes of death in Lea County occurred in males for firearms (38.9 deaths per 100,000 population) with drug-induced deaths in males at 32.6. The lowest rates of causes of deaths in Lea County were no female deaths due to injury at work, along with 2.6 deaths per 100,000 for alcohol-induced deaths in females. Male alcohol-induced deaths (31.5 deaths per 100,000) and intentional self-harm (suicide) at 30.7 deaths per 100,000 were highest within the state of New Mexico and higher than the same rates in males in Lea County, New Mexico (see **Table 1-13**).


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The New Mexico Indicator-Based Information System (NM-IBIS) is a database that provides information on New Mexico's priority public health issues. NM-IBIS has partnered with New Mexico's Environmental Public Health Tracking Network (NM-EPHT). According to the NM-IBIS, between 1999 and 2013, Lea County had approximately 762.5 deaths per 100,000 individuals. The majority of the deaths documented were related to circulatory/heart disease, malignant neoplasms, and causes other than the National Center for Health Statistics' (NCHS) 50 leading causes (**Table 1-14**). Lea County deaths were low per 100,000 individuals for categories such as nutritional deficiencies, chronic liver disease, viral hepatitis, and renal disease (NMDH, NM-IBIS 2015).

The NM-IBIS also provided calculated life expectancy by county from birth from 1993–2013 by race. Statewide the highest average life expectancy was within Asian or Pacific Islanders at 84.6 years, with White and Hispanic populations at 78.7 and 78.3 years, respectively. Lea County, New Mexico, life expectancies were slightly different than the statewide expectancies with American Indian or Alaska Native populations at 85 years. Asian or Pacific Islander (81 years) and White populations (75.9 years) were lower than the statewide average. Hispanic populations were slightly older at 80.4 years in Lea County, New Mexico (**Table 1-15**).

### 1.1.3 Ethnic and Racial Distribution

The term "minority population" is not clearly defined by the U.S. Census Bureau. The minority population for this document is to include the five racial categories of Hispanic or Latino, Black or African American, American Indian or Alaska Native, Asian, and Native Hawaiian or other Pacific Islander. Data also include those individuals who declared some other race or two or more races.


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| Table 1-13: Causes of Death (per 100,000) for Lea County and the State of New Mexico (2013) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Firearms | | | Alcohol-induced | | | Drug-induced | | | Injury at work | | | Intentional self-harm (suicide) | | | Assault (homicide) | | |
| | Male | Female | Both Sexes | Male | Female | Both Sexes | Male | Female | Both Sexes | Male | Female | Both Sexes | Male | Female | Both Sexes | Male | Female | Both Sexes |
| **Lea Co., NM** | 38.9 | 7.1 | 23.2 | 15.8 | 2.6 | 9.3 | 32.6 | 16.6 | 24.8 | 6.5 | 0 | 3.4 | 27.3 | 4.1 | 15.7 | 18.4 | 6 | 12.4 |
| **New Mexico** | 26.3 | 4.8 | 15.3 | 31.5 | 12.8 | 21.8 | 28.1 | 16.8 | 22.5 | 3.2 | 0.1 | 1.6 | 30.7 | 9.7 | 20 | 10.5 | 2.9 | 6.7 |

Source: New Mexico Selected Health Statistics Annual Report 2013, The State Center for Health Statistics, Tables M-20 and M-22, Age-adjusted death rates are the numbers of deaths per 100,000 U.S. standard population.



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| Table 1-14: Mortality Ratios by Cause of Death, 1999–2013 Lea County, New Mexico | |
|---|---|
| **National Center for Health Statistics (NCHS) 50 Leading Causes*** | **Deaths per 100,000 Population** |
| Overall Deaths | 762.5 |
| Circulatory, Heart disease | 180.4 |
| Causes other than NCHS 50 leading causes | 152.5 |
| Neoplasm, malignant | 140.8 |
| Respiratory, Chronic lower respiratory diseases | 55.7 |
| Injury, Unintentional injuries | 49.9 |
| Diabetes mellitus | 32.3 |
| Circulatory, Cerebrovascular diseases | 26.4 |
| Respiratory, Influenza and pneumonia | 20.5 |
| Nephritis, nephrotic syndrome and nephrosis | 16.1 |
| Injury, Intentional self-harm (suicide) | 14.7 |
| Septicemia | 13.2 |
| Injury, Homicide | 11.7 |
| Alzheimer's disease | 8.8 |
| Chronic liver disease and cirrhosis | 8.8 |
| Parkinson's disease | 4.4 |
| Certain conditions originating in the perinatal period | 4.4 |
| Viral hepatitis | 2.9 |
| Neoplasm, In situ, benign and of uncertain or unknown behavior | 2.9 |
| Circulatory, Aortic aneurysm and dissection | 2.9 |
| Respiratory, Pneumonitis due to solids and liquids | 2.9 |
| Congenital malformations, deformations and chromosomal abnormalities | 2.9 |
| Nutritional deficiencies | 1.5 |
| Circulatory, Essential (primary) hypertension and hypertensive renal disease | 1.5 |
| Cholelithiasis and other disorders of gallbladder | 1.5 |
| Pregnancy, childbirth and the puerperium | 1.5 |
| Injury, Complications of medical and surgical care | 1.5 |

Source: New Mexico Department of Health, New Mexico's Indicator-Based Information System, Query Results for Mortality Data, Years 1999 to 2013 - Leading Causes of Death, Crude Rates (Deaths per 100,000), https://ibis.health.state.nm.us/query/builder/mort/MortCnty/LCDCrudeRate.html.

*Table does not include causes of death that are not statistically significant.


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| Table 1-15: Life Expectancy From Birth, 1999–2013 (Lea County and NM) | | | | | | |
|---|---|---|---|---|---|---|
| NM Race and Ethnicity | Overall | White | Black or African American | Hispanic | American Indian or Alaska Native | Asian or Pacific Islander |
| New Mexico State | 78 | 78.7 | 75.5 | 78.3 | 72.5 | 84.6 |
| Lea County, NM | 77 | 75.9 | 68.2 | 80.4 | 85 | 81 |

Source: New Mexico Department of Health, New Mexico's Indicator-Based Information System, Query Results for Query Module for Life Expectancy, Years 1999 to 2013 - Life Expectancy from Birth, https://ibis.health.state.nm.us/query/builder/mort/MortCntyLifeExp/LifeExpBirth.html.

Based on U.S. Census Bureau data in 2010 (**Table 1-16**), the minority populations of project area counties in the ROI were as follows: Andrews County was 52.1 percent minority; Gaines County was 39.4 percent minority; Winkler County was 57.5 percent minority; Ector County was 58.9 percent minority; and Lea County, New Mexico was 57.0 percent minority. By comparison, the percentages at the state level were 59.5 percent (New Mexico) and 44.3 percent (Texas). The city closest to the WCS facility is Eunice, New Mexico, which had a minority population of 49.9 percent in 2010. The Hispanic or Latino populations are the largest percentages of minorities within the ROI, ranging from 36.6 percent of the population in Gaines County to 53.8 percent in Winkler County. Black or African American was the next-largest share, with percentages ranging from 0.9 to 5.6 percent, depending on the location. Census tracts are shown on **Figure 1.1-1, Census Geographies**.

Within Andrews County, Texas, there are three census tracts (CT) in the ROI (CT 9501, 9502, and 9504). Within these census tracts, the largest percentages of minorities occur in CT 9504, with 48.7 percent of the population as Hispanic or Latino. This is comparable to Hispanic or Latino population percentages of 48.7 percent within Andrews County, Texas. Black or American Africans are the second largest population of minorities in CT 9502 at 1.8 percent, which is comparable to the second largest population within Andrews County, Texas (1.7 percent). CT 9501 has 1.5 percent Asian population, which is the second largest in CT 9502, with Hispanic or Latino populations being the largest percentage within the tract (45.5 percent) (see **Figure 1.1-2, Minority Populations in the Region of Interest**).

Ector County, Texas, contains one census tract within the ROI (CT 22). Minority populations in this census tract were predominantly Hispanic or Latino (71.4 percent), with two or more races the next highest at 0.6 percent. Ector County, Texas, as a whole has lower percentages of minority persons (58.9 percent) than CT 22.


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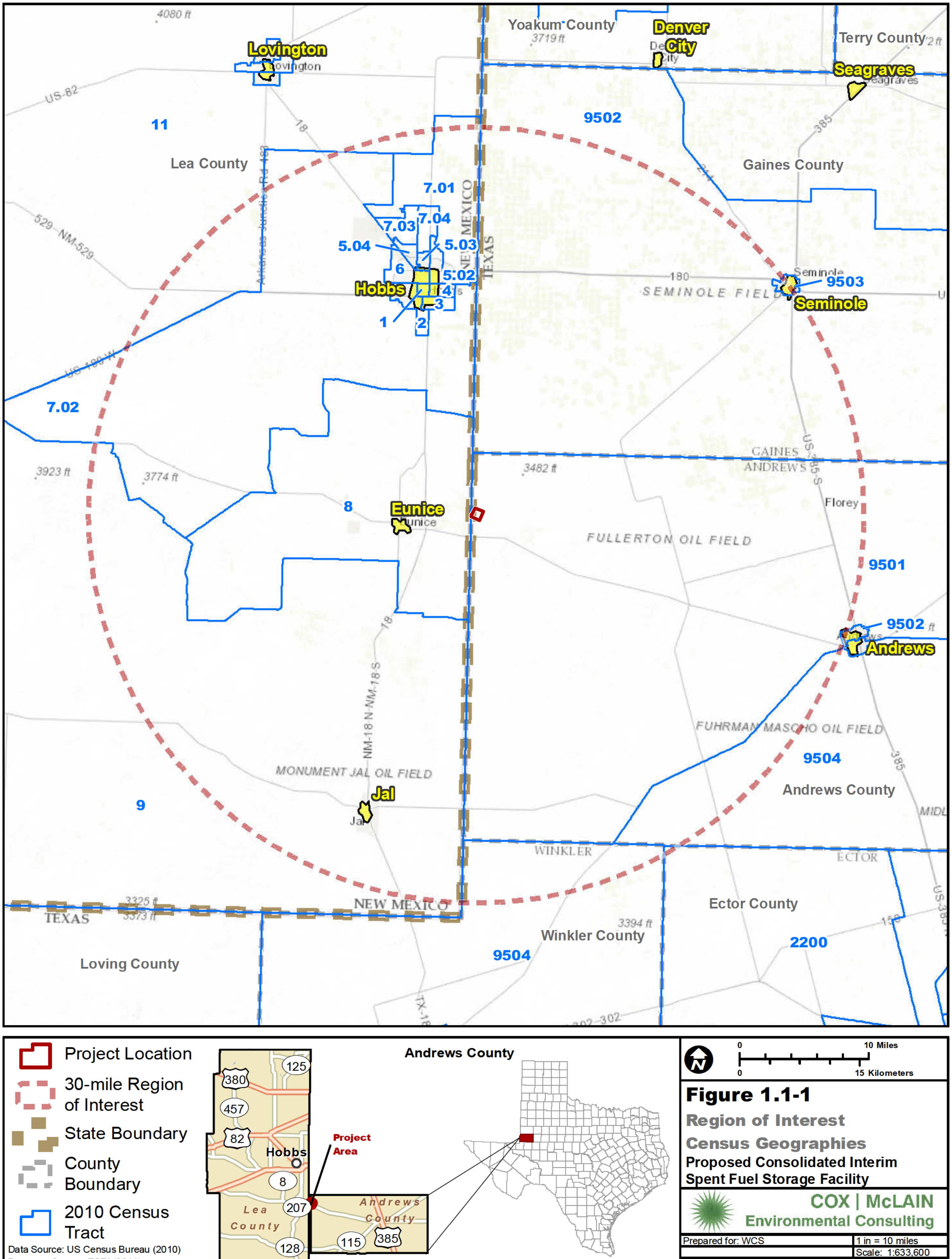
| Table 1-16: Racial and Ethnic Distribution by Census Tracts (2010) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Census 2010 Geography | | Race and Ethnicity | | | | | | | | | | | | | | | | | |
| Census Tracts | Total Population | White Alone Number of persons | Percent White Alone | African American Alone Number of persons | Percent Black or African American Alone | American Indian and Alaska Native Alone Number of persons | Percent American Indian and Alaska Native Alone | Asian Alone Number of persons | Percent Asian Alone | Native Hawaiian and Other Pacific Islander Alone Number of persons | Percent Native Hawaiian and Other Pacific Islander Alone | Some Other Race Alone Number of persons | Percent Some Other Race Alone | Two or More Races Number of persons | Percent Two or More Races | Hispanic or Latino of Any Race Number of persons | Percent Hispanic or Latino of Any Race | Minority Number of persons | Percent Minority |
| Andrews County, TX | 14,786 | 7,083 | 47.9% | 199 | 1.3% | 95 | 0.6% | 85 | 0.6% | 1 | - | 17 | 0.1% | 111 | 0.8% | 7,195 | 48.7% | 7,703 | 52.1% |
| Andrews, TX | 11,088 | 5,101 | 46% | 183 | 1.7% | 70 | 0.6% | 69 | 0.6% | 1 | - | 14 | 0.1% | 84 | 0.8% | 5,566 | 50.2% | 5,987 | 54% |
| Census Tract 9501 | 1,678 | 1,142 | 68.1% | 6 | 0.4% | 5 | 0.3% | 26 | 1.5% | - | - | 2 | 0.1% | 14 | 0.8% | 483 | 28.8% | 536 | 31.9% |
| Census Tract 9502 | 6,473 | 3,275 | 50.6% | 116 | 1.8% | 40 | 0.6% | 36 | 0.6% | 1 | - | 5 | 0.1% | 52 | 0.8% | 2,948 | 45.5% | 3,198 | 49.4% |
| Census Tract 9504 | 2,711 | 1,329 | 49% | 13 | 0.5% | 23 | 0.8% | 9 | 0.3% | - | - | 3 | 0.1% | 15 | 0.6% | 1,319 | 48.7% | 1,382 | **51%** |
| Ector County, TX | 137,130 | 56,306 | 41.1% | 5,596 | 4.1% | 623 | 0.5% | 1,004 | 0.7% | 106 | 0.1% | 68 | - | 1,096 | 0.8% | 72,331 | 52.7% | 80,824 | 58.9% |
| Census Tract 22 | 3,117 | 853 | 27.4% | 14 | 0.4% | 5 | 0.2% | - | - | - | - | - | - | 18 | 0.6% | 2,227 | 71.4% | 2,264 | **72.6%** |
| Gaines County, TX | 17,526 | 10,628 | 60.6% | 261 | 1.5% | 46 | 0.3% | 37 | 0.2% | - | - | 17 | 0.1% | 124 | 0.7% | 6,413 | 36.6% | 6,898 | 39.4% |
| Seminole, TX | 6,430 | 3,614 | 56.2% | 93 | 1.4% | 23 | 0.4% | 24 | 0.4% | - | - | 10 | 0.2% | 47 | 0.7% | 2,619 | 40.7% | 2,816 | 43.8% |
| Census Tract 9502 | 8,643 | 6,356 | 73.5% | 23 | 0.3% | 21 | 0.2% | 16 | 0.2% | - | - | 9 | 0.1% | 78 | 0.9% | 2,140 | 24.8% | 2,287 | 26.5% |
| Census Tract 9503 | 5,372 | 2,959 | 55.1% | 83 | 1.5% | 19 | 0.4% | 19 | 0.4% | - | - | 7 | 0.1% | 33 | 0.6% | 2,252 | 41.9% | 2,413 | 44.9% |
| Winkler County, TX | 7,110 | 3,024 | 42.5% | 129 | 1.8% | 29 | 0.4% | 16 | 0.2% | - | - | 43 | 0.6% | 45 | 0.6% | 3,824 | 53.8% | 4,086 | 57.5% |
| Census Tract 9504 | 1,424 | 882 | 61.9% | 11 | 0.8% | 6 | 0.4% | 1 | 0.1% | - | - | - | - | 11 | 0.8% | 513 | 36% | 542 | 38.1% |
| Lea County, NM | 64,727 | 27,845 | 43% | 2,399 | 3.7% | 468 | 0.7% | 302 | 0.5% | 18 | - | 51 | 0.1% | 581 | 0.9% | 33,063 | 51.1% | 36,882 | 57% |
| Eunice, NM | 2,922 | 1,464 | 50.1% | 27 | 0.9% | 11 | 0.4% | 3 | 0.1% | 2 | 0.1% | 5 | 0.2% | 22 | 0.8% | 1,388 | 47.5% | 1,458 | 49.9% |
| Hobbs, NM | 34,122 | 13,059 | 38.3% | 1,924 | 5.6% | 270 | 0.8% | 199 | 0.6% | 14 | - | 24 | 0.1% | 315 | 0.9% | 18,317 | 53.7% | 21,063 | 61.7% |
| Jal, NM | 2,047 | 1,021 | 49.9% | 12 | 0.6% | 10 | 0.5% | 2 | 0.1% | - | - | 1 | - | 16 | 0.8% | 985 | 48.1% | 1,026 | 50.1% |
| Census Tract 1 | 2,812 | 571 | 20.3% | 119 | 4.2% | 18 | 0.6% | 7 | 0.2% | 1 | - | 1 | - | 27 | 1% | 2,068 | 73.5% | 2,241 | **79.7%** |
| Census Tract 2 | 3,431 | 806 | 23.5% | 126 | 3.7% | 34 | 1% | 4 | 0.1% | 2 | 0.1% | - | - | 27 | 0.8% | 2,432 | 70.9% | 2,625 | **76.5%** |
| Census Tract 3 | 3,909 | 545 | 13.9% | 363 | 9.3% | 12 | 0.3% | 6 | 0.2% | 2 | 0.1% | - | - | 27 | 0.7% | 2,954 | 75.6% | 3,364 | **86.1%** |
| Census Tract 4 | 3,406 | 634 | 18.6% | 459 | 13.5% | 17 | 0.5% | 5 | 0.1% | 6 | 0.2% | 5 | 0.1% | 22 | 0.6% | 2,258 | 66.3% | 2,772 | **81.4%** |
| Census Tract 5.02 | 6,244 | 2,841 | 45.5% | 295 | 4.7% | 38 | 0.6% | 33 | 0.5% | - | - | 2 | - | 67 | 1.1% | 2,968 | 47.5% | 3,403 | **54.5%** |
| Census Tract 5.03 | 3,743 | 2,261 | 60.4% | 126 | 3.4% | 24 | 0.6% | 39 | 1% | 1 | - | 2 | 0.1% | 38 | 1% | 1,252 | 33.4% | 1,482 | 39.6% |
| Census Tract 5.04 | 3,635 | 2,525 | 69.5% | 105 | 2.9% | 19 | 0.5% | 42 | 1.2% | 1 | - | 7 | 0.2% | 56 | 1.5% | 880 | 24.2% | 1,110 | 30.5% |
| Census Tract 6 | 6,487 | 2,822 | 43.5% | 263 | 4.1% | 33 | 0.5% | 35 | 0.5% | 1 | - | 8 | 0.1% | 54 | 0.8% | 3,271 | 50.4% | 3,665 | **56.5%** |
| Census Tract 7.01 | 1,489 | 1,036 | 69.6% | 7 | 0.5% | 11 | 0.7% | 2 | 0.1% | - | - | - | - | 6 | 0.4% | 427 | 28.7% | 453 | 30.4% |
| Census Tract 7.02 | 3,263 | 1,458 | 44.7% | 138 | 4.2% | 100 | 3.1% | 6 | 0.2% | - | - | 2 | 0.1% | 23 | 0.7% | 1,536 | 47.1% | 1,805 | **55.3%** |
| Census Tract 7.03 | 2,321 | 1,660 | 71.5% | 60 | 2.6% | 8 | 0.3% | 36 | 1.6% | 1 | - | 1 | - | 20 | 0.9% | 535 | 23.1% | 661 | 28.5% |
| Census Tract 7.04 | 2,565 | 1,500 | 58.5% | 42 | 1.6% | 17 | 0.7% | 30 | 1.2% | - | - | 2 | 0.1% | 35 | 1.4% | 939 | 36.6% | 1,065 | 41.5% |
| Census Tract 8 | 3,220 | 1,676 | 52% | 30 | 0.9% | 11 | 0.3% | 3 | 0.1% | 2 | 0.1% | 5 | 0.2% | 25 | 0.8% | 1,468 | 45.6% | 1,544 | 48% |
| Census Tract 9 | 2,175 | 1,114 | 51.2% | 12 | 0.6% | 13 | 0.6% | 3 | 0.1% | - | - | 1 | - | 22 | 1% | 1,010 | 46.4% | 1,061 | 48.8% |
| Census Tract 11 | 4,557 | 2,599 | 57% | 22 | 0.5% | 29 | 0.6% | 13 | 0.3% | 1 | - | - | - | 41 | 0.9% | 1,852 | 40.6% | 1,958 | 43% |

Source: U.S. Census Bureau Census 2010, Summary File 1, Table P9.

Note: Census Tracts that contain minority populations equal to or higher than 50 percent are bolded.



Appendix A has been revised in response to RAI SOC-1




Data Source: US Census Bureau (2010)
Basemap Source: ESRI (2014)

**Figure 1.1-1**
**Region of Interest**
**Census Geographies**
**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 10 miles |
| | Scale: 1:633,600 |
| Prepared by: SL | Date: 4/4/2016 |

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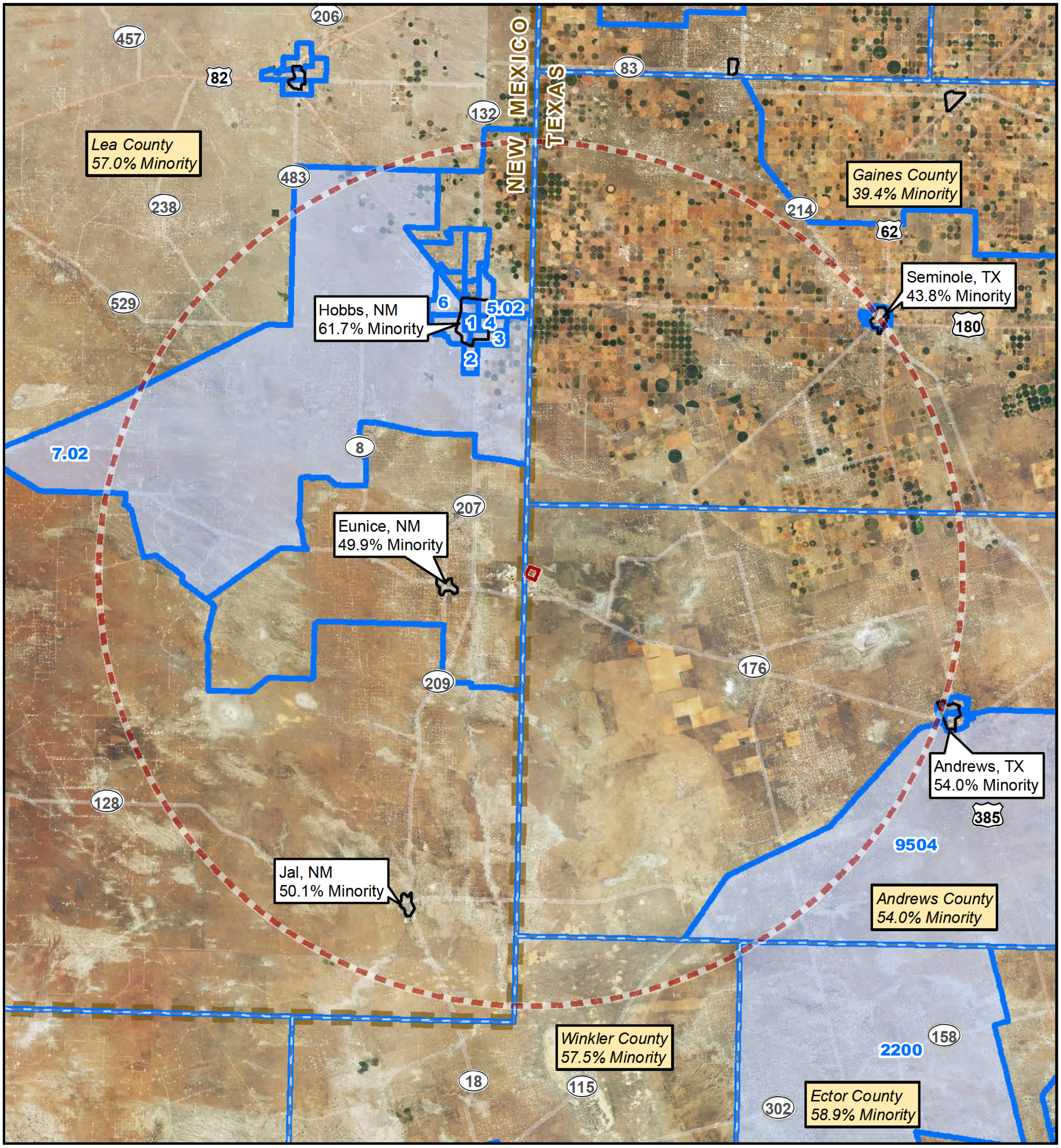
Appendix A has been revised in response to RAI SOC-1




Project Location

30-mile Region of Interest

2010 Census Tract

Census Tract with >50% Minority Population

State Boundary

County Boundary

Data Source: US Census Bureau (2010)
Aerial Source: NAIP (2014)

0 10 Miles
0 15 Kilometers

**Figure 1.1-2**
**Minority Populations in the Region of Interest**
**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN
Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 10 miles |
| | Scale: 1:633,600 |
| Prepared by: SL | Date: 4/4/2016 |

G:\Projects\WCS\Figure 1.1-2_Minority_20160404.mxd

Appendix A has been revised in response to RAI SOC-1

Gaines County, Texas, contains two census tracts within the ROI (CT 9502 and 9503). Minority populations range from 26.5 to 44.9 percent within these tracts, in comparison to 39.4 percent in Gaines County, and 43.8 percent for the city of Seminole, Texas. The largest percentage of minorities within the county was Hispanic or Latino populations at 40.7 percent. In both Gaines County census tracts, the largest percentage of minorities was also Hispanic or Latino populations, with 24.8 (CT 9502) and 41.9 percent (CT 9503).

Winkler County, Texas, has one census tract, CT 9504, within the ROI. The percent minorities within the census tract was 38.1 percent compared to 57.5 percent for the county as a whole. Within CT 9504, the largest minority population was Hispanic or Latino, at 36 percent.

Lea County, New Mexico, contains 15 census tracts within the ROI. Minority populations within these tracts ranged from 28.5 percent (CT 7.03) to 86.1 percent (CT 3). Within CT 7.03 the highest percentage of minority populations was Hispanic or Latinos (23.1 percent), Hispanic or Latino populations were highest in CT 3 (75.6 percent).

Lea County, New Mexico, also contains the cities of Eunice, Hobbs, and Jal. Minority populations within Eunice, New Mexico, were 49.9 percent with 47.5 percent of the population as Hispanic or Latino, and within Hobbs, New Mexico, 61.7 percent of the population was a minority with highest percentage as also Hispanic or Latino (53.7 percent). Jal, New Mexico, minority populations as a whole were 50.1 percent, with Hispanic or Latino populations having the highest percentage of minorities (48.1 percent).

Limited English Proficiency (LEP) populations were determined using census tract level data from the U.S. Census Bureau 2009–2013 American Community Survey (ACS) data. Census tracts within a 30-mile radius of the proposed project were assessed. Within the population that is five years of age and older, persons who speak English less than "very well" are considered to have a limited English proficiency. The populations that speak English less than "very well," according to the U.S. Census Bureau's 2009–2013 ACS, are presented in **Table 1-17**.

As shown in **Table 1-17**, the LEP populations in the individual census tracts for all counties within the project area range from approximately 0.9 to 30.0 percent of the total populations. Of the 10,497 people within the census tracts in the ROI within Andrews County, Texas, persons that speak English less than "very well" ranged from 9 to 15.6 percent. The majority of the populations were Spanish speakers (8.4 to 15.6 percent) with 0.6 to 2.4 percent Asian/Pacific language. In Ector County, Texas, there is one census tract that lies within the ROI, where approximately 26 percent of the 784 people speak English less than "very well," all of which are Spanish speaking. Of the 11,821 people in the two census tracts within the ROI in Seminole, Texas (Gaines County, Texas), approximately 12.7 to 19.7 percent speak English less than "very well." The highest percentage of persons that speak English less than "very well" within these census tracts was 7.1 percent Spanish and 12.3 percent Indo-European in CT 9502, and 10.6 percent Spanish and 2.1 percent Indo-European in CT 9503.


Appendix A has been revised in response to RAI SOC-1

**Table 1-17: Limited English Proficiency (Population that Speaks English Less than "Very Well") (2009–2013)**

| Census Tract/ Block Group | Total Population 5 Years and Over | Number of LEP persons | Percent LEP persons | Languages Spoken by LEP Populations | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Spanish speakers (#) | Spanish speakers (%) | Indo-European (#) | Indo-European (%) | Asian/Pacific Island (#) | Asian/Pacific Island (%) | Other (#) | Other (%) |
| Andrews County, TX | 14,191 | 2,225 | 15.7% | 2,068 | 14.6% | - | - | 157 | 1.1% | - | - |
| Andrews, TX | 10,612 | 1,818 | 17.1% | 1,661 | 15.7% | - | - | 157 | 1.5% | - | - |
| Census Tract 9501 | 1,894 | 171 | 9% | 159 | 8.4% | - | - | 12 | 0.6% | - | - |
| Census Tract 9502 | 6,067 | 927 | 15.3% | 782 | 12.9% | - | - | 145 | 2.4% | - | - |
| Census Tract 9504 | 2,536 | 396 | 15.6% | 396 | 15.6% | - | - | - | - | - | - |
| Ector County, TX | 128,984 | 19,098 | 14.8% | 18,398 | 14.3% | 237 | 0.2% | 340 | 0.3% | 123 | 0.1% |
| Census Tract 22 | 3,019 | 784 | 26% | 784 | 26% | - | - | - | - | - | - |
| Gaines County, TX | 16,204 | 2,825 | 17.4% | 1,698 | 10.5% | 1,100 | 6.8% | 27 | 0.2% | - | - |
| Seminole, TX | 5,972 | 663 | 11.1% | 545 | 9.1% | 118 | 2% | - | - | - | - |
| Census Tract 9502 | 7,899 | 1,555 | 19.7% | 560 | 7.1% | 968 | 12.3% | 27 | 0.3% | - | - |
| Census Tract 9503 | 5,019 | 635 | 12.7% | 531 | 10.6% | 104 | 2.1% | - | - | - | - |
| Winkler County, TX | 6,644 | 1,146 | 17.2% | 1,137 | 17.1% | - | - | 9 | 0.1% | - | - |
| Census Tract 9504 | 1,512 | 204 | 13.5% | 195 | 12.9% | - | - | 9 | 0.6% | - | - |
| Lea County, NM | 59,945 | 7,926 | 13.2% | 7,848 | 13.1% | 38 | 0.1% | 25 | 0.0% | 15 | 0.0% |
| Eunice, NM | 2,756 | 517 | 18.8% | 517 | 18.8% | - | - | - | - | - | - |
| Hobbs, NM | 31,397 | 4,034 | 12.8% | 3,996 | 12.7% | 23 | 0.1% | - | - | 15 | 0.0% |
| Jal, NM | 1,939 | 180 | 9.3% | 180 | 9.3% | - | - | - | - | - | - |
| Census Tract 1 | 2,213 | 665 | 30% | 659 | 29.8% | 6 | 0.3% | - | - | - | - |
| Census Tract 2 | 3,018 | 599 | 19.8% | 590 | 19.5% | - | - | - | - | 9 | 0.3% |
| Census Tract 3 | 3,269 | 832 | 25.5% | 832 | 25.5% | - | - | - | - | - | - |
| Census Tract 4 | 3,372 | 688 | 20.4% | 688 | 20.4% | - | - | - | - | - | - |
| Census Tract 5.02 | 5,444 | 452 | 8.3% | 452 | 8.3% | - | - | - | - | - | - |
| Census Tract 5.03 | 3,426 | 233 | 6.8% | 233 | 6.8% | - | - | - | - | - | - |
| Census Tract 5.04 | 3,381 | 31 | 0.9% | 31 | 0.9% | - | - | - | - | - | - |
| Census Tract 6 | 6,257 | 522 | 8.3% | 505 | 8.1% | 17 | 0.3% | - | - | - | - |
| Census Tract 7.01 | 1,691 | 67 | 4% | 67 | 4% | - | - | - | - | - | - |
| Census Tract 7.02 | 3,184 | 140 | 4.4% | 125 | 3.9% | 15 | 0.5% | - | - | - | - |
| Census Tract 7.03 | 2,295 | 105 | 4.6% | 99 | 4.3% | - | - | - | - | 6 | 0.3% |
| Census Tract 7.04 | 2,540 | 240 | 9.4% | 226 | 8.9% | - | - | 14 | 0.6% | - | - |
| Census Tract 8 | 2,987 | 517 | 17.3% | 517 | 17.3% | - | - | - | - | - | - |
| Census Tract 9 | 2,041 | 225 | 11% | 214 | 10.5% | - | - | 11 | 0.5% | - | - |
| Census Tract 11 | 4,488 | 562 | 12.5% | 562 | 12.5% | - | - | - | - | - | 0% |

Source: U.S. Census Bureau, 2009–2013 ACS Table B16004.

ACS data are estimates; they are not counts.



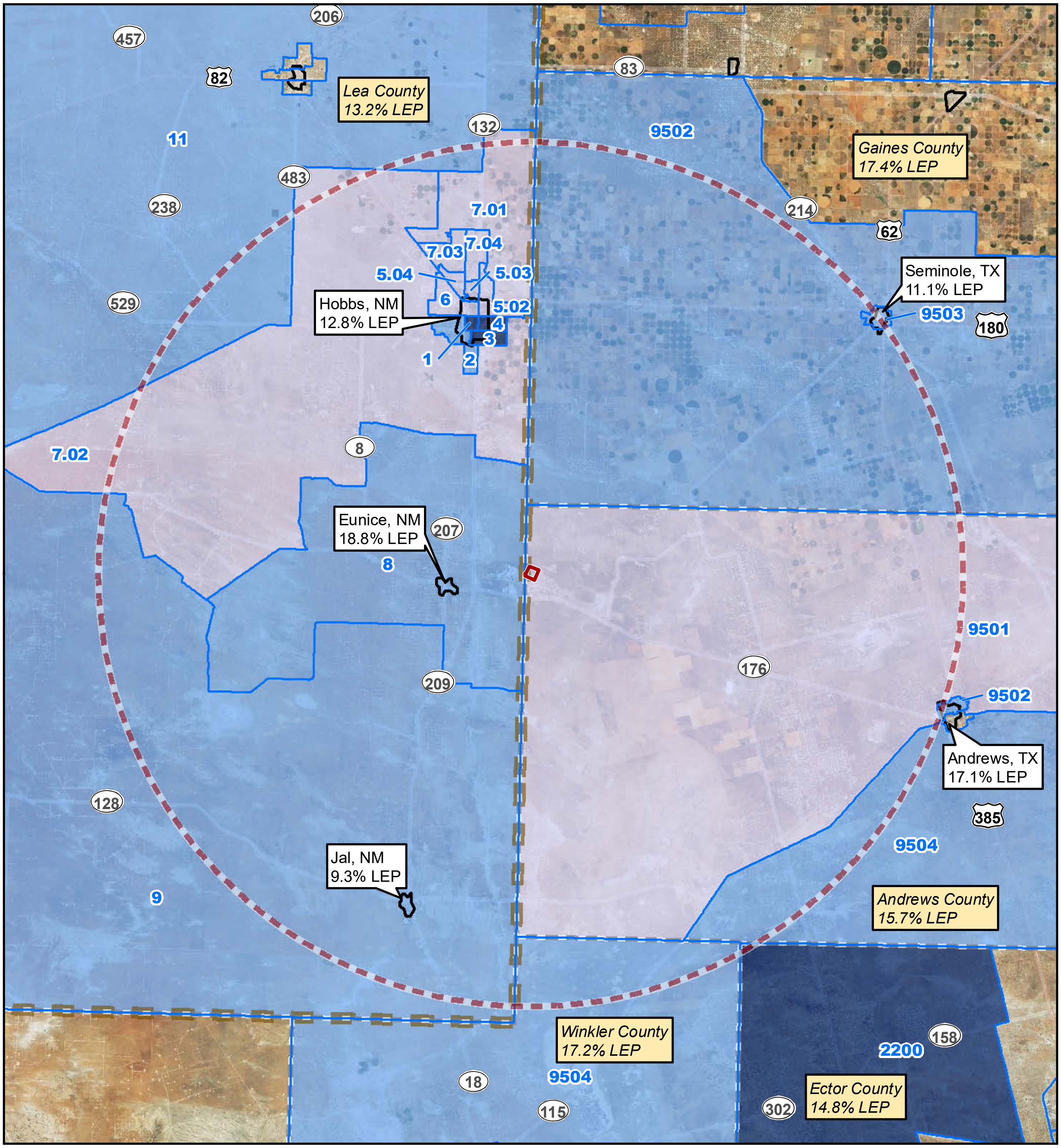
Appendix A has been revised in response to RAI SOC-1

Of the 1,512 people who live within the one census tract in the ROI in Winkler County, Texas, approximately 13.5 percent speak English less than "very well," most of which are Spanish speaking (12.9 percent) and 0.6 percent Asian/Pacific language. Of the 49,606 people within the 15 census blocks groups within the ROI in Lea County, New Mexico, populations that speak English less than "very well" ranged from 0.9 to 30 percent. These percentages were largely Spanish speaking, ranging from 0.9 to 28.8 percent of the population, with 0.3 to 0.6 percent in either Indo-European, Asian/Pacific, or other languages (see **Figure 1.1-3, Limited English Proficiency in the Region of Interest**).

### 1.1.4 Housing Characteristics by Race/Ethnicity, Including Owner Renter, Value, Rent

Data for housing characteristics (**Table 1-18**) shows the majority of housing units are owner-occupied: 72,268 units or 69.4 percent are owned by residents in the ROI. The median value for owner-occupied housing for Lea County, New Mexico, is $97,200, Andrews County $88,600, Gaines County $93,000, $45,100 for Winkler County, and $91,200 for Ector County. These values are lower than the state median values of $160,000 (New Mexico) and $128,900 (Texas). The ROI is 69.4 percent owner-occupied housing, compared to 68.5 percent in New Mexico and 63.7 percent in Texas. In the ROI, most owner-occupied housing units are occupied by White persons (54.9%) followed by Hispanic or Latino persons (40.8%) and Black or African American persons (2.6%).


Appendix A has been revised in response to RAI SOC-1




Project Location
30-mile Region of Interest
State Boundary
County Boundary
2010 Census Tract

**Limited English Proficiency (LEP)**
**Percent at the Census Tract Level**
0-10%
10-20%
20-30%

0 10 Miles
0 15 Kilometers

**Figure 1.1-3**
**Limited English Proficiency in the Region of Interest**
**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN
Environmental Consulting

Prepared for: WCS
Prepared by: SL
1 in = 10 miles
Scale: 1:633,600
Date: 4/4/2016

Data Source: US Census Bureau (2010)
Aerial Source: NAIP (2014)
G:\Projects\WCS\Figure 1.1-3_LEP_20160404.mxd

Appendix A has been revised in response to RAI SOC-1

| Table 1-18: Housing Characteristics in the Region of Interest (2010; 2009–2013) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Housing Status** | **Lea County, NM** | **Eunice, NM** | **Hobbs, NM** | **Jal, NM** | **Andrews County, TX** | **Andrews, TX** | **Gaines County, TX** | **Seminole, TX** | **Winkler County, TX** | **Ector County, TX** | **New Mexico** | **Texas** |
| **Total housing units** | **24,919** | **1,264** | **12,900** | **1,009** | **5,814** | **4,379** | **6,301** | **2,506** | **3,027** | **53,027** | **901,388** | **9,977,436** |
| Occupied housing units | 22,236 | 1,073 | 11,629 | 788 | 5,259 | 3,999 | 5,606 | 2,275 | 2,578 | 48,688 | 791,395 | 8,922,933 |
| Vacant housing units | 2,683 | 191 | 1,271 | 221 | 555 | 380 | 695 | 231 | 449 | 4,339 | 109,993 | 1,054,503 |
| **Occupied housing units** | **22,236** | **1,073** | **11,629** | **788** | **5,259** | **3,999** | **5,606** | **2,275** | **2,578** | **48,688** | **791,395** | **8,922,933** |
| Owner occupied | 15,434 | 835 | 7,307 | 623 | 4,020 | 2,942 | 4,324 | 1,739 | 2,094 | 32,950 | 542,122 | 5,685,353 |
| Renter occupied | 6,802 | 238 | 4,322 | 165 | 1,239 | 1,057 | 1,282 | 536 | 484 | 15,738 | 249,273 | 3,237,580 |
| **Vacant housing units** | **2,683** | **191** | **1,271** | **221** | **555** | **380** | **695** | **231** | **449** | **4,339** | **109,993** | **1,054,503** |
| For rent | 867 | 50 | 606 | 29 | 94 | 86 | 144 | 59 | 46 | 1,800 | 22,150 | 394,310 |
| For sale only | 187 | 11 | 83 | 11 | 72 | 65 | 78 | 40 | 29 | 483 | 11,050 | 121,430 |
| Sold, not occupied | 46 | 8 | 16 | 1 | 52 | 30 | 54 | 22 | 47 | 491 | 2,143 | 30,437 |
| Rented, not occupied | 47 | 8 | 20 | 6 | 13 | 11 | 13 | 3 | 14 | 108 | 1,303 | 16,509 |
| For seasonal, recreational, or occasional use | 217 | 14 | 89 | 12 | 80 | 42 | 73 | 24 | 40 | 240 | 36,612 | 208,733 |
| For migratory workers | 13 | 0 | 2 | 0 | 4 | 3 | 17 | 2 | 2 | 21 | 229 | 2,209 |
| Other vacant | 1,306 | 100 | 455 | 162 | 240 | 143 | 316 | 81 | 271 | 1,196 | 36,506 | 280,875 |
| Median Value for Owner- Occupied Housing Units* | 97,200 | 90,300 | 98,200 | 63,900 | 88,600 | 79,600 | 93,000 | 92,100 | 45,100 | 91,200 | 160,000 | 128,900 |
| Median Rent ** | 734 | 651 | 812 | 671 | 769 | 793 | 657 | 863 | 575 | 789 | 758 | 851 |
| **Occupied housing units** | **22,236** | **1,073** | **11,629** | **788** | **5,259** | **3,999** | **5,606** | **2,275** | **2,578** | **48,688** | **791,395** | **8,922,933** |
| **Owner-occupied housing units** | **15,434** | **835** | **7,307** | **623** | **4,020** | **2,942** | **4,324** | **1,739** | **2,094** | **32,950** | **542,122** | **5,685,353** |
| White alone householder | 8,773 | 498 | 3,833 | 382 | 2,334 | 1,652 | 2,850 | 1,115 | 1,081 | 17,187 | 282,929 | 3,435,141 |
| Black or African American alone householder | 424 | 9 | 337 | 3 | 44 | 40 | 52 | 22 | 47 | 903 | 6,612 | 478,340 |
| American Indian and Alaska Native alone householder | 87 | 2 | 41 | 2 | 33 | 20 | 7 | 5 | 5 | 175 | 33,771 | 19,840 |
| Asian alone householder | 52 | 0 | 35 | 1 | 16 | 12 | 7 | 7 | 1 | 198 | 5,341 | 188,010 |
| Native Hawaiian and Other Pacific Islander alone householder | 5 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 225 | 2,553 |
| Some Other Race alone householder | 6 | 0 | 1 | 0 | 4 | 4 | 2 | 2 | 5 | 14 | 899 | 4,832 |
| Two or More Races householder | 101 | 5 | 41 | 5 | 22 | 18 | 31 | 15 | 11 | 182 | 4,821 | 46,313 |
| Hispanic or Latino householder | 5,986 | 320 | 3,016 | 230 | 1,567 | 1,196 | 1,375 | 573 | 944 | 14,286 | 207,524 | 1,510,324 |



Appendix A has been revised in response to RAI SOC-1

| Table 1-18: Housing Characteristics in the Region of Interest (2010; 2009–2013) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Housing Status** | **Lea County, NM** | **Eunice, NM** | **Hobbs, NM** | **Jal, NM** | **Andrews County, TX** | **Andrews, TX** | **Gaines County, TX** | **Seminole, TX** | **Winkler County, TX** | **Ector County, TX** | **New Mexico** | **Texas** |
| **Renter-occupied housing units** | **6,802** | **238** | **4,322** | **165** | **1,239** | **1,057** | **1,282** | **536** | **484** | **15,738** | **249,273** | **3,237,580** |
| White alone householder | 3,000 | 124 | 1,818 | 83 | 639 | 542 | 693 | 281 | 257 | 7,065 | 109,350 | 1,368,439 |
| Black or African American alone householder | 469 | 4 | 408 | 3 | 25 | 24 | 35 | 11 | 14 | 1,206 | 7,950 | 589,768 |
| American Indian and Alaska Native alone householder | 60 | 3 | 38 | 2 | 3 | 2 | 5 | 4 | 4 | 99 | 17,743 | 12,232 |
| Asian alone householder | 45 | 1 | 33 | 0 | 14 | 13 | 3 | 2 | 4 | 134 | 3,701 | 115,429 |
| Native Hawaiian and Other Pacific Islander alone householder | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 21 | 207 | 2,849 |
| Some Other Race alone householder | 8 | 2 | 5 | 0 | 1 | 1 | 0 | 0 | 4 | 15 | 477 | 4,362 |
| Two or More Races householder | 48 | 0 | 35 | 0 | 6 | 3 | 1 | 0 | 2 | 156 | 3,921 | 40,668 |
| Hispanic or Latino householder | 3,170 | 104 | 1,984 | 77 | 550 | 471 | 545 | 238 | 199 | 7,042 | 105,924 | 1,103,833 |

Source U.S. Census Bureau, 2010 QT-H1

*ACS 2009–2013 Table B25077.

** ACS 2009–2013 Table DP04.



Appendix A has been revised in response to RAI SOC-1

### 1.1.5 Households by Type

**Table 1-19** indicates that in 2010, the majority of households were owner-occupied and the largest groups of the householders were the age groups of 45 to 54 years and 65 years and over. The average household size was 2.8 persons for the ROI.

As defined by the Census, "Contract Rent" and "Gross Rent" are somewhat different. For the ROI, the data are virtually the same.

**Contract rent**: The monthly rent agreed to or contracted for, regardless of any furnishing, utilities, fees, meals, or services that may be included. For vacant units, it is the monthly rent asked for the rental unit at the time of the interview.

Within the ROI, 31,863 or 30.6 percent of housing units were renter-occupied. **Tables 1-20** and **1-21** show the median rent asked and the range of contract and gross rent for the renter-occupied housing. The highest median contract rent asked was within Seminole, Texas ($702 per month), higher than the Texas state average of $688 and even higher than the state average for New Mexico at $635. The lowest median contract rent asked was in Winkler County, Texas, at $391 per month.

**Gross rent**: The amount of the contract rent plus the estimated average of monthly cost of utilities (electricity, gas, water, and sewer) and fuels (oil, coal, kerosene, wood, etc.) if these are paid for by the renter (or paid for the renter by someone else). Gross rent is intended to eliminate differentials that result from varying practices with respect to the inclusion of utilities and fuels in the rental payment.

The highest gross rent was within Seminole, Texas ($863 per month), higher than the New Mexico and Texas state medians of $758 and $851, respectively. The lowest median gross rent was also in Winkler County at $575 per month.


Appendix A has been revised in response to RAI SOC-1

| Table 1-19: Tenure, Household Size and Age of Householder in the Region of Interest (2010) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Housing Status** | **Lea County, New Mexico** | **Eunice, New Mexico** | **Hobbs, New Mexico** | **Jal, New Mexico** | **Andrews County, Texas** | **Andrews, Texas** | **Gaines County, Texas** | **Seminole, Texas** | **Winkler County, Texas** | **Ector County, Texas** | **New Mexico** | **Texas** |
| **Total housing units** | **24,919** | **1,264** | **12,900** | **1,009** | **5,814** | **4,379** | **6,301** | **2,506** | **3,027** | **53,027** | **901,388** | **9,977,436** |
| Occupied housing units | 22,236 | 1,073 | 11,629 | 788 | 5,259 | 3,999 | 5,606 | 2,275 | 2,578 | 48,688 | 791,395 | 8,922,933 |
| Vacant housing units | 2,683 | 191 | 1,271 | 221 | 555 | 380 | 695 | 231 | 449 | 4,339 | 109,993 | 1,054,503 |
| **Occupied housing units** | **22,236** | **1,073** | **11,629** | **788** | **5,259** | **3,999** | **5,606** | **2,275** | **2,578** | **48,688** | **791,395** | **8,922,933** |
| Owner occupied | 15,434 | 835 | 7,307 | 623 | 4,020 | 2,942 | 4,324 | 1,739 | 2,094 | 32,950 | 542,122 | 5,685,353 |
| Renter occupied | 6,802 | 238 | 4,322 | 165 | 1,239 | 1,057 | 1,282 | 536 | 484 | 15,738 | 249,273 | 3,237,580 |
| **Average household size**** | 2.82 | 2.72 | 2.81 | 2.6 | 2.80 | 2.75 | 3.11 | 2.79 | 2.72 | 2.77 | 2.55 | 2.75 |
| **Age of Householder** | | | | | | | | | | | | |
| Owner-occupied housing units* | 15,434 | 835 | 7,307 | 623 | 4,020 | 2,942 | 4,324 | 1,739 | 2,094 | 32,950 | 542,122 | 5,685,353 |
| 15 to 24 years | 472 | 32 | 237 | 18 | 134 | 110 | 182 | 66 | 61 | 988 | 10,185 | 77,434 |
| 25 to 34 years | 2,272 | 144 | 1,148 | 64 | 563 | 439 | 750 | 290 | 298 | 4,846 | 56,531 | 659,840 |
| 35 to 44 years | 2,514 | 131 | 1,201 | 93 | 685 | 503 | 769 | 285 | 329 | 5,644 | 83,630 | 1,113,632 |
| 45 to 54 years | 3,419 | 195 | 1,563 | 133 | 942 | 658 | 1,024 | 394 | 492 | 7,535 | 121,364 | 1,360,235 |
| 55 to 64 years | 2,980 | 150 | 1,352 | 114 | 773 | 537 | 721 | 300 | 409 | 6,477 | 123,328 | 1,167,002 |
| 65 years and over | 3,777 | 183 | 1,806 | 201 | 923 | 695 | 878 | 404 | 505 | 7,460 | 147,084 | 1,307,210 |
| Renter-occupied housing units* | 6,802 | 238 | 4,322 | 165 | 1,239 | 1,057 | 1,282 | 536 | 484 | 15,738 | 249,273 | 3,237,580 |
| 15 to 24 years | 945 | 34 | 653 | 22 | 175 | 150 | 185 | 80 | 55 | 2,475 | 33,360 | 431,700 |
| 25 to 34 years | 1,812 | 44 | 1,168 | 34 | 325 | 282 | 353 | 149 | 113 | 4,349 | 63,080 | 931,814 |
| 35 to 44 years | 1,342 | 46 | 806 | 40 | 247 | 210 | 259 | 105 | 90 | 2,898 | 45,852 | 672,190 |
| 45 to 54 years | 1,156 | 49 | 753 | 24 | 225 | 179 | 207 | 85 | 94 | 2,647 | 43,130 | 534,003 |
| 55 to 64 years | 785 | 41 | 479 | 27 | 116 | 103 | 141 | 61 | 58 | 1,679 | 31,841 | 336,353 |
| 65 years and over | 762 | 24 | 463 | 18 | 151 | 133 | 137 | 56 | 74 | 1,690 | 32,010 | 331,520 |

Source: U.S. Census Bureau, 2010 Table QT-H1;
*Table QT-H2;
**DP-1.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| Table 1-20: Contract Rent (in Dollars) in the Region on Interest (2009–2013) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Housing Value** | **Lea County, New Mexico** | **Eunice, New Mexico** | **Hobbs, New Mexico** | **Jal, New Mexico** | **Andrews County, Texas** | **Andrews, Texas** | **Gaines County, Texas** | **Seminole, Texas** | **Winkler County, Texas** | **Ector County, Texas** | **New Mexico** | **Texas** |
| Median contract rent* | **584** | **516** | **633** | **422** | **604** | **617** | **478** | **702** | **391** | **612** | **635** | **688** |
| Total Renter-Occupied Housing | 6,336 | 341 | 3,654 | 190 | 1,140 | 1,050 | 1,257 | 481 | 530 | 17,140 | 238,594 | 3,262,919 |
| With cash rent: | 5,606 | 310 | 3,495 | 163 | 983 | 923 | 944 | 377 | 390 | 15,231 | 219,395 | 3,076,712 |
| Less than $100 | 44 | 0 | 34 | 0 | 0 | 0 | 7 | 0 | 25 | 199 | 3,814 | 37,725 |
| $100 to $149 | 155 | 0 | 83 | 4 | 12 | 12 | 31 | 8 | 14 | 219 | 3,612 | 38,706 |
| $150 to $199 | 53 | 6 | 29 | 0 | 15 | 15 | 91 | 48 | 13 | 170 | 4,579 | 38,226 |
| $200 to $249 | 189 | 14 | 92 | 7 | 10 | 10 | 86 | 5 | 4 | 266 | 5,967 | 50,634 |
| $250 to $299 | 161 | 14 | 52 | 0 | 41 | 41 | 72 | 0 | 21 | 277 | 5,450 | 48,686 |
| $300 to $349 | 271 | 12 | 98 | 19 | 203 | 188 | 0 | 0 | 51 | 595 | 7,417 | 73,240 |
| $350 to $399 | 144 | 44 | 37 | 42 | 59 | 59 | 101 | 60 | 82 | 670 | 8,945 | 85,203 |
| $400 to $449 | 555 | 31 | 329 | 22 | 54 | 45 | 64 | 14 | 43 | 1,143 | 13,132 | 142,679 |
| $450 to $499 | 351 | 11 | 203 | 18 | 21 | 21 | 36 | 4 | 44 | 770 | 13,284 | 163,943 |
| $500 to $549 | 626 | 72 | 353 | 19 | 16 | 16 | 70 | 32 | 36 | 1,765 | 17,674 | 236,220 |
| $550 to $599 | 372 | 36 | 274 | 6 | 53 | 26 | 130 | 0 | 0 | 1,273 | 14,643 | 218,151 |
| $600 to $649 | 453 | 8 | 245 | 10 | 91 | 82 | 30 | 0 | 0 | 1,092 | 16,065 | 231,574 |
| $650 to $699 | 287 | 36 | 110 | 5 | 14 | 14 | 16 | 16 | 3 | 792 | 14,410 | 229,342 |
| $700 to $749 | 322 | 12 | 158 | 7 | 94 | 94 | 42 | 42 | 6 | 1,380 | 13,892 | 217,333 |
| $750 to $799 | 213 | 0 | 175 | 4 | 47 | 47 | 18 | 18 | 0 | 739 | 10,001 | 177,332 |
| $800 to $899 | 567 | 14 | 510 | 0 | 134 | 134 | 64 | 64 | 0 | 1,447 | 19,986 | 306,766 |
| $900 to $999 | 267 | 0 | 177 | 0 | 33 | 33 | 0 | 0 | 0 | 1,004 | 13,020 | 208,120 |
| $1,000 to $1,249 | 323 | 0 | 283 | 0 | 86 | 86 | 73 | 53 | 34 | 916 | 20,583 | 300,189 |
| $1,250 to $1,499 | 128 | 0 | 128 | 0 | 0 | 0 | 13 | 13 | 14 | 139 | 6,439 | 134,912 |
| $1,500 to $1,999 | 39 | 0 | 39 | 0 | 0 | 0 | 0 | 0 | 0 | 136 | 4,393 | 91,251 |
| $2,000 or more | 86 | 0 | 86 | 0 | 0 | 0 | 0 | 0 | 0 | 239 | 2,089 | 46,480 |
| No cash rent | 730 | 31 | 159 | 27 | 157 | 127 | 313 | 104 | 140 | 1,909 | 19,199 | 186,207 |

Source: ACS 2009–2013 Table B25056 and *B25058.



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| Table 1-21: Gross Rent (in Dollars) in the Region of Interest (2009–2013) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Lea County, New Mexico** | **Eunice, New Mexico** | **Hobbs, New Mexico** | **Jal, New Mexico** | **Andrews County, Texas** | **Andrews, Texas** | **Gaines County, Texas** | **Seminole, Texas** | **Winkler County, Texas** | **Ector County, Texas** | **New Mexico** | **Texas** |
| Median gross rent* | **$734** | **$651** | **$812** | **$671** | **$769** | **$793** | **$657** | **$863** | **$575** | **$789** | **$758** | **$851** |
| Total Renter Occupied Housing | 6,336 | 341 | 3,654 | 190 | 1,140 | 1,050 | 1,257 | 481 | 530 | 17,140 | 238,594 | 3,262,919 |
| With cash rent | 5,606 | 310 | 3,495 | 163 | 983 | 923 | 944 | 377 | 390 | 15,231 | 219,395 | 3,076,712 |
| Less than $100 | 34 | 0 | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 977 | 10,250 |
| $100 to $149 | 44 | 0 | 34 | 0 | 0 | 0 | 2 | 0 | 5 | 36 | 1,119 | 10,539 |
| $150 to $199 | 38 | 0 | 38 | 0 | 0 | 0 | 41 | 0 | 16 | 141 | 2,675 | 22,622 |
| $200 to $249 | 126 | 14 | 85 | 0 | 25 | 25 | 41 | 4 | 20 | 188 | 4,740 | 35,471 |
| $250 to $299 | 98 | 6 | 15 | 0 | 12 | 12 | 85 | 44 | 0 | 256 | 3,614 | 34,296 |
| $300 to $349 | 151 | 0 | 88 | 7 | 0 | 0 | 42 | 13 | 11 | 173 | 3,951 | 35,011 |
| $350 to $399 | 68 | 0 | 0 | 4 | 34 | 34 | 50 | 0 | 25 | 255 | 5,727 | 40,493 |
| $400 to $449 | 165 | 28 | 38 | 14 | 123 | 123 | 76 | 24 | 3 | 434 | 8,338 | 57,750 |
| $450 to $499 | 298 | 12 | 198 | 5 | 56 | 56 | 68 | 36 | 30 | 425 | 9,376 | 77,404 |
| $500 to $549 | 235 | 23 | 115 | 25 | 0 | 0 | 13 | 0 | 47 | 642 | 11,282 | 111,088 |
| $550 to $599 | 464 | 50 | 207 | 7 | 84 | 78 | 26 | 14 | 77 | 1,028 | 13,601 | 147,051 |
| $600 to $649 | 369 | 21 | 234 | 8 | 23 | 20 | 17 | 0 | 46 | 1,033 | 13,890 | 175,526 |
| $650 to $699 | 491 | 67 | 218 | 28 | 26 | 26 | 77 | 36 | 12 | 1,311 | 14,242 | 190,816 |
| $700 to $749 | 323 | 0 | 194 | 17 | 94 | 71 | 4 | 0 | 10 | 1,015 | 14,086 | 200,748 |
| $750 to $799 | 348 | 37 | 190 | 25 | 38 | 19 | 101 | 0 | 11 | 861 | 13,589 | 197,467 |
| $800 to $899 | 720 | 0 | 480 | 12 | 69 | 69 | 77 | 28 | 20 | 1,868 | 23,876 | 376,340 |
| $900 to $999 | 552 | 30 | 446 | 4 | 92 | 83 | 65 | 39 | 0 | 1,294 | 18,074 | 316,592 |
| $1,000 to $1,249 | 639 | 22 | 467 | 7 | 185 | 185 | 55 | 55 | 37 | 2,764 | 29,851 | 515,231 |
| $1,250 to $1,499 | 245 | 0 | 226 | 0 | 30 | 30 | 51 | 31 | 0 | 837 | 14,258 | 253,043 |
| $1,500 to $1,999 | 108 | 0 | 98 | 0 | 92 | 92 | 53 | 53 | 20 | 399 | 8,836 | 194,629 |
| $2,000 or more | 90 | 0 | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 261 | 3,293 | 74,345 |
| No cash rent | 730 | 31 | 159 | 27 | 157 | 127 | 313 | 104 | 140 | 1,909 | 19,199 | 186,207 |

Source: ACS 2009–2013 Table B25063 and *B25064.


Appendix A has been revised in response to RAI SOC-1

### 1.1.6 Income and Poverty Status

According to 2009–2013 American Community Survey data, the highest median household income for the ROI was in Andrews County ($57,825) at the county level while Jal, New Mexico, located in Lea County had the lowest median household income of $48,790 at the city level (**Table 1-22**). Within the three census tracts in Andrews, Texas, the median household incomes ranged from $61,719 (CT 9504) to $88,250 (CT 9501). Ector County has one census tract and the median household income is $36,927. Seminole, Texas, has two census tracts and median household incomes were $46,512 (CT 9503) and $64,024 (CT 9502), respectively. Winkler County, Texas, has one census tract and the median household income is $49,583. Jal, Lea County, New Mexico, has 15 census tracts within the ROI. Median household incomes ranged $29,882 in CT 3 and $108,922 in CT 7.03 (see **Figure 1.1-4, Median Household Income in the Region of Interest**).

The median household income for geographies within the ROI may be compared to poverty status as defined by the U.S. Census Bureau. Appendix C of NUREG-1748 states that the U.S. Census Bureau's Current Population Reports, Series P-60 on Income and Poverty, should be utilized for this purpose. The U.S. Census uses an income threshold that varies by family size and composition to determine who is in poverty. If the family's total income is less than the family's threshold, then the family and every individual is considered in poverty. The preliminary estimate of the poverty threshold for 2014 for a family of four is $24,221 (USCB 2015). The final 2014 thresholds was released in September 2015 and that threshold was $24,036 (USCB 2015). U.S. Department of Health and Human Services (DHHS) also publishes a poverty guideline. For comparison purposes, the 2015 DHHS poverty guideline is $24,250 for a family of four.

The median household incomes for all the counties and cities within the ROI are above the poverty thresholds established by the USCB and the DHHS.


Appendix A has been revised in response to RAI SOC-1

| Table 1-22: Median Household Income (2009–2013) | | | |
|---|---|---|---|
| Census 2010 Geography | Total Households | Median Household Income | 2015 DHHS Poverty Guideline |
| Andrews County, TX | 5,217 | $57,825 | $24,250 |
| Andrews, TX | 4,082 | $53,833 | |
| Census tract 9501 | 639 | $88,250 | |
| Census tract 9502 | 2,419 | $63,125 | |
| Census tract 9504 | 811 | $61,719 | |
| Ector County, TX | 49,962 | $51,466 | |
| Census tract 22 | 1,012 | $36,927 | |
| Gaines County, TX | 5,437 | $52,910 | |
| Seminole, TX | 2,175 | $50,911 | |
| Census tract 9502 | 2,376 | $64,024 | |
| Census tract 9503 | 1,862 | $46,512 | |
| Winkler County, TX | 2,709 | $48,992 | |
| Census tract 9504 | 570 | $49,583 | |
| Lea County, NM | 21,126 | $50,694 | |
| Eunice, NM | 1,151 | $54,152 | |
| Hobbs, NM | 10,995 | $49,243 | |
| Jal, NM | 730 | $48,790 | |
| Census tract 1 | 829 | $32,052 | |
| Census tract 2 | 992 | $39,667 | |
| Census tract 3 | 1,141 | $29,882 | |
| Census tract 4 | 1,109 | $39,917 | |
| Census tract 5.02 | 2,097 | $52,236 | |
| Census tract 5.03 | 1,367 | $55,150 | |
| Census tract 5.04 | 1,508 | $81,111 | |
| Census tract 6 | 2,085 | $60,432 | |
| Census tract 7.01 | 512 | $64,717 | |
| Census tract 7.02 | 622 | $45,682 | |
| Census tract 7.03 | 774 | $108,922 | |
| Census tract 7.04 | 997 | $56,875 | |
| Census tract 8 | 1,278 | $56,000 | |
| Census tract 9 | 779 | $47,702 | |
| Census tract 11 | 1,571 | $65,524 | |

Source: U.S. Census Bureau, 2009–2013 American Community Survey, Tables B11001 and B19013.

ACS data are estimates; they are not counts. Income data is provided in 2013 inflation adjusted dollars.


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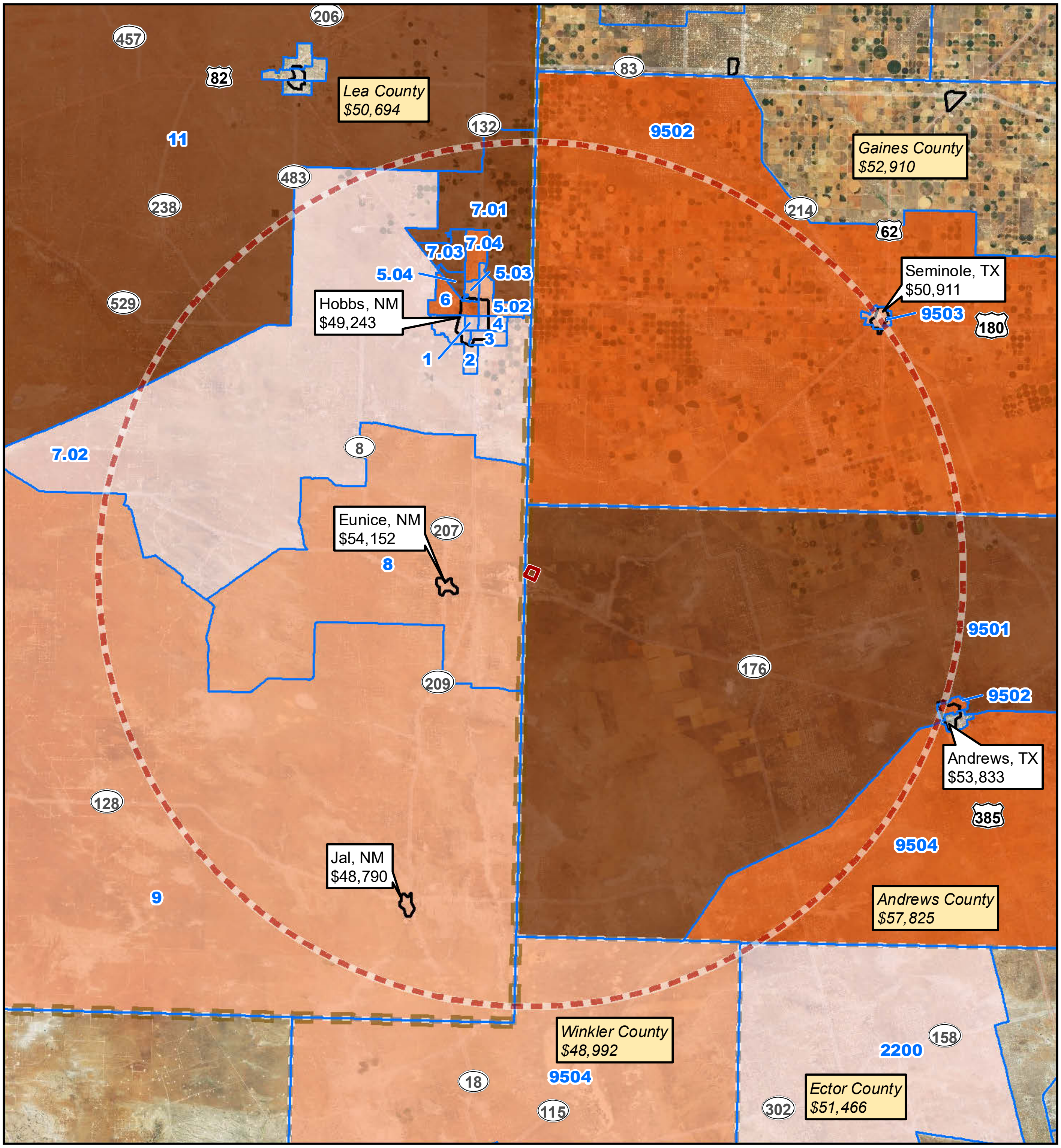



Project Location
30-mile Region of Interest
State Boundary
County Boundary
2010 Census Tract

**Median Household Income**

$29,882 - $45,682
$45,683 - $56,000
$56,001 - $64,024
$64,025 - $108,922

Note: no census tracts within the ROI have median household incomes below any of the 2014 Poverty Thresholds developed by the Census or the 2015 poverty guidelines developed by the Department of Health and Human Services

Data Source: US Census Bureau (2010)
Aerial Source: NAIP (2014)

0 10 Miles
0 15 Kilometers

# Figure 1.1-4

## Median Household Income in the Region of Interest

**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN
Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 10 miles |
| | Scale: 1:633,600 |
| Prepared by: SL | Date: 4/4/2016 |

G:\Projects\WCS\Figure 1.1-4_Income_20160404.mxd

Appendix A has been revised in response to RAI SOC-1

### 1.1.7 Population in Poverty within ROI

As previously mentioned (see **Section 1.1.6**), no total population for any city or county within the ROI has median incomes that are within the poverty thresholds established by the U.S. Census Bureau or the Department of Health and Human Services. This section did identify there were percentages of families and individuals living below poverty levels, with highest percentages in Gaines County, Texas. A review of population data was performed to assess comparisons of this data and population data.

The population below poverty level within the ROI is summarized in **Table 1-23**. In Andrews, Texas, there are three census tracts totaling with 11,308 individuals within these tracts for whom poverty status was determined, 5.1 to 9.6 percent of the population in the past 12 months were below poverty level. In Ector County, Texas, 909 individuals in census tract 22 were below poverty level, approximately 27.5 percent of the population whom poverty status was determined. Seminole, Texas, contained two census tracts within the ROI and percentages of individuals below poverty level ranged between 12.6 and 18.0 percent. Of the 1,549 individuals in Winkler County, Texas, in CT 9504, 13.2 percent were determined to be below poverty level in the past 12 months. Within Jal in Lea County, New Mexico, there were 15 census tracts with 52,502 individuals whom poverty status was determined. Of these individuals, 7,084 individuals were below the poverty level and depending on the census tract, percentages ranged from 0.4 (CT 7.03) to 27.1 (CT 4) percent.

### 1.1.8 Employment and Unemployment Characteristics

**Table 1-24** shows the employment status of persons over the age of 16 within the ROI. Within these populations, the employment rate ranges from the lowest of 50.6 percent in Jal, New Mexico, to the highest, 63.0 percent in Ector County, Texas. These employment rates are lower than the state employment percentage in New Mexico (54.4 percent) and higher than in Texas (59.4 percent). The unemployment percentages range from the highest (8.4 percent) in Lea County, New Mexico, to the lowest unemployment percentage of 3.5 in Winkler County, Texas. These rates are slightly better (lower) with the State of New Mexico's unemployment rate of 9.7 percent and considerably better (lower) than State of Texas' rate of 8.1 percent.

Within the ROI, the population with the highest percentage employed is Native Hawaiian/Other Pacific Islander (100%) in Gaines and Ector counties, and Seminole, Texas, however that is for a total of 35 persons in Ector County, and 48 persons in Gaines County and Seminole, Texas, which is a fraction of the total population of 104,044 (Ector County), 12,468 (Gaines County) and 5,080 (Seminole). In comparison, the population with the highest percentage of unemployed is Black and African American (100%) in Jal, New Mexico. As with the number of employed, the number of persons within this population (15) is relatively small as compared to the total population of 1,612.


Appendix A has been revised in response to RAI SOC-1

| Table 1-23: Population in Poverty (2009–2013) | | | |
|---|---|---|---|
| Census 2010 Geography | Total Population For Whom Poverty Status is Determined | Population with Income in the past 12 months below poverty level | Percent of Population with Income in the past 12 months below poverty level |
| Andrews County, TX | 15,379 | 1,926 | 12.5% |
| Andrews, TX | 11,537 | 1,613 | 14% |
| Census tract 9501 | 1,949 | 99 | 5.1% |
| Census tract 9502 | 6,584 | 620 | 9.4% |
| Census tract 9504 | 2,775 | 266 | 9.6% |
| Ector County, TX | 138,967 | 22,080 | 15.9% |
| Census tract 22 | 3,309 | 909 | 27.5% |
| Gaines County, TX | 17,907 | 3,000 | 16.8% |
| Seminole, TX | 6,558 | 997 | 15.2% |
| Census tract 9502 | 8,660 | 1,561 | 18% |
| Census tract 9503 | 5,597 | 704 | 12.6% |
| Winkler County, TX | 7,121 | 909 | 12.8% |
| Census tract 9504 | 1,549 | 204 | 13.2% |
| Lea County, NM | 63,552 | 9,507 | 15% |
| Eunice, NM | 2,973 | 303 | 10.2% |
| Hobbs, NM | 33,228 | 5,542 | 16.7% |
| Jal, NM | 2,056 | 163 | 7.9% |
| Census tract 1 | 2,506 | 543 | 21.7% |
| Census tract 2 | 3,321 | 756 | 22.8% |
| Census tract 3 | 3,823 | 949 | 24.8% |
| Census tract 4 | 3,641 | 987 | 27.1% |
| Census tract 5.02 | 6,203 | 977 | 15.8% |
| Census tract 5.03 | 3,823 | 539 | 14.1% |
| Census tract 5.04 | 3,587 | 318 | 8.9% |
| Census tract 6 | 6,589 | 521 | 7.9% |
| Census tract 7.01 | 1,726 | 247 | 14.3% |
| Census tract 7.02 | 1,984 | 199 | 10% |
| Census tract 7.03 | 2,227 | 9 | 0.4% |
| Census tract 7.04 | 2,901 | 246 | 8.5% |
| Census tract 8 | 3,210 | 329 | 10.2% |
| Census tract 9 | 2,158 | 194 | 9% |
| Census tract 11 | 4,803 | 270 | 5.6% |

Source: U.S. Census Bureau, 2009–2013 American Community Survey, Table B17001.
ACS data are estimates; they are not counts.


Appendix A has been revised in response to RAI SOC-1

| Table 1-24: Employment Status by Race/Ethnicity in the Region of Interest (2009–2013) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subject** | **Lea County, New Mexico** | **Eunice, New Mexico** | **Hobbs, New Mexico** | **Jal, New Mexico** | **Andrews County, Texas** | **Andrews, Texas** | **Gaines County, Texas** | **Seminole, Texas** | **Winkler County, Texas** | **Ector County, Texas** | **New Mexico** | **Texas** |
| **Population 16 years and over** | **48,357** | **2,332** | **25,092** | **1,612** | **11,457** | **8,535** | **12,468** | **5,080** | **5,352** | **104,044** | **1,612,730** | **19,468,136** |
| *Percent of Persons Employed/Unemployment* | *56.4%/8.4%* | *62.0%/5.8%* | *55.9%/7.9%* | *50.6%/4.6%* | *61.5%/5.9%* | *59.4%/4.9%* | *59.3%/5.8%* | *60.5%/6.8%* | *59.1%/3.5%* | *63.0%/6.2%* | *54.4%/9.7%* | *59.4%/8.1%* |
| White alone, not Hispanic or Latino | 22,628 | 1,225 | 10,850 | 978 | 5,765 | 4,251 | 7,560 | 2,933 | 2,465 | 46,040 | 711,032 | 9,444,102 |
| *Percent of Persons Employed/Unemployment* | *56.7%/6.8%* | *61.3%/6.6%* | *54.8%/7.0%* | *49.1%/5.0%* | *60.7%/4.4%* | *60.0%/3.8%* | *59.2%/5.2%* | *63.1%/5.2%* | *57.0%/4.9%* | *62.4%/4.7%* | *54.9%/7.0%* | *59.6%/6.4%* |
| Black or African American | 1,598 | 0 | 1,231 | 15 | 214 | 200 | 137 | 42 | 117 | 4,249 | 31,856 | 2,282,951 |
| *Percent of Persons Employed/Unemployment* | *55.3%/10.2%* | *-/-* | *55.5%/8.0%* | *0.0%/100.0%* | *54.7%/24.5%* | *51.5%/27.0%* | *20.4%/0.0%* | *9.5%/0.0%* | *53.8%/0.0%* | *51.1%/9.5%* | *52.9%/12.5%* | *55.5%/13.3%* |
| American Indian and Alaska Native | 481 | 0 | 363 | 11 | 290 | 268 | 181 | 125 | 43 | 671 | 139,355 | 98,684 |
| *Percent of Persons Employed/Unemployment* | *45.9%/12.6%* | *-/-* | *41.3%/17.1%* | *63.6%/0.0%* | *89.7%/0.0%* | *88.8%/0.0%* | *59.1%/1.8%* | *59.2%/0.0%* | *65.1%/26.3%* | *68.7%/0.0%* | *45.1%/16.2%* | *57.4%/10.8%* |
| Asian | 176 | 0 | 151 | 0 | 138 | 138 | 32 | 5 | 28 | 899 | 22,841 | 797,419 |
| *Percent of Persons Employed/Unemployment* | *67.6%/0.0%* | *-/-* | *78.8%/0.0%* | *-/-* | *69.6%/0.0%* | *69.6%/0.0%* | *0.0%/-* | *0.0%/-* | *67.9%/0.0%* | *66.1%/5.3%* | *61.8%/7.4%* | *62.9%/6.3%* |
| Native Hawaiian and Other Pacific Islander | 0 | 0 | 0 | 0 | 0 | 0 | 48 | 48 | 0 | 35 | 1,162 | 15,834 |
| *Percent of Persons Employed/Unemployment* | *-/-* | *-/-* | *-/-* | *-/-* | *-/-* | *-/-* | *100.0%/0.0%* | *100.0%/0.0%* | *-/-* | *100.0%/0.0%* | *59.0%/2.4%* | *56.2%/12.6%* |
| Some other race | 2,596 | 169 | 1,454 | 6 | 498 | 484 | 463 | 135 | 226 | 5,479 | 175,144 | 1,269,528 |
| *Percent of Persons Employed/Unemployment* | *65.8%/9.4%* | *60.4%/20.3%* | *62.7%/11.8%* | *50.0%/0.0%* | *41.2%/0.0%* | *41.7%/0.0%* | *67.0%/0.0%* | *71.1%/0.0%* | *56.2%/7.3%* | *59.5%/11.3%* | *56.8%/10.8%* | *62.5%/9.4%* |
| Two or more races | 1,110 | 42 | 568 | 53 | 159 | 121 | 246 | 157 | 148 | 2,287 | 37,715 | 337,241 |
| *Percent of Persons Employed/Unemployment* | *54.9%/6.9%* | *85.7%/0.0%* | *39.3%/16.8%* | *47.2%/0.0%* | *66.0%/8.7%* | *60.3%/8.8%* | *50.8%/12.6%* | *34.4%/0.0%* | *73.0%/2.7%* | *62.5%/7.2%* | *54.4%/12.1%* | *58.0%/11.0%* |
| Hispanic or Latino origin (of any race) | 22,739 | 1,059 | 12,211 | 567 | 5,355 | 3,990 | 4,541 | 2,010 | 2,707 | 51,513 | 697,273 | 6,697,763 |
| *Percent of Persons Employed/Unemployment* | *55.9%/10.1%* | *61.8%/5.2%* | *57.0%/8.7%* | *55.0%/1.9%* | *61.8%/7.5%* | *58.2%/6.3%* | *60.3%/6.6%* | *57.0%/9.6%* | *61.4%/2.5%* | *64.3%/7.4%* | *55.4%/11.3%* | *60.1%/8.9%* |

Source: ACS 2009–2013 Table S2301.



Appendix A has been revised in response to RAI SOC-1

### 1.1.9 Employment by Industry Sector

Employment within all counties of the ROI is primarily within the industries of 1) educational services, and health care and social assistance (18.1%); 2) agriculture, forestry, fishing, hunting, and mining (16.4%); and 3) retail trade (10.1%) (see **Table 1-25**). The lowest percentage of persons employed is within the information industry (1.2%). The industry percentages are consistent between the counties and the states for wholesale trade, information, and other services, except public administration. Agriculture, forestry, fishing and hunting, and mining had the greatest variability (16.4% for the counties when compared to 4.4% for New Mexico and 3.1% for Texas) (ACS 2013).

Employment in Lea County, New Mexico, is primarily through the industries of 1) agriculture, forestry, fishing and hunting, and mining (21.2 percent); 2) educational services, and heath care and social assistance (16.9%); and 3) retail trade (9.5 percent) (ACS 2013). The highest percentage of industry employment within Andrews, Gaines, and Winker Counties, Texas, was agriculture, forestry, fishing and hunting, and mining (ranging from 21.4 to 27.6 percent) and Ector County industry employment being highest in educational services, health care and social assistance (18.2 percent). These percentages are higher than the state of Texas (3.1 percent). The percentage for all counties combined within the ROI for the agriculture, forestry, fishing and hunting, and mining industry is 16.4 percent. The information industry was 1.1 percent in Lea County, New Mexico, and ranged between 0.4 to 1.4 percent within Andrews, Ector, Gaines, and Winkler Counties, Texas. These percentages are comparable to their respective states and combined counties within the ROI (ACS 2013).

American Community Survey data from 2009 through 2013 contain unemployment information for the census tract level (see **Table 1-26**). In the ROI, there is some variation in the unemployment rate in the civilian labor force. The unemployment rate in Andrews, Texas, ranges from 1.9 percent (CT 9501) to 10.2 percent (CT 9504) with unemployment in Andrews, Texas, at 4.9 percent and 5.9 percent for Andrews County, Texas. Five armed forces personnel were within Andrews, Texas, and 3,195 individuals were not in the labor force. Andrews County, Texas, had 3,965 individuals not in the labor force.

Ector County, Texas, only had one census tract (CT 22) in the ROI with 5.3 percent unemployed in the civilian labor force, no armed forces personnel, and 1,013 individuals not in the labor force. Ector County, Texas, as a whole had 6.2 percent unemployment, 35 armed forces personnel, and 34,102 individuals not in the labor force.

Gaines County, Texas, has two census tracts within Seminole, Texas (CT 9502 and 9503). The rates in these areas ranged from 3.8 percent (CT 9502) to 9.1 percent (CT 9503) with Gaines County, Texas, at 5.8 percent. There were no armed forces personnel in either Gaines County, Texas, or Seminole, Texas, with individuals not in the labor force ranging from 1,666 individuals to 4,620 individuals.


Appendix A has been revised in response to RAI SOC-1

**Table 1-25: Employment by Industry Sector in the Region of Interest (2009–2013)**

| INDUSTRY | Lea County, New Mexico | Eunice, New Mexico | Hobbs, New Mexico | Jal, New Mexico | Andrews County, Texas | Andrews, Texas | Gaines County, Texas | Seminole, Texas | Winkler County, Texas | Ector County, Texas | New Mexico | Texas | Counties Combined (New Mexico, Texas) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Civilian employed population 16 years and over** | **27,256** | **1,447** | **14,025** | **816** | **7,048** | **5,072** | **7,390** | **3,072** | **3,165** | **65,574** | **876,823** | **11,569,041** | **110,433** |
| **Agriculture, forestry, fishing and hunting, and mining** | **5,765** | **368** | **2,536** | **140** | **1,942** | **1,410** | **1,601** | **412** | **677** | **8,072** | **38,237** | **359,977** | **18,057** |
| *Percent of Total* | *21.2%* | *25.4%* | *18.1%* | *17.2%* | *27.6%* | *27.8%* | *21.7%* | *13.4%* | *21.4%* | *12.3%* | *4.4%* | *3.1%* | *16.4%* |
| **Construction** | **2,390** | **123** | **1,485** | **79** | **488** | **341** | **1,133** | **341** | **417** | **5,353** | **62,241** | **914,460** | **9,781** |
| *Percent of Total* | *8.8%* | *8.5%* | *10.6%* | *9.7%* | *6.9%* | *6.7%* | *15.3%* | *11.1%* | *13.2%* | *8.2%* | *7.1%* | *7.9%* | *8.9%* |
| **Manufacturing** | **1,378** | **79** | **622** | **69** | **455** | **374** | **335** | **131** | **89** | **5,978** | **44,362** | **1,083,079** | **8,235** |
| *Percent of Total* | *5.1%* | *5.5%* | *4.4%* | *8.5%* | *6.5%* | *7.4%* | *4.5%* | *4.3%* | *2.8%* | *9.1%* | *5.1%* | *9.4%* | *7.5%* |
| **Wholesale trade** | **1,053** | **67** | **407** | **15** | **208** | **116** | **155** | **99** | **102** | **2,913** | **18,578** | **347,982** | **4,431** |
| *Percent of Total* | *3.9%* | *4.6%* | *2.9%* | *1.8%* | *3%* | *2.3%* | *2.1%* | *3.2%* | *3.2%* | *4.4%* | *2.1%* | *3%* | *4.0%* |
| **Retail trade** | **2,593** | **71** | **1,559** | **84** | **375** | **269** | **734** | **272** | **253** | **7,145** | **98,496** | **1,345,939** | **11,100** |
| *Percent of Total* | *9.5%* | *4.9%* | *11.1%* | *10.3%* | *5.3%* | *5.3%* | *9.9%* | *8.9%* | *8%* | *10.9%* | *11.2%* | *11.6%* | *10.1%* |
| **Transportation and warehousing, and utilities** | **2,124** | **119** | **911** | **151** | **506** | **406** | **618** | **177** | **282** | **3,408** | **39,445** | **629,548** | **6,938** |
| *Percent of Total* | *7.8%* | *8.2%* | *6.5%* | *18.5%* | *7.2%* | *8%* | *8.4%* | *5.8%* | *8.9%* | *5.2%* | *4.5%* | *5.4%* | *6.3%* |
| **Information** | **293** | **0** | **185** | **8** | **51** | **29** | **32** | **9** | **13** | **908** | **14,651** | **213,097** | **1,297** |
| *Percent of Total* | *1.1%* | *0%* | *1.3%* | *1%* | *0.7%* | *0.6%* | *0.4%* | *0.3%* | *0.4%* | *1.4%* | *1.7%* | *1.8%* | *1.2%* |
| **Finance and insurance, and real estate and rental and leasing** | **963** | **34** | **535** | **16** | **123** | **63** | **121** | **21** | **112** | **2,903** | **40,799** | **769,050** | **4,222** |
| *Percent of Total* | *3.5%* | *2.3%* | *3.8%* | *2%* | *1.7%* | *1.2%* | *1.6%* | *0.7%* | *3.5%* | *4.4%* | *4.7%* | *6.6%* | *3.8%* |
| **Professional, scientific, and management, and administrative and waste management services** | **1,554** | **88** | **942** | **38** | **426** | **326** | **301** | **211** | **116** | **4,284** | **95,063** | **1,251,791** | **6,681** |
| *Percent of Total* | *5.7%* | *6.1%* | *6.7%* | *4.7%* | *6%* | *6.4%* | *4.1%* | *6.9%* | *3.7%* | *6.5%* | *10.8%* | *10.8%* | *6.1%* |
| **Educational services, and health care and social assistance** | **4,616** | **256** | **2,329** | **137** | **1,561** | **1,119** | **1,233** | **810** | **609** | **11,962** | **218,046** | **2,514,011** | **19,981** |
| *Percent of Total* | *16.9%* | *17.7%* | *16.6%* | *16.8%* | *22.1%* | *22.1%* | *16.7%* | *26.4%* | *19.2%* | *18.2%* | *24.9%* | *21.7%* | *18.1%* |
| **Arts, entertainment, and recreation, and accommodation and food services** | **1,830** | **118** | **1,108** | **4** | **491** | **306** | **402** | **276** | **244** | **6,633** | **94,257** | **1,001,258** | **9,600** |
| *Percent of Total* | *6.7%* | *8.2%* | *7.9%* | *0.5%* | *7%* | *6%* | *5.4%* | *9%* | *7.7%* | *10.1%* | *10.7%* | *8.7%* | *8.7%* |
| **Other services, except public administration** | **1,379** | **84** | **796** | **40** | **325** | **241** | **581** | **219** | **103** | **4,338** | **42,250** | **621,998** | **6,726** |
| *Percent of Total* | *5.1%* | *5.8%* | *5.7%* | *4.9%* | *4.6%* | *4.8%* | *7.9%* | *7.1%* | *3.3%* | *6.6%* | *4.8%* | *5.4%* | *6.1%* |
| **Public administration** | **1,318** | **40** | **610** | **35** | **97** | **72** | **144** | **94** | **148** | **1,677** | **70,398** | **516,851** | **3,384** |
| *Percent of Total* | *4.8%* | *2.8%* | *4.3%* | *4.3%* | *1.4%* | *1.4%* | *1.9%* | *3.1%* | *4.7%* | *2.6%* | *8%* | *4.5%* | *3.06%* |

Source: ACS 2009–2013 Table DP03.



Appendix A has been revised in response to RAI SOC-1

Winkler County, Texas, has one census tract (CT 9504) within the ROI and had eight percent of the labor force as unemployed with no armed services personnel and 478 individuals not in the labor force. Within the county as a whole, there was 3.5 percent unemployed with 2,072 individuals not in the labor force.

Lea County, New Mexico, has 15 census tracts within the ROI, all within Jal, New Mexico. The percentage of unemployed in the civilian labor force ranged from the highest (18.5 percent in CT 7.02) to the lowest (4.2 percent in CT 7.03). Twenty armed services personnel were identified in CT 5.02 and five in CT 7.02, which constituted a majority of the armed services personnel in Lea County, New Mexico (34 individuals). The number of individuals not in the labor force ranged from 389 (CT 7.01) to 1,899 (CT 7.02). Eunice, New Mexico, had 89 individuals (5.8 percent) unemployed with no armed forces personnel, and 796 individuals not in the labor force. Hobbs, New Mexico, had 1,195 individuals (7.9 percent) unemployed, 20 armed services personnel, and 9,852 individuals not in the labor force. **Table 1-26** provides data regarding employment status within the ROI.

The top three industries in terms of employment in the Fourth Quarter of 2014 for Andrews County were 1) Natural Resources and Mining (2,055 employees); 2) Trade, Transport, and Utilities (1,527) and 3) Education and Health Services (1,143). Ector County top industries included 1) Trade, Transportation, and Utilities (18,235), 2) Education and Health Services (13,091) and 3) Natural Resources and Mining (12,429). Gaines County top industries includes 1) Natural Resources and Mining (2,239), 2) Trade, Transportation and Utilities (1,124) and 3) Construction (435). Winkler County top industries includes 1) Natural Resources and Mining (863), 2) Trade, Transportation and Utilities (555), and 3) Education and Health Services (496) (see **Table 1-27**) (TWC 2015).

There is general consistency when comparing employment industries between the recent Texas Workforce Commission 2014 information and the American Community Survey from 2009–2013. The primary industries within the ROI are agricultural and mining based. Educational and health-related industries are very prevalent, along with trade-related industries.


Appendix A has been revised in response to RAI SOC-1

| Table 1-26: Employment Status in the Region of Interest (2009–2013) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Civilian labor force (CLF) | | | | | |
| **Census 2010 Geography** | **Population 16 years and over** | **In Labor force** | **Civilian labor force** | **Employed in CLF** | **Unemployed In CLF** | **% Unemployed in CLF** | **Armed Forces** | **Not in labor force** |
| **Andrews County, TX** | 11457 | 7492 | 7487 | 7048 | 439 | 5.9% | 5 | 3965 |
| Andrews, TX | 8535 | 5340 | 5335 | 5072 | 263 | 4.9% | 5 | 3195 |
| Census tract 9501 | 1476 | 995 | 995 | 976 | 19 | 1.9% | 0 | 481 |
| Census tract 9502 | 5065 | 3052 | 3047 | 2962 | 85 | 2.8% | 5 | 2013 |
| Census tract 9504 | 2058 | 1596 | 1596 | 1433 | 163 | 10.2% | 0 | 462 |
| **Ector County, TX** | 104044 | 69942 | 69907 | 65574 | 4333 | 6.2% | 35 | 34102 |
| Census tract 22 | 2466 | 1453 | 1453 | 1376 | 77 | 5.3% | 0 | 1013 |
| **Gaines County, TX** | 12468 | 7848 | 7848 | 7390 | 458 | 5.8% | 0 | 4620 |
| Seminole, TX | 5080 | 3295 | 3295 | 3072 | 223 | 6.8% | 0 | 1785 |
| Census tract 9502 | 5841 | 3748 | 3748 | 3604 | 144 | 3.8% | 0 | 2093 |
| Census tract 9503 | 4111 | 2445 | 2445 | 2222 | 223 | 9.1% | 0 | 1666 |
| **Winkler County, TX** | 5352 | 3280 | 3280 | 3165 | 115 | 3.5% | 0 | 2072 |
| Census tract 9504 | 1277 | 799 | 799 | 735 | 64 | 8% | 0 | 478 |
| **Lea County, NM** | 48357 | 29783 | 29749 | 27256 | 2493 | 8.4% | 34 | 18574 |
| Eunice, NM | 2332 | 1536 | 1536 | 1447 | 89 | 5.8% | 0 | 796 |
| Hobbs, NM | 25092 | 15240 | 15220 | 14025 | 1195 | 7.9% | 20 | 9852 |
| Jal, NM | 1612 | 855 | 855 | 816 | 39 | 4.6% | 0 | 757 |
| Census tract 1 | 1915 | 1227 | 1227 | 1126 | 101 | 8.2% | 0 | 688 |
| Census tract 2 | 2507 | 1479 | 1479 | 1213 | 266 | 18% | 0 | 1028 |
| Census tract 3 | 2502 | 1416 | 1416 | 1266 | 150 | 10.6% | 0 | 1086 |
| Census tract 4 | 2358 | 1307 | 1307 | 1241 | 66 | 5% | 0 | 1051 |
| Census tract 5.02 | 4320 | 2844 | 2824 | 2658 | 166 | 5.9% | 20 | 1476 |
| Census tract 5.03 | 2824 | 1935 | 1935 | 1780 | 155 | 8% | 0 | 889 |
| Census tract 5.04 | 2797 | 2158 | 2158 | 1996 | 162 | 7.5% | 0 | 639 |
| Census tract 6 | 4922 | 3123 | 3123 | 2927 | 196 | 6.3% | 0 | 1799 |
| Census tract 7.01 | 1289 | 900 | 900 | 816 | 84 | 9.3% | 0 | 389 |
| Census tract 7.02 | 2818 | 919 | 914 | 745 | 169 | 18.5% | 5 | 1899 |
| Census tract 7.03 | 1918 | 1321 | 1321 | 1265 | 56 | 4.2% | 0 | 597 |
| Census tract 7.04 | 2336 | 1575 | 1575 | 1346 | 229 | 14.5% | 0 | 761 |
| Census tract 8 | 2536 | 1652 | 1652 | 1563 | 89 | 5.4% | 0 | 884 |
| Census tract 9 | 1714 | 916 | 916 | 877 | 39 | 4.3% | 0 | 798 |
| Census tract 11 | 3512 | 2322 | 2322 | 2175 | 147 | 6.3% | 0 | 1190 |

Source: ACS 2009–2013 Table DP03.


Appendix A has been revised in response to RAI SOC-1

| Table 1-27: Employment by Industry for Texas Counties 2014 (Texas Workforce Commission) | | | | |
|---|---|---|---|---|
| **INDUSTRY** | **Andrews County, TX** | **Ector County, TX** | **Gaines County, TX** | **Winkler County, TX** |
| **Civilian employed population 16 years and over** | **7,879** | **79,051** | **4,964** | **2,818** |
| **Natural Resources and Mining** | **2,055** | **12,429** | **2,239** | **863** |
| *Percent of Total* | *26.08%* | *15.72%* | *45.10%* | *30.62%* |
| **Construction** | **872** | **7,591** | **435** | **399** |
| *Percent of Total* | *11.07%* | *9.60%* | *8.76%* | *14.16%* |
| **Manufacturing** | **348** | **5,958** | **149** | **0** |
| *Percent of Total* | *4.42%* | *7.54%* | *3.00%* | *0.00%* |
| **Trade, Transportation and Utilities** | **1,527** | **18,235** | **1,124** | **555** |
| *Percent of Total* | *19.38%* | *23.07%* | *22.64%* | *19.69%* |
| **Information** | **100** | **496** | **23** | **8** |
| *Percent of Total* | *1.27%* | *0.63%* | *0.46%* | *0.28%* |
| **Financial Activities** | **439** | **3,993** | **180** | **95** |
| *Percent of Total* | *5.57%* | *5.05%* | *3.63%* | *3.37%* |
| **Professional and Business Services** | **491** | **4,794** | **148** | **65** |
| *Percent of Total* | *6.23%* | *6.06%* | *2.98%* | *2.31%* |
| **Education and Health Services** | **1,143** | **13,091** | **142** | **496** |
| *Percent of Total* | *14.51%* | *16.56%* | *2.86%* | *17.60%* |
| **Leisure and Hospitality** | **470** | **7,886** | **393** | **132** |
| *Percent of Total* | *5.97%* | *9.98%* | *7.92%* | *4.68%* |
| **Other Services** | **238** | **3,166** | **131** | **65** |
| *Percent of Total* | *3.02%* | *4.01%* | *2.64%* | *2.31%* |
| **Public Administration** | **196** | **1,404** | **0** | **140** |
| *Percent of Total* | 2.49% | 1.78% | 0.00% | 4.97% |
| **Unclassified** | **0** | **8** | **0** | **0** |
| *Percent of Total* | *0.00%* | *0.01%* | *0.00%* | *0.00%* |

Source: Labor Market and Career Information, Texas Workforce Commission, 2015.


Appendix A has been revised in response to RAI SOC-1

### 1.1.10 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" requires each Federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations."

Appendix C ("Environmental Justice Procedures") to NUREG-1748 "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (2003) provides detailed guidance for environmental justice analyses. The appendix has a header noting that necessary updates will be made following the issuance of an Environmental Justice Policy Statement. The Final Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (2004) does not state that the interim guidance provided in Appendix C to NUREG-1748 has been superseded, and, in fact, continues to reference the appendix. Therefore, Appendix C was utilized as guidance for this analysis.

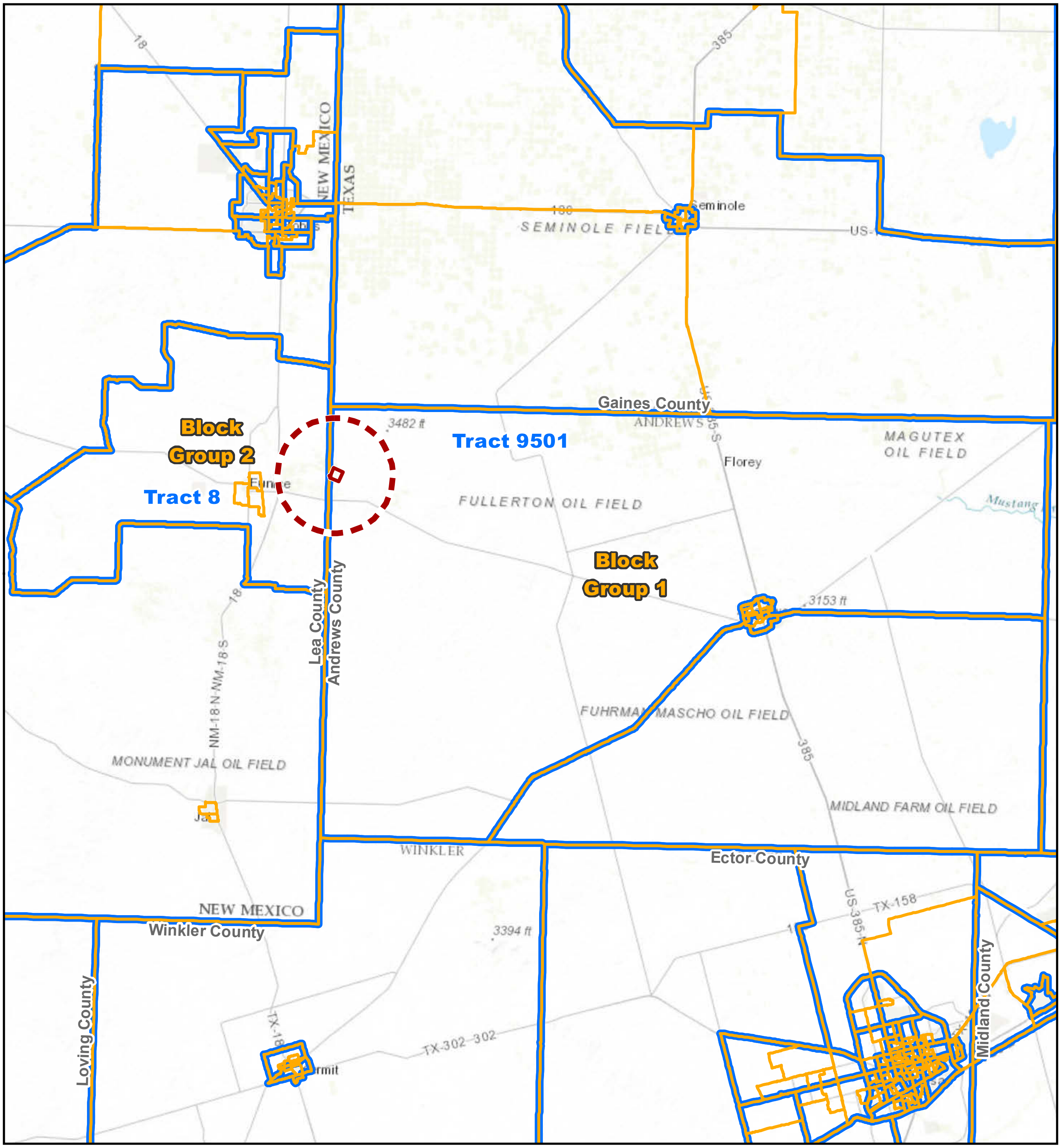
The first step in the environmental justice analysis is gathering demographic data for the area around the proposed facility as well as state and county data for comparison. Appendix C states that if a proposed facility is located outside city limits or in a rural area, a radius of four miles (50 square miles) should be used. The recommended geographic area for evaluating Census data is the block group. As the proposed facility would be located in a rural area outside of city limits, census data on race and income was collected for the block groups within a four-mile radius.

The four-mile radius intersects two block groups, according to the 2010 Census. One block group is within Andrews County, Texas, and the other is within Lea County, New Mexico. Therefore, comparison data was also collected for these counties and the states of Texas and New Mexico (see **Figure 1.1-5, Overview of Area – Census Geographies**, and **1.1-6, Census Geographies Within a Four-Mile Radius of the Site**). Although not required, data for census tracts and the city of Eunice (west of the four-mile study area) is included.

#### 1.1.10.1 Identification of Environmental Justice Populations – Minority Populations

Based on the guidance in Appendix C, minority is defined as "individual(s) who are members of the following population groups: American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; African American (not of Hispanic or Latino origin); some other race; and Hispanic or Latino (of any race)." Anyone who identifies themselves as white and a minority will be counted as that minority group. The race and ethnicity characteristics for each geography from Census 2010 are presented below in **Table 1-28**. The "Minority" calculation was conservatively defined as all persons who do not identify themselves as "White Only."


Appendix A has been revised in response to RAI SOC-1




- Project Location
- 4-mile Study Area
- 2010 Census Tract
- 2010 Census Block Group

0 10 Miles
0 15 Kilometers

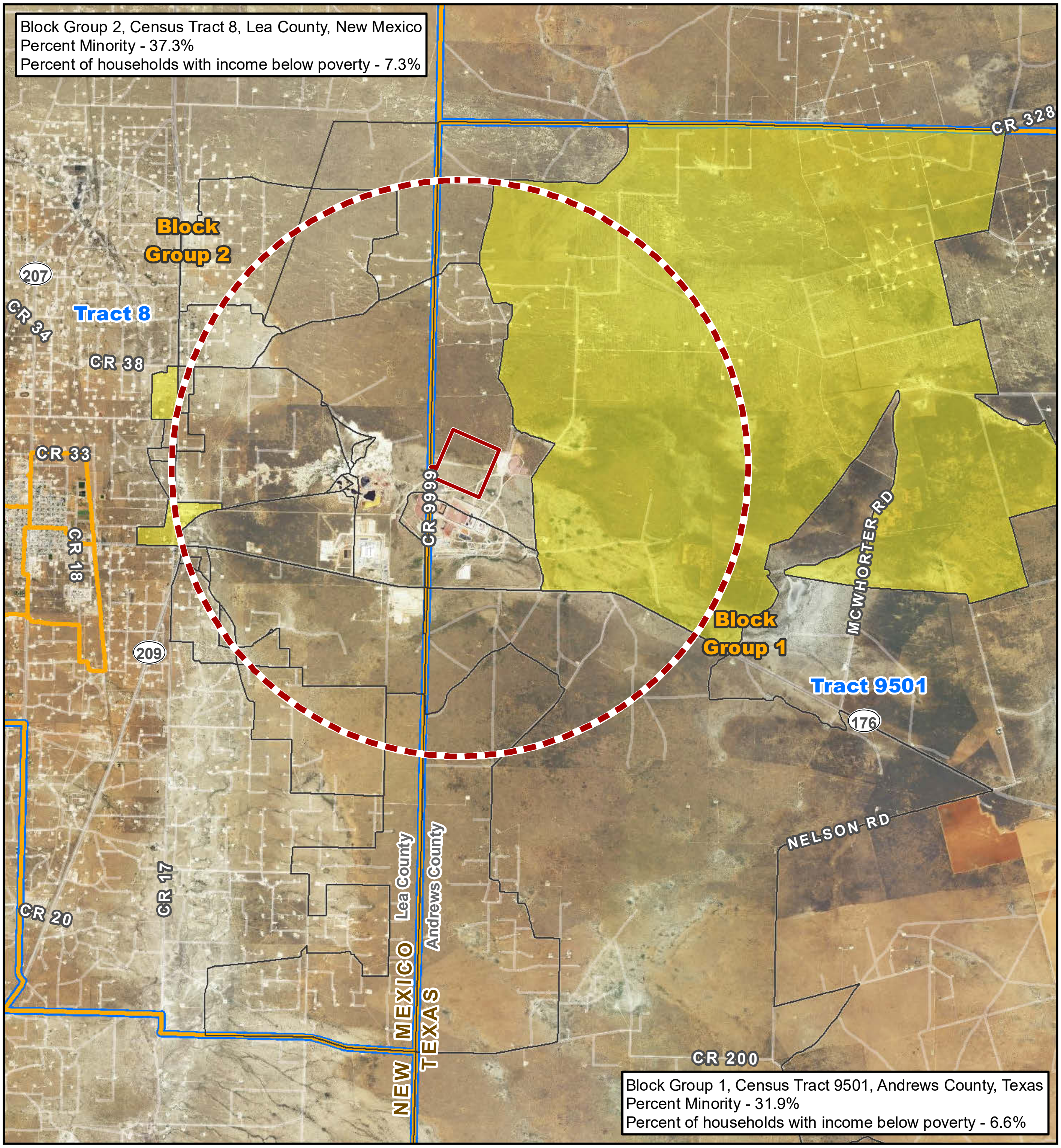
**Figure 1.1-5**
**Overview of Area**
**Census Geographies**
**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 10 miles |
| | Scale: 1:633,600 |
| Prepared by: SL | Date: 4/4/2016 |

Data Source: US Census Bureau (2010)
Basemap Source: ESRI (2014)
G:\Projects\WCS\Figure 1.1-5_Overview of Area_Census Geographies_20160404.mxd

Appendix A has been revised in response to RAI SOC-1




Project Location
4-mile Study Area
2010 Census Tract
2010 Census Block Group
2010 Census Block
Populated 2010 Census Block within the 4-mile Study Area

0 2 Miles
0 3 Kilometers

**Figure 1.1-6**

**Census Geographies within a 4-mile Radius of the Site**

**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN Environmental Consulting

Data Source: US Census Bureau (2010)
Basemap Source: ESRI (2014)

| | |
|---|---|
| Prepared for: WCS | 1 in = 2 miles |
| | Scale: 1:126,720 |
| Prepared by: SL | Date: 4/4/2016 |

G:\Projects\WCS\Figure 1.1-6_Census Geographies within 4 miles_20160404.mxd

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**Table 1-28: Race and Ethnicity in the Four-Mile Radius and Comparison Geographies (2010)**

| Census 2010 Geography | Total Population | Not Hispanic | | | | | | | | | | | | | | Hispanic** | | Minority (non-White) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | White | | Black* | | Indian* | | Asian | | Islander* | | Other* | | Two* | | | | | |
| | | # | % | # | % | # | % | # | % | # | % | # | % | # | % | # | % | # | % |
| **Texas** | | | | | | | | | | | | | | | | | | | |
| BG 1, CT 9501, Andrews County | 1,678 | 1,142 | 68.1 | 6 | 0.4 | 5 | 0.3 | 26 | 1.5 | 0 | 0 | 2 | 0.1 | 14 | 0.8 | 483 | 28.8 | 536 | 31.9 |
| CT 9501, Andrews County | 1,678 | 1,142 | 68.1 | 6 | 0.4 | 5 | 0.3 | 26 | 1.5 | 0 | 0 | 2 | 0.1 | 14 | 0.8 | 483 | 28.8 | 536 | 31.9 |
| Andrews County | 14,786 | 7,083 | 47.9 | 199 | 1.3 | 95 | 0.6 | 85 | 0.6 | 1 | 0 | 17 | 0.1 | 111 | 0.8 | 7,195 | 48.7 | 7,703 | 52.1 |
| Texas | 25,145,561 | 11,397,345 | 45.3 | 2,886,825 | 11.5 | 80,586 | 0.3 | 948,426 | 3.8 | 17,920 | 0.1 | 33,980 | 0.1 | 319,558 | 1.3 | 9,460,921 | 37.6 | 13,748,216 | 54.7 |
| **New Mexico** | | | | | | | | | | | | | | | | | | | |
| BG 2, CT 8, Lea County | 727 | 456 | 62.7 | 3 | 0.4 | 2 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 1.7 | 254 | 34.9 | 271 | 37.3 |
| CT 8, Lea County | 3,220 | 1,676 | 52 | 30 | 0.9 | 11 | 0.3 | 3 | 0.1 | 2 | 0.1 | 5 | 0.2 | 25 | 0.8 | 1,468 | 45.6 | 1,544 | 48.0 |
| Lea County | 64,727 | 27,845 | 43.0 | 2,399 | 3.7 | 468 | 0.7 | 302 | 0.5 | 18 | 0 | 51 | 0.1 | 581 | 0.9 | 33,063 | 51.1 | 36,882 | 57.0 |
| Eunice | 2,922 | 1,464 | 50.1 | 27 | 0.9 | 11 | 0.4 | 3 | 0.1 | 2 | 0.1 | 5 | 0.2 | 22 | 0.8 | 1,388 | 47.5 | 1,458 | 49.9 |
| New Mexico | 2,059,179 | 833,810 | 40.5 | 35,462 | 1.7 | 175,368 | 8.5 | 26,305 | 1.3 | 1,246 | 0.1 | 3,750 | 0.7 | 29,835 | 1.4 | 953,403 | 46.3 | 1,225,369 | 59.5 |

Source: 2010 Census Summary File 1—New Mexico[machine-readable data files]/prepared by the U.S. Census Bureau, 2011. Table P9.

Source: 2010 Census Summary File 1—Texas[machine-readable data files]/prepared by the U.S. Census Bureau, 2011. Table P9.

* The complete Census race descriptions are as follows: White alone; Black or African American alone; American Indian and Alaska Native alone; Asian alone; Native Hawaiian and Other Pacific Islander alone; Some Other Race alone; and Two or More Races. **Hispanic persons can be of any race.



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As shown in **Table 1-28**, the percentages of the population considered to be minority for the two block groups within the four-mile radius are 37.3 percent and 31.9 percent. The guidance states that if the minority percentage in the relevant block groups exceeds 50 percent, or if the minority percentage in the relevant block groups is more than 20 percentage points greater than the state or county percentages, environmental justice should be considered in greater detail. As shown in **Table 1-28**, the minority percentages for the relevant block groups are below 50 percent and are also each lower than the respective county and state in which the block group is located.

### 1.1.10.2 Identification of Environmental Justice Populations – Low-income Populations

The guidance in Appendix C states that "low-income is defined as being below the poverty level as defined by the U.S. Census Bureau (e.g., the U.S. Census Bureau's Current Population Reports, Series P-60 on Income and Poverty)." The 2014 Poverty Thresholds (the most recent data available) were obtained from the U.S. Census Bureau and compared to the median household income for the block groups within the four-mile radius, based on data from the 2009–2013 ACS. The median household income levels were conservatively compared to the highest Census poverty threshold ($52,685), as the Census presents several thresholds for varying family sizes and characteristics.

As shown in **Table 1-29**, the median household incomes for the relevant block groups are above the *highest* 2014 Census poverty threshold. In 2014 dollars, these numbers would be even higher.

**Table 1-29: Income in the Four-Mile Radius**

| Census 2010 Geography | Total Households | Median Household Income ($) |
|---|---|---|
| BG 1, CT 9501, Andrews Co., TX | 639 | 88,250 |
| BG 2, CT 8, Lea Co., NM | 274 | 53,036 |

Source: U.S. Census Bureau, 2009–2013 American Community Survey, Tables B11001 and B19013.
ACS data are estimates; they are not counts. Income data is provided in 2013 inflation adjusted dollars.

Appendix C instructs analysts to determine whether the percentage of low-income households exceeds 50 percent of a given block group, or if the percentage of low-income households in the block groups are more than 20 percentage points greater than the reference area. To this end, data from the 2009–2013 ACS was collected regarding the percentage of households living below the poverty level in the relevant block groups and for the reference geographies.

As shown in **Table 1-30**, neither of the block groups have greater than 50 percent of the households with incomes below the poverty level. Furthermore, the percentages of households with incomes below the poverty level are lower in the block groups than in the reference geographies, and therefore do not exceed the 20 percent criterion.


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**Table 1-30: Poverty in the Four-Mile Radius and Comparison Geographies**

| | | Income below poverty level | |
|---|---|---|---|
| Geography | Total Households | Number | Percent |
| Block Group 1, Census Tract 9501, Andrews County, Texas | 639 | 42 | 6.6% |
| Andrews County, Texas | 5,217 | 668 | 12.8% |
| Texas | 8,886,471 | 1,395,335 | 15.7% |
| Block Group 2, Census Tract 8, Lea County, New Mexico | 274 | 20 | 7.3% |
| Lea County, New Mexico | 21,126 | 2,911 | 13.8% |
| New Mexico | 761,938 | 139,901 | 18.4% |

Source: Table B17017, ACS 2009–2013 five-year estimates.

Furthermore, no minority or low-income populations were identified within the four-mile study area. Based on the foregoing, further environmental justice analysis is not necessary.

## 1.2 EXISTING FISCAL, GOVERNMENTAL, AND COMMUNITY SERVICES

### 1.2.1 Andrews County

Located in the oil-rich Permian Basin, Andrews County has produced over two billion barrels of oil since the 1920s. A substantial portion of the area's economy is supported through oil and gas production with over 1,600 laborers, approximately 27 percent of the total work force in this industry in 2011 (TWC 2015). According to the Texas Workforce Commission, the total labor force for Andrews County is 9,654 laborers in March 2015. Most of industry jobs are in natural resources and mining, education and health services, and trade/transport/utilities. Top manufacturers include Andrews Pump & Supply, BP America Production Company, Centrilift, Chevron Corporation, Kirby West Manufacturing, Sargent Industries Oil Well, and Superior Woodwork (Freese and Nichols 2013).

The City of Andrews has been in a period of large economic activity triggered by major industry investments, which have brought in hundreds of high-paying jobs and additional construction activity. There has been a renewed investment in the oil and gas industry, mainly related to the returns from new technology for oil and gas exploration and extraction (Freese and Nichols 2013). Recent examples of new infrastructure and investments include: Performance Center (Olympic sized natatorium for swimming and diving; 1,000-seat concert hall and 2,000-seat gymnasium); two new elementary schools and significant improvements and additions to every school campus in town; City of Andrews Business and Technology Center; a Senior Citizens Activity Center; a new 90-bed Residential Care Facility; two new business parks (energy industry driven); County Special Events Center; Andrews downtown streetscape improvements; and $59 million campus for the Permian


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Regional Medical Center approved in 2012. Approximately $163 million in new construction and remodeling has occurred within the City (Freese and Nichols 2013). The City of Andrews is also home to a plant that assembles Kirby vacuum cleaners and a plant that manufactures fiberglass tanks. One library, two banks, three credit unions, and a biweekly newspaper serve the city of Andrews. Fraternal and civil organizations include the Lions Club, Rotary Club, United Way of Andrews, Knights of Columbus, and Girl Scouts of America. Local facilities serving the community of Andrews include 39 churches, a museum, a municipal swimming pool, a golf course, tennis courts, youth club/center/parks, and athletic fields.

Andrews County had a tax base (total certified net taxable value) in 2014 of over $7.2 billion dollars, a general fund tax rate of 0.2936 per $100, and a road and bridge tax rate of .0.0477 per $100 (Andrews County Appraisal District 2015). The county tax levy in 2014 for all funds amounted to almost $21,177,205. Total tax rates (per $100) in 2014 for jurisdictions within the Andrews County Appraisal District include: Andrews Independent School District – a combined rate of $1.17000; City of Andrews – $0.18900; Andrews County – $0.2936; and, Andrews Hospital District – $0.29612.

### 1.2.2 Andrews Independent School District

Andrews Independent School District is the only public school district in Andrews County and comprises one high school, one middle school, three elementary schools, and the Andrews Education Center, with a 2014 student population of 3,758 (TEA 2014). Andrews High School offers a comprehensive curriculum including academic studies for the college bound with advanced courses in several areas, a variety of vocational courses, physical training, and extracurricular activities. The District participates in Class 4A University Interscholastic League competition. The district is in good financial condition. In 2014, certified total net taxable value in the District was over $6.6 million. In 2011, voters approved a $33-million rolling bond to be divided into three phases: one covering costs from 2011–2014, a second becoming available in 2015, and a third in 2019, each being $10 million (KWES NewsWest9 2015). In November 2014, the Andrews ISD was considering seeking an additional rolling bond (CBS7 2014). The Andrews Business and Technology Center was completed in 2006 in conjunction with Odessa College and the University of Texas of the Permian Basin. Texas Tech University Health Sciences Center and Odessa College School of Nursing – Andrews Campus also have campuses in Andrews County (AEDC 2015).

### 1.2.3 Andrews ISD Education Foundation

The Andrews ISD Education Foundation (The Foundation) is a 501(c)(3) tax exempt, nonprofit corporation chartered in April 2000. It is a legal entity that is independent of the school district whose mission is to provide quality educational opportunities in order that all students may become successful and productive citizens. The Foundation operates independently of the Andrews Independent School District for the purpose of:

1. Facilitating student achievement and skill development.
2. Recognizing and promoting staff excellence.
3. Encouraging involvement from individuals, businesses, and civic organizations in the community.

The Foundation's goals are to:

1. Encourage all students to work toward reaching their highest potential.
2. Attract, support, and recognize teachers for innovative efforts and exemplary teaching.
3. Build public awareness and confidence in Andrews schools.
4. Involve the community in assuring a quality education for the leaders and works of tomorrow.

A volunteer Board of Directors with representative community membership governs The Foundation as it seeks funds and sets policy according to its bylaws. The Foundation cooperates with the Andrews ISD to enhance and enrich the educational opportunities of students and teachers of the school district. WCS contributed $13,925.69 in 2014, and $4,537.84 in 2015 as of April 1 to The Foundation.

### 1.2.4 Andrews County Hospital District

Andrews County Hospital District (ACHD) was formed through a public election in May 2001. The ACHD encompasses Andrews County and was organized under Chapter 286 of the Texas Health and Safety Code. The ACHD is governed by a seven-member elected Board of Directors, four of whom are elected based on the four local precincts, and three members elected at large. The Board of Directors is governed by the ACHD bylaws.

ACHD is composed of an 85-bed medical center (Permian Regional Medical Center [PRMC]) and a 90-bed nursing facility (Permian Residential Care Center [PRCC]), which opened in 2004. The PRMC also houses seven physician practices and a quick care clinic with one doctor, three nurse practitioners, and one per diem registered nurse (PRN) (Quick Care Clinic, personal communication 2015). The PRMC is a general acute care facility that provides a wide array of services including General Surgery, Obstetrics and Gynecology, Newborn Care, a Level IV trauma Emergency room, and three-bed intensive care unit. It also has the only nuclear medicine and magnetic resonance imaging (MRI) capability between the Odessa-Midland area and Lubbock.

In 2003 ACHD, with community support, identified a need to take over the provision of long-term care in the community. The district issued revenue bonds of $5,755,000 to construct PRCC, a new 90-bed nursing home that is physically attached to the medical center on the east side of the building. The new facility opened in October 2004 and has been approved for occupancy.


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ACHD is a taxing authority for Andrews County that for fiscal year 2014 had certified total net taxable values of $6,748,528,780. ACHD's taxing authority allows a maximum tax rate of $0.75 per $100 valuation. ACHD's tax rate for fiscal year 2014 was set at $0.29612 per $100 valuation, which generated a 2014 tax levy of $19,989,673 (ACAD 2014a and 2014b).

### 1.2.5 City of Andrews

Andrews County is unique in that it is among the few Texas counties that include only one incorporated city within its borders (the City of Andrews). Over 70 percent of the county's 14,786 residents live within the city limits of Andrews (US Census Bureau 2015a and 2015b).

The City of Andrews currently operates under a Council-Manager form of city government. City Council members are elected by cumulative vote. The Mayor is elected by single-vote majority. Each Council Member has one vote, with the Mayor breaking tie votes only. A general election to elect three council members was held on May 9, 2015.

The 2014–2015 City Budget reflects a continuing commitment of maintaining a high level of customer service, retaining a well-trained, experienced workforce, and investing in long-term infrastructure. The City remains committed to the fiduciary responsibility that it has in managing public resources. Depreciation is full-funded, and the City's only debt – certificates of obligation issued in 2011 for the construction of the Truck Reliever Route – is tied to a voter-approved, dedicated source of revenue (City of Andrews 2014). The City's overall cost of operating is among the lowest in the state and is reflected in a lower-than-average ratio of personnel costs to total operating expenses.

The City of Andrews is recognized for its financial strength, quality of services, and commitment to excellence. The approved FY 2014–2015 Budget, which has been posted on-line (http://www.cityofandrews.org/docs/2015_Budget_Introduction_and_Overview.pdf), provides for the efficient and effective delivery of municipal services.

The General Fund provides for public safety services (police, fire, emergency medical service [EMS], and animal control), public health, streets/traffic maintenance, recreational activities, as well as general finance and administration. The General Fund budget proposes operating revenues of $6,869,358. The Utility Fund provides water production and distribution services as well as sewage collection and treatment for the citizens of Andrews. The 2014–2015 Utility Fund Budget proposes expenditures of $3,065,614, along with $1 million from a transfer to the Utility Capital Improvement Fund, to help finance capital projects benefiting the Utility Fund. Revenues, less operating expenditures and transfers, results in a decrease in the fund balance by $690,167.

The Sanitation Fund provides garbage collection and disposal services. The Sanitation Fund budget has proposed operating expenditures of $1,542,520.


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The FY 2014–2015 City Budget also proposed an ambitious Capital Improvements Program with nearly $8.1 million in capital expenditures. Major capital improvement expenditures identified in the FY 2014–2015 City Budget reflect that $5,000,000 is being carried over from the FY 2014 budget for the construction of a water treatment facility, and $500,000 is being carried over to line the wastewater lagoon. The City identified funds for the police car take-home program, coating for the interior of a water storage tank, replacement of 800 water meters, laying new water lines in southwest Andrews, and a new street sweeper.

The FY 2014–2015 City Budget provides for efficient and effective delivery of municipal services. Long-term needs are addressed through "pay-as-you-go" fiscal policies. The City maintains a very low tax rate (0.18900/$100 valuation in 2014), and a lower-than-average ratio of personnel costs to operating expenses.

The Andrews Business & Technology Center opened its doors in 2006. The building is a state-of-the-art facility offering job training, continuing education, higher education courses, the latest in distance learning technology, and the development of numerous quality of life initiatives (AEDC 2015).

### 1.2.6 Andrews Chamber of Commerce, Andrews Industrial Foundation

Andrews County Chamber of Commerce was formed in the 1950s. It was a typical, traditional Chamber of Commerce that had voluntary membership of businesses, both retail and wholesale, in Andrews, Texas whose primary economy was based on oil and gas production. It has been in continuous operation ever since, and has a membership open to anyone in the community that is interested in promoting Andrews from a business, tourism, or cultural standpoint. The current membership is approximately 290 to 302 members (Andrews Chamber of Commerce 2015). The Chamber of Commerce has been supportive of various community initiatives and activities.

The Andrews Industrial Foundation (AIF) is a private foundation that was created in the mid-1960s to seek economic diversification. It has received support from the general business community, as well as from the City, County, school district, and local governments over the years, and has worked in conjunction with those governing bodies to bring new industry to Andrews. The President of the AIF in the 1970s, 1980s, and 1990s was James Roberts. In the 1990s, Mr. Roberts was approached about the possibility of locating a low-level hazardous waste site in Andrews County because of the arid climate and redbed clay geology. After that, there were visits with the community leaders about the proposal. A public information meeting was held by the AIF and thereafter WCS was formed. More information regarding the coordination with WCS and AIF, along with assistance with community activities historically, can be found in the 2008 Hicks & Company socioeconomic impact study.

WCS has been an active member of the Andrews Chamber of Commerce for many years and has had employees on the board of directors several times. WCS employees are also involved in other community groups, such as the local Rotary Club, Lions Club, Andrews Education Foundation, Hospital Board, United Way, Women's Division of the Chamber of Commerce, American Cancer Relay for Life, Faith in Action, Lea County Economic Development, Chamber Ambassadors, and other volunteer organizations. WCS's contribution to the community includes 160-full time jobs in Andrews County and $13 million in annual payroll, which also adds $4 million in revenue for Andrews County (WCS 2015).

### 1.2.7 Lea County

New Mexico's median property tax is perennially ranked among the eight lowest states in the nation; any change in taxes requires an amendment to the state constitution. One-third, or 33.3 percent, of the valuation of property's market value (assessment) is its taxable value. There are exemptions of $2,000 for heads-of-households, and $4,000 for veterans. The one-third taxable value on property excludes oil and gas properties. The tax applied is a composite of state, county, municipal, school district and other special district levies. Properties outside city limits are taxed at lower rates. Major facilities may be assessed by the New Mexico State Taxation and Revenue Department instead of by the county.

New Mexico communities can abate property taxes on a plant location or expansion for a maximum of 30 years, (usually 20 years in most communities), controlled by the community. The state also has a Gross Receipts Tax paid by product producers. This tax is imposed on businesses in New Mexico, but in almost every case it is passed on to the consumer. In that way, the gross receipts tax resembles a sales tax. The New Mexico Gross Receipts Tax for 2015 is 5.125 percent. The gross receipts tax for the Eunice area is 6.8125 percent, with areas outside of Eunice in the remainder of the county as 5.5 percent (New Mexico Taxation and Revenue Department 2015). Certain deductions may apply to this tax for plant equipment.

The Lea County community was initially agriculturally based, but the discovery of oil and gas in the mid-1920s has had a significant impact on the region. Today the county's agricultural heritage continues to have underlying influences on the county's development with an active dairy industry as well as farming and ranching. The oil and gas industry still has a strong effect on the local economy, and in addition, there is a growing manufacturing sector. Five libraries, nine financial institutions, and two daily newspapers serve Lea County. Cities in Lea County that are within the ROI include Hobbs, Eunice and Jal.

In Lea County, there are five public school districts and four private schools; the county has a total of 31 public schools with 15,011 students enrolled in pre-kindergarten through 12th grade during the 2014–2015 academic year (EDCLC 2015). The closest school district is in Eunice, located six miles to the west, with the other districts located in Hobbs, Jal, Lovington, and Tatum. The main campus of the University of the Southwest (USW) is located just north of Hobbs. The 2014 enrollment was approximately 312 students (Personal communication, Michelle Goar, 2015). New Mexico Junior College, located in Hobbs, has a current enrollment of 2,712 full and part time students (Personal communication, Connie Hanson, NMJC 2015). NMJC has a New Mexico Junior College Training and


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Outreach Department, which provides workforce training programs throughout the county, including learning vocational skills in a variety of business and vocational-technical fields.

There are two hospitals in Lea County, New Mexico. The Lea Regional Medical Center is located in Hobbs, New Mexico about 20 miles north of the WCS facility. Lea Regional Medical Center is a 201-bed hospital providing complete care, including cardiac care, pediatrics, mental health, and outpatient surgery. The hospitals have 39 active physicians and 34 consulting physicians. In Lovington, New Mexico, 39 miles north-northwest of the facility, Covenant Medical Systems manages Nor-Lea Hospital, a 25-bed Medicare-certified Critical Access Hospital serving southeastern New Mexico. They manage medical clinics in Lovington, Tatum, and Hobbs, and offer a range of outpatient, specialty, image, and infusion services. These clinics include the Lovington Medical Clinic, Nor-Lea Evening Clinic, Family Health Center of Lea County, Tatum Clinic, and the Lovington Student Healthcare Center (Nor-Lea 2012).

### 1.2.8 City of Hobbs

The City of Hobbs FY 2015 Preliminary Budget reveals that the City is in good fiscal condition (City of Hobbs 2015). The Gross Receipts Tax (GRT) is the dominant revenue source in the City's General Fund, and totals approximately 87.5 percent of all General Fund Revenues. The GRT is collected by the New Mexico Taxation and Revenue Department, and is disbursed back to the cities with a lag time of about two months. The current GRT rate in the City of Hobbs is 6.8125 percent.

#### Cities of Eunice and Jal

The City of Eunice, New Mexico, located about six miles west of the processing and storage facilities, has a Mayor-Council form of municipal government and provides water, sewer, and EMS services. In 2014, its general fund expenditures was $4,002,127, and all funds were $10,264,108. The City employed 6 police officers, 2 full-time firefighters, and 21 part-time firefighters in 2012 (City-Data 2012). The City had a residential property tax rate of 28.244 per $1,000 and a non-residential rate of 35.437 per $1,000 within the city in 2014 (LCTAO 2014). The City's Gross Receipts Tax rate was 6.8125 percent within the City limits (NMTRD 2015).

The City of Jal, New Mexico, has a Mayor-Council form of municipal government and provides water, sewer, solid waste, and EMS services. In 2014, its general fund expenditures was $1,514,950, and all funds were $5,904,526. The City employed eight part-time police officers and nine other police staff, and was served by an all-volunteer fire department in 2012 (City-Data 2012). The City had a residential property tax mill rate of 23.784 and a non-residential mill rate of 30.110 within the city in 2014 (LCTAO 2014). The City's Gross Receipts Tax rate was 7.0625 percent within the City limits (NMTRD 2015).

### 1.2.9 Public Safety in Andrews and Lea Counties

Fire protection is provided from both Texas and New Mexico. The Andrews Volunteer Fire Department is staffed by a Fire Marshal and three companies, each led by a Fire Chief. The department has 44 active firemen. Equipment includes 23 trucks and one hazardous materials trailer. The trucks includes:

- Three pumper trucks
- One tanker
- Four booster trucks
- One foam application boom truck used primarily for fighting oilfield fires
- Two chief officers' trucks,
- One hazmat trailer; and
- One rescue truck

Lea County has three volunteer fire departments located in Knowles, Maljamar, and Monument. There are a total of nine fire departments in Lea County, with five being municipal fire departments. The Knowles Fire Department is a 30-member, totally volunteer, fire/EMS organization that has 13 firefighters/EMTs, 14 firefighters, and 3 dispatchers. The fire department has 3 Class A Engines with pump and roll capabilities, 2 water tankers, 2 wildland grass rigs, with a total rolling water capacity of 14,000 gallons. The Maljamar Fire Department has one station with 17 volunteer firefighters.

The City of Hobbs is staffed by 74 uniformed and 4 civilian employees. They have hazardous materials duties, emergency medical service and support, as well as fire prevention and suppression, provided at three fire station locations.

Mutual aid agreements are in place with Lea County and the City of Eunice. Fire and emergency support services for the Eunice area are provided by Eunice Fire and Rescue located approximately six miles from the processing and storage facility. Equipment at the Eunice Fire and Rescue includes three ambulances, three pumper fire trucks, three grass fire trucks, and one rescue truck. If additional fire equipment is needed, or if the Eunice Fire and Rescue is unavailable, the Central Dispatch will call the Hobbs Fire Department. In instances where radioactive/hazardous materials are involved, knowledgeable members of the WCS Emergency Response Organization (ERO) provide information and assistance to the responding off-site personnel.

The Andrews Sheriff's Department and Police Department are the primary law enforcement for Andrews County. The force consists of 15 police officers, including the chief, a school resource officer, administrative assistant, and an animal control officer. All officers are certified in emergency services as paramedics or EMTs. There are three shifts, with four officers assigned to each shift, with each shift having a police supervisor overseeing the 8-hour shift. A dispatcher in the County's Sheriff's Department dispatches officers, ambulance, and fire personnel. If additional resources are needed,


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officers from mutual aid communities within Lea County, New Mexico, and the City of Eunice, can provide an additional level of response. The Eunice Police Department, with five full-time officers, provides local law enforcement. The Lea County Sheriff's Department also maintains a substation in the community of Eunice.

## 1.3 EXISTING SOCIAL STRUCTURE IN THE REGION OF INTEREST

This section assesses various characteristics of the project area to gain a basic understanding of social structure in the ROI. For a detailed analysis of social and cultural history in the project area focused on recent WCS licensing activities, including opinion surveys, see the Socioeconomic Impact Assessment for the Low-Level Waste Disposal Facility (2007) and License Renewal (2008) by Hicks & Company, according to the Texas Department of State Health Services licensing requirements.

### 1.3.1 Historical Summary

The 2008 WCS license application includes a detailed history of social attitudes in the Region of Interest. In summary, the residents of the ROI have generational experience with a cyclical resource extraction economy; a long history with risk-associated industries, including toxic and flammable chemicals and gases (such as hydrogen sulfide), and the transportation of these materials; an increasingly effective regulatory regime to protect the environment; a long-term desire to increase economic diversification and more stable growth of employment and income in the area; and prospects for a more diverse occupational and income structure. In general, the ROI population appears to have the common social objectives of good jobs for their children, maintenance of all age sectors within their populations, and more opportunities for college-educated residents. The populations of the ROI have experienced "boom-bust" cycles for more than 30 years and have benefited from the development of the waste and nuclear energy sectors within recent decades. Residents seek higher incomes and job opportunities for community residents. Basic sectors still dominate industry along with resource extraction, but the regional economy is anticipated to benefit from expansion of the growing waste disposal and related nuclear energy industry.

### 1.3.2 Social Stratification Analysis

In the context of the specific history of the area, there are numerous shared life experiences that indicate a commonality of interests. As discussed in detail in the WCS 2008 Socioeconomic Impact Assessment, the ROI shares a dependence upon the variable vitality of the petroleum industry and to a lesser extent, the hardships inherent in dry land agriculture. Both of these industries are highly dependent upon external events, such as the international price of oil, rainfall, and/or cattle demand. To a large extent, large corporations and/or governmental entities create the circumstances of work and income for workers in these industries, for workers in related and dependent businesses; these influences in turn affect the adequacy of community infrastructure, housing costs, and numerous other community effects. Increasingly, the job base created by the construction of the URENCO USA


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facility and associated industry is benefitting economies in the ROI including infrastructure and community services.

### 1.3.2.1 Employment

As can be computed for the ROI from **Table 1-26**, the labor participation rate (the total persons in the labor force divided by total population 16 years and over) in the ROI (Ector, Andrews, Gaines, and Winkler Counties, Texas, and Lea County, New Mexico) was 65.1 percent (118,345 out of 181,678). This is essentially the same as for Texas but higher than the rate in New Mexico. There was an approximately 60.7 percent labor participation rate in New Mexico (979,565 participating out of 1,612,730 in the work force 16 and older) and approximately 65.2 percent in Texas (with 12,691,031 participating out of 19,468,136 persons over 16 in the work force). In Lea County, labor participation was 61.6 percent. In Eunice it was 65.9 percent and in Hobbs it was 60.7 percent. Jal had the lowest labor participation rate at 53.0 percent. In Andrews County, the labor participation rate was 65.4 and it was 62.9 percent in Gaines County. Approximately 62.6 percent of persons over 16 participated in the labor force in the City of Andrews and 64.9 participated in Seminole. In Ector County, the labor participation rate was 67.2 percent, and in Winkler County it was about 61.3 percent.

The rate of employment in basic labor sectors (defined for this area as agriculture and mining, manufacturing, construction and transportation) is significant. As shown in **Table 1-25**, the economic sector including agriculture and mining (which includes oil and mineral extraction) ranges from a low of 13.4 in Seminole to a high of 27.8 in the city of Andrews, with 25.4 percent in Eunice. In Lea and Andrews counties, 21.2 and 27.6 percent of persons work in these sectors compared to the states of New Mexico and Texas, where 4.4 percent and 3.1 percent respectively are employed in these sectors. When added together the basic sectors for all counties in the ROI make up 39.1 percent of employment compared to 25.8 percent in Texas and 21.0 percent in New Mexico.

In sectors that generally require higher educational attainment (e.g., information; finance, insurance, real estate; professional, scientific, administrative and waste management services); the counties within the ROI employ approximately 11.1 percent of their workers in these industries, compared to 19.2 percent in Texas or 17.2 percent in New Mexico. See **Table 1-11** for educational attainment in the ROI.

Similar rate of employment by sector were identified by the Texas Workforce Commission annual reports of Jobs. As shown in **Table 1-27**, the natural resources and mining sector was a major employer in the ROI, constituting 26.08 percent in Andrews, 45.10 percent in Gaines County, and 30.62 percent in Winkler County.

A review of **Table 1-31** indicates that in Lea County, 79.2 percent of workers 16 and over travel less than 25 minutes to work. Approximately 70 percent of Eunice residents travel less than 25 minutes to work. In Hobbs, 83.5 percent of persons travel less than 25 minutes to work, while 68.9 percent of Jal's commuters travel less than 25 minutes. In Andrews County, 65.2 percent of workers travel less than 25 minutes to work and 63.2 percent in Andrews City travel less than 25 minutes to work. In Gaines, 79.9 percent of workers travel 25 minutes or less compared 87.7 percent of Seminole workers. In Winkler County, 70.4 percent of workers travel less than 25 minutes to work, compared to 76.9 percent in Ector County. Overall in New Mexico, approximately 68.4 percent of workers travel 25 minutes or less while in Texas, 58.2 percent of workers travel that amount of time to work. The majority of workers in the ROI travel 25 minutes or less for work, indicating that they live and work in relatively close proximity.

With regard to employment versus unemployment by race, data can be found in **Table 1-24**. Note that data from the American Community Survey is based on statistical analysis estimates rather than 100 percent census data or counts, so it is accompanied by a margin of error. Within the ROI, the population with the highest percentage employed is Native Hawaiian/Other Pacific Islander (100%) in Gaines and Ector counties, and Seminole, Texas, however that is for a total of 35 persons in Ector County, and 48 persons in Gaines County and Seminole, Texas, which is a fraction of the total population of 104,044 (Ector County), 12,468 (Gaines County) and 5,080 (Seminole). In comparison, the population with the highest percentage of unemployed is Black and African American (100%) in Jal, New Mexico. As with the number of employed, the number of persons within this population (15) is relatively small as compared to the total population of 1,612. The Hispanic population constitutes the largest minority group in the ROI and unemployment rates range from a low of 1.9 percent in Jal, New Mexico, and a high of Winkler County to 10.1 percent in Lea County, New Mexico.

#### 1.3.2.2 Labor Force Participation and Unemployment Distribution

The "boom-bust" cycle in the oil sector is best represented by longitudinal analysis of population, labor force participation and unemployment trends. Population analysis of data from 1920–2010 are shown in **Table 1-32**. As shown, after the discovery of oil in the 1920's, population grew rapidly in Lea, Andrews, and Ector counties through 1960. This growth also occurred to a lesser extent in Gaines, and Winkler counties (with Winkler County experiencing very large growth between 1920 and 1930). Andrews and Gaines counties grew more than 100 percent between 1940 and 1950, and between 1950 and 1960. Regional population after 1960 either declined or stabilized through 2000.

| Table 1-31: Travel Time to Work in the Nation and Region of Interest (2009 – 2013) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Travel Time** | **Lea County, New Mexico** | **Eunice, New Mexico** | **Hobbs, New Mexico** | **Jal, New Mexico** | **Andrews County, Texas** | **Andrews, Texas** | **Gaines County, Texas** | **Seminole, Texas** | **Winkler County, Texas** | **Ector County, Texas** | **New Mexico** | **Texas** | **United States** |
| **Total Workers 16 years and over** | **25,967** | **1,412** | **13,361** | **795** | **6,685** | **4,774** | **7,051** | **2,927** | **3,012** | **62,866** | **826,524** | **10,983,502** | **133,740,254** |
| **Did not work at home** | **25,259** | **1,377** | **12,989** | **783** | **6,490** | **4,632** | **6,903** | **2,912** | **2,942** | **61368** | **784,111** | **10,521,990** | **127,693,869** |
| **Less than 5 minutes** | **1,762** | **178** | **830** | **100** | **659** | **502** | **1,102** | **406** | **543** | **2,647** | **35,443** | **333,493** | **4,308,933** |
| *Percentage* | *6.8%* | *12.6%* | *6.2%* | *12.6%* | *9.9%* | *10.5%* | *15.6%* | *13.9%* | *18%* | *4.2%* | *4.3%* | *3%* | *3.2%* |
| **5 to 9 minutes** | **5,022** | **310** | **2,545** | **228** | **1,691** | **1,271** | **1,982** | **1,129** | **860** | **8,478** | **109,113** | **1,105,605** | **13,714,706** |
| *Percentage* | *19.3%* | *22%* | *19%* | *28.7%* | *25.3%* | *26.6%* | *28.1%* | *38.6%* | *28.6%* | *13.5%* | *13.2%* | *10.1%* | *10.3%* |
| **10 to 14 minutes** | **6,545** | **198** | **4,209** | **161** | **1,025** | **708** | **991** | **582** | **334** | **13,627** | **144,373** | **1,569,957** | **19,150,654** |
| *Percentage* | *25.2%* | *14%* | *31.5%* | *20.3%* | *15.3%* | *14.8%* | *14.1%* | *19.9%* | *11.1%* | *21.7%* | *17.5%* | *14.3%* | *14.3%* |
| **15 to 19 minutes** | **4,518** | **75** | **2,641** | **34** | **837** | **487** | **991** | **323** | **288** | **14,085** | **152,151** | **1,761,760** | **20,753,054** |
| *Percentage* | *17.4%* | *5.3%* | *19.8%* | *4.3%* | *12.5%* | *10.2%* | *14.1%* | *11%* | *9.6%* | *22.4%* | *18.4%* | *16%* | *15.5%* |
| **20 to 24 minutes** | **2,726** | **227** | **933** | **24** | **149** | **53** | **563** | **127** | **93** | **9,501** | **123,775** | **1,626,711** | **19,796,414** |
| *Percentage* | *10.5%* | *16.1%* | *7%* | *3%* | *2.2%* | *1.1%* | *8%* | *4.3%* | *3.1%* | *15.1%* | *15%* | *14.8%* | *14.8%* |
| **25 to 29 minutes** | **808** | **119** | **393** | **24** | **102** | **97** | **224** | **41** | **34** | **2,003** | **41,705** | **640,387** | **8,189,640** |
| *Percentage* | *3.1%* | *8.4%* | *2.9%* | *3%* | *1.5%* | *2%* | *3.2%* | *1.4%* | *1.1%* | *3.2%* | *5%* | *5.8%* | *6.1%* |
| **30 to 34 minutes** | **2,233** | **134** | **871** | **64** | **592** | **457** | **601** | **93** | **205** | **5,695** | **99,121** | **1,644,071** | **18,220,851** |
| *Percentage* | *8.6%* | *9.5%* | *6.5%* | *8.1%* | *8.9%* | *9.6%* | *8.5%* | *3.2%* | *6.8%* | *9.1%* | *12%* | *15%* | *13.6%* |
| **35 to 39 minutes** | **155** | **0** | **51** | **14** | **205** | **169** | **18** | **14** | **20** | **629** | **14,188** | **289,616** | **3,673,571** |
| *Percentage* | *0.6%* | *0%* | *0.4%* | *1.8%* | *3.1%* | *3.5%* | *0.3%* | *0.5%* | *0.7%* | *1%* | *1.7%* | *2.6%* | *2.7%* |
| **40 to 44 minutes** | **224** | **30** | **64** | **25** | **195** | **195** | **49** | **33** | **13** | **942** | **19,798** | **382,174** | **4,920,004** |
| *Percentage* | *0.9%* | *2.1%* | *0.5%* | *3.1%* | *2.9%* | *4.1%* | *0.7%* | *1.1%* | *0.4%* | *1.5%* | *2.4%* | *3.5%* | *3.7%* |
| **45 to 59 minutes** | **379** | **40** | **122** | **48** | **588** | **376** | **182** | **20** | **200** | **1,671** | **43,747** | **851,111** | **10,154,523** |
| *Percentage* | *1.5%* | *2.8%* | *0.9%* | *6%* | *8.8%* | *7.9%* | *2.6%* | *0.7%* | *6.6%* | *2.7%* | *5.3%* | *7.7%* | *7.6%* |
| **60 to 89 minutes** | **976** | **76** | **354** | **73** | **350** | **258** | **203** | **91** | **231** | **1,696** | **27,692** | **555,552** | **7,488,235** |
| *Percentage* | *3.8%* | *5.4%* | *2.6%* | *9.2%* | *5.2%* | *5.4%* | *2.9%* | *3.1%* | *7.7%* | *2.7%* | *3.4%* | *5.1%* | *5.6%* |
| **90 or more minutes** | **619** | **25** | **348** | **0** | **292** | **201** | **145** | **68** | **191** | **1,892** | **15,418** | **223,065** | **3,369,669** |
| *Percentage* | *2.4%* | *1.8%* | *2.6%* | *0%* | *4.4%* | *4.2%* | *2.1%* | *2.3%* | *6.3%* | *3%* | *1.9%* | *2%* | *2.5%* |

Source: ACS 2009–2013 Table B99084 & B08303.



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| Table 1-32: Historic Population Trends in the Region of Interest | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Year** | **Lea County, NM** | **Andrews County, TX** | **Gaines County, TX** | **Winkler County, TX** | **Ector County, TX** | **New Mexico** | **Texas** |
| 1920 | 3,545 | 350 | 1,018 | 81 | 760 | 360,350 | 4,663,228 |
| *Percent Change 1920-1930* | *73.3%* | *110.3%* | *175%* | *8,375.3%* | *420.8%* | *17.5%* | *24.9%* |
| 1930 | 6,144 | 736 | 2,800 | 6,784 | 3,958 | 423,317 | 5,824,715 |
| *Percent Change 1930-1940* | *244.3%* | *73.5%* | *190.6%* | *-9.5%* | *280.3%* | *25.6%* | *10.1%* |
| 1940 | 21,154 | 1,277 | 8,136 | 6,141 | 15,051 | 531,818 | 6,414,824 |
| *Percent Change 1940-1950* | *45.2%* | *291.7%* | *9.5%* | *63.9%* | *179.7%* | *28.1%* | *20.2%* |
| 1950 | 30,717 | 5,002 | 8,909 | 10,064 | 42,102 | 681,187 | 7,711,194 |
| *Percent Change 1950-1960* | *73.9%* | *168.9%* | *37.7%* | *35.7%* | *116.1%* | *39.6%* | *24.2%* |
| 1960 | 53,429 | 13,450 | 12,267 | 13,652 | 90,995 | 951,023 | 9,579,677 |
| *Percent Change 1960-1970* | *-7.3%* | *-22.9%* | *-5.5%* | *-29.4%* | *0.9%* | *6.8%* | *16.9%* |
| 1970 | 49,554 | 10,372 | 11,593 | 9,640 | 91,805 | 1,016,000 | 11,196,730 |
| *Percent Change 1970-1980* | *13%* | *28.5%* | *13.4%* | *3.2%* | *25.7%* | *28.2%* | *27.1%* |
| 1980 | 55,993 | 13,323 | 13,150 | 9,944 | 115,374 | 1,302,894 | 14,229,191 |
| *Percent Change 1980-1990* | *-0.4%* | *7.6%* | *7.4%* | *-13.3%* | *3.1%* | *16.3%* | *19.4%* |
| 1990 | 55,765 | 14,338 | 14,123 | 8,626 | 118,934 | 1,515,069 | 16,986,510 |
| *Percent Change 1990-2000* | *-0.5%* | *-9.3%* | *2.4%* | *-16.8%* | *1.8%* | *20.1%* | *22.8%* |
| 2000 | 55,511 | 13,004 | 14,467 | 7,173 | 121,123 | 1,819,046 | 20,851,820 |
| *Percent Change 2000-2010* | *16.6%* | *13.7%* | *21.1%* | *-0.9%* | *13.2%* | *13.2%* | *20.6%* |
| 2010 | 64,727 | 14,786 | 17,526 | 7,110 | 137,130 | 2,059,179 | 25,145,561 |

Source: U.S. Census Bureau, Decennial Census; City and County Data Book (through 2000); U.S. Census for 2010 data because the data book was last published in 2007.


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Between 2000 and 2010, growth occurred again in Lea, Andrews, Gaines, and Ector counties with a slight decline in Winkler County's population. Data from the mid-1980s, 1990, and 2000 from the City and County Data Book files (2000) were examined for patterns. The last published version of this document was 2007 so the 2010 census was used for 2010 data. Focusing on Lea County and Andrews County, as indicated in **Table 1-33**, after the resurgent oil economy of the late 1970s and early 1990s, there was a significant drop in oil prices followed by a reduction in oil production, some capping of wells, the closure of two oil company administrative offices in Andrews, and the loss of a natural gas industry administrative office in Jal. Population declined between 1980 and 1990 in Lea and Winkler Counties. With the decline in population, labor force participation increased, while unemployment actually decreased. Per capita income in constant dollars (accounting for inflation) decreased slightly and in current dollars grew at about half of the state rate of increase. Population increased and labor force participation increased; unemployed remained low; and per capital income actually increased. Between 1990 and 2000, population in Lea, Andrews, and Winkler Counties declined and population slightly increased in Gaines and Ector counties. During that same time period, overall population in New Mexico and Texas grew by more than 20 percent. The period between 2000 and 2008 includes the so-called "energy crisis" where prices for a barrel of oil steadily increased until they arguably peaked in 2008, with various impacts on the global economy. Oil and gas prices reached between 120 and 140 dollars a barrel, with very steep declines after that down into the 40s and below by 2009 (Phillips 2015). In Texas, the Permian Basis has anchored the ROI in oil and gas and related activities, such that populations again grew in the ROI between 2000 and 2010 for all counties in the ROI except Winkler County.

While this effect of steady or increasing labor force participation and decreased unemployment may seem contradictory, it has been found to be a common "boom-bust" effect of rapid industrialization. With a growing basic industry, more people move in than can be supported during the slowing of the boom. Following a boom, the oil-related tax revenues can be used to grow services and infrastructure and there is often a lag period between the extremes of growth, unemployment, out-migration, and a gradual increase in jobs for the people remaining, typically in lower paying sectors (Summers, et al. 1976).

In the ROI, it is likely that additional women entered the labor force in health, education, and retail trades to supplement family income, partly due to local economic conditions and also in alignment with national trends. To investigate this effect further, in- and out-migration data for the region from the 2010 census were examined for the 2008 to 2012 period. During this period, the oil industry was fluctuating. In-migration between 2008 and 2012 exceeded out-migration, primarily, as shown on **Table 1-34** with the highest example of in-migration from a different state being Lea County, New Mexico. Over this time period, net migration calculated by subtracting total out-migration from total in-migration was positive for Lea, Andrews, Winkler, and Ector Counties (with the highest net migration), with out-migration exceeding in-migration only for Gaines County, Texas.


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| Table 1-33: Selected Economic Trends in the Region of Interest | | | | |
|---|---|---|---|---|
| **Variables** | **Lea Co.** | **New Mexico** | **Andrews Co.** | **Texas** |
| Population 1986 | 65,080 | 1,426,185 | 15,837 | 16,087,289 |
| Population >14 yrs. 1986 | 45,490 | 1,061,080 | 15,837 | 12,176,078 |
| Civilian Labor Force 1986 | 25,498 | 627,000 | 8,258 | 8,159,000 |
| Labor Force Participation 1986 | 56.05% | 59.09% | 52.14% | 67.01% |
| Percent Unemployment 1986 | 12.50% | 9.20% | 8.80% | 8.00% |
| Per capita Income (Current $) 1985 | $11,436 | $10,256 | $12,893 | $12,575 |
| Population 1992 | 55,765 | 1,515,069 | 14,338 | 16,986,510 |
| Population >16 yrs. 1990 | 37,251 | 1,068,124 | 9,377 | 12,145,355 |
| Civilian Labor Force 1990 | 23,013 | 715,000 | 6,156 | 8,555,000 |
| Labor Force Participation 1990 | 61.78% | 66.94% | 65.65% | 70.44% |
| Percent Unemployment 1990 | 7.20% | 6.90% | 6.90% | 6.60% |
| Per capita Income (Current $) 1989 | $13,428 | $14,254 | $15,316 | $16,717 |
| Population 2000 | 55,511 | 1,629,146 | 13,004 | 21,325,018 |
| Population >16 yrs. 2000 | 38,824 | 1,320,572 | 8,900 | 19,238,259 |
| Civilian Labor Force 2000 | 24,634 | 832,835 | 4,998 | 10,324,527 |
| Labor Force Participation 2000 | 63.45% | 63.07% | 56.16% | 53.67% |
| Percent Unemployment 2000 | 4.80% | 4.90% | 5.80% | 4.20% |
| Per capita Income (Current $) 1999 | $18,756 | $21,164 | $17,351 | $25,369 |
| Population 2006 | 57,312 | 1,954,599 | 12,952 | 23,507,783 |
| Population >15 years old | 44,302 | 1,548,042 | 10,011 | 18,077,485 |
| Civilian Labor Force | 26,803 | 935,350 | 7,022 | 11,487,496 |
| Labor Force Participation 2006 | 60.50% | 60.40% | 70.10% | 63.50% |
| Percent Unemployment 2006 | 3.2% | 4.2% | 3.5% | 4.9% |
| Per capita Income (Current $) 2005 | $27,636 | $27,889 | $27,727 | $32,460 |

Source: City and County Data Book, 1988, 1994, 2000, and 2007.


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| Table 1-34: In-Migration and Out-Migration by County (2008–2012) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Domestic In-Migration | | | Domestic Out-Migration | | | 5-Year Net Migration (Total In-Migration minus Total Out-Migration) |
| Geographic Area | From Same State | From Different State | Total Migration | To Same State | To Different State | Total Migration | |
| Lea County | 1,358 | 2,468 | 3,826 | 1,351 | 1,913 | 3,264 | 562 |
| Andrews County | 822 | 313 | 1,135 | 535 | 230 | 765 | 370 |
| Gaines County | 632 | 242 | 874 | 668 | 347 | 1,015 | –141 |
| Winkler County | 448 | 133 | 581 | 313 | - | 313 | 268 |
| Ector County | 6,620 | 2,095 | 8,715 | 5,083 | 1,370 | 6,453 | 2,262 |

Source: ACS (2008–2012) Census Flow Mapper.
http://flowsmapper.geo.census.gov/flowsmapper/flowsmapper.html.

These gross effects of net out-migration are not borne equally by the ROI's population. As indicated in **Table 1-24**, Employment Status in the ROI, 2010, the unemployment rate for most races in most geographies was lower than for Texas or New Mexico. Note that the ACS data is statistical sampling which is not census data, so there is a margin of error associated with the data (and the percentages). Nonetheless, unemployment was lower than for Texas and New Mexico in the majority of races and geographies. The exceptions were that for all persons in Lea County, the unemployment rate was below New Mexico's rate but above the Texas rate. The unemployment rate for Black or African American persons; American Indian/Alaska Native; and Other Race in Lea County was lower than in the state of New Mexico but higher than in Texas. In Eunice, populations were too low to register statistically for some races, but unemployment was higher than in Texas or New Mexico for persons from Other races, but otherwise lower than state rates. In Hobbs, unemployment was lower than for the states for all persons, Black or African Americans, Asians, and Hispanics, but higher for American Indian/Alaska Natives, Other Races, and Two or More Races. In Jal, Andrews County and the City of Andrews, unemployment was lower than the states for all races except Black or African American. In Gaines County, unemployment was lower than the states for all races except Two or More Races. In Seminole, unemployment was lower than the states for all groups except Hispanics, and in Winkler unemployment was higher than the states for American Indian and Alaska Natives. In Ector County, unemployment rates for all races except for people of a race not listed were lower than for New Mexico and Texas.

### 1.3.2.3 Income

As shown in **Table 1-35**, median household income according to ACS ranges from approximately $48,000 to nearly $58,000 in the ROI. Income levels are highest for White persons, American Indian/Alaska Native, and Asians in some areas and lowest for Black or African American persons. Hispanic median household incomes range from $44,000 to almost $49,000, and are higher than for New Mexico or Texas. Given that this is statistical data, the data set is larger for Hispanic persons and therefor more consistent across geographies when compared to some smaller racial groups or geographies. In terms of poverty status, as shown in **Table 1-36**, according to ACS data the


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| Table 1-35: Income of Households by Race and Age in the Region of Interest (2009–2013) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subject** | **Lea County, New Mexico** | **Eunice, New Mexico** | **Hobbs, New Mexico** | **Jal, New Mexico** | **Andrews County, Texas** | **Andrews, Texas** | **Gaines County, Texas** | **Seminole, Texas** | **Winkler County, Texas** | **Ector County, Texas** | **New Mexico** | **Texas** |
| Median Households Income | 50,694 | 54,152 | 49,243 | 48,790 | 57,825 | 53,833 | 52,910 | 50,911 | 48,992 | 51,466 | 44,927 | 51,900 |
| White median income | 55,240 | 75,875 | 53,103 | 49,479 | 60,929 | 58,608 | 55,230 | 52,917 | 55,444 | 55,654 | 54,334 | 63,924 |
| Black or African American median income | 39,203 | - | 32,098 | - | 36,645 | 36,908 | 29,028 | - | 33,958 | 35,379 | 41,214 | 38,156 |
| American Indian/Alaska Native median income | 62,216 | - | 68,125 | - | 93,185 | 93,185 | 86,438 | - | - | 41,125 | 32,136 | 45,161 |
| Asian median income | 18,450 | - | - | - | 135,435 | 135,435 | - | - | - | 81,042 | 57,457 | 71,259 |
| Native Hawaiian/ Other Pacific Islander median income | - | - | - | - | - | - | - | - | - | - | 32,071 | 59,276 |
| Hispanic or Latino median income | 46,805 | 48,542 | 46,927 | 45,139 | 49,034 | 44,190 | 47,536 | 48,018 | 45,147 | 48,723 | 36,851 | 39,629 |
| Median Household Income by Age of Householder | | | | | | | | | | | | |
| 15 to 24 years | 37,262 | 34,375 | 35,827 | 49,375 | 66,307 | 66,989 | 91,686 | 90,698 | 38,750 | 40,062 | 23,535 | 25,601 |
| 25 to 44 years | 61,086 | 53,884 | 55,362 | 60,078 | 64,018 | 59,360 | 56,136 | 64,219 | 56,420 | 60,196 | 46,884 | 54,524 |
| 45 to 64 years | 62,357 | 81,304 | 57,370 | 65,938 | 80,827 | 80,176 | 63,450 | 60,809 | 60,625 | 58,926 | 54,447 | 63,165 |
| 65 years and over | 30,453 | 37,969 | 31,725 | 29,091 | 20,077 | 19,625 | 25,591 | 22,333 | 22,112 | 30,030 | 35,779 | 36,915 |

Source: ACS Survey Table S1903.



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| Table 1-36: Poverty Status of Families by Race in the Region of Interest (2009–2013) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Lea County, New Mexico** | **Eunice, New Mexico** | **Hobbs, New Mexico** | **Jal, New Mexico** | **Andrews County, Texas** | **Andrews, Texas** | **Gaines County, Texas** | **Seminole, Texas** | **Winkler County, Texas** | **Ector County, Texas** | **New Mexico** | **Texas** |
| Total Families | 15,560 | 834 | 7,861 | 566 | 3,913 | 2,923 | 4,158 | 1,530 | 1,875 | 35,011 | 498,457 | 6,206,755 |
| Families below poverty | 12.0% | 8.3% | 13.8% | 4.4% | 9.5% | 10.7% | 14.7% | 12.5% | 7.8% | 13.1% | 15.6% | 13.7% |
| **Families with a householder who is:** | | | | | | | | | | | | |
| White below poverty level | 6.7% | 2.6% | 8.7% | 3.5% | 6.7% | 8.1% | 12.3% | 11.7% | 4.1% | 8.0% | 7.3% | 5.9% |
| Black or African American below poverty level | 22.4% | - | 27.8% | 0.0% | 3.0% | 3.4% | 0.0% | 0.0% | 0.0% | 26.0% | 22.5% | 20.5% |
| American Indian/Alaska Native below poverty level | 0.0% | - | 0.0% | - | 0.0% | 0.0% | 3.0% | 0.0% | 0.0% | 13.5% | 29.7% | 18.5% |
| Asian below poverty level | - | - | - | - | 0.0% | 0.0% | - | - | 0.0% | 0.0% | 11.0% | 9.1% |
| Native Hawaiian/ Other Pacific Islander below poverty level | - | - | - | - | - | - | - | - | - | 0.0% | 36.6% | 14.9% |
| Hispanic or Latino below poverty level | 17.1% | 14.1% | 17.3% | 6.4% | 12.7% | 13.3% | 19.5% | 14.0% | 12.0% | 16.7% | 22.2% | 23.7% |

Source: ACS Survey Table S1702.



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percentage in poverty are highest for Black or African American populations in Lea County and Hobbs, New Mexico, and Ector County, Texas. Percentages below poverty are consistent across the ROI for Hispanic persons, ranging from a low of six percent in Jal to a high of 19.5 percent in Gaines County. Overall, families in poverty constitute between 4 and 15 percent in the ROI, with just over 15 percent in New Mexico and just over 13 percent in Texas. Again, these are statistics rather than census data and are accompanied by a margin of error.

#### 1.3.2.4 Housing

As indicated in **Tables 1-18** and **1-20**, housing within the ROI is less expensive than within the respective states, with median home values at less than $100,000 in all components of the ROI compared to more than $100,000 in Texas ($128,900) and New Mexico ($160,000). The lowest median home values were in Winkler County at $45,100 and Jal, New Mexico, at $63,900. Median rent asked in the ROI ranged from $575/month in Winkler to $863/month in Seminole compared to $758/month in New Mexico and $851/month in Texas. The number of owner-occupied units substantially exceeded renter-occupied units in the ROI by roughly double. From a race perspective, White and Hispanic owners and renters constituted a substantial portion of the residential populations in the ROI.

A database search of homes currently for sale revealed that in Eunice, the closest town to the proposed site, on May 6, 2015, there were five single family homes for sale ranging in price from $99,000 to $140,000. On the same day in Andrews, Texas, there were 175 homes or lots for sale ranging in price from more than $4 million for 25 acres of land down to $25,000 for one-quarter to one-half acre of land. Existing homes were listed for $69,900 to $1.6 million (www.realtor.com/realestateandhomes-search/).

#### 1.3.2.5 General Summary of Stratification

Looking at selected economic trends over time in the ROI (Lea and Andrews Counties in particular), from 1986 to 2006 it appears that the labor force participation was lower than became equivalent between Lea County and New Mexico, and was lower and subsequently exceeded labor force participation in Andrews County compared to Texas. Unemployment rates were historically equivalent to or higher in the counties compared to the states, but by 2006 they were lower in the counties compared to the states. Per capita income levels used to be lower in counties compared to states but by 2006, they were equivalent to or near the state levels (see **Table 1-33**). More recent data shown in **Table 1-35** indicates that median household incomes for cities or counties in the ROI are generally higher than Texas and New Mexico.

There is still heavy reliance on basic sector employment in the ROI, and jobs requiring higher educational attainment constitute a lower percentage of employment in the ROI compared to the states. The primary industries within the ROI are agricultural and mining based. Educational and health-related industries are very prevalent, along with trade-related industries. There appears to be a rural-urban differentiation, whereby in the ROI's larger cities there is more similarity in income and employment stratification to state averages. Housing is somewhat less expensive in the ROI than in Texas or New Mexico as a whole.

With some exceptions, the ROI is economically interdependent, with most residents working in or near their residence and evidently within the ROI, given that most travel 25 minutes or less for work. The public sector has benefited greatly by tax payments from oil and gas royalties and ad valorem taxes resulting in a greater level of educational resources, hospital availability, and emergency response resources than would exist in similar regional economies dependent upon less lucrative industries. As a result of WCS' investment in the Andrews County as the host community as well, the ROI has benefitted in terms of economics and related development of community resources and infrastructure.

## 1.4 HISTORIC, SCENIC, CULTURAL, AND ARCHEOLOGICAL RESOURCES

### 1.4.1 Historic Resources

Historic resources include buildings, structures, objects, and non-archeological sites and districts that are important in the history of a community, a region, a state, or the nation. The proposed licensing activities are regulated by the NRC; the project is therefore subject to Section 106 of the National Historic Preservation Act.

The Area of Potential Effect (APE) for direct impacts is the project footprint. Taking into consideration the height of the crane that would be required, the height of the potential above-ground facility, and the relatively flat surrounding terrain, the APE for indirect/visual impacts is a 1-mile radius from the proposed project footprint. WCS anticipates that the NRC will issue a Final Environmental Impact Statement and License by April 1, 2019. Therefore, a historic-age date of 1974 (45 years prior to 2019) is proposed. The direct effects APE is contained entirely within the state of Texas, while the indirect effects APE extends into New Mexico. Therefore, coordination is underway with the State Historic Preservation Office for both states.

#### Direct Effects

A search of the Texas Historic Sites Atlas maintained by the Texas Historical Commission (THC) was conducted for previously identified Official State Historical Markers (OSHM), Recorded Texas Historic Landmarks (RTHL), properties or districts listed on the National Register of Historic Places (NRHP), State Antiquities Landmarks (SALs), cemeteries, or other cultural resources that may have been previously recorded. No such resources were identified within the APE for direct effects. The nearest previously identified resource is the OSHM for Andrews County, located approximately 17 miles southeast of the project area. As the area containing the proposed project footprint is devoid of any standing structures, the proposed project would not result in a direct effect to any non-archeological historic resources.


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**Indirect Effects**

A search of the THC Atlas indicates that there are also no previously identified historic-resources in Texas within the 1-mile APE for indirect effects. A search of the New Mexico Cultural Resources Information System (NMCRIS) database administered by the Archeological Records Management Section (ARMS) of the New Mexico Historic Preservation Division (NMHPD) will be undertaken and results will be provided at a future date.

The area is surrounded by a high density of oil wells to the west and some oil wells to the north; there is little development to the south and east, excluding portions of the existing WCS facility. The first development at the WCS facility was constructed in the late 1990s; none of the development is historic-age. Adjacent to the WCS facility to the west is a large uranium enrichment plant called the National Enrichment Facility, operated by URENCO. This facility was developed within the past 15 years. The proposed project area is located in a very remote area of Texas with little development aside from the non-historic age WCS and URENCO facilities. There do not appear to be any historic resources 45 years or older (dating to 1974 or earlier) within the 1-mile indirect effects APE.

The nearest developed area is Eunice, New Mexico, which is located approximately five miles west of the proposed site. There are two large visual obstructions between viewers in Eunice and the proposed crane at the site: red soil mounds approximately 100 feet in height on WCS property, and the URENCO facility. Based on information from WCS, the soil mounds will be in place indefinitely or potentially utilized as fill. Excluding the crane, the CISF storage facility would be approximately 30 feet above the surface and less visible from Eunice than existing features and structures.

On June 1, 2015, THC concurred with the recommendation that no further survey is required for historic resources and project may proceed (see Appendix D, Texas Historical Commission Coordination Letters and Archeological Survey Permit).

In addition, a coordination letter was submitted to New Mexico State Historic Preservation Office addressing historic and archeological resources in New Mexico. On August 12, 2015, the NMSHPO responded with concurrence that no additional cultural resources identification efforts were needed for the undertaking since all construction activities would be confined to Texas (see Appendix D).

## 1.4.2 Archeological Resources

A search of the *Texas Archeological Sites Atlas* (Atlas) maintained by the THC and the Texas Archeological Research Laboratory (TARL) was conducted in order to identify archeological sites, OSHMs, RTHLs, properties or districts listed on the NRHP, SALs, cemeteries, or other cultural resources that may have been previously recorded in or near the archeological APE, as well as previous surveys undertaken in the area. With the current APE defined as the proposed 140-acre construction footprint, no previously recorded resources were found in the APE or near it. The nearest known archeological site in Texas is over 3.7 miles away.


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One previous survey was found in the records search. The southern half of the current APE appears to have been included in a 1994 archeological survey by Galván Eling Associates, Inc., with only minor finds (six pieces of burned caliche) that the THC agreed did not merit further work (Galván Eling Associates, Inc. 1994; THC 2015). In 2004, URS Corporation contacted the THC on behalf of WCS regarding development of a portion of the Galván Eling 1994 survey area that had not been developed between 1994 and 2004. The THC concurred that no further work was required on June 25, 2004.

Although the APE is located entirely within Texas, CMEC has also requested access to the NMCRIS database. Access to ARMS records is currently pending and the results of an ARMS search will be included in the background research section of draft and final archeological survey reports to be prepared in 2015 (see below).

Because of the ambiguity in older survey maps, the lack of full coverage under the previous survey, and the fact that the Galván Eling study was conducted over 20 years ago, prior to the THC's development of minimum survey standards, WCS elected to scope a survey of the entire new facility footprint. An intensive archeological survey meeting current THC standards was conducted, and the results were presented in a draft report to be submitted to WCS, Andrews County, and the THC. No sites were found. The draft archeological survey report under Texas Antiquities Permit 7277 was submitted to the THC on July 2, 2015. Following THC's 30-day review of the draft report, the final report incorporating regulatory comments was prepared and submitted to the THC, who concurred No Historic Properties Affected – Project May Proceed on July 29, 2015. Copies were prepared for submittal to designated state repositories to close the Antiquities Permit (see Appendix D, Texas Historical Commission Coordination Letters and Archeological Survey Permit).

### 1.4.3 Scenic Resources

According to the U.S. Department of Interior (DOI) – Bureau of Land Management (BLM) (1986), visual resources consist of landscape or visual character, and visual sensitivity and exposure. A study area's landscape features include landform, vegetation, water resource features, color, adjacent scenery, scarcity, and cultural modifications (that either add to or detract from visual quality). The overall impression of an area, composed of the elements above, is referred to as the "visual character." For this analysis, the visual character of the area is focused on the perspective of residents living in close proximity to the proposed facility who would be affected by the continued operations, and the perspective of the driving public (along roads within the visual resources study area). However, since the closest residence is approximately four miles away from the facility, the majority of the analysis is geared toward the driving public.

The environmental team analyzed whether the following features exist or are likely to exist within 10 miles of the facility:

- landform (elevated views, hilltops, vegetation (woodlands)
- water (stream crossings, bridges, wetlands, pastoral scenes, wildlife viewing potential)
- scarcity (known scarcity of wildlife habitat, vegetation, or cultural resource)
- cultural modifications (urbanized areas, historic structures, visual detractors)

In accordance with DOI and BLM guidance, a photo inventory of the scenic qualities of the WCS facility was conducted on April 7 and 8, 2015. This study included views from as far as 15 miles from the WCS project. Views were captured to illustrate several zones: foreground, middle ground, background, and seldom-seen. This inventory replicated photos taken for the WCS licensing efforts in 2007 and 2008 for the low-level hazardous waste disposal license. The study team was interested in learning what has changed in the landscape over the last seven years.

The Scenic Resources Inventory is located in **Appendix C**, **Figures C-1 and C-2**, and **photos 1–14**. Each photo is labeled with the direction in relation to the facility, whether it represents foreground, middle ground, background, or seldom-seen views, and approximate distance from the center point of the proposed CISF facility on the WCS property. The foreground and middle ground views are taken from locations less than three to five miles from the facility, with several mid-ground range photos just beyond the 5-mile radius. This zone includes the road cut for State Highway 176 (SH 176), which creates berms that intermittently obscure views beyond the roadway and then open up views to the various landfills in the vicinity and to the sole urbanized area of Eunice, approximately five miles to the west of the facility. The background zone includes views from locations between five and ten miles away (see **photos 11 and 13**). These views are from generally flatter terrain allowing broader views across the landscape. These broader views take in oil-extraction structures (pump jacks, tanks and fence lines) in the foreground and a combination of constructed landscape forms (i.e., landfill and extraction facility earth mound(s) and naturally occurring swales. The seldom-seen views were from locations that are farther than ten miles away or otherwise hidden from view (see **Photo 12**). The WCS facility is barely seen from this distance, with the most prominent features of the facility (the redbeds) hardly registering as more than an undulation in the horizon. Adjacent to the WCS facility to the west in New Mexico is a large uranium enrichment plant called the National Enrichment Facility, operated by URENCO. This facility was developed and constructed since the last visual resources inventory was conducted. This facility is the most substantial new structure on the visual landscape. The relationship of WCS to URENCO is shown on **Figure C-1**. Photo locations are shown on **Figure C-2** along with a 5-mile radius and a 10-mile radius around the site. The proposed CISF activities would take place beyond the existing railroad spur on the WCS property, farthest from SH 176 compared to other current activities at the site.


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It was determined that the visual resources study area does not contain notable representations of any of the landscape features listed above, although the relative lack of visual obstructions to a vast view of this section of the West Texas/East New Mexico landscape could be considered the "visual character" of the area. Overall, the entire study area can be considered to have modest scenic quality that is pleasant to regard for its rural, undeveloped nature, but not dramatic, unique or rare. Facilities geared towards resources extraction, the Lea County Landfill, and oil well pump jacks exist in the project area, in addition to the URENCO facility, which have an equal or higher impact on the visual landscape compared to the proposed new CISF activities at the WCS facility.

## 1.4.4 Agricultural Production

### 1.4.4.1 Andrews County

The 2012 Census of Agriculture (USDA 2012) reports that Andrews County had 169 farms in 2012, down three percent from 175 farms in 2007. These farms amounted to 752,030 acres in 2012, and 808,474 acres in 2007, down seven percent. The average size farm in the county was 4,450 acres in 2012, and 4,620 acres in 2007.

The market value of agricultural production was $12,578,000 in 2012, and $15,919,000 in 2007, down 21 percent. Crop sales accounted for $5,819,000 of the total value in 2012, while livestock sales accounted for $6,758,000 of the total market value. Andrews County is not a leading agricultural producer in Texas, ranking 210 out of 254 counties in market value of agricultural products statewide in 2012.

**Table 1-37** presents the agricultural data for the year 2012 from the USDA's National Agricultural Statistics Service, Census of Agriculture, County Profile for Andrews County. No tobacco; nursery, greenhouse, floriculture, and sod; cut Christmas trees and short duration woody crops; aquaculture; or milk production was reported in the county in 2012.


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| Table 1-37: Value of Agricultural Products in Andrews County, 2012 | | | |
|---|---|---|---|
| **Market Value of Agricultural Products Sold** | | | |
| **Item** | **Quantity ($1,000)** | **State Rank** | **US Rank** |
| Total value of agricultural products sold | 12,578 | 210 | 2,585 |
| Value of crops including nursery and greenhouse | 5,819 | 174 | 2,356 |
| Value of livestock, poultry, and their products | 6,758 | 208 | 2,341 |
| **Value of Sales by commodity Group** | | | |
| **Item** | **Quantity ($1,000)** | **State Rank** | **US Rank** |
| Grains, oilseeds, dry beans, and dry peas | 1,424 | 138 | 2,150 |
| Cotton and cottonseed | 2,241 | 90 | 358 |
| Fruits, tree nuts, and berries | 60 | 173 | 1,676 |
| Other Crops and Hay | 2,094 | 132 | 1,303 |
| Cattle and Calves | 6,240 | 194 | 1,656 |
| Hogs and Pigs | * | * | * |
| Sheep, Goats and Their Products | 422 | 56 | 395 |
| Horses, Ponies, Mules, Burros, and Donkeys | 75 | 204 | 2,046 |

Source: U.S. Department of Agriculture, National Agricultural Statistics Service. County Profile, Andrews County, Texas (2012).

*Withheld to avoid disclosing data for individual operators.

The top livestock inventory items in 2012 in Andrews County included 10,177 cattle and calves, 622 goats, 337 horses and ponies, and 146 sheep and lambs. Cotton was the leading crop in terms of acreage with 8,248 acres, followed by sorghum for grain with 3,856 acres, forage with 1,236 acres, and peanuts with 1,227 acres.

There is no agricultural activity within one mile of the existing WCS facility based on aerial interpretation and land use data. The majority of the land within five miles of the facility is grassland, pasture, and shrublands, with minor outparcels of barren, developed, and alfalfa production.

### 1.4.4.2 Lea County

The 2012 Census of Agriculture reports that Lea County, New Mexico, had 460 farms in 2012, down from 572 in 2007. The land in farms in the county was 1,981,988 acres in 2012, down from 2,365,168 acres in 2007. The average size farm in the county was 4,309 acres in 2012, compared to 4,135 acres in 2007.

The market value of agricultural production was $188,926,000 in 2012 and $93,644,000 in 2007, down 50 percent. Crop sales accounted for 22 percent of the total value in 2012, while livestock sales accounted for 78 percent of the total market value. Lea County ranked fifth out of 33 counties in New Mexico for the market value of agricultural products statewide in 2012.

**Table 1-38** presents the agricultural data for the year 2012 from the USDA's, National Agricultural Statistics Service, Census of Agriculture, County Profile for Lea County. No tobacco, cut Christmas trees and short duration woody crops, or aquaculture was reported in the county in 2012.

**Table 1-38: Value of Agricultural Products in Lea County, 2012**

| Market Value of Agricultural Products Sold | | | |
|---|---|---|---|
| **Item** | **Quantity ($1,000)** | **State Rank** | **US Rank** |
| Total value of agricultural products sold | 188,926 | 5 | 582 |
| Value of crops including nursery and greenhouse | 40,738 | 5 | 1,280 |
| Value of livestock, poultry, and their products | 148,188 | 5 | 274 |
| **Value of Sales by commodity Group** | | | |
| **Item** | **Quantity ($1,000)** | **State Rank** | **US Rank** |
| Grains, oilseeds, dry beans, and dry peas | * | 7 | * |
| Cotton and cottonseed | 14,805 | 1 | 120 |
| Vegetables, melons, potatoes, and sweet potatoes | * | 4 | * |
| Fruits, tree nuts, and berries | 793 | 8 | 548 |
| Nursery, greenhouse, floriculture, and sod | 411 | 11 | 1,444 |
| Other Crops and Hay | 9,812 | 7 | 295 |
| Milk from cows | 115,888 | 5 | 61 |
| Poultry and eggs | * | * | * |
| Cattle and Calves | 30,468 | 7 | 519 |
| Hogs and Pigs | * | * | * |
| Sheep, Goats and Their Products | 119 | 14 | 1,212 |
| Horses, Ponies, Mules, Burros, and Donkeys | 948 | 7 | 269 |
| Other animals and other animal products | 757 | 5 | 316 |

Source: U.S. Department of Agriculture, National Agricultural Statistics Service. County Profile, Lea County, Texas (2012).
* Withheld to avoid disclosing data for individual operators.

The top livestock inventory items in 2012 in Lea County included 84,950 cattle and calves, 1,952 horses and ponies, and 1,475 sheep and lambs. Cotton was the leading crop in terms of acreage with 19,589 acres, followed by forage with 16,892 acres, corn for silage with 9,738 acres and wheat for grain with 3,282 acres.


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# 2.0 SOCIOECONOMIC IMPACT ANALYSIS

The characterization of the CISF's social, demographic and economic impacts on the ROI is based upon an economic impact analysis conducted for the WCS's CISF using the IMPLAN economic modeling tool, plus a discussion of anticipated employment during its construction and operations phase. (A summary of the transportation impact assessment is found in a separate report. The discussion of the potential cumulative impacts resulting from this facility and other operations on the WCS property is also in a separate technical report.)

## 2.1 BACKGROUND: GENERIC EIS FINDINGS

In September 2014, the NRC published a generic assessment of potential impacts of continued storage of spent nuclear fuel, *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel (NUREG-2157)*. The document relied on the license issued by NRC to Private Fuel Storage, LLC (PFS) to construct and operate a facility on the Reservation of the Skull Valley Band of Goshute Indians in Tooele County, Utah. While the project has not moved forward, the NRC considers the PFS EIS to be a reasonable assessment of potential impacts of away-from-reactor storage of spent nuclear fuel.

For short-term storage activities, the GEIS determined that there would be incremental changes to offsite services to support construction activities. Additionally, relatively few workers would move to the area permanently given the short duration of the construction phase. Impacts to housing and public services would be considered minor. Direct employment impacts on the regional economy would occur as would indirect impacts, such as purchases of goods by workers in the local community. Indirect and induced jobs would likely be filled by local residents.

The GEIS discusses anticipated employment related to operations. Some of the workers employed to operate the CISF facility would be expected to move into the area with their families. According to the GEIS, (based on the PFS analysis), a relatively small number of operations workers would move into the area and the impact on housing, public services, and the local and regional economy would be considered minor. For the WCS spent nuclear fuel CISF, however, the analysis that follows provides modeling information that indicates a substantive impact on the economy of the analysis region.

With regard to impacts to local and state government, tax payments would be received from the CISF licensee. The impact would depend on many factors including the local economy. The magnitude of the tax impact would be relative to the size and overall health of the local and regional economy. In the case of PSF, the tax impacts would be significantly beneficial to the host community; the WCS facility would be constructed in an area with a more established economy and therefore would contribute a smaller overall percentage of government tax revenues.

For short-term storage, the GEIS discussed the PFS' conclusion that the socioeconomic impacts of construction and operation of an away-from-reactor CISF would have a small socioeconomic impact, especially given the sparse local population. NRC concluded that any away-from-reactor CISF would be similar to those described in the PFS EIS — potentially large beneficial economic impacts to rural communities with small adverse socioeconomic impacts due to increased demand for housing and public services.

The analysis that follows focuses on the three-county region used for IMPLAN modeling – Gaines and Andrews Counties, Texas, and Lea County, New Mexico to assess potential socioeconomic impacts of the spent nuclear fuel CISF.

## 2.2 IMPACT ANALYSIS METHODOLOGIES

This section will summarize the methodology used to conduct the economic impact assessment for the proposed facility. There have been two previous economic impact analyses conducted to permit two other facilities on the WCS property:

- Waste Control Specialists LLC, 2007. Socioeconomic Impacts of the Waste Control Specialists Proposed Low-Level Radioactive Waste Disposal Facility, Andrews County, Texas, March 16, 2007; and
- Waste Control Specialists LLC, 2008. Socioeconomic Impacts of the Waste Control Specialists Radioactive Material Storage and Processing Facility, Andrews County, Texas for the Renewal of License No. R04971, July 3, 2008.

The analysis in this section does not incorporate the economic impacts of the facilities listed above. Another difference with the previous studies is that this study does not utilize the RIMS II Economic Multipliers to assess the facility's direct, indirect, and final economic impacts during the initial construction period or during the ongoing operations phase.[1] The U.S. Bureau of Economic Analysis (BEA) has since discontinued supporting the RIMS II model, so this analysis was performed using the IMPLAN model. In addition to also being an input-output economic analysis tool, the IMPLAN model provides greater analytical detail and is more frequently updated. The IMPLAN model will be the tool that provides insight into how the proposed construction and operational activities may affect the ROI.

### 2.2.1 IMPLAN Economic Multipliers

IMPLAN stands for "IMpact analysis for PLANning" and consists of the data and software created by MIG, Inc. Originally developed for the U.S. Forest Service, IMPLAN is now privately owned and supported. IMPLAN uses input-output analysis in combination with region-specific social accounting matrices and multiplier models to determine the potential economic impacts of a defined activity on the regional economy. The data in the IMPLAN model contain county, state, zip code, and federal

[1] The resulting analyses from these two previous studies are on file with WCS and the licensing entities.


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economic statistics that are specialized by region. The multiplier tools within IMPLAN can be used to estimate the secondary impacts, stemming from an economic change, such as investment of construction dollars or the outlay of the operational expenses.

There are three types of effects measured with a multiplier: the direct, the indirect, and the induced effects. IMPLAN provides the following definitions in its glossary of terms on the company website (https://implan.com/index.php?option=com_glossary&task=list&letter=F&Itemid=1866).

**Table 2-1: Definitions of Economic Effects Based on Using the IMPLAN Model**

| | |
|---|---|
| **Direct effects** | The set of expenditures applied to the predictive model (i.e., I/O multipliers) for impact analysis. It is a series (or single) of production changes or expenditures made by producers/consumers as a result of an activity or policy. These initial changes are determined by an analyst to be a result of this activity or policy. Applying these initial changes to the multipliers in an IMPLAN model will then display how the region will respond, economically to these initial changes. |
| **Indirect effects** | The impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to value added. The impacts are calculated by applying Direct Effects to the Type I Multipliers. |
| **Induced effects** | The response by an economy to an initial change (direct effect) that occurs through re-spending of income received by a component of value added. IMPLAN's default multiplier recognizes that labor income (employee compensation and proprietor income components of value added) is not a leakage to the regional economy. This money is recirculated through the household spending patterns causing further local economic activity. |

For the CISF analysis, a regional input-output model was built using data for Andrews County, Texas. This single county was the unit of analysis with the IMPLAN model.

The IMPLAN model's baseline characteristics for Andrews County, Texas, are summarized below in **Table 2-2**. The estimated population of the region was 17,722 residents organized into 6,093 households, with 10,144 workers. The county's land area is almost 1,501 square miles, and it had a gross regional product that exceeded $1.2 billion in 2017. The county's top industry for employment was *Support Activities for Oil and Gas Operations*, with 1,146 workers, who collectively earned more than $92.4 million in labor income.[2] The *Extraction of Natural Gas and Crude Petroleum* sector was the second largest employer with approximately 759 workers, followed by *Local Government (Non-education),* which employed 671 persons during 2017.

Various components of these regional data are considered later in this discussion, in order to give additional perspective on the impact of the proposed facility on the analysis region.

[2] Note that in the IMPLAN model, according to their glossary of terms, labor income is defined as "All forms of employment income, including Employee Compensation (wages and benefits) and Proprietor Income."


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**Table 2-2: IMPLAN Model – Economic Overview for Andrews County, Texas Economic Analysis Region**

| | | | |
|---|---|---|---|
| **Model Information** | | | |
| Model Year | 2017 | **Value Added** | |
| GRP | $1,248,796,954 | Employee Compensation | $558,553,714 |
| Total Personal Income | $817,035,800 | Proprietor Income | $155,486,915 |
| Total Employment | 10144 | Other Property Type Income | $417,442,845 |
| | | Tax on Production and Import | $695,457,582 |
| Number of Industries | 151 | | |
| Land Area (Sq. Miles) | 1,501 | Total Value Added | $1,248,796,954 |
| Area Count | 1 | | |
| | | **Final Demand** | |
| Population | 17,722 | Households | $704,663,888 |
| Total Households | 6,093 | State/Local Government | $181,301,071 |
| Average Household Income | $134,092 | Federal Government | $3,632,737 |
| | | Capital | $400,748,215 |
| Trade Flows Method | Trade Flows Model | Exports | $1,160,400,962 |
| Model Status | Multipliers | Imports | ($1,065,644,333) |
| | | Institutional Sales | ($136,305,588) |
| **Economic Indicators** | | | |
| Shannon-Weaver Index | 0.63743 | Total Final Demand: | $1,248,796,952 |

**Top Ten Industries**

| **Sector** | **Description** | **Employment** | **Labor Income** | **Output** |
|---|---|---|---|---|
| 38 | Support activities for oil and gas operations | 1,146 | $92,417,220 | $147,518,500 |
| 20 | Extraction of natural gas and crude petroleum | 759 | $112,599,100 | $295,754,600 |
| 533 | * Employment and payroll of local govt, non-education | 671 | $45,547,980 | $54,423,990 |
| 534 | * Employment and payroll of local govt, education | 534 | $32,845,130 | $39,219,500 |
| 395 | Wholesale trade | 424 | $40,666,700 | $122,550,900 |
| 411 | Truck transportation | 388 | $33,435,070 | $74,400,980 |
| 37 | Drilling oil and gas wells | 383 | $44,220,760 | $143,493,400 |
| 502 | Limited-service restaurants | 223 | $5,021,095 | $20,122,860 |
| 433 | Monetary authorities and depository credit intermediation | 206 | $14,268,120 | $48,728,850 |
| 58 | Construction of other new nonresidential structures | 186 | $14,566,820 | $31,177,730 |

**Areas in the Model**

| | |
|---|---|
| Texas | Andrews County |



## 2.2.2 Socioeconomic Impact Analysis

The evaluation of the potential social impacts of the CISF considered residents and communities located within Andrews County, Texas (see **Figure 1**). The social impact analysis in this section relies largely on demographic data laid out in **Chapter 1**. Additionally, this section summarizes the results from the IMPLAN model for the construction phase and operations phase impacts.



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To assess the relative magnitude of the impacts within the IMPLAN model's analysis region, the guidelines from the NRC (1996) and the DOE (1999) — documented in the URENCO Environmental Report — were used. These measures were used to assess the levels of socioeconomic impact:

- Employment/economic activity impacts (Geography analyzed: three-county economic analysis region)
    - Small = <0.1% increase in employment
    - Moderate = 0.1 – 1.0 percent increase in employment
    - Large = > 1.0 percent increase in employment
- Population/housing impacts (Geography analyzed: 30-mile ROI)
    - Small = <0.1 % increase in population growth and/or <20% of vacant housing units required to accommodate people moving to the area
    - Moderate = 0.1 – 1.0% increase in population growth and/or 20–50% of vacant housing units required to accommodate people moving to the area
    - Large = >1% increase in population growth and/or >50% of vacant housing units required to accommodate people moving to the area
- Public Revenue impacts (Geography analyzed: three-county economic analysis region)
    - Small = <0.1% increase in local revenues
    - Moderate = 1 - 5% increase in local revenues
    - Large = >5% increase in local revenues

## 2.3 IMPACTS OF FACILITY CONSTRUCTION

ISP has estimated the cost of constructing the first phase of the CISF to be approximately $198.3 million. This amount includes all licensing, engineering, design, excavation and grading, fencing, security system costs, administrative and support buildings, handling equipment, plus constructing storage pads for the storage systems that will hold the first 5,000 MTU (427 casks). This figure does not include the costs of constructing the concrete overpacks. Using this estimate, the IMPLAN model analyzed the economic impacts of construction (in nominal dollars), assuming all expenditures ($198.3 million) occurred during 2020. The construction of the ISF required different types of constructions and activities (e.g., engineering and design work), so the activities were entered into the model in several different categories. In some cases, the Andrews County model did not have an existing industry sector, so those activities were entered under a closely related industry sector. As proposed, Phase 1 could provide capacity for approximately three years of canister transfers. If the demand exists, additional phases of the project would be constructed, up to eight phases. Under the current assumptions, the construction costs for the additional phases would primarily consist of building additional concrete pads for spent fuel storage (not modeled).



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**Table 2-3** provides an overview of the economic impacts generated by the $198.3 million that will be spent on the facility's construction. The direct effects of the construction include 555 jobs, $43,850,820 in labor income, and $54,560,291 in value-added output.[3] The indirect effects of the project's construction include 47 jobs, a labor income of $3,167,665, and a value-added output of approximately $5,355,599. The indirect effects output is anticipated to be approximately $15,361,192. Note that the IMPLAN model's estimate of value-added output means the difference between an industry's or an establishment's total output and the cost of intermediate inputs; it equals gross output (sales or receipts and other operating income, plus inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported). The induced effect resulting from construction would include 106.4 person-years of employment, $3,768,535 in labor income, approximately $9,023,529 value-added output, and $15,361,620 in total output.

| Table 2-3: Total Impact of Construction Phase (2020) | | | | |
|---|---|---|---|---|
| **Impact Type** | **Person-Years Employment** | **Labor Income** | **Value Added** | **Output** |
| Direct Effect | 555.3 | 43,850,819.6 | 54,560,291.3 | 87,952,872.4 |
| Indirect Effect | 47.2 | 3,167,664.7 | 5,355,598.8 | 8,757,555.2 |
| Induced Effect | 106.4 | 3,768,050.2 | 9,023,529.4 | 15,361,192.3 |
| Total Effect | 708.9 | 50,786,534.5 | 68,939,419.5 | 112,071,619.8 |

Source: MIG, Inc.   IMPLAN Model – Andrews County, TX.  CMEC utilizing inputs from ISP.

**Table 2-4** shows the top ten industries benefiting from the project's construction in the modeled region by employment, labor income, value added, and output. The largest employment gains from the $198.3 million expenditure go to *Sector 53 – Construction of New Manufacturing Structures* (244.3 jobs) followed by *Sector 56 – Construction of New Highways and Streets*. The industry sector with the highest labor income gain is also *Sector 53*, with more than $19.2 million in anticipated labor income, followed by *Sector 56 – Construction of New Highways and Streets* and *Sector 57 – Construction of New Commercial Structures, Including Farm Structures*. The estimated value-added output is greatest for *Sector 53 – Construction of New Manufacturing Structures* and *Sector 57 – Construction of New Commercial Structures, Including Farm Structures*. Total output is also highest in *Sector 53 – Construction of New Manufacturing Structures* and *Sector 57 – Construction of New Commercial Structures, Including Farm Structures*. Note that a number of industries in the local economy could benefit from the proposed construction.

[3] It is important for the reader to understand that the IMPLAN model's definition of a "job" is one person employed for one year or a "person-year" of employment. This definition of employment may include a person without a job, who is hired for a year, or a person with a job, who retains it for another year. The definition of a "job" in the IMPLAN model does not mean that one person finds continuous long-term employment. Thus, the estimated employment effect of constructing the WCS CISF is a total of 709 person years of employment.

| Table 2-4: Construction Phase (2020) – Top Ten by Category | | | | | |
|---|---|---|---|---|---|
| **Sector** | **Description** | **Total Employment** | **Total Labor Income** | **Total Value Added** | **Total Output** |
| **TOP TEN INDUSTRIES - EMPLOYMENT** | | | | | |
| 53 | Construction of new manufacturing structures | 244.3 | $19,230,279 | $23,719,036 | $36,060,407 |
| 57 | Construction of new commercial structures, including farm structures | 180.9 | $14,209,962 | $17,897,528 | $28,781,298 |
| 58 | Construction of other new nonresidential structures | 65.3 | $5,174,891 | $6,787,678 | $11,126,446 |
| 56 | Construction of new highways and streets | 40.1 | $3,193,173 | $4,147,533 | $8,123,646 |
| 449 | Architectural, engineering, and related services | 27.7 | $2,291,828 | $2,253,681 | $4,332,367 |
| 502 | Limited-service restaurants | 10.2 | $231,145 | $545,828 | $926,629 |
| 395 | Wholesale trade | 9.7 | $939,011 | $2,081,975 | $2,816,205 |
| 501 | Full-service restaurants | 7.9 | $130,461 | $152,869 | $341,556 |
| 411 | Truck transportation | 6.5 | $564,382 | $686,735 | $1,251,781 |
| 433 | Monetary authorities and depository credit intermediation | 6.3 | $444,298 | $799,924 | $1,506,532 |
| **TOP TEN INDUSTRIES - LABOR INCOME** | | | | | |
| 53 | Construction of new manufacturing structures | 244.3 | $19,230,279 | $23,719,036 | $36,060,407 |
| 57 | Construction of new commercial structures, including farm structures | 180.9 | $14,209,962 | $17,897,528 | $28,781,298 |
| 58 | Construction of other new nonresidential structures | 65.3 | $5,174,891 | $6,787,678 | $11,126,446 |
| 56 | Construction of new highways and streets | 40.1 | $3,193,173 | $4,147,533 | $8,123,646 |
| 449 | Architectural, engineering, and related services | 27.7 | $2,291,828 | $2,253,681 | $4,332,367 |
| 395 | Wholesale trade | 9.7 | $939,011 | $2,081,975 | $2,816,205 |
| 411 | Truck transportation | 6.5 | $564,382 | $686,735 | $1,251,781 |
| 433 | Monetary authorities and depository credit intermediation | 6.3 | $444,298 | $799,924 | $1,506,532 |
| 502 | Limited-service restaurants | 10.2 | $231,145 | $545,828 | $926,629 |
| 504 | Automotive repair and maintenance, except car washes | 3.7 | $224,855 | $303,561 | $435,589 |
| **TOP TEN INDUSTRIES - VALUE ADDED** | | | | | |
| 53 | Construction of new manufacturing structures | 244.3 | $19,230,279 | $23,719,036 | $36,060,407 |
| 57 | Construction of new commercial structures, including farm structures | 180.9 | $14,209,962 | $17,897,528 | $28,781,298 |
| 58 | Construction of other new nonresidential structures | 65.3 | $5,174,891 | $6,787,678 | $11,126,446 |
| 56 | Construction of new highways and streets | 40.1 | $3,193,173 | $4,147,533 | $8,123,646 |
| 441 | Owner-occupied dwellings | 0.0 | $0 | $2,699,500 | $4,127,713 |
| 449 | Architectural, engineering, and related services | 27.7 | $2,291,828 | $2,253,681 | $4,332,367 |
| 395 | Wholesale trade | 9.7 | $939,011 | $2,081,975 | $2,816,205 |
| 433 | Monetary authorities and depository credit intermediation | 6.3 | $444,298 | $799,924 | $1,506,532 |
| 411 | Truck transportation | 6.5 | $564,382 | $686,735 | $1,251,781 |



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| Table 2-4: Construction Phase (2020) – Top Ten by Category | | | | | |
|---|---|---|---|---|---|
| **Sector** | **Description** | **Total Employment** | **Total Labor Income** | **Total Value Added** | **Total Output** |
| 445 | Commercial and industrial machinery and equipment rental and leasing | 2.7 | $216,149 | $658,438 | $887,255 |
| **TOP TEN INDUSTRIES - OUTPUT** | | | | | |
| 53 | Construction of new manufacturing structures | 244.3 | $19,230,279 | $23,719,036 | $36,060,407 |
| 57 | Construction of new commercial structures, including farm structures | 180.9 | $14,209,962 | $17,897,528 | $28,781,298 |
| 58 | Construction of other new nonresidential structures | 65.3 | $5,174,891 | $6,787,678 | $11,126,446 |
| 56 | Construction of new highways and streets | 40.1 | $3,193,173 | $4,147,533 | $8,123,646 |
| 449 | Architectural, engineering, and related services | 27.7 | $2,291,828 | $2,253,681 | $4,332,367 |
| 441 | Owner-occupied dwellings | 0.0 | $0 | $2,699,500 | $4,127,713 |
| 395 | Wholesale trade | 9.7 | $939,011 | $2,081,975 | $2,816,205 |
| 433 | Monetary authorities and depository credit intermediation | 6.3 | $444,298 | $799,924 | $1,506,532 |
| 411 | Truck transportation | 6.5 | $564,382 | $686,735 | $1,251,781 |
| 502 | Limited-service restaurants | 10.2 | $231,145 | $545,828 | $926,629 |

Source: MIG, Inc. IMPLAN model — Andrews County, Texas. CMEC utilizing inputs from ISP.

When the CISF facility expands its storage capacity over time (eight phases are planned in total), there will be additional construction activities to build these future phases, namely the construction of concrete pads for transferred canisters. Even with this initial investment, the analysis of economic impacts shows the construction would be beneficial to the region from a direct, indirect, induced, and value-added output perspective.

The IMPLAN model estimates that 709 person-years of employment would be created through the construction project's direct, indirect, and induced effects. Total 2017 employment in the Andrews County region was 10,144 jobs. Therefore, the 7.0% increase to regional employment represents a Large Effect, according to the previously discussed criteria. This employment estimate may represent a maximum impact, because there may not be enough construction workers in Andrews County to meet the need. Also, local construction workers may simply transfer to a new project within an existing firm, rather than represent a new hire. Additionally, because of the specialized nature of some of the work, it may be necessary to hire companies with appropriate experience located outside of Andrews County.

With regard to wages, the Texas Labor Market Information website provides employment and wage information by quarter by industry. Data for total employment and income by county is available, but wage information by county by industry is not available (the Bureau of Labor Statistics was queried for quarterly wage information for the non-residential building construction sector in Andrews County but the information was non-disclosable). According to wage data from the U.S. Bureau of



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Labor Statistics, the 2017 average annual pay in Andrews County's construction sector was $76,323 (U.S. Bureau of Labor Statistics, 2019).

According to the IMPLAN model, Andrews County had an average annual income (including wages and benefits) of $71,669 in the new commercial construction sector (based on total labor income for the sector divided by the 112.4 direct jobs in the sector) during 2017.

## 2.4 IMPACTS OF FACILITY OPERATION

### 2.4.1 Employment Information for Current and Planned Operations

WCS provided information about employment based on current staff, as well as anticipated staffing needs to support CISF operations. As of spring 2015, on-site employment (at all WCS facilities) included the following positions:

- Accounting – 3 employees
- Administrative – 16 employees
- Business Development – 12 employees
- Canister Production Facility – 6 employees
- Engineering – 5 employees
- Environmental – 9 employees
- Field Administration – 15 employees
- Integrated Services – 12
- Laboratory – 3 employees
- Landfill – 7 employees
- Landfill CWF – 6 employees
- Landfill FWF – 12 employees
- Licensing – 4 employees
- Maintenance – 21 employees
- MWTF Treatment and Storage – 11 employees
- Quality Assurance – 4 employees
- Rad Safety – 27 employees
- Safety – 4 employees
- Security – 18 employees
- Various – 9 employees

The total number of employees working at the facility would be approximately 204, with 184 of those employees located at the site and the others being corporate employees. As of mid-2015, approximately 50 percent of the site employees lived in Texas and 50 percent lived in New Mexico. In Texas, most employees live in the city of Andrews and, in New Mexico, the workers are evenly split between residents of Hobbs and residents of Eunice. The average annual salary for WCS employees in 2015 dollars was $80,334. Employees specifically assigned to the CISF site would be an estimated 20 trained security officers. For the purposes of this analysis, it was assumed that the new jobs created by the CISF operations would be limited to 3 administrative staff, 20 security officers, 7 engineering and technical staff, and 6 maintenance and equipment staff. These counts are assumed in the benefit/cost analysis and subsequently the socioeconomic impact analysis.

### 2.4.2 Economic Impacts of Operations

WCS provided estimates of annual operating expenditures, not including transportation, professional services, or capital costs. The operating costs accounted for in the IMPLAN model consisted of the following: administration, the purchase of concrete overpacks, labor costs during loading and/or


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unloading, and labor costs during the caretaker period. Decommissioning costs for the facility are not included. Table 2.5 shows the operating costs by category. The total operating costs over 40 years is $1.29 billion, which averages to $32.3 million per year.

**Table 2-5: Total Estimated Annual Operating Costs at CISF**

| Year | Utilities | Concrete Pads | Waste Management and Remediation | Commercial and Industrial Machinery and Equipment | Total |
|---|---|---|---|---|---|
| 2020 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2021 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2022 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2023 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2024 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2025 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2026 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2027 | $1,101,825 | $33,330,203 | $5,009,998 | $2,892,290 | $42,334,316 |
| 2028 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2029 | $1,101,825 | $33,330,203 | $5,009,998 | $2,892,290 | $42,334,316 |
| 2030 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2031 | $1,101,825 | $39,390,239 | $5,009,998 | $2,892,290 | $48,394,352 |
| 2032 | $1,101,825 | $33,330,203 | $5,009,998 | $2,892,290 | $42,334,316 |
| 2033 | $1,101,825 | $33,330,203 | $5,009,998 | $2,892,290 | $42,334,316 |
| 2034 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2035 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2036 | $1,101,825 | $33,330,203 | $5,009,998 | $2,892,290 | $42,334,316 |
| 2037 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2038 | $1,101,825 | $6,060,037 | $5,009,998 | $2,892,290 | $15,064,150 |
| 2039 | $1,101,825 | $33,330,203 | $5,009,998 | $2,892,290 | $42,334,316 |
| 2040 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2041 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2042 | $1,101,825 | $45,450,276 | $5,009,998 | $2,892,290 | $54,454,389 |
| 2043 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2044 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2045 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2046 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2047 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2048 | $1,101,825 | $60,600,368 | $5,009,998 | $2,892,290 | $69,604,481 |
| 2049 | $1,101,825 | $36,360,221 | $5,009,998 | $2,892,290 | $45,364,334 |
| 2050 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2051 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2052 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2053 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |



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| Table 2-5: Total Estimated Annual Operating Costs at CISF | | | | | |
|---|---|---|---|---|---|
| Year | Utilities | Concrete Pads | Waste Management and Remediation | Commercial and Industrial Machinery and Equipment | Total |
| 2054 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2055 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2056 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2057 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2058 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| 2059 | $1,101,825 | $0 | $5,009,998 | $2,892,290 | $9,004,113 |
| **TOTAL** | **$44,072,995** | **$933,245,673** | **$200,399,909** | **$115,691,612** | **$1,293,410,190** |

Source: MIG, Inc. IMPLAN model — Andrews County, Texas. CMEC utilizing inputs from ISP.

Once issued, the operating license for this facility would be valid for 40 years. To provide an overview of its regional economic impacts, the estimated annual operating expenditure was entered into the regional IMPLAN model. The activity or "event" year was set to 2020 for the first year of operations and the model was re-run for each event year over a 40-year period (2020–2059) which would represent the entire length of the initial license. The operating costs for the facility varied from year-to-year until 2050, when the CISF is assumed to reach full capacity. The primary variable expenditure is the construction of concrete pads which is determined by the availability of spent fuel for transfer and rail car capacity. The total estimated operating costs, by year, are shown in Table 2-5. Tables 2-6 through 2-9 provide the total employment, labor income, value-added output, and total output for the direct, indirect, induced, and total impacts. Table 2-10 provides a summary of the data for the entire period of the license.

| Table 2-6: Estimated Direct Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| Year | Employment | Labor Income | Value Added | Output |
| 2020 | 55.7 | $6,662,169 | $9,676,914 | $13,348,040 |
| 2021 | 55.7 | $6,602,661 | $9,590,477 | $13,227,076 |
| 2022 | 55.7 | $6,543,685 | $9,504,814 | $13,107,277 |
| 2023 | 55.7 | $6,485,235 | $9,419,915 | $12,988,629 |
| 2024 | 55.7 | $6,427,308 | $9,335,774 | $12,871,122 |
| 2025 | 55.7 | $6,369,898 | $9,252,386 | $12,754,743 |
| 2026 | 55.7 | $6,313,001 | $9,169,742 | $12,639,482 |
| 2027 | 85.0 | $8,587,202 | $12,114,980 | $18,464,833 |
| 2028 | 55.7 | $6,200,727 | $9,006,661 | $12,432,701 |
| 2029 | 84.5 | $8,434,482 | $11,899,521 | $18,154,335 |
| 2030 | 107.6 | $10,215,348 | $14,204,209 | $22,723,385 |
| 2031 | 89.1 | $8,693,284 | $12,218,880 | $18,889,159 |
| 2032 | 83.8 | $8,210,480 | $11,583,495 | $17,698,486 |
| 2033 | 83.5 | $8,137,142 | $11,480,028 | $17,549,131 |
| 2034 | 55.7 | $5,875,744 | $8,534,618 | $11,832,812 |
| 2035 | 55.7 | $5,823,260 | $8,458,385 | $11,735,739 |


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| Table 2-6: Estimated Direct Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| Year | Employment | Labor Income | Value Added | Output |
| 2036 | 82.8 | $7,921,036 | $11,175,143 | $17,108,688 |
| 2037 | 104.4 | $9,593,493 | $13,339,535 | $21,399,219 |
| 2038 | 60.6 | $6,052,526 | $8,732,412 | $12,426,080 |
| 2039 | 82.1 | $7,710,670 | $10,878,354 | $16,679,457 |
| 2040 | 103.1 | $9,338,710 | $12,985,264 | $20,855,880 |
| 2041 | 102.7 | $9,255,294 | $12,869,277 | $20,677,887 |
| 2042 | 90.7 | $8,246,662 | $11,551,616 | $18,145,719 |
| 2043 | 114.0 | $9,206,184 | $12,826,762 | $20,326,499 |
| 2044 | 101.5 | $9,009,493 | $12,527,496 | $20,153,076 |
| 2045 | 101.1 | $8,929,019 | $12,415,599 | $19,981,152 |
| 2046 | 100.7 | $8,849,263 | $12,304,700 | $19,810,712 |
| 2047 | 100.3 | $8,770,220 | $12,194,792 | $19,641,743 |
| 2048 | 99.4 | $8,593,061 | $11,699,563 | $18,704,583 |
| 2049 | 82.0 | $7,222,892 | $10,170,719 | $15,768,475 |
| 2050 | 55.7 | $5,089,988 | $7,393,295 | $10,373,345 |
| 2051 | 55.7 | $5,044,524 | $7,327,257 | $10,288,473 |
| 2052 | 55.7 | $4,999,465 | $7,261,809 | $10,204,310 |
| 2053 | 55.7 | $4,954,809 | $7,196,945 | $10,120,849 |
| 2054 | 55.7 | $4,910,552 | $7,132,660 | $10,038,086 |
| 2055 | 55.7 | $4,866,690 | $7,068,950 | $9,956,013 |
| 2056 | 55.7 | $4,823,220 | $7,005,809 | $9,874,626 |
| 2057 | 55.7 | $4,780,138 | $6,943,231 | $9,793,919 |
| 2058 | 55.7 | $4,737,441 | $6,881,213 | $9,713,885 |
| 2059 | 55.7 | $4,695,125 | $6,819,749 | $9,634,519 |
| **TOTAL** | **2,973.8** | **$283,182,098** | **$402,152,950** | **$602,094,147** |

| Table 2-7: Estimated Indirect Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| Year | Employment | Labor Income | Value Added | Output |
| 2020 | 12.9 | $804,436 | $1,240,008 | $2,135,376 |
| 2021 | 12.8 | $797,310 | $1,229,001 | $2,116,434 |
| 2022 | 12.7 | $790,249 | $1,218,093 | $2,097,665 |
| 2023 | 12.6 | $783,251 | $1,207,285 | $2,079,066 |
| 2024 | 12.5 | $776,317 | $1,196,575 | $2,060,637 |
| 2025 | 12.3 | $769,446 | $1,185,962 | $2,042,375 |
| 2026 | 12.2 | $762,638 | $1,175,446 | $2,024,278 |
| 2027 | 17.3 | $1,101,210 | $1,778,964 | $3,040,120 |
| 2028 | 12.0 | $749,786 | $1,155,632 | $1,990,156 |
| 2029 | 17.0 | $1,082,331 | $1,748,408 | $2,987,917 |



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| Table 2-7: Estimated Indirect Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| Year | Employment | Labor Income | Value Added | Output |
| 2030 | 21.0 | $1,347,810 | $2,221,925 | $3,784,869 |
| 2031 | 17.7 | $1,124,298 | $1,825,984 | $3,117,804 |
| 2032 | 16.6 | $1,054,620 | $1,703,556 | $2,911,290 |
| 2033 | 16.5 | $1,045,542 | $1,688,863 | $2,886,188 |
| 2034 | 11.4 | $712,520 | $1,098,174 | $1,891,208 |
| 2035 | 11.3 | $706,492 | $1,088,880 | $1,875,203 |
| 2036 | 16.0 | $1,018,774 | $1,645,541 | $2,812,175 |
| 2037 | 19.8 | $1,268,073 | $2,090,204 | $3,560,563 |
| 2038 | 11.9 | $745,549 | $1,162,525 | $1,998,160 |
| 2039 | 15.6 | $992,693 | $1,603,333 | $2,740,063 |
| 2040 | 19.3 | $1,235,363 | $2,036,174 | $3,468,555 |
| 2041 | 19.1 | $1,224,649 | $2,018,477 | $3,438,418 |
| 2042 | 16.9 | $1,076,946 | $1,757,198 | $2,998,133 |
| 2043 | 18.8 | $1,203,499 | $1,983,544 | $3,378,928 |
| 2044 | 18.6 | $1,193,061 | $1,966,305 | $3,349,571 |
| 2045 | 18.5 | $1,182,715 | $1,949,216 | $3,320,470 |
| 2046 | 18.3 | $1,172,458 | $1,932,276 | $3,291,622 |
| 2047 | 18.2 | $1,162,290 | $1,915,483 | $3,263,024 |
| 2048 | 17.9 | $1,147,926 | $1,892,469 | $3,223,914 |
| 2049 | 14.7 | $936,240 | $1,516,098 | $2,589,892 |
| 2050 | 10.0 | $621,967 | $958,562 | $1,650,782 |
| 2051 | 9.9 | $616,706 | $950,452 | $1,636,815 |
| 2052 | 9.8 | $611,490 | $942,410 | $1,622,967 |
| 2053 | 9.7 | $606,319 | $934,437 | $1,609,236 |
| 2054 | 9.6 | $601,191 | $926,531 | $1,595,622 |
| 2055 | 9.6 | $596,106 | $918,692 | $1,582,123 |
| 2056 | 9.5 | $591,065 | $910,920 | $1,568,738 |
| 2057 | 9.4 | $586,067 | $903,214 | $1,555,467 |
| 2058 | 9.3 | $581,110 | $895,573 | $1,542,308 |
| 2059 | 9.2 | $576,196 | $887,997 | $1,529,261 |
| **TOTAL** | **568.7** | **$35,956,711** | **$57,460,387** | **$98,367,392** |

| Table 2-8: Estimated Induced Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| Year | Employment | Labor Income | Value Added | Output |
| 2020 | 16.9 | $598,784 | $1,433,617 | $2,440,643 |
| 2021 | 16.8 | $593,440 | $1,420,824 | $2,418,862 |
| 2022 | 16.6 | $588,145 | $1,408,144 | $2,397,276 |


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| Table 2-8: Estimated Induced Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| Year | Employment | Labor Income | Value Added | Output |
| 2023 | 16.5 | $582,896 | $1,395,578 | $2,375,884 |
| 2024 | 16.3 | $577,695 | $1,383,125 | $2,354,683 |
| 2025 | 16.2 | $572,540 | $1,370,783 | $2,333,671 |
| 2026 | 16.0 | $567,431 | $1,358,551 | $2,312,848 |
| 2027 | 21.9 | $776,388 | $1,859,283 | $3,165,136 |
| 2028 | 15.7 | $557,396 | $1,334,526 | $2,271,947 |
| 2029 | 21.5 | $762,636 | $1,826,352 | $3,109,075 |
| 2030 | 26.2 | $926,290 | $2,218,525 | $3,776,586 |
| 2031 | 22.2 | $786,666 | $1,883,953 | $3,207,110 |
| 2032 | 21.0 | $742,465 | $1,778,046 | $3,026,842 |
| 2033 | 20.8 | $735,860 | $1,762,229 | $2,999,917 |
| 2034 | 14.9 | $528,345 | $1,264,972 | $2,153,535 |
| 2035 | 14.8 | $523,653 | $1,253,738 | $2,134,409 |
| 2036 | 20.2 | $716,397 | $1,715,620 | $2,920,571 |
| 2037 | 24.6 | $870,087 | $2,083,916 | $3,547,442 |
| 2038 | 15.4 | $545,076 | $1,305,103 | $2,221,826 |
| 2039 | 19.7 | $697,449 | $1,670,243 | $2,843,325 |
| 2040 | 23.9 | $847,057 | $2,028,756 | $3,453,544 |
| 2041 | 23.7 | $839,517 | $2,010,697 | $3,422,801 |
| 2042 | 21.1 | $747,021 | $1,789,059 | $3,045,549 |
| 2043 | 23.6 | $833,882 | $1,997,206 | $3,399,833 |
| 2044 | 23.1 | $817,296 | $1,957,476 | $3,332,204 |
| 2045 | 22.9 | $810,020 | $1,940,051 | $3,302,541 |
| 2046 | 22.7 | $802,809 | $1,922,781 | $3,273,142 |
| 2047 | 22.5 | $795,663 | $1,905,665 | $3,244,005 |
| 2048 | 22.0 | $780,291 | $1,868,871 | $3,181,363 |
| 2049 | 18.5 | $653,805 | $1,565,750 | $2,665,432 |
| 2050 | 12.9 | $458,068 | $1,096,715 | $1,867,088 |
| 2051 | 12.8 | $454,000 | $1,086,976 | $1,850,507 |
| 2052 | 12.7 | $449,969 | $1,077,323 | $1,834,073 |
| 2053 | 12.6 | $445,973 | $1,067,756 | $1,817,786 |
| 2054 | 12.5 | $442,012 | $1,058,273 | $1,801,643 |



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| Table 2-8: Estimated Induced Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| Year | Employment | Labor Income | Value Added | Output |
| 2055 | 12.4 | $438,087 | $1,048,875 | $1,785,643 |
| 2056 | 12.3 | $434,196 | $1,039,561 | $1,769,786 |
| 2057 | 12.2 | $430,340 | $1,030,329 | $1,754,069 |
| 2058 | 12.0 | $426,519 | $1,021,179 | $1,738,493 |
| 2059 | 11.9 | $422,731 | $1,012,111 | $1,723,054 |
| **TOTAL** | **722.5** | **$25,578,897** | **$61,252,537** | **$104,274,143** |

| Table 2-9: Estimated Total Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| Year | Employment | Labor Income | Value Added | Output |
| 2020 | 85.6 | $8,065,389 | $12,350,540 | $17,924,059 |
| 2021 | 85.3 | $7,993,411 | $12,240,301 | $17,762,372 |
| 2022 | 85.0 | $7,922,078 | $12,131,051 | $17,602,218 |
| 2023 | 84.8 | $7,851,383 | $12,022,778 | $17,443,579 |
| 2024 | 84.5 | $7,781,320 | $11,915,474 | $17,286,441 |
| 2025 | 84.3 | $7,711,884 | $11,809,131 | $17,130,789 |
| 2026 | 84.0 | $7,643,070 | $11,703,740 | $16,976,608 |
| 2027 | 124.3 | $10,464,799 | $15,753,228 | $24,670,089 |
| 2028 | 83.5 | $7,507,909 | $11,496,819 | $16,694,804 |
| 2029 | 123.1 | $10,279,449 | $15,474,280 | $24,251,327 |
| 2030 | 154.8 | $12,489,448 | $18,644,659 | $30,284,840 |
| 2031 | 129.0 | $10,604,247 | $15,928,818 | $25,214,073 |
| 2032 | 121.3 | $10,007,565 | $15,065,096 | $23,636,618 |
| 2033 | 120.8 | $9,918,544 | $14,931,120 | $23,435,235 |
| 2034 | 82.1 | $7,116,609 | $10,897,764 | $15,877,555 |
| 2035 | 81.9 | $7,053,405 | $10,801,002 | $15,745,351 |
| 2036 | 119.0 | $9,656,208 | $14,536,304 | $22,841,434 |
| 2037 | 148.8 | $11,731,654 | $17,513,654 | $28,507,224 |
| 2038 | 87.9 | $7,343,151 | $11,200,040 | $16,646,065 |
| 2039 | 117.4 | $9,400,813 | $14,151,930 | $22,262,846 |
| 2040 | 146.4 | $11,421,130 | $17,050,195 | $27,777,979 |
| 2041 | 145.6 | $11,319,460 | $16,898,451 | $27,539,106 |
| 2042 | 128.7 | $10,070,629 | $15,097,873 | $24,189,400 |


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| Table 2-9: Estimated Total Impacts from Proposed Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| **Year** | **Employment** | **Labor Income** | **Value Added** | **Output** |
| 2043 | 156.4 | $11,243,565 | $16,807,512 | $27,105,260 |
| 2044 | 143.2 | $11,019,850 | $16,451,277 | $26,834,852 |
| 2045 | 142.4 | $10,921,754 | $16,304,866 | $26,604,163 |
| 2046 | 141.7 | $10,824,530 | $16,159,756 | $26,375,477 |
| 2047 | 140.9 | $10,728,173 | $16,015,940 | $26,148,773 |
| 2048 | 139.4 | $10,521,278 | $15,460,904 | $25,109,860 |
| 2049 | 115.2 | $8,812,938 | $13,252,567 | $21,023,799 |
| 2050 | 78.7 | $6,170,024 | $9,448,572 | $13,891,215 |
| 2051 | 78.5 | $6,115,230 | $9,364,684 | $13,775,795 |
| 2052 | 78.3 | $6,060,924 | $9,281,542 | $13,661,350 |
| 2053 | 78.1 | $6,007,100 | $9,199,137 | $13,547,871 |
| 2054 | 77.9 | $5,953,755 | $9,117,465 | $13,435,350 |
| 2055 | 77.7 | $5,900,883 | $9,036,518 | $13,323,779 |
| 2056 | 77.5 | $5,848,481 | $8,956,290 | $13,213,150 |
| 2057 | 77.3 | $5,796,545 | $8,876,774 | $13,103,455 |
| 2058 | 77.1 | $5,745,070 | $8,797,966 | $12,994,685 |
| 2059 | 77.5 | $5,848,481 | $8,956,290 | $13,213,150 |
| **TOTAL** | **4,265.5** | **$344,872,135** | **$521,102,307** | **$805,061,999** |

| Table 2-10: Summary of Economic Impacts from Operations, 2020–2059 (2018 $) | | | | |
|---|---|---|---|---|
| **Impact Type** | **Employment** | **Labor Income** | **Value Added** | **Output** |
| Direct Effect | 2,973.8 | $283,182,098 | $402,152,950 | $602,094,147 |
| Indirect Effect | 568.7 | $35,956,711 | $57,460,387 | $98,367,392 |
| Induced Effect | 722.5 | $25,578,897 | $61,252,537 | $104,274,143 |
| **Total Effect** | **4,265.5** | **$344,872,135** | **$521,102,307** | **$805,061,999** |

Overall, the IMPLAN model estimates that the CISF will create 4,265 person-years of employment over a 40-year period through the direct, indirect, and induced effects of the facility's operations. Over the 40-year period, the average annual direct, indirect, and induced total employment was 106.6 person-years of employment. Total employment in the Andrews County region of analysis was 10,144 in 2017. Therefore, the estimated 1.05% increase in employment represents a large positive effect.

According to the IMPLAN regional economic model for Andrews County, the average annual income (wages and benefits) for the hazardous waste disposal facilities sector (based on total labor income



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for the sector divided by the 157 direct jobs in the sector) was $91,923 (model year 2017). WCS stated that average income for WCS employees was $80,334 (2015). It appears that wages and benefits associated with waste disposal activities at WCS and in the economic analysis region exceed the average income for the sector at the State level. Likewise, the wages at WCS exceeds the *Waste Management and Remediation Services* sector (NAICS 562) statewide, which paid an annual average income of $69,108 in 2019 (Texas Workforce Commission 2019).

## 2.5 OTHER SOCIOECONOMIC IMPACTS

### 2.5.1 Competition for Labor and Wage Rates

The impacts of the CISF's operation on the regional labor market and wages can be assessed by relating its impact to regional employment characteristics. Taking Andrews County as representative of the local labor market conditions in the ROI, U.S. Census Bureau (ACS 2009–2013) data showed that out of 11,457 persons 16 years and over, approximately 5.9 percent were unemployed. In Gaines County, Texas, out of 12,468 persons, 5.8 percent were unemployed. These unemployment rates were much lower than the State of Texas' unemployment rate of 8.1 percent during the same period. In Lea County, New Mexico, out of 48,357 persons, approximately 8.4 percent were unemployed compared to 9.7 percent in New Mexico overall. See **Table 1-24** and **Table 1-26**. More recent information from the U.S. Bureau of Labor Statistics indicates that the unemployment rates in the economic analysis region were currently lower than the rates available from the American Community Survey. As of April 2015, in Andrews County, out of 9,625 persons in the civilian labor force, approximately 274 (2.8 percent) were unemployed. In Gaines County during the same time period, out of 9,519 persons approximately 268 (2.8 percent) were unemployed. In Lea County, New Mexico, as of April 2015, out of 31,322 persons, there were 1,496 unemployed persons (approximately 4.8 percent).

WCS estimates there will be 204 persons working in association with the CISF activities, including current positions at the facility plus approximately 20 new positions specifically devoted to CISF activities. According to the IMPLAN projections, over the 40-year time period a total of 912 person-years of employment would be created through direct, indirect, and induced effects of operations.

### 2.5.2 Population and Housing

The population of the ROI, according to the 2010 decennial census and based on the total population of all counties with any portion of the county in the ROI, was 241,279 persons in Andrews, Ector, Gaines, and Winkler Counties in Texas and Lea County, New Mexico. The IMPLAN regional model's area of analysis (Andrews and Gaines Counties, Texas, and Lea County, New Mexico) estimated the region to have 103,782 persons, which may more accurately represent the ROI (see **Table 1-16**). (Ector County has only a small portion of its boundary within the 30-mile ROI and has a relatively large population of 137,130 residents). The majority of the employment impacts are expected to occur in Andrews County, Texas, and Lea County, New Mexico.



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The WCS's June 2008 Socioeconomic Impact Assessment references an earlier study from 1996 that estimated approximately half of the future workers at the WCS facility would relocate to the region. Other jobs would be filled locally with trained and experienced workers. Indirect and induced jobs could be filled by workers already residing in the ROI. A similar breakdown could be anticipated for the proposed spent fuel CISF activities.

The construction employment impact is estimated at approximately 82 person-years of direct employment (2018) and each year employment impact from operation is estimated to be approximately 29 person-years of employment. Therefore a total of 111 person-years of employment could be created in the first couple years. Because these figures represent only direct employment, if half of those workers moved to the ROI, then that would mean approximately 55 people. The IMPLAN model indicates a population of 103,782 in the region. That number of people (excluding other family members) would constitute approximately 0.053 percent of the population or a small impact, based on the criteria in the URENCO study.

Lea County had 2,683 vacant housing units and Andrews County had 555 vacant housing units in 2010 (see **Table 1-19**). Assuming those figures represent available vacancies, then 55 households seeking to purchase or rent housing units out of 3,238 available units constitutes 1.7 percent of the vacant units. This potential housing need generated by the CISF facility would constitute a small impact on housing according to the criteria in the URENCO study.

Currently, according to WCS, approximately half their employees live in Texas and the other half live in New Mexico. Travel time to work was examined. According to the American Community Survey, over the years 2009–2013, more than 18 percent of commuters in Andrews County traveled more than 45 minutes to reach their job sites compared to 14.8 percent in Texas overall (see **Table 1-31**). More than seven percent of commuters travelled 45 minutes or more to their jobs in Gaines County and Lea County. These existing journey-to-work patterns suggest that some workers who live up to 45 minutes away from the CISF facility might choose to commute there, if they obtained a job at the facility, rather than choosing to move closer to the facility. This may indicate that substantial in-migration of population to the ROI would not be anticipated from the facility's operation-related job growth. Based on 2010 U.S. Census Bureau data, approximately 12.0 percent of total housing units were vacant in Lea County and 10.6 percent of housing units were vacant in Andrews County (see **Table 1-18**). It does not appear that there would be an unmet demand for housing in the ROI created by the new spent fuel CISF project.

### 2.5.3 Changes in Land Value and Uses

The WCS's spent fuel CISF is one component of a larger waste management plant that occupies 1,338 acres in the middle of approximately 14,400 acres owned by WCS in Andrews County, Texas. The land surrounding the facility is high plains scrub/brush land used for rangeland, limited dryland farming and oil and gas extraction. Since the continued operations at the processing and storage component of the facility would be entirely contained within the WCS property and


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adjacent uses are characterized by agricultural and resource extraction operations, no negative impacts on proximal property values are expected as a result of the new facility operation.

The small to moderate employment impact described above and the subsequent demographic impact described below further suggests that real estate values in and around the City of Andrews will not be impacted adversely. The closest community to the CISF is Eunice, New Mexico. Eunice was once a small town characterized by older residential and commercial structures, vacant lots, a nearby gasoline plant, active oil and gas wells, pipelines, and related facilities. However, following the construction of the Louisiana Energy Services URENCO plant, employment in the Eunice area has increased and the city has experienced a surge of new development, including a new Main Street landscaped boulevard, in addition to several new businesses and restaurants. The URENCO Environmental Report estimated approximately 400 new jobs (8-year average) in the region associated with the plant's construction. In fact, according to the U.S. Census Bureau, the population of Eunice rose from 2,922 residents during the decennial census to 3,147 residents in 2014 according to American Factfinder.

The construction employment impact is estimated at approximately 555 person-years of direct employment (2020). Therefore a total of 709 person-years of employment could be directly created in the first couple years as a result of the WCS CISF. Indirect employment during construction is estimated to be approximately 47 person-years of employment while induced effects would be approximately 106 person-years of employment. Over the 40-year license (2020–2059), the direct, indirect, and induced person-years of employment associated with CISF operations are estimated to total 4,266 person-years of employment. Some indirect and induced employment would likely go to existing local residents rather than new workers moving into the area. The proposed WCS spent fuel CISF would likely have a positive effect on land values in the overall area, similar to the effects from construction of the URENCO facility.

### 2.5.4 Government Impacts to the Region of Interest

According to the IMPLAN model, various tax benefits would accrue to state and local governments, based on the economic activity associated with the construction phase of the spent nuclear fuel CISF facility. At the state and local level, tax revenues from employee compensation are estimated to be $67,388 from the construction activities (**Table 2-11**). Taxes on production and imports would reach almost $2.1 million. Taxes generated by households would be approximately $1,088,683 and corporations would generate $28,096 in government revenue. At the federal level, employee compensation-generated tax revenues would exceed $5,389,646, plus $191,526 in proprietor income and $184,390 of tax on production and imports. Households would generate $3.8 million in federal taxes and corporations would generate $725,793 in federal taxes.

| Table 2-11: Local, State, and Federal Estimated Tax Impacts of Construction (2018 $) | |
|---|---|
| CONSTRUCTION PHASE – 2020, $198.3M construction | |

| TAX IMPACT – STATE AND LOCAL | | | | |
|---|---|---|---|---|
| Employee Compensation | Proprietor Income | Tax on Production and Imports | Households | Corporations |
| $67,338 | $0 | $2,089,511 | $1,088,683 | $28,096 |
| **TAX IMPACT – FEDERAL** | | | | |
| Employee Compensation | Proprietor Income | Tax on Production and Imports | Households | Corporations |
| $5,389,646 | $191,526 | $184,930 | $3,840,191 | $725,793 |

Source: MIG, Inc. IMPLAN model — Andrews County, Texas. CMEC utilizing inputs from ISP.

Once the facility begins operations, additional state and local tax revenues would be generated on an ongoing basis. Approximately $454,354 in employee compensation would be generated from 40 years of operations, along with $37,416,628 in taxes on production and imports (**Table 2-12**). Household taxes would be $7,321,769 and corporations would generate $237,175 in state and local taxes.

**Table 2-12: State and Local Estimated Tax Impacts of Operations, 2020–2059 (2018 $)**

| Year | Employee compensation | Proprietor Income | Tax on Production and Imports | Households | Corporations | Total Revenue |
|---|---|---|---|---|---|---|
| 2020 | $10,776 | $0 | $1,001,908 | $171,123 | $5,595 | $1,189,402 |
| 2021 | $10,680 | $0 | $992,965 | $169,596 | $5,545 | $1,178,786 |
| 2022 | $10,585 | $0 | $984,101 | $168,082 | $5,495 | $1,168,263 |
| 2023 | $10,490 | $0 | $975,317 | $166,582 | $5,446 | $1,157,835 |
| 2024 | $10,397 | $0 | $966,611 | $165,095 | $5,398 | $1,147,501 |
| 2025 | $10,304 | $0 | $957,984 | $163,622 | $5,350 | $1,137,260 |
| 2026 | $10,212 | $0 | $949,433 | $162,162 | $5,302 | $1,127,109 |
| 2027 | $13,734 | $0 | $1,085,046 | $222,346 | $7,194 | $1,328,320 |
| 2028 | $10,031 | $0 | $932,654 | $159,295 | $5,208 | $1,107,188 |
| 2029 | $13,491 | $0 | $1,065,855 | $218,408 | $7,066 | $1,304,820 |
| 2030 | $16,249 | $0 | $1,171,108 | $265,546 | $8,548 | $1,461,451 |
| 2031 | $13,886 | $0 | $1,072,269 | $225,349 | $7,281 | $1,318,785 |
| 2032 | $13,134 | $0 | $1,037,702 | $212,631 | $6,879 | $1,270,346 |
| 2033 | $13,017 | $0 | $1,028,484 | $210,740 | $6,818 | $1,259,059 |
| 2034 | $9,508 | $0 | $884,077 | $150,993 | $4,937 | $1,049,515 |
| 2035 | $9,424 | $0 | $876,230 | $149,652 | $4,893 | $1,040,199 |
| 2036 | $12,673 | $0 | $1,001,320 | $205,166 | $6,638 | $1,225,797 |
| 2037 | $15,263 | $0 | $1,100,162 | $249,434 | $8,029 | $1,372,888 |
| 2038 | $9,770 | $0 | $876,834 | $155,851 | $5,083 | $1,047,538 |
| 2039 | $12,338 | $0 | $974,872 | $199,740 | $6,463 | $1,193,413 |
| 2040 | $14,859 | $0 | $1,071,089 | $242,832 | $7,817 | $1,336,597 |
| 2041 | $14,726 | $0 | $1,061,569 | $240,670 | $7,747 | $1,324,712 |
| 2042 | $13,160 | $0 | $994,907 | $214,044 | $6,908 | $1,229,019 |



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| Table 2-12: State and Local Estimated Tax Impacts of Operations, 2020–2059 (2018 $) | | | | | | |
|---|---|---|---|---|---|---|
| Year | Employee compensation | Proprietor Income | Tax on Production and Imports | Households | Corporations | Total Revenue |
| 2043 | $14,625 | $0 | $1,052,267 | $239,060 | $7,739 | $1,313,691 |
| 2044 | $14,336 | $0 | $1,033,516 | $234,300 | $7,542 | $1,289,694 |
| 2045 | $14,209 | $0 | $1,024,331 | $232,215 | $7,475 | $1,278,230 |
| 2046 | $14,082 | $0 | $1,015,227 | $230,148 | $7,409 | $1,266,866 |
| 2047 | $13,957 | $0 | $1,006,205 | $228,099 | $7,343 | $1,255,604 |
| 2048 | $13,675 | $0 | $953,602 | $223,716 | $6,833 | $1,197,826 |
| 2049 | $11,552 | $0 | $902,408 | $187,267 | $6,055 | $1,107,282 |
| 2050 | $8,243 | $0 | $766,557 | $130,910 | $4,281 | $909,991 |
| 2051 | $8,170 | $0 | $759,754 | $129,747 | $4,243 | $901,914 |
| 2052 | $8,097 | $0 | $753,012 | $128,595 | $4,205 | $893,909 |
| 2053 | $8,025 | $0 | $746,329 | $127,453 | $4,168 | $885,975 |
| 2054 | $7,954 | $0 | $739,706 | $126,321 | $4,131 | $878,112 |
| 2055 | $7,883 | $0 | $733,141 | $125,200 | $4,094 | $870,318 |
| 2056 | $7,813 | $0 | $726,635 | $124,088 | $4,058 | $862,594 |
| 2057 | $7,744 | $0 | $720,186 | $122,986 | $4,022 | $854,938 |
| 2058 | $7,675 | $0 | $713,795 | $121,894 | $3,986 | $847,350 |
| 2059 | $7,607 | $0 | $707,460 | $120,811 | $3,951 | $839,829 |
| **TOTAL** | **$454,354** | **$0** | **$37,416,628** | **$7,321,769** | **$237,175** | **$45,429,926** |

Source: MIG, Inc. IMPLAN model — Andrews County, Texas. CMEC utilizing inputs from ISP.

From the federal perspective, employee compensation taxes would generate $36,365,778 and proprietor income would generate $1,250,411 (**Table 2-13**). Taxes on production and imports would be $3,311,519. Households would generate approximately $25,826,615, while corporations would pay approximately $6,126,830. Overall, these revenues would generate a substantial benefit to the governments receiving the tax payments, as a result of the CISF's operations.

| Table 2-13: Federal Estimated Tax Impacts of Operations, 2020–2059 (2018 $) | | | | | | |
|---|---|---|---|---|---|---|
| Year | Employee compensation | Proprietor Income | Tax on Production and Imports | Households | Corporations | Total Revenue |
| 2020 | $862,492 | $25,233 | $88,673 | $603,614 | $144,532 | $1,724,544 |
| 2021 | $854,798 | $25,007 | $87,881 | $598,227 | $143,242 | $1,709,155 |
| 2022 | $847,174 | $24,783 | $87,097 | $592,888 | $141,963 | $1,693,905 |
| 2023 | $839,617 | $24,560 | $86,319 | $587,597 | $140,695 | $1,678,788 |
| 2024 | $832,128 | $24,340 | $85,549 | $582,353 | $139,439 | $1,663,809 |
| 2025 | $824,706 | $24,122 | $84,785 | $577,157 | $138,194 | $1,648,964 |
| 2026 | $817,350 | $23,905 | $84,029 | $572,006 | $136,961 | $1,634,251 |
| 2027 | $1,099,282 | $39,582 | $96,031 | $784,297 | $185,830 | $2,205,022 |
| 2028 | $802,889 | $23,485 | $82,544 | $561,891 | $134,540 | $1,605,349 |
| 2029 | $1,079,807 | $38,883 | $94,332 | $770,407 | $182,540 | $2,165,969 |



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| Year | Employee compensation | Proprietor Income | Tax on Production and Imports | Households | Corporations | Total Revenue |
|---|---|---|---|---|---|---|
| 2030 | $1,300,529 | $51,192 | $103,648 | $936,680 | $220,807 | $2,612,856 |
| 2031 | $1,111,404 | $40,983 | $94,900 | $794,891 | $188,094 | $2,230,272 |
| 2032 | $1,051,239 | $37,857 | $91,841 | $750,030 | $177,715 | $2,108,682 |
| 2033 | $1,041,885 | $37,521 | $91,025 | $743,359 | $176,135 | $2,089,925 |
| 2034 | $761,024 | $22,268 | $78,244 | $532,607 | $127,533 | $1,521,676 |
| 2035 | $754,262 | $22,071 | $77,550 | $527,877 | $126,401 | $1,508,161 |
| 2036 | $1,014,321 | $36,532 | $88,621 | $723,698 | $171,479 | $2,034,651 |
| 2037 | $1,221,604 | $48,091 | $97,369 | $879,848 | $207,416 | $2,454,328 |
| 2038 | $781,974 | $24,109 | $77,603 | $549,746 | $131,316 | $1,564,748 |
| 2039 | $987,486 | $35,568 | $86,280 | $704,557 | $166,946 | $1,980,837 |
| 2040 | $1,189,263 | $46,820 | $94,796 | $856,559 | $201,928 | $2,389,366 |
| 2041 | $1,178,675 | $46,404 | $93,953 | $848,934 | $200,132 | $2,368,098 |
| 2042 | $1,053,281 | $39,680 | $88,053 | $755,014 | $178,452 | $2,114,480 |
| 2043 | $1,170,543 | $46,172 | $93,130 | $843,255 | $199,909 | $2,353,009 |
| 2044 | $1,147,471 | $45,178 | $91,470 | $826,465 | $194,837 | $2,305,421 |
| 2045 | $1,137,254 | $44,777 | $90,657 | $819,108 | $193,103 | $2,284,899 |
| 2046 | $1,127,128 | $44,379 | $89,852 | $811,816 | $191,385 | $2,264,560 |
| 2047 | $1,117,093 | $43,985 | $89,053 | $804,590 | $189,682 | $2,244,403 |
| 2048 | $1,094,539 | $43,486 | $84,397 | $789,130 | $176,522 | $2,188,074 |
| 2049 | $924,641 | $33,721 | $79,867 | $660,560 | $156,422 | $1,855,211 |
| 2050 | $659,754 | $19,322 | $67,843 | $461,768 | $110,581 | $1,319,268 |
| 2051 | $653,893 | $19,151 | $67,241 | $457,667 | $109,600 | $1,307,552 |
| 2052 | $648,083 | $18,982 | $66,644 | $453,603 | $108,627 | $1,295,939 |
| 2053 | $642,325 | $18,814 | $66,053 | $449,575 | $107,663 | $1,284,430 |
| 2054 | $636,618 | $18,648 | $65,467 | $445,582 | $106,708 | $1,273,023 |
| 2055 | $630,962 | $18,484 | $64,886 | $441,626 | $105,761 | $1,261,719 |
| 2056 | $625,356 | $18,320 | $64,310 | $437,704 | $104,822 | $1,250,512 |
| 2057 | $619,800 | $18,159 | $63,739 | $433,817 | $103,892 | $1,239,407 |
| 2058 | $614,293 | $17,998 | $63,174 | $429,965 | $102,970 | $1,228,400 |
| 2059 | $608,835 | $17,839 | $62,613 | $426,147 | $102,056 | $1,217,490 |
| **TOTAL** | **$36,365,778** | **$1,250,411** | **$3,311,519** | **$25,826,615** | **$6,126,830** | **$72,881,153** |

Table 2-13: Federal Estimated Tax Impacts of Operations, 2020–2059 (2018 $)

Source: MIG, Inc. IMPLAN model — Andrews County, Texas. CMEC utilizing inputs from ISP.

The URENCO criteria cannot be precisely applied because the modeled data does not directly relate to the county level revenue data, especially given the varying components that go into that data depending on the county. Generally speaking however, it appears that anticipated state and local tax revenues that would result from the WCS CISF facility would have a positive impact on the overall county tax revenues, based on recent data.



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## 2.6 OTHER IMPACTS

### 2.6.1 Environmental Justice Impacts

As discussed in Section 1.1.10, based on Appendix C ("Environmental Justice Procedures") to NUREC-1748, the data on minority and low-income populations in the four-mile radius study area does not indicate the presence of an environmental justice community of concern.

No relocations or displacements would be required for the proposed CISF activities. Any noise or air quality considerations would be primarily limited to temporary impacts during the construction phase. Deliveries of storage casks would happen only a few times a week and transportation would be on rail cars, resulting in limited noise or air quality impacts. Economic impacts from construction and operations would result in small positive effects on the local and regional economy.

To achieve meaningful public involvement consistent with E.O. 12898 on Environmental Justice and E.O. 13166 on Limited English Proficiency, future public involvement activities would include populations within the ROI so that questions and concerns from those living within the larger ROI can be incorporated into the environmental process.

### 2.6.2 Historic Resources Impacts

As discussed in Section 1.4.1, coordination with the THC has been completed and no further work is required regarding historic resources. Coordination with NMSHPO is underway.

### 2.6.3 Archeological Resources Impacts

As discussed in Section 1.4.2, no impacts to archeological sites would occur as a result of the proposed project within the boundaries of the 2015 survey area. The archeological survey report is under review at THC. Coordination with NMSHPO is underway.

### 2.6.4 Scenic Resources Impacts

As discussed in Section 1.4.3, scenic resources in the project area are not considered to be dramatic, unique, or rare. The proposed facility would add to other existing industrial facilities in the area but would not have a substantial adverse effect on the current landscape for area viewers.

### 2.6.5 Agricultural Impacts

As discussed in Section 1.4.4, agriculture has been in decline as documented by the census of agriculture over the period from 2007 to 2012. Between 2007 and 2012, the acreage of land in farms and average farm size declined in Andrews County and Lea County, and the market value of agricultural production declined over that time period as well. Although these data are county-wide, it is assumed that these general trends toward land use development may continue. Though the proposed CISF project would not take land out of agricultural production, some areas surrounding the WCS facility may convert to developed uses over time as CISF activities are mobilized and with continued development of operations at the URENCO nuclear generation facility in New Mexico.

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# Appendix A

# WCS Photographs of Proposed Spent Fuel Consolidated Interim Storage Facility Site

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Project Location

Photo Location

0 2,500 Feet

0 600 Meters

**Figure A-1**

**WCS Photos of Proposed ISFS Site**

**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 2,500 feet |
| | Scale: 1:30,000 |
| Prepared by: SL | Date: 4/4/2016 |

Source: CMEC (2015)
Aerial Source: TNRIS (2015)

G:\Projects\WCS\Scenic_Figure A-1_Photos of ISFS Site_20160404.mxd

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At P1, facing southwest from proposed site to redbed stockpile on existing WCS site.

At P2, new site facing north.



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At P2, from south of new site facing southwest to redbed stockpile.

At P3, WCS railroad spur facing west towards New Mexico, south boundary of proposed site.



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At P5, project area vegetation.

At P6, view from top of redbed stockpile towards New Mexico and Urenco facility.



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At P7, view northeast from stockpile towards project site at northeast quadrant of intersection.



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# Appendix B

# Andrews County Resolution

IN THE COMMISSIONERS COURT
OF
ANDREWS COUNTY, TEXAS

*A resolution in support of establishing a site in Andrews County for consolidated interim storage of spent nuclear fuel and high-level radioactive waste.*

**WHEREAS,** Andrews County, Texas, as host to two low-level radioactive waste disposal facilities operated by Waste Control Specialists LLC ("WCS"), greatly benefits directly and indirectly from the economic activity associated with disposal of radioactive materials; and

**WHEREAS,** Andrews County recognizes the importance of a diversified economy to the livelihood of the citizens of Andrews County; and

**WHEREAS,** Andrews County is home to a specialized workforce with expertise concerning radioactive materials, and WCS currently employs more than 170 full-time employees with an annual payroll of more than $13 million in Andrews County; and

**WHEREAS,** Andrews County has invested in the success of the low-level radioactive waste disposal facilities operated by WCS by issuing $75 million in bonds and using that revenue to purchase property leased by WCS as part of the operation of the disposal facilities; and

**WHEREAS,** Andrews County receives five percent of the gross receipts from waste disposed of at the two low-level radioactive waste disposal facilities, which receipts to date have totaled over $5 million directly paid to Andrews County and are expected to total more than $3 million per year in the future; and

**WHEREAS,** WCS has consistently shown its commitment to the environment and the citizens of Andrews County by, among other things, designing and operating safe, state-of-the-art radioactive materials facilities, working to ensure that Andrews County shares in economic benefits because of WCS operations, and working to ensure that local stakeholders are kept informed and made an integral part of the decision-making process concerning WCS operations; and

**WHEREAS,** there are substantial quantities of Spent Nuclear Fuel ("SNF") and High-Level Radioactive Waste ("HLW") currently stored at sites throughout Texas and the United States; and

**WHEREAS,** much of the SNF and HLW is currently stored at sites that are vulnerable to natural disasters and located near large metropolitan centers; and

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**WHEREAS,** the United States Department of Energy (the "DOE") concluded in 2013 that a geologic repository for the permanent disposal of SNF and HLW will not be available until 2048, at the earliest; and

**WHEREAS,** the federal Blue Ribbon Commission on America's Nuclear Future in 2012 recommended "prompt" efforts to develop one or more consolidated SNF and HLW interim storage facilities while further efforts are made to develop a permanent disposal site; and

**WHEREAS,** the Texas Commission on Environmental Quality ("TCEQ") analyzed the challenges associated with creating a consolidated SNF and HLW interim storage solution in Texas in its March 2014 *Assessment of Texas's High Level Radioactive Waste Storage Options* report (the "Report"); and

**WHEREAS,** the TCEQ, in the Report, noted that consolidated SNF and HLW interim storage in Texas would offer electricity consumers significant savings compared to storage at each nuclear power plant and that the siting and construction of a consolidated SNF and HLW interim storage facility is "not only feasible but could be highly successful" so long as the approach "minimizes local and state opposition through stakeholder meetings, finding volunteer communities, financial incentives, and a process that is considered fair and technically rigorous;" and

**WHEREAS,** the Texas Radiation Advisory Board issued an official statement of its position "that it is in the state's best interest to request that Texas be considered by the Federal Government as a consolidated SNF storage site;" and

**WHEREAS,** the Governor of Texas noted that Texas should "begin looking for a safe and secure solution for HLW in Texas;" and

**WHEREAS,** the workforce, the geography, and the geology of Andrews County make it an ideal location for safe storage of radioactive materials, and Andrews County is a volunteer community that wishes to offer its unique resources to help solve the state's and country's SNF and HLW storage problems.

**NOW, THEREFORE, BE IT RESOLVED AND ORDERED** that the Commissioners Court of Andrews County, Texas, meeting in open session, believes that the construction and operation of a consolidated SNF and HLW interim storage facility in Andrews County (the "Facility"), licensed by the Nuclear Regulatory Commission and developed by WCS, will enhance the health, safety, and welfare of the citizens of Andrews County; and

**BE IT FURTHER RESOLVED AND ORDERED** that the Commissioners Court of Andrews County does hereby declare and express the commitment of Andrews County

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to explore the development of the Facility, and in support thereof does hereby call upon and ask:

the State of Texas, all its agencies, officials and political subdivisions, and all members of the Texas congressional delegation to work cooperatively with all relevant entities towards the creation of the Facility, including taking actions to evidence approval of the development of the Facility, such as executing and delivering letters of support, cooperative agreements, or other documents needed in connection with the site selection, siting and licensing of the Facility; and

the State of Texas, all its agencies and officials, and all members of the Texas congressional delegation to assist Andrews County in securing all federal incentives that may be available, as a result of siting the Facility, from the DOE or another appropriate federal entity; and

**BE IT FURTHER RESOLVED AND ORDERED** that the Andrews County Judge is hereby authorized to negotiate terms of any interlocal agreements and other contracts and agreements related to financial incentives that may be available to Andrews County as a result of siting the Facility, which terms and agreements or contracts will be subject to approval by this Commissioners Court; and

**BE IT FURTHER RESOLVED AND ORDERED** that Andrews County is committed to exercising its regulatory and service-providing powers, including such powers as those related to transportation planning, infrastructure development, and police and fire protection, in a manner that protects the health, safety, and welfare of the citizens of Andrews County by facilitating the development of the Facility; and

**BE IT FURTHER RESOLVED AND ORDERED** that a copy of this resolution be sent to the Texas Governor, the Texas Lieutenant Governor, the Speaker of the Texas House, the State Representative for Texas House District 81, the State Senator for State Senate District 31, the United States Representative for Congressional District 11, the United States Senators for the State of Texas, the Commissioners of the United States Nuclear Regulatory Commission, and the United States Secretary of Energy.

Appendix A has been revised in response to RAI SOC-1

Passed and Approved this 20th day of January, 2015.

County Judge Richard H Dolgener

Commissioner, Pct 3

Jeneanne Anderegg

Commissioner, Pct 1 Barney Fowler

Commissioner,Pct. 4 Jim Waldrop

ATTEST:

Dick Scott, Deputy

Commissioner, Pct 2 Brad Young

County Clerk

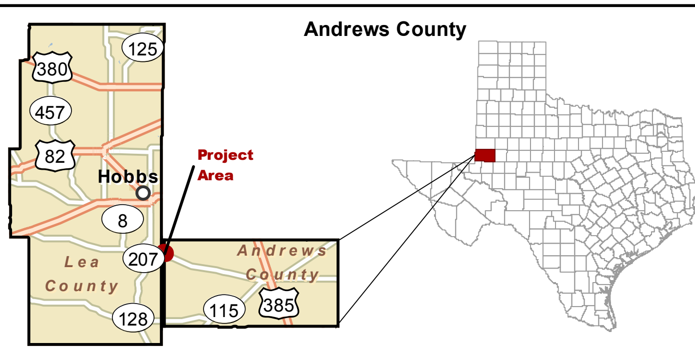
Appendix A has been revised in response to RAI SOC-1

# Appendix C

# WCS Scenic Resources Photo Inventory – 2015

Appendix A has been revised in response to RAI SOC-1


Project Location




0 3,000 Feet
0 800 Meters

**Figure C-1**

**Project Location**

**Proposed Consolidated Interim Spent Fuel Storage Facility**

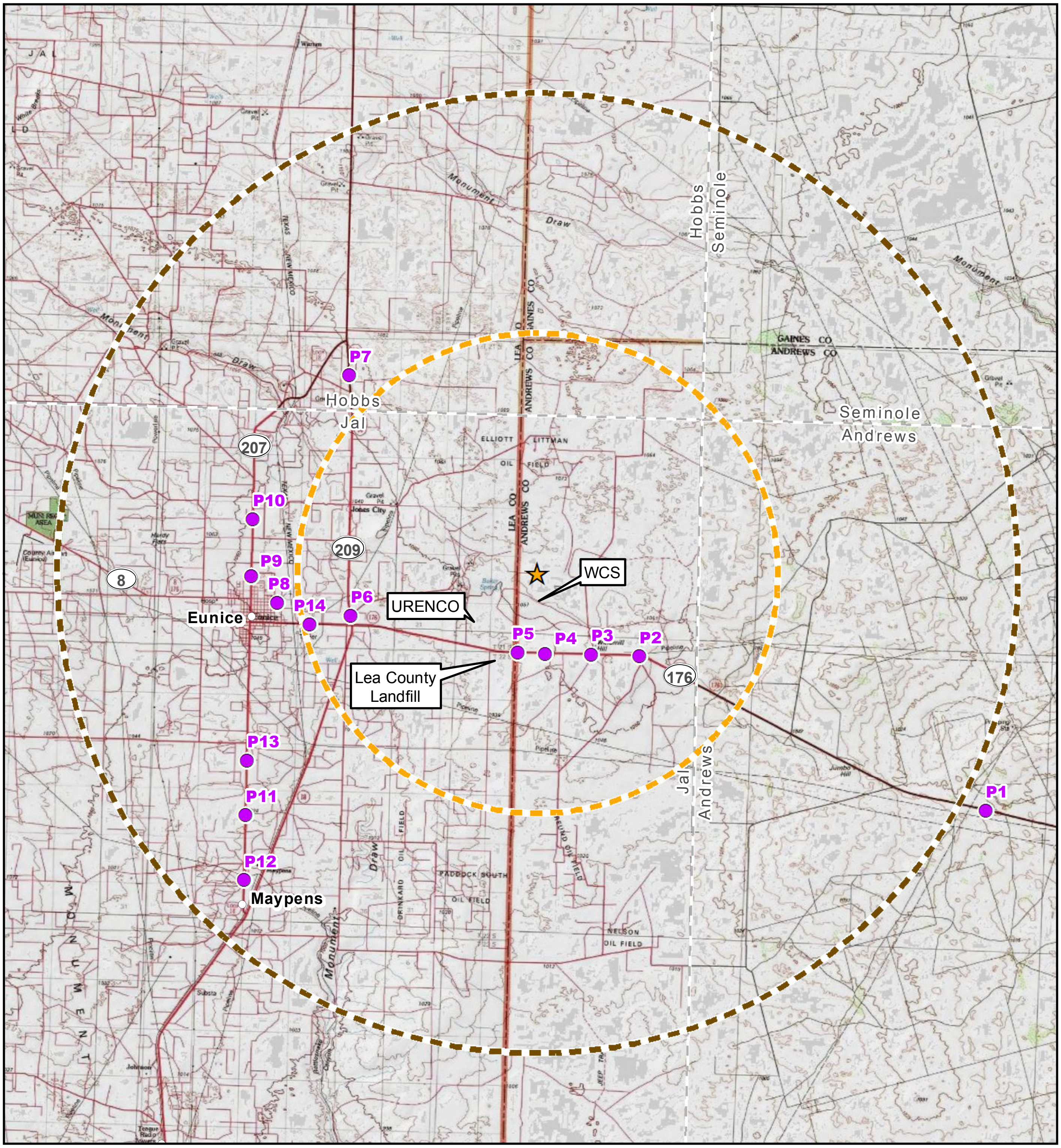
COX | McLAIN Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 3,000 feet |
| | Scale: 1:36,000 |
| Prepared by: SL | Date: 4/4/2016 |

Aerial Source: TNRIS (2015)

G:\Projects\WCS\Scenic_Figure C-1_Project Location_20160404.mxd

Appendix A has been revised in response to RAI SOC-1




★ Proposed Facility

● Photo Location

Proposed Facility 5-mile Radius

Proposed Facility 10-mile Radius

USGS 30' x 60' Quadrangle Boundary

0 3 Miles
0 4 Kilometers

**Figure C-2**

**Scenic Resources in the Visual Resources Study Area**

**Proposed Consolidated Interim Spent Fuel Storage Facility**

COX | McLAIN Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 3 miles |
| | Scale: 1:190,080 |
| Prepared by: SL | Date: 5/8/2015 |

Source: CMEC (2015)
Basemap Sources: USGS Jal, New Mexico 30' x 60' Quadrangle (1978), USGS Andrews, Texas 30' x 60' Quadrangle (1991), USGS Seminole, Texas 30' x 60' Quadrangle (1992), USGS Hobbs, New Mexico 30' x 60' Quadrangle (1975)

G:\Projects\WCS\Scenic_Figure C-2_Scenic Resources_20150508.mxd

Appendix A has been revised in response to RAI SOC-1

Photo 1, facing slightly northwest from Highway 176 – background range (approximately 10.6 miles from center point of proposed CISF facility).

Photo 2, facing northwest from Highway 176 – foreground/mid-ground range (approximately 2.7 miles from centerpoint of proposed CISF facility).



Appendix A has been revised in response to RAI SOC-1


Photo 3, facing northwest from Highway 176 – facility redbed piles in distance –- foreground/ mid-ground range (approximately 2.0 miles from centerpoint of proposed CISF facility).

Photo 4, facing northwest from Highway 176 east of facility entrance; redbed piles and WCS buildings visible – foreground range (approximately 1.7 miles from centerpoint of proposed CISF facility).



Appendix A has been revised in response to RAI SOC-1

Photo 5, facing west from Highway 176 at WCS entrance – foreground range
(approximately 1.7 miles south of centerpoint of proposed CISF facility).

Photo 5b, facing southwest from WCS entrance – foreground range
(existing Lea County, New Mexico, landfill).


Appendix A has been revised in response to RAI SOC-1

Photo 5c, facing north from Highway 176 at Urenco Uranium Enrichment Facility – foreground range (photo taken from just west of photo point 5).


Photo 6, facing east from NM 18 toward facility – Urenco visible as white structure at horizon – foreground/mid-ground range (approximately 4.0 miles from centerpoint of proposed CISF facility).

Photo 7, facing southeast from NM 18 toward facility – just beyond mid-ground range (approximately 5.6 miles from centerpoint of proposed CISF facility).

Photo 8, facing east from Eunice neighborhood toward facility – just beyond mid-ground range; Urenco facility visible as white structure on horizon (approximately 5.5 miles from centerpoint of proposed CISF facility).



Appendix A has been revised in response to RAI SOC-1

Photo 9, facing east from NM 207 – just beyond mid-ground range; Urenco facility visible as white structure on horizon (approximately 5.9 miles from the centerpoint of proposed CISF facility).

Photo 10a, facing southeast from NM 207 toward facility, just beyond mid-ground range (approximately 6.0 miles from centerpoint of proposed CISF facility).



Appendix A has been revised in response to RAI SOC-1

Photo 10a, facing south along NM 207 toward Eunice, just beyond mid-ground range (approximately 6.0 miles from centerpoint of proposed CISF facility).

Photo 11, facing northeast from NM 207 south of Eunice – background range (approximately 7.9 miles from centerpoint of proposed CISF facility).



Appendix A has been revised in response to RAI SOC-1

Photo 12, facing northeast from NM 207 south of Eunice – seldom seen range (approximately 8.8 miles from centerpoint of proposed CISF facility).

Photo 13, facing northeast towards facility from NM 207 south of Eunice – background range (approximately 7.2 miles from centerpoint of proposed CISF facility).



Appendix A has been revised in response to RAI SOC-1

Photo 14, facing east toward facility from east of Eunice on Highway 176; redbed piles and Urenco facility visible on the horizon – midground range (approximately 4.0 miles from centerpoint of proposed CISF facility).



Appendix A has been revised in response to RAI SOC-1

# Appendix D

# Texas Historical Commission Letters and Archeological Survey Permit; New Mexico State Historic Preservation Office Coordination

COX | McLAIN
Environmental Consulting

May 5, 2015

Sarah Birtchet
Texas Historical Commission
History Division
P.O. Box 12276
Austin, TX 78711

**Re: Project Review under Section 106 for a Proposed Consolidated Interim Spent Fuel Storage Facility in Andrews County, Texas**

Dear Ms. Birtchet:

Waste Control Specialists LLC (WCS) intends to file an application for a license for the independent storage of spent nuclear fuel and reactor-related, greater-than-Class C wastes at a site in western Andrews County, Texas (see **Figure 1**, attached). These activities are regulated by the U.S. Nuclear Regulatory Commission (NRC); the project is therefore subject to Section 106 of the National Historic Preservation Act. This letter addresses historic resources; archeological resources are being coordinated under separate cover. The site is in the northwestern-most corner of Andrews County and is immediately adjacent to the Texas/New Mexico state line; this project is also being shared with the New Mexico State Historic Preservation Office (SHPO).

A previous license for disposal of low-level radioactive waste on the WCS complex was coordinated with the Texas Historical Commission (THC) and the New Mexico SHPO in 2006. The THC and New Mexico SHPO concurred that there would be no historic properties affected on July 20, 2006, and July 21, 2006 respectively.

**Project Description**
WCS is requesting authorization from the NRC to construct and operate a Consolidated Interim Spent Fuel (CISF) storage facility for spent nuclear fuel on approximately 100 acres of land within the approximately 14,000-acre complex owned by WCS (see **Figure 2**). The project is located in a remote area approximately five miles east of Eunice, New Mexico and north of Highway 176 (also named Highway 87). The area is surrounded by a high density of oil wells to the west and some oil wells to the north; there is little development to the south and east, excluding portions of the existing WCS facility. Operations at the WCS facility began in 1994; none of the development is historic-age.

The proposed facility would house a dry cask storage system. WCS is exploring several different options for the system. One option would be an above-ground system utilizing several low-rise buildings (see **Figure 3**), while another option would store the casks underground. Both the above-ground and below-ground design options are assumed to require the presence of a crane approximately 60 feet in height during the operating license timeframe.

**Historic Resources Area of Potential Effect**
The Area of Potential Effect (APE) for direct impacts is proposed as the project footprint (see **Figure 4**). Taking into consideration the height of the crane that would be required, the height of the potential above-ground facility, and the relatively flat surrounding terrain, the APE for indirect/visual impacts is

proposed as a one-mile radius from the proposed project footprint (see **Figure 4**). WCS anticipates that the NRC will issue a Final Environmental Impact Statement and License by April 1, 2019. Therefore, a historic-age date of 1974 (45 years prior to 2019) is proposed.

According to a search of the digital Sites Atlas maintained by the THC, no known historic cemeteries, Official State Historical Markers (OSHM), State Antiquities Landmarks (SALs), or properties or districts listed on the National Register of Historic Places (NRHP) are located within the APE for direct or indirect impacts. The nearest previously identified resource is the OSHM for Andrews County, located approximately 17 miles southeast of the project area.

Adjacent to the WCS facility to the west is a large uranium enrichment plant called the National Enrichment Facility, operated by Urenco. This facility was developed within the past 15 years. The proposed project area is located in a very remote area of Texas with little development aside from the non-historic age WCS and Urenco facilities. The proposed project would not result in a direct effect to any historic resources. There do not appear to be any historic resources 45 years or older (dating to 1974 or earlier) within the one-mile indirect effects APE.

The nearest developed area is Eunice, New Mexico, which is located approximately five miles west of the proposed site. There are two large visual obstructions between viewers in Eunice and the proposed crane at the site: red soil mounds approximately 100 feet in height on WCS property, and the Urenco facility (see **Figure 5**). Based on information from WCS, the soil mounds will be in place indefinitely or potentially utilized as fill. As illustrated in **Photos 3-5** in the attached photo sheets, the red soil mounds and the Urenco facility are visible from the outskirts of Eunice but tend to dissolve visually into the horizon. Excluding the crane, the CISF storage facility would be approximately 30 feet above the surface and less visible from Eunice than existing features and structures.

**Request for Concurrence**

It is the professional opinion of CMEC cultural resources personnel that further historic resources investigations are not warranted prior to construction. We ask for your concurrence with this finding.

Should you have any questions, please contact me at EmilyR@coxmclain.com or 512-338-2223.

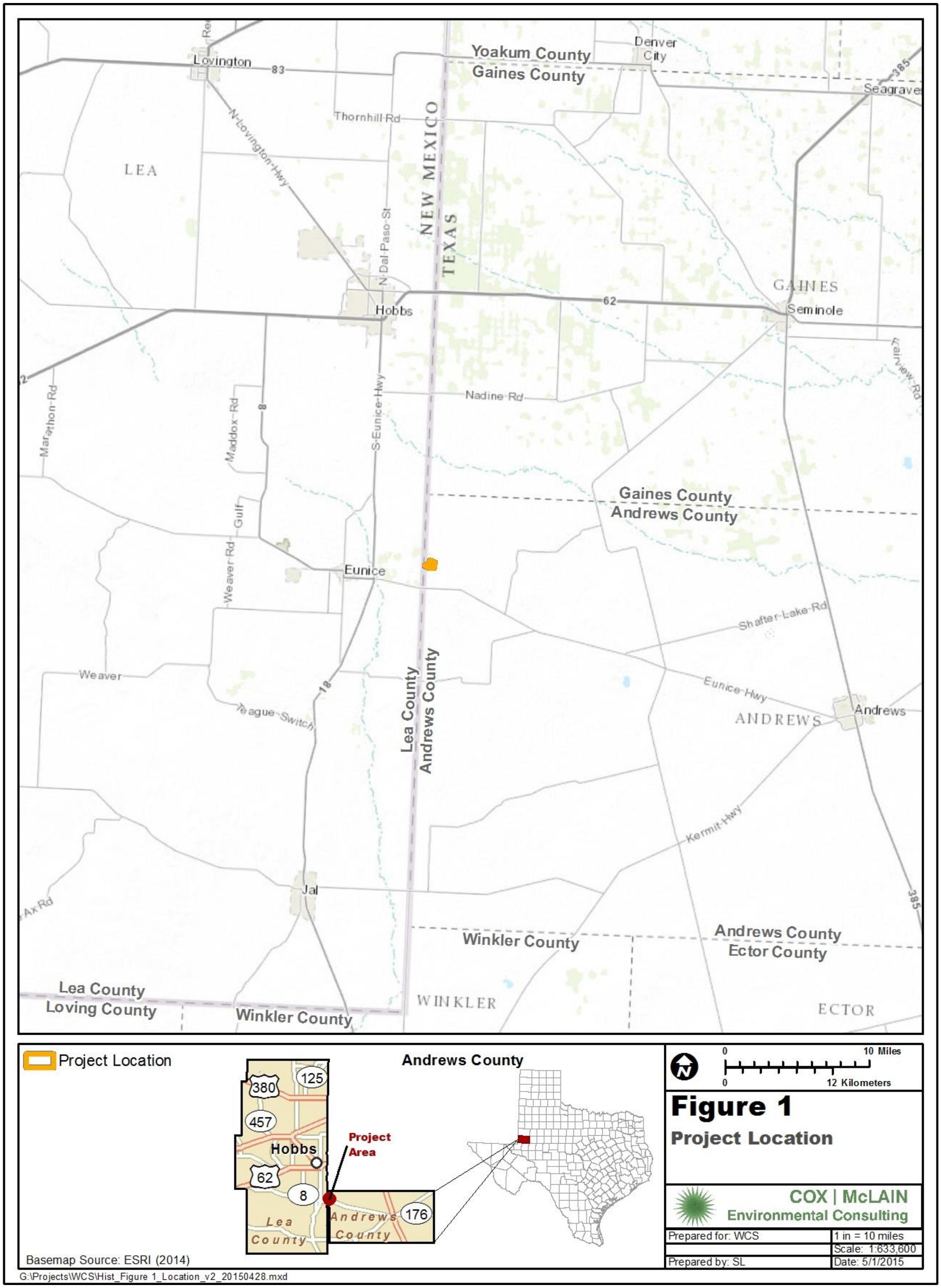
Sincerely,

Emily Reed

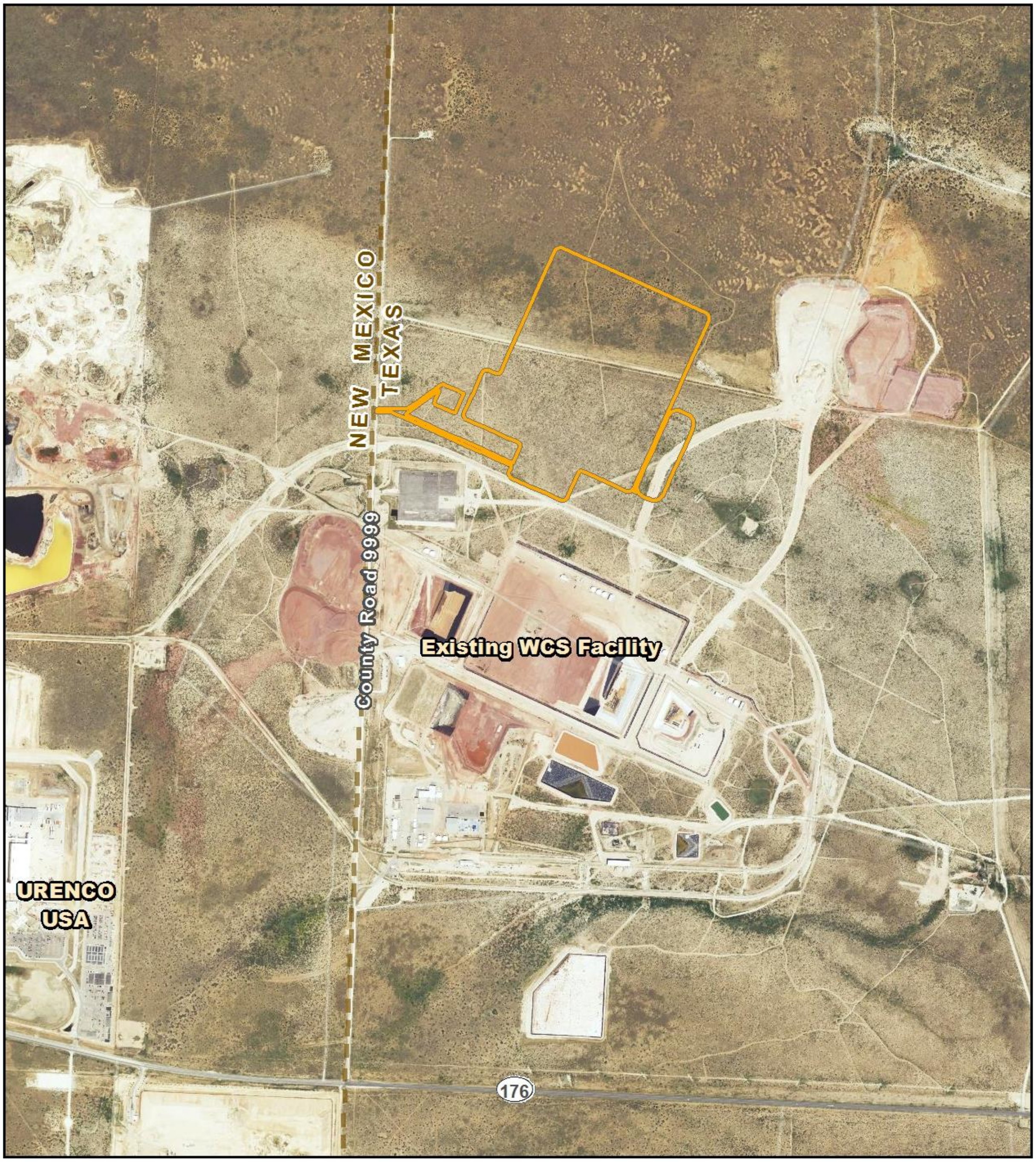
Emily Reed, Architectural Historian
Cox|McLain Environmental Consulting, Inc.

**Attachments**

Figure 1: General Project Location Map
Figure 2: Detail Facility Map
Figure 3: Potential CISF Storage Facility Site Design Renderings
Figure 4: Proposed APE for Historic Resources
Figure 5: Viewshed Analysis
Contextual Photographs




Appendix A has been revised in response to RAI SOC-1




Project Footprint

0 — 2,000 Feet
0 — 600 Meters

**Figure 2**

**Aerial Photograph**

COX | McLAIN
Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 2,000 feet |
| | Scale: 1:24,000 |
| Prepared by: SL | Date: 5/4/2015 |

Aeria Source: NAIP (2014)

G:\Projects\WCS\Hist_Figure 2_Aerial_20150428.mxd

Appendix A has been revised in response to RAI SOC-1

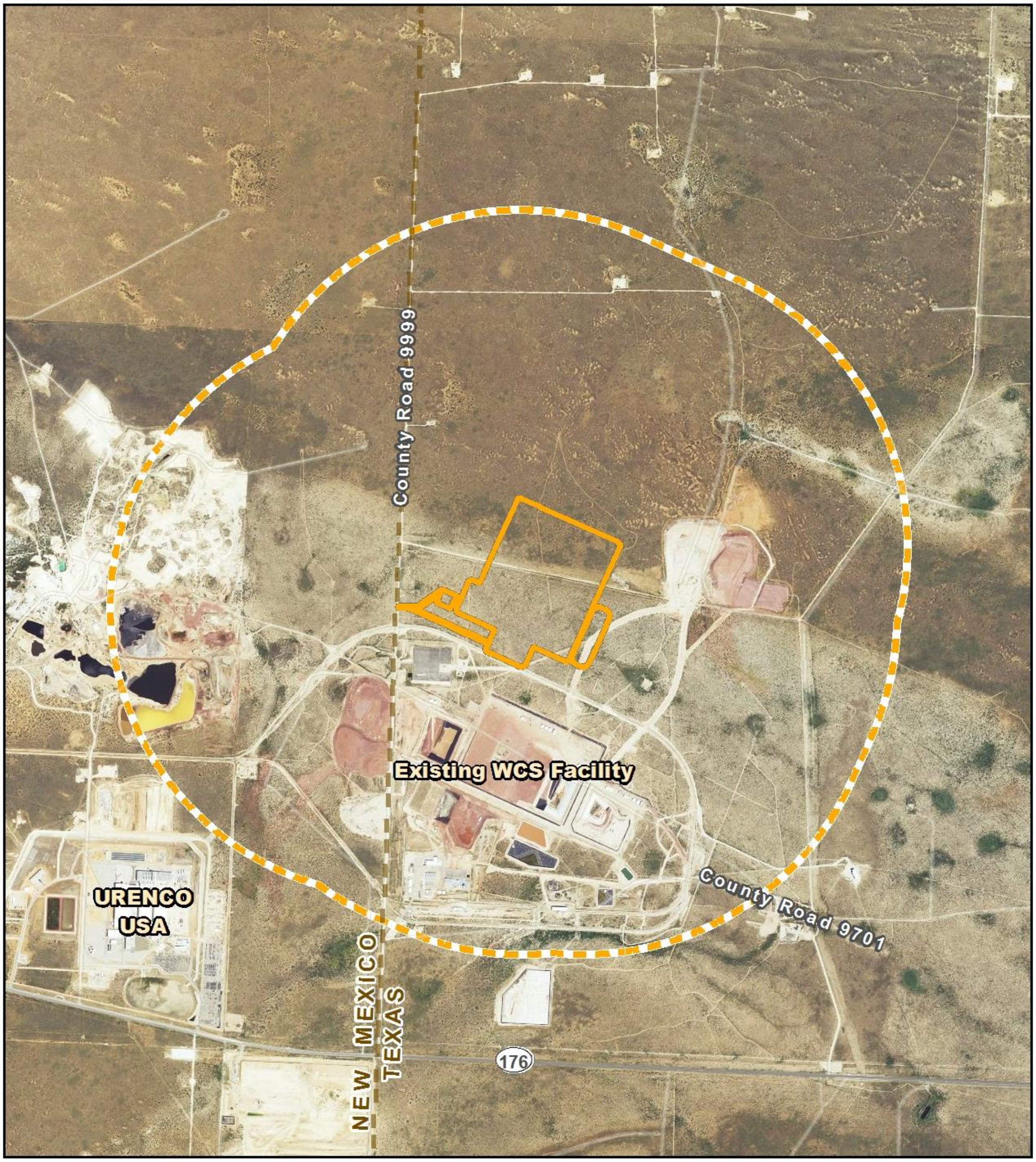
AMERICA'S NUCLEAR SOLUTION

## POTENTUAL ISFSI SITE RENDERINGS

**Figure 3**

**Potential Storage Facility Site Design Renderings**

Appendix A has been revised in response to RAI SOC-1




APE for Direct Impacts (project footprint)
APE for Indirect/Visual Impacts (1-mile radius)

Note: no previously recorded Texas resources mapped within either APE

Sources: THC (2015), TARL (2015)
Aerial Source: NAIP (2014)

0 — 3,000 Feet
0 — 800 Meters

# Figure 4

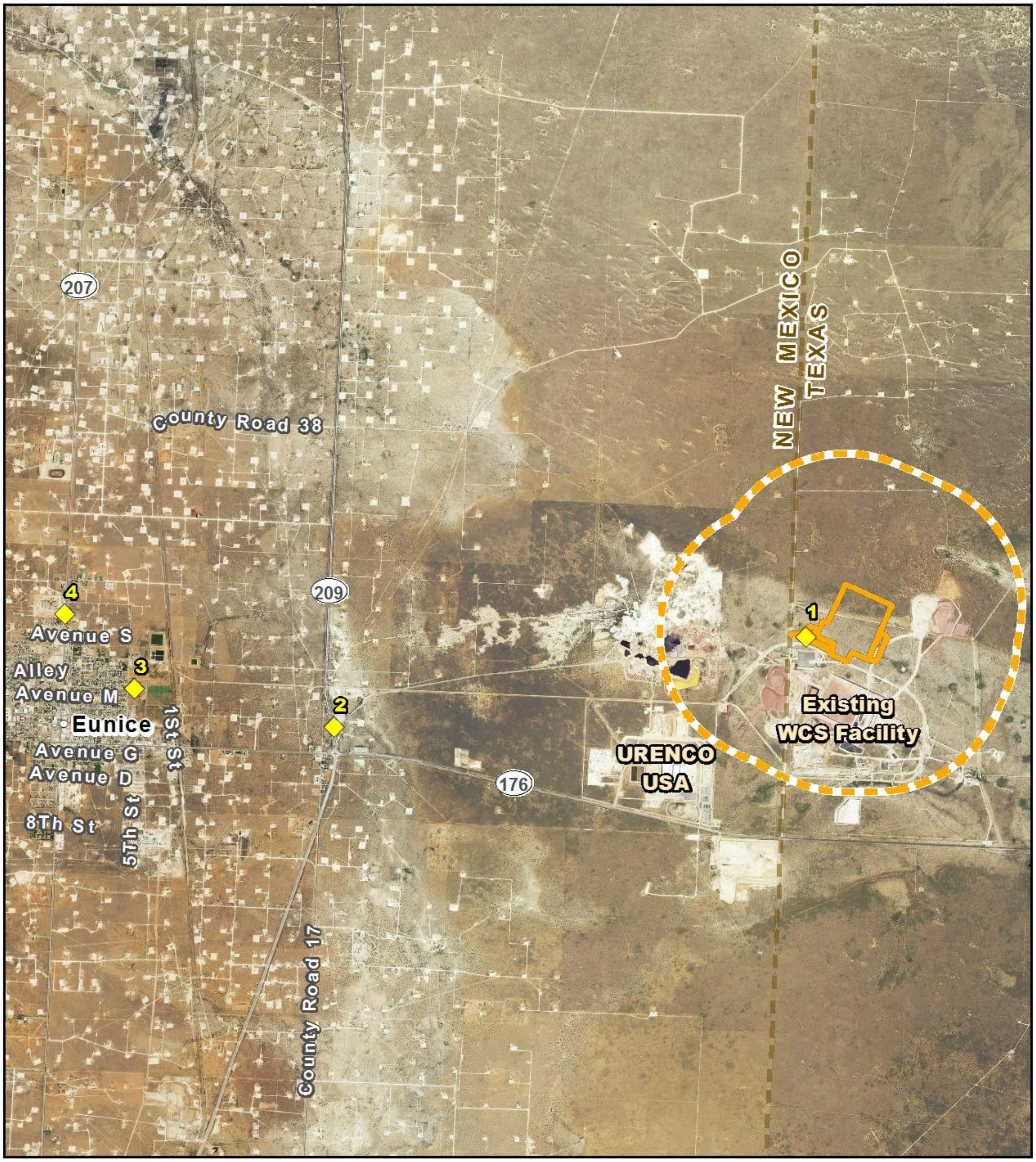
**Location of Historic Area of Potential Effect**

COX | McLAIN
Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 3,000 feet |
| | Scale: 1:36,000 |
| Prepared by: SL | Date: 5/4/2015 |

G:\Projects\WCS\Hist_Figure 4_APE_20150428.mxd

Appendix A has been revised in response to RAI SOC-1




APE for Direct Impacts (project footprint)
APE for Indirect/Visual Impacts (1-mile radius)
Photo Location

0 1.25 Miles
0 1.5 Kilometers

# Figure 5
## Viewshed Analysis

COX | McLAIN Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 1.25 miles |
| | Scale: 1:79,200 |
| Prepared by: SL | Date: 5/1/2015 |

Source: CMEC (2015)
Aerial Source: NAIP (2014)

G:\Projects\WCS\Hist_Figure 5_Viewshed Analysis_20150430.mxd

Appendix A has been revised in response to RAI SOC-1

**Contextual Photographs**

Photo 1. View of proposed site, looking north.

Appendix A has been revised in response to RAI SOC-1

Photo 2. View from proposed site on WCS property looking southwest towards red soil pile (see Photo Point 1 on **Figure 5**).

Photo 3. View looking east towards the proposed site from Photo Point 2 (see **Figure 5**). Note the URENCO facility barely visible on the horizon.

Appendix A has been revised in response to RAI SOC-1

Photo 4. View looking east from Photo Point 3 (see **Figure 5**).

Appendix A has been revised in response to RAI SOC-1

Photo 5. View looking east from Photo Point 4 (see **Figure 5**).

Appendix A has been revised in response to RAI SOC-1

COX | McLAIN
Environmental Consulting

May 5, 2015

FORBES
Sarah ~~Birtchet~~
Texas Historical Commission
History Division
P.O. Box 12276
Austin, TX 78711

NO HISTORIC PROPERTIES AFFECTED
PROJECT MAY PROCEED
by
for Mark Wolfe
State Historic Preservation Officer
Date 6/1/15

MAY 06 2015

**Re: Project Review under Section 106 for a Proposed Consolidated Interim Spent Fuel Storage Facility in Andrews County, Texas**

FORBES
Dear Ms. ~~Birtchet:~~

Waste Control Specialists LLC (WCS) intends to file an application for a license for the independent storage of spent nuclear fuel and reactor-related, greater-than-Class C wastes at a site in western Andrews County, Texas (see **Figure 1**, attached). These activities are regulated by the U.S. Nuclear Regulatory Commission (NRC); the project is therefore subject to Section 106 of the National Historic Preservation Act. This letter addresses historic resources; archeological resources are being coordinated under separate cover. The site is in the northwestern-most corner of Andrews County and is immediately adjacent to the Texas/New Mexico state line; this project is also being shared with the New Mexico State Historic Preservation Office (SHPO).

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**Project Description**

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The proposed facility would house a dry cask storage system. WCS is exploring several different options for the system. One option would be an above-ground system utilizing several low-rise buildings (see **Figure 3**), while another option would store the casks underground. Both the above-ground and below-ground design options are assumed to require the presence of a crane approximately 60 feet in height during the operating license timeframe.

**Historic Resources Area of Potential Effect**

The Area of Potential Effect (APE) for direct impacts is proposed as the project footprint (see **Figure 4**). Taking into consideration the height of the crane that would be required, the height of the potential above-ground facility, and the relatively flat surrounding terrain, the APE for indirect/visual impacts is proposed as a one-mile radius from the proposed project footprint (see **Figure 4**). WCS anticipates that the NRC will issue a Final Environmental Impact Statement and License by April 1, 2019. Therefore, a historic-age date of 1974 (45 years prior to 2019) is proposed.

According to a search of the digital Sites Atlas maintained by the THC, no known historic cemeteries, Official State Historical Markers (OSHM), State Antiquities Landmarks (SALs), or properties or districts listed on the National Register of Historic Places (NRHP) are located within the APE for direct or indirect impacts. The nearest previously identified resource is the OSHM for Andrews County, located approximately 17 miles southeast of the project area.

Adjacent to the WCS facility to the west is a large uranium enrichment plant called the National Enrichment Facility, operated by Urenco. This facility was developed within the past 15 years. The proposed project area is located in a very remote area of Texas with little development aside from the non-historic age WCS and Urenco facilities. The proposed project would not result in a direct effect to any historic resources. There do not appear to be any historic resources 45 years or older (dating to 1974 or earlier) within the one-mile indirect effects APE.

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**Request for Concurrence**

It is the professional opinion of CMEC cultural resources personnel that further historic resources investigations are not warranted prior to construction. We ask for your concurrence with this finding.

Should you have any questions, please contact me at EmilyR@coxmclain.com or 512-338-2223.

Sincerely,

Emily Reed

Emily Reed, Architectural Historian
Cox|McLain Environmental Consulting, Inc.

**Attachments**

Figure 1: General Project Location Map
Figure 2: Detail Facility Map
Figure 3: Potential CISF Storage Facility Site Design Renderings
Figure 4: Proposed APE for Historic Resources
Figure 5: Viewshed Analysis
Contextual Photographs

# ANTIQUITIES PERMIT APPLICATION FORM ARCHEOLOGY

## GENERAL INFORMATION

I. PROPERTY TYPE AND LOCATION

Project Name (and/or Site Trinomial) Waste Control Specialists (WCS) Spent Fuel Storage Facility
County (ies) Andrews
USGS Quadrangle Name and Number Eunice NE (3203-144)
UTM Coordinates (approximate) Zone 13 S E 683128-681989 N 3592495-3592059
Location WCS Storage Facility
Federal Involvement ☒ Yes ☐ No
Name of Federal Agency Nuclear Regulatory Commission (NRC)
Agency Representatives

II. OWNER (OR CONTROLLING AGENCY)

Owner Andrews County
Representative Richard H. Dolgener, County Judge
Address 201 N. Main, Rm 104
City/State/Zip Andrews, TX 79714
Telephone (include area code) 432-524-1401 Email Address rdolgener@co.andrews.tx.us

III. PROJECT SPONSOR (IF DIFFERENT FROM OWNER)

Sponsor
Representative
Address
City/State/Zip
Telephone (include area code) Email Address

## PROJECT INFORMATION

I. PRINCIPAL INVESTIGATOR (ARCHEOLOGIST)

Name Chris Dayton
Affiliation Cox|McLain Environmental Consulting, Inc.
Address 6010 Balcones Dr. Ste. 210
City/State/Zip Austin, TX 78731
Telephone (include area code) 512-338-2223 Email Address chris@coxmclain.com

(OVER)

Appendix A has been revised in response to RAI SOC-1

## ANTIQUITIES PERMIT APPLICATION FORM (CONTINUED)

### II. PROJECT DESCRIPTION

Proposed Starting Date of Fieldwork ___May 18, 2015___
Requested Permit Duration ___3___ Years ______ Months (1 year minimum)
Scope of Work (Provided an Outline of Proposed Work) ___pedestrian survey, judgmental shovel testing___

### III. CURATION & REPORT

Temporary Curatorial or Laboratory Facility ___Cox|McLain Environmental Consulting, Austin, TX___
Permanent Curatorial Facility ___Texas State Center for Archaeological Studies (CAS)___

### IV. OWNER'S CERTIFICATION

I, ___Richard H. Dolgener___, as legal representative of the Owner, ___Andrews County___, do certify that I have reviewed the plans and research design, and that no investigations will be performed prior to the issuance of a permit by the Texas Historical Commission. Furthermore, I understand that the Owner, Sponsor, and Principal Investigator are responsible for completing the terms of the permit.

Signature ___Richard H Dolgener___ Date ___5-7-2015___

### V. SPONSOR'S CERTIFICATION

I, ______, as legal representative of the Sponsor, ______, do certify that I have review the plans and research design, and that no investigations will be performed prior to the issuance of a permit by the Texas Historical Commission. Furthermore, I understand that the Sponsor, Owner, and Principal Investigator are responsible for completing the terms of this permit.

Signature ______ Date ______

### VI. INVESTIGATOR'S CERTIFICATION

I, ___Chris Dayton___, as Principal Investigator employed by ___Cox|McLain Environmental Consulting, Inc.___ (Investigative Firm), do certify that I will execute this project according to the submitted plans and research design, and will not conduct any work prior to the issuance of a permit by the Texas Historical Commission. Furthermore, I understand that the Principal Investigator (and the Investigative Firm), as well as the Owner and Sponsor, are responsible for completing the terms of this permit.

Signature ___[signature]___ Date ___April 29, 2015___

Principal Investigator must attach a research design, a copy of the USGS quadrangle showing project boundaries, and any additional pertinent information. Curriculum vitae must be on file with the Division of Antiquities Protection.

---

**FOR OFFICIAL USE ONLY**

Reviewer ______ Date Permit Issues ______
Permit Number ______ Permit Expiration Date ______
Type of Permit ______ Date Received for Data Entry ______

---

Texas Historical Commission
Archeology Division
P.O. Box 12276, Austin, TX 78711-2276
Phone 512/463-6096
www.thc.state.tx.us

TEXAS HISTORICAL COMMISSION
*The State Agency for Historic Preservation*

Appendix A has been revised in response to RAI SOC-1

## ARCHEOLOGICAL INTENSIVE SURVEY SCOPE

**WCS Spent Fuel Storage Facility**
**Andrews County, Texas**

### Project Description

In collaboration with Andrews County, Waste Control Specialists LLC (WCS), a private company, proposes to develop an away-from-reactor spent nuclear fuel storage facility in the northwest part of the county, immediately north of an existing WCS facility (see **Figures 1** and **2**). The proposed footprint of the planned facility and access roads covers an area of approximately 140 acres (57 hectares). Because the project includes a host agreement with the County, a political subdivision of the State of Texas, the project is considered subject to the Antiquities Code of Texas (9 TNRC 191). The project would also be subject to Section 106 of the National Historic Preservation Act (NHPA), as amended (16 USC 470; 36 CFR 800), due to oversight by the U.S. Nuclear Regulatory Commission (NRC).

### Background Information

The 140-acre (57-hectare) archeological area of potential effects (APE) is located at approximately 3,500 feet above mean sea level near the northwest corner of Andrews County and is immediately adjacent to the Texas/New Mexico state line (see **Figure 1**). The APE is located in a remote area north of Highway 176 (also called Highway 87) approximately 6.5 miles (10.5 kilometers) from Eunice, New Mexico. Existing disturbances in the area include an existing WCS facility just south of the APE, URENCO USA, a nuclear fuel enrichment facility in New Mexico, southwest of the APE, and various oil wells and pipelines (see **Figure 2**).

The APE falls into the stepped region of the Llano Estacado or the Southern High Plains. The nearest water source in the past would have been Baker Springs (no longer active) located approximately 0.4 miles or 0.65 kilometers west-southwest of the APE. The other major water sources in the region are the Pecos and Colorado Rivers, which are over 20 miles to the south and north, respectively. The geology of the APE includes the Pliocene-age Ogallala Formation with occurrences of Pleistocene-age windblown cover sand on the north side (BEG 1976). According to Natural Resources Conservation (NRCS) data, soils in the APE are primarily gently undulating Blakeney and Conger soils with small occurrences of Ratliff, Triomas, Wickett, and undulating Jalmar-Penwell soils (NRCS 2015). Most of the soils mapped within the APE have a low probability of buried materials; Blakeney and Conger soils are shallow, and Ratliff, Triomas, and Wickett soils are technically deep but their profiles include Pleistocene-age Blackwater Draw Formation parent material. The exception is Jalmar-Penwell soils, which tend to form on Holocene-age eolian deposits (NRCS 2015). Jalmar-Penwell soils are expected to be present only in the northeast corner of the APE.

A search of the *Texas Archeological Sites Atlas* (Atlas) maintained by the Texas Historical Commission (THC) and the Texas Archeological Research Laboratory (TARL) was conducted in order to identify archeological sites, historical markers (Recorded Texas Historic Landmarks or RTHLs), properties or districts listed on the National Register of Historic Places (NRHP), State Antiquities Landmarks (SALs), cemeteries, or other cultural resources that may have been previously recorded in or near the APE, as well as previous surveys undertaken in the area.

According to Atlas survey coverage data, the APE has not been subjected to an archeological survey. However, the Atlas does show that a portion of the existing WCS facility was surveyed in 1994 by Galván Eling Associates, Inc. (THC 2015). A review of the 1994 letter report by Galván Eling Associates, Inc. indicates that that project's APE was actually larger than the APE shown on the Atlas, and that the southern half of the current APE may have been included within it (Galván Eling Associates, Inc. 1994). Six pieces of burned caliche were found and no further work was recommended. The THC concurred on August 8, 1994. In 2004, URS Corporation contacted the THC on behalf of WCS regarding development of a portion of the Galván Eling 1994 survey area that had not



Appendix A has been revised in response to RAI SOC-1

been developed between 1994 and 2004. The THC concurred that no further work was required on June 25, 2004. Because of the ambiguity in older survey maps, the lack of full coverage under the previous survey, and the fact that the previous study was over 20 years old, WCS elected to scope a survey of the entire new facility footprint.

According to the Atlas data, there are no other surveys within the study area and the nearest archeological site is over 3.7 miles (6 kilometers) away.

CMEC requested access to the *New Mexico Cultural Resources Information System* (NMCRIS) database administered by the Archeological Records Management Section (ARMS) of the New Mexico Historic Preservation Division (NMHPD) because a one-mile (1.6-kilometer) buffer around the APE extends into New Mexico. Approval by the New Mexico State Historic Preservation Officer (SHPO) is pending; CMEC expects that access will be granted and the results of that background study can be incorporated into the draft and final versions of the report.

**Research Design**

Although a portion of the APE was covered by the Galván Eling Associates, Inc. survey, the previous study was conducted more than 20 years ago. CMEC will conduct an intensive survey of the entire 140-acre (57-hectare) APE per category 6 under 13 TAC 26.15 and using the definitions in 13 TAC 26.3. Field methods and strategies will comply with the requirements of relevant subsections of 13 TAC 26, as elaborated by the THC and the Council of Texas Archeologists (CTA).

Based on the geographic setting, topography, geology, and soils in the APE, pedestrian examination supplemented by the excavation of shovel test units is anticipated. Shovel tests will be placed where ground surface visibility is below 30 percent, soils appear to be of sufficient depth to contain subsurface cultural materials, and/or previous disturbance appears minimal. All shovel tests will be excavated in natural levels to subsoil or 60 cm (24 in), whichever is encountered first. Excavated matrix will be screened through 0.635-cm (0.25-in) hardware cloth as allowed by moisture and clay content, which may require that the removed sediment be crumbled/sorted by hand, trowel, and/or shovel point. Deposits will be described using conventional texture classifications and Munsell color designations. Radial shovel tests will be placed at 5-m (16-ft) intervals around each shovel test positive for cultural material until two negative units have been established in each cardinal direction, as allowed by project limits, observed disturbance, and other constraints. Deviations from THC and CTA standards will be explicitly justified.

The project is located on privately owned land; therefore, diagnostic historic-age and prehistoric-age materials will be described and photographed in the field but not collected. At this time, full right of entry has been granted by WCS. However, if for any reason full access is not available at the time of the survey, a reasonable and good-faith effort will be made to document inaccessible areas from accessible areas for the purposes of the present permit. This permit would then be closed (assuming all work products and submittals meet THC/CTA requirements) and, if necessary, an additional permit application would be submitted at a future date when any remaining land becomes accessible.

Any site recorded during the investigation will be identified by a temporary marker placed on the site. The marker will have an identifying number in the form of the initials of the CMEC employee who recorded the site, followed by a consecutively assigned number that will indicate the order in which the sites were discovered (e.g. HR-01, HR-02, etc). This number is a temporary field number to be superseded by a formal site trinomial obtained following the completion of fieldwork (see below). Site designations will be applied only to features (whether surface or subsurface) that appear to represent occupation or activity areas and/or to clusters of artifacts (whether surface or subsurface), with the minimum threshold of two contiguous positive shovel test units.

CMEC personnel will keep a complete record of field notes supplemented by digital photographs, with observations including (but not limited to) identified sites, cultural materials, location markers, contextual



Appendix A has been revised in response to RAI SOC-1

integrity, estimated time periods of occupations, vegetation, topography, hydrology, land use, soil exposures, general conditions at the time of the survey, and field techniques employed.

The project has a low probability of encountering human burials; however, if burials are found, Andrews County will be notified and all requirements of 8 THSC 711 will be followed.

**Reporting and Curation**

Relevant field observations for any new sites discovered will be transferred to TexSite forms and submitted to TARL for official recording and integration into the trinomial system. An analysis of recorded materials and site characteristics will be performed, and the results presented in a clear and concise manner. These data will be used to formulate a preliminary evaluation of the NRHP and/or SAL eligibility of each site, as well as a recommendation for further work or no further work, supported by explicit justifications (36 CFR 60; 36 CFR 800; 13 TAC 26.3; 13 TAC 26.10; 13 TAC 26.16). Data, sites recorded, and NRHP/SAL eligibility assessments will be presented in a standard draft survey report to be submitted to Andrews County, the NRC, and the THC. Per 13 TAC 26.16, the final permit-closure submittal to the THC will include a transmittal letter, abstract form, project area shapefile, tagged PDF files of the report in both restricted (with site locations) and public (without site locations) versions, as applicable. Copies of the public version of the report will be made available to future researchers at 11 repositories across the state; project records and artifacts (if applicable) will be curated at CAS per 13 TAC 26.16 and 26.17. It is understood that following submittal of records to CAS for curation, CAS will supply an approved Curation form to the THC as well as a Held-in-Trust form to be completed by personnel at the THC prior to the approval of permit closure.

**References**

Bureau of Economic Geology (BEG)

1976 *Geological Atlas of Texas, Hobbs Sheet.* University of Texas at Austin. Available at http://twbd.state.tx.us/groundwater/acquifer/GAT/hobbs.htm. Accessed April 22, 2015.

Galván Eling Associates, Inc.

1994 *Cultural Resource Survey of a Proposed Waste Facility, Andrews County, Texas.* Letter Report. Galván Eling Associates, Inc., Austin.

Natural Resources Conservation Service (NRCS)

2015 NRCS SSURGO and STATSGO soil data viewed through SoilWeb KMZ interface for Google Earth, available at http://casoilresource.lawr.ucdavis.edu/soilweb/. U.S. Department of Agriculture and California Soil Resource Laboratory, University of California, Davis. Accessed April 22, 2015.

Texas Historical Commission (THC)

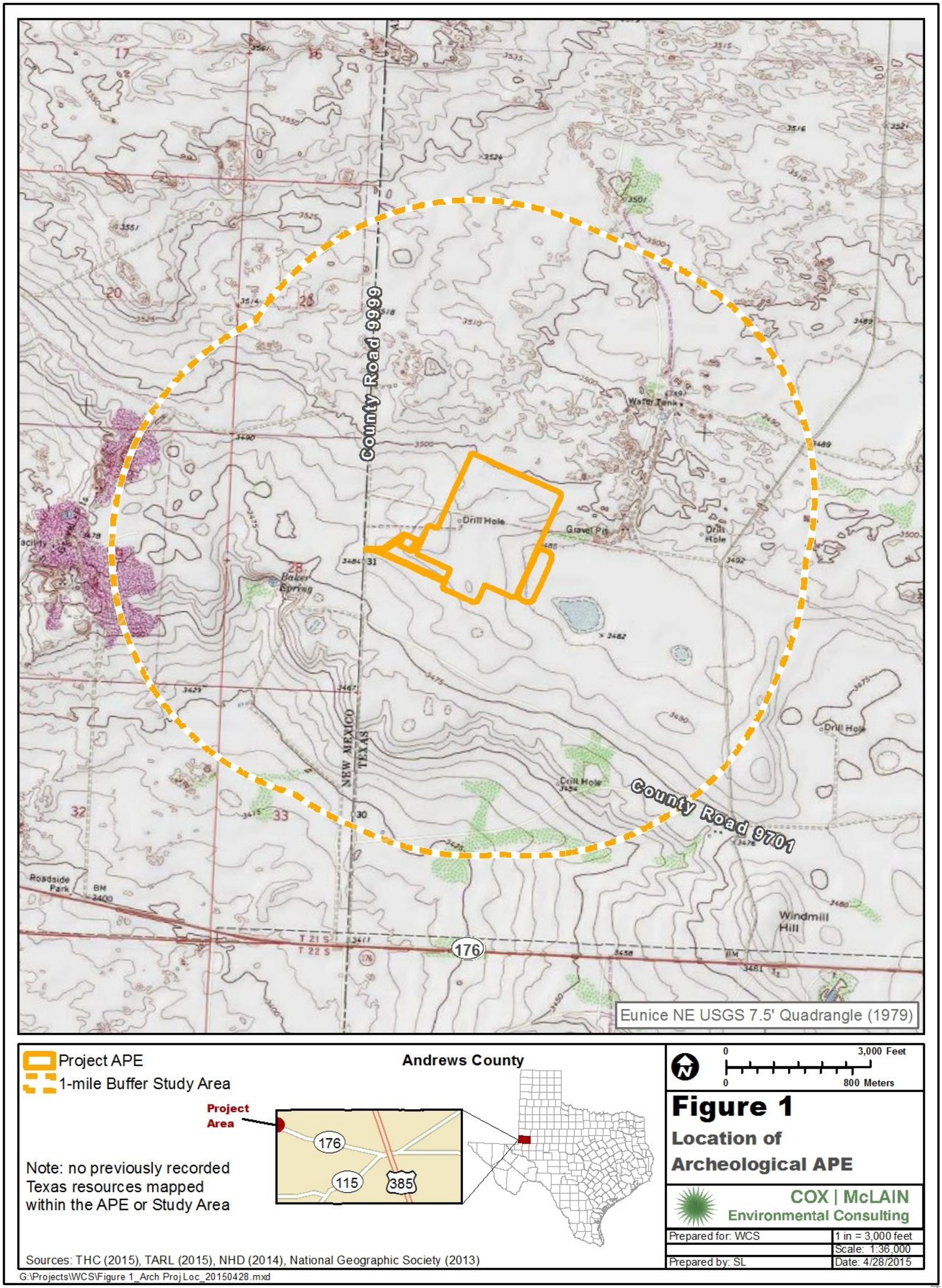
2015 *Texas Archeological Sites Atlas*. Texas Archeological Research Laboratory and the Texas Historical Commission. Available at http://nueces.thc.state.tx.us. Accessed April 22, 2015.

**Figures**

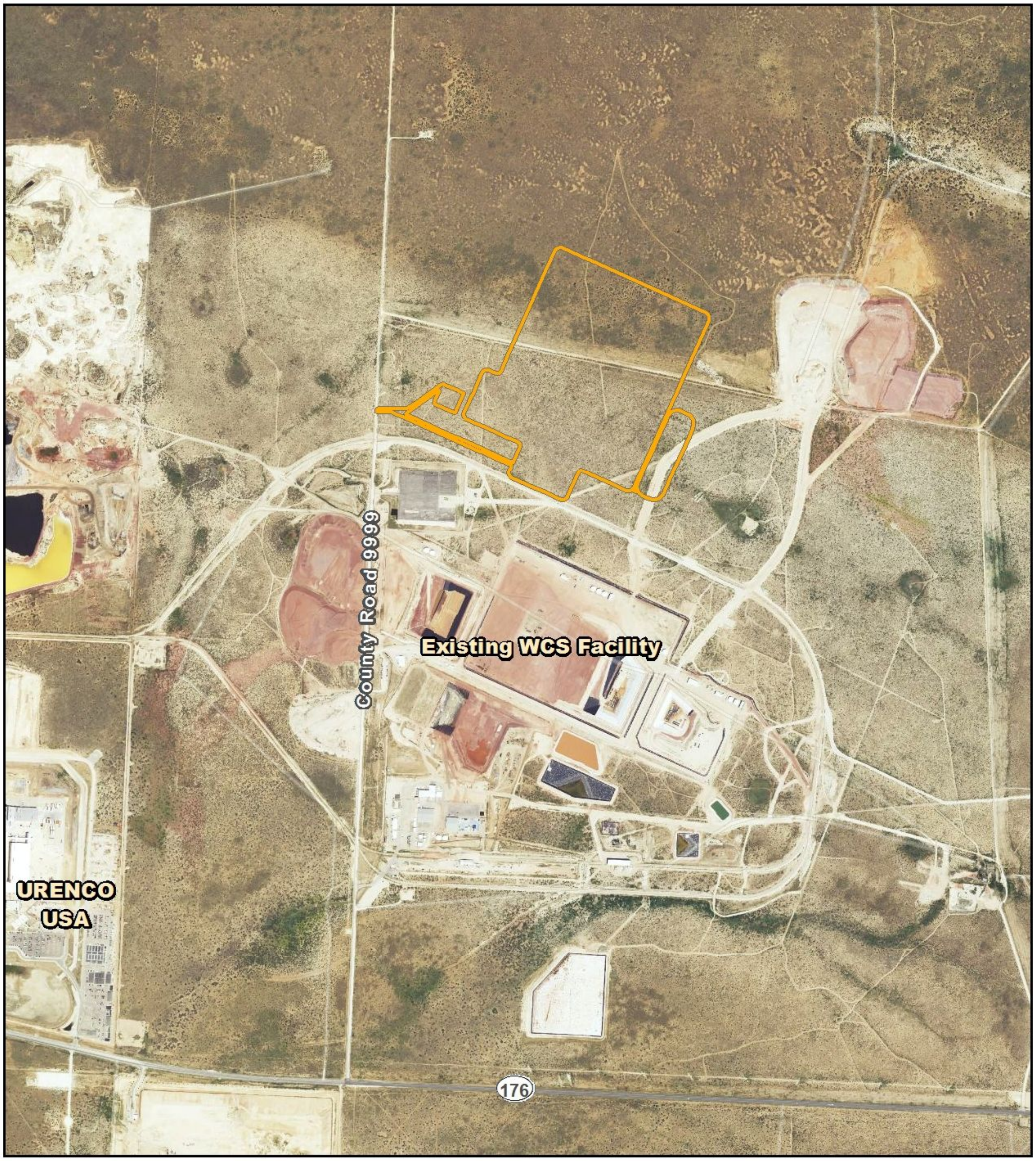
1. Location of archeological APE (topo base)
2. Location of archeological APE (aerial base)



Appendix A has been revised in response to RAI SOC-1




Appendix A has been revised in response to RAI SOC-1




Project APE

0 2,000 Feet
0 600 Meters

# Figure 2

**Aerial Photograph**

COX | McLAIN
Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 2,000 feet |
| | Scale: 1:24,000 |
| Prepared by: SL | Date: 4/28/2015 |

Aeria Source: NAIP (2014)

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Appendix A has been revised in response to RAI SOC-1

**COX | McLAIN**
**Environmental Consulting**

<table>
<tr><td rowspan="4">TRANSMITTAL MEMO<br><br>Cox|McLain Environmental Consulting, Inc.<br>6010 Balcones Drive, Suite 210<br>Austin, TX 78731<br>www.coxmclain.com<br>(512) 338-2223</td><td>To: Tiffany Osburn, THC<br>CC: Scott Kirk, WCS<br>RECEIVED JUL 02 2015</td></tr>
<tr><td>From: Chris Dayton, CMEC</td></tr>
<tr><td>Date: 07/02/15</td></tr>
<tr><td>RE: Draft Report Submittal: Intensive Archeological Survey of the Proposed Waste Control Specialists Spent Nuclear Fuel Consolidated Interim Storage Facility, Andrews County, Texas (NRC)</td></tr>
</table>

Dear Ms. Osburn:

Please find enclosed one (1) unbound copy of the draft report *Intensive Archeological Survey of the Proposed Waste Control Specialists Spent Nuclear Fuel Consolidated Interim Storage Facility, Andrews County, Texas*. The work was carried out under Texas Antiquities Permit 7277 and Section 106 of the National Historic Preservation Act, as amended.

The archeological area of potential effects (APE) consists of the 216.6-acre footprint of the proposed facility. The APE was found to be heavily disturbed by recent grading and road construction and also contained ubiquitous evidence of chaining, root-plowing, and/or brush-hogging in the last several decades, likely related to the parcel's previous use for livestock ranching. The survey consisted of pedestrian examination due to the extent of previous disturbance, the lack of alluvial or dune deposits in the APE, and the high visibility of the ground surface. No archeological materials of any kind were observed within the APE, and no further work is recommended within the APE prior to the construction of the proposed storage facility.

Please do not hesitate to call or email if you have any questions or comments.

Sincerely,

Chris Dayton, PhD, RPA
chris@coxmclain.com
(512) 338-2223

NO HISTORIC PROPERTIES AFFECTED
PROJECT MAY PROCEED
by
for Mark Wolfe
State Historic Preservation Officer
Date 7/29/15
Track# 201510249

Appendix A has been revised in response to RAI SOC-1

COX | McLAIN
Environmental Consulting

July 8, 2015

Jeff Pappas, PhD
State Historic Preservation Officer and Director
New Mexico Historic Preservation Division
Department of Cultural Affairs
Bataan Memorial Building
407 Galisteo Street, Suite 236
Santa Fe, NM 87501

**Re: Project Review under Section 106 for a Proposed Consolidated Interim Spent Fuel Storage Facility**

Dear Dr. Pappas:

Waste Control Specialists LLC (WCS) intends to file an application for a license for the independent storage of spent nuclear fuel and reactor-related, greater-than-Class C wastes at a site in western Andrews County, Texas (see **Figure 1**, attached). These activities are regulated by the U.S. Nuclear Regulatory Commission (NRC); the project is therefore subject to Section 106 of the National Historic Preservation Act. The site is in the northwestern-most corner of Andrews County and is immediately adjacent to the Texas/New Mexico state line. Because a portion of the area of potential effect (APE) for visual/indirect effects extends into New Mexico, we are seeking your input on the project.

A previous license for disposal of low-level radioactive waste on the WCS complex was coordinated with Lisa Meyer in your office in July 2006 (file reference 078585). The New Mexico SHPO concurred that there would be no historic properties affected on July 21, 2006.

Coordination with the Texas Historical Commission (THC), the Texas State Historic Preservation Officer, has been completed for historic resources and is underway for archeological resources. On May 6, 2015, the THC concurred with the recommendations made by architectural historians at Cox|McLain Environmental Consulting (CMEC), that no historic properties would be affected and that the project may proceed. In May 2015, CMEC archeologists conducted an archeological survey under Texas Antiquities Permit 7277. No archeological resources were found within the proposed footprint; reporting of these results is currently in process.

**Project Description**

WCS is requesting authorization from the NRC to construct and operate a Consolidated Interim Spent Fuel (CISF) storage facility for spent nuclear fuel on approximately 216.6 acres of land within the approximately 14,000-acre complex owned by WCS (see **Figure 2**). The project is located in a sparsely populated area, with the town of Eunice, New Mexico located approximately five miles west of the site. The area is surrounded by a high density of oil wells to the west and some oil wells to the north; there is little development to the south and east, excluding portions of the existing WCS facility. Operations at the WCS facility began in 1994; none of the development is historic-age.

The proposed facility would house a dry cask storage system. WCS is exploring several different options for the system. One option would be an above-ground system utilizing several low-rise buildings (see **Figure 3**), while another option would store the casks underground. Both the above-ground and below-



Appendix A has been revised in response to RAI SOC-1

ground design options are assumed to require the presence of a crane approximately 60 feet in height during the operating license timeframe.

**Historic Resources**

The Area of Potential Effect (APE) for direct impacts is proposed as the project footprint (see **Figure 4**). Taking into consideration the height of the crane that would be required, the height of the potential above-ground facility, and the relatively flat surrounding terrain, the APE for indirect/visual impacts is proposed as a one-mile radius from the proposed project footprint (see **Figure 4**). WCS anticipates that the NRC will issue a Final Environmental Impact Statement by April 2018; issuance of the license is expected by April 2019. Therefore, a historic-age date of 1974 (45 years prior to 2019) is proposed.

According to a search of the digital Sites Atlas maintained by the THC and a search of the New Mexico Cultural Resources Information System (NMCRIS), there are no previously-identified non-archeological historic resources located within the APE for direct or indirect impacts. The nearest previously identified resource in Texas is the historical marker for Andrews County, located approximately 17 miles southeast of the project area. The closest historic resource in New Mexico is "HCPI 37299" (building at 703 Ruth Circle, Eunice, Lea County), located approximately 4.5 miles from the site.

Adjacent to the WCS facility to the west is a large uranium enrichment plant called the National Enrichment Facility, operated by URENCO USA. This facility was developed within the past 15 years. The proposed project area is located in a sparsely populated area of Texas with little development aside from the non-historic age WCS and URENCO USA facilities. The proposed project would not result in a direct effect to any historic resources.

The nearest developed area is Eunice, New Mexico, which is located approximately five miles west of the proposed site. There are two large visual obstructions between viewers in Eunice and the proposed crane at the site: red soil mounds approximately 100 feet in height on WCS property, and the Urenco facility (see **Figure 5**). Based on information from WCS, the soil mounds will be in place indefinitely or potentially utilized as fill. As illustrated in **Photos 3-5** in the attached photo sheets, the red soil mounds and the Urenco facility are visible from the outskirts of Eunice but tend to dissolve visually into the horizon. Excluding the crane, the CISF storage facility would be approximately 30 feet above the surface and less visible from Eunice than existing features and structures.

**Archeological Resources**

According to the Atlas/NMCRIS search referenced above, no cemeteries, State Antiquities Landmarks (SALs), or archeological sites have been recorded in the project area or within one mile (NMDCA 2015; THC 2015). The closest known resources, five prehistoric sites, are all located in New Mexico, just outside the one-mile study buffer. Sites LA140701, LA140702, LA140703, LA140704, and LA140705 are all surface and near-surface scatters of fire-cracked rock, flaking debris, and ground stone recorded in an aeolian dune field by Western Cultural Resource Management during a 2003 survey for the New Mexico State Land Office (NMDCA 2015). These sites were excavated prior to destruction of the dune field by the construction of the National Enrichment Facility.

In May 2015, a pedestrian archeological survey was completed under Texas Antiquities Permit 7277. The archeological APE consists of the 216.6-acre footprint of the proposed spent fuel site. The APE was found to be heavily disturbed by recent grading and road construction and also contained ubiquitous evidence of chaining, root-plowing, and/or brush-hogging in the last several decades, likely related to the parcel's previous use for livestock ranching (see **Photos 6-8**). The survey consisted of pedestrian examination due to the lack of alluvial or dune deposits in the APE and the high visibility of the uneven, disturbed, burrowed ground surface. No archeological materials of any kind were observed within the APE, and no further work is recommended within the APE prior to the construction of the proposed storage facility.

A draft report with the observations and recommendations above is currently in preparation and will be submitted to Andrews County, the THC, and the NRC.

**Request for Concurrence**

It is the professional opinion of CMEC cultural resources personnel that further cultural resources investigations are not warranted prior to construction. We ask for your concurrence with this finding.

Should you have any questions, please contact me at EmilyR@coxmclain.com or 512-338-2223.

Sincerely,

Emily Reed

Emily Reed, Architectural Historian/ Project Manager
Cox|McLain Environmental Consulting, Inc.

**Attachments**

Figure 1: General Project Location Map
Figure 2: Detail Facility Map
Figure 3: Potential CISF Storage Facility Site Design Renderings
Figure 4: Proposed APE for Historic Resources
Figure 5: Viewshed Analysis
Contextual Photographs

**References**

New Mexico Department of Cultural Affairs (NMDCA)

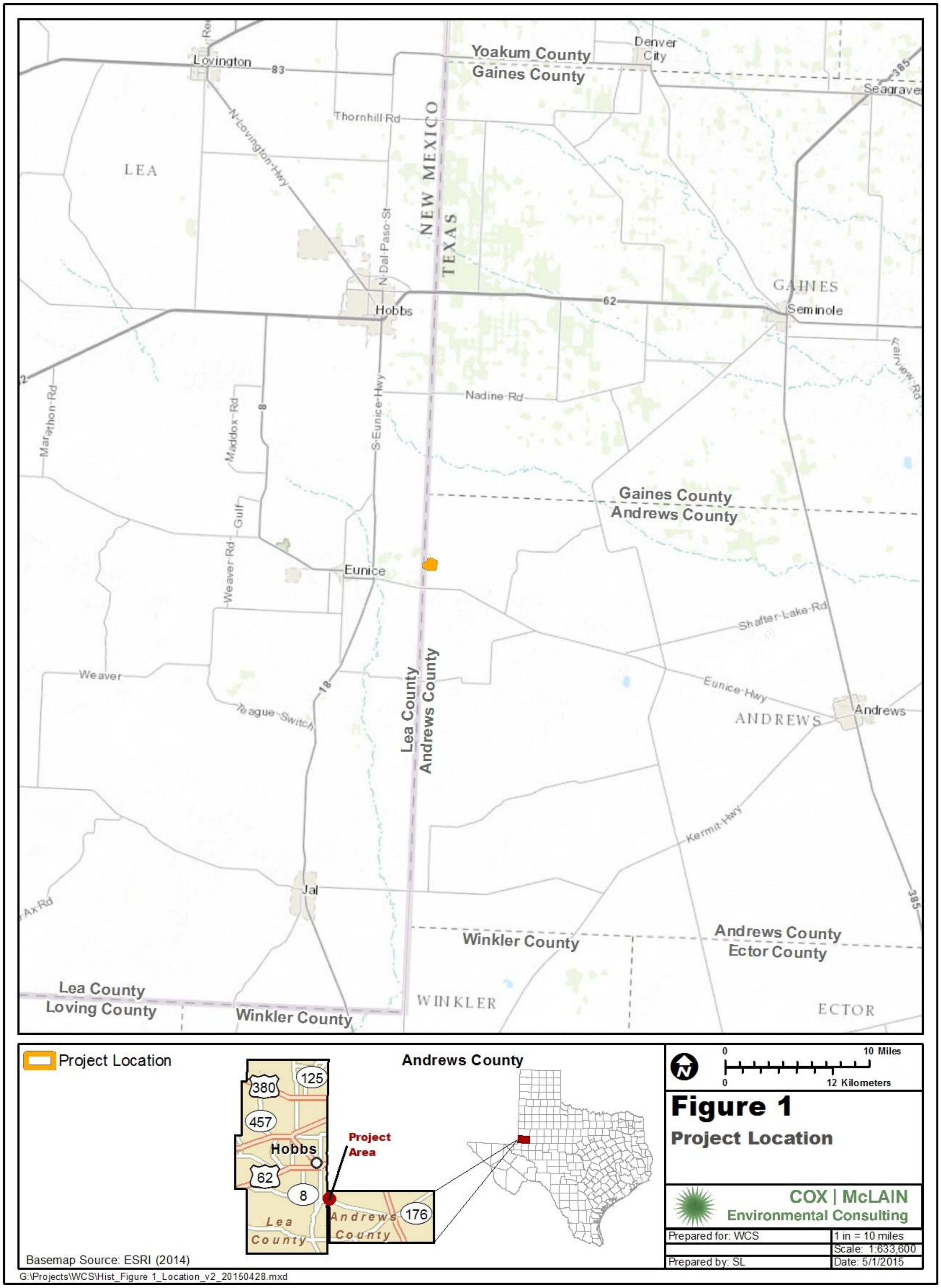
2015 *New Mexico Cultural Resources Information System (NMCRIS)*. DCA Historic Preservation Division, Archaeological Records Management Section. Available at https://nmcris.dca.state.nm.us, accessed June 8, 2015.

Texas Historical Commission (THC)

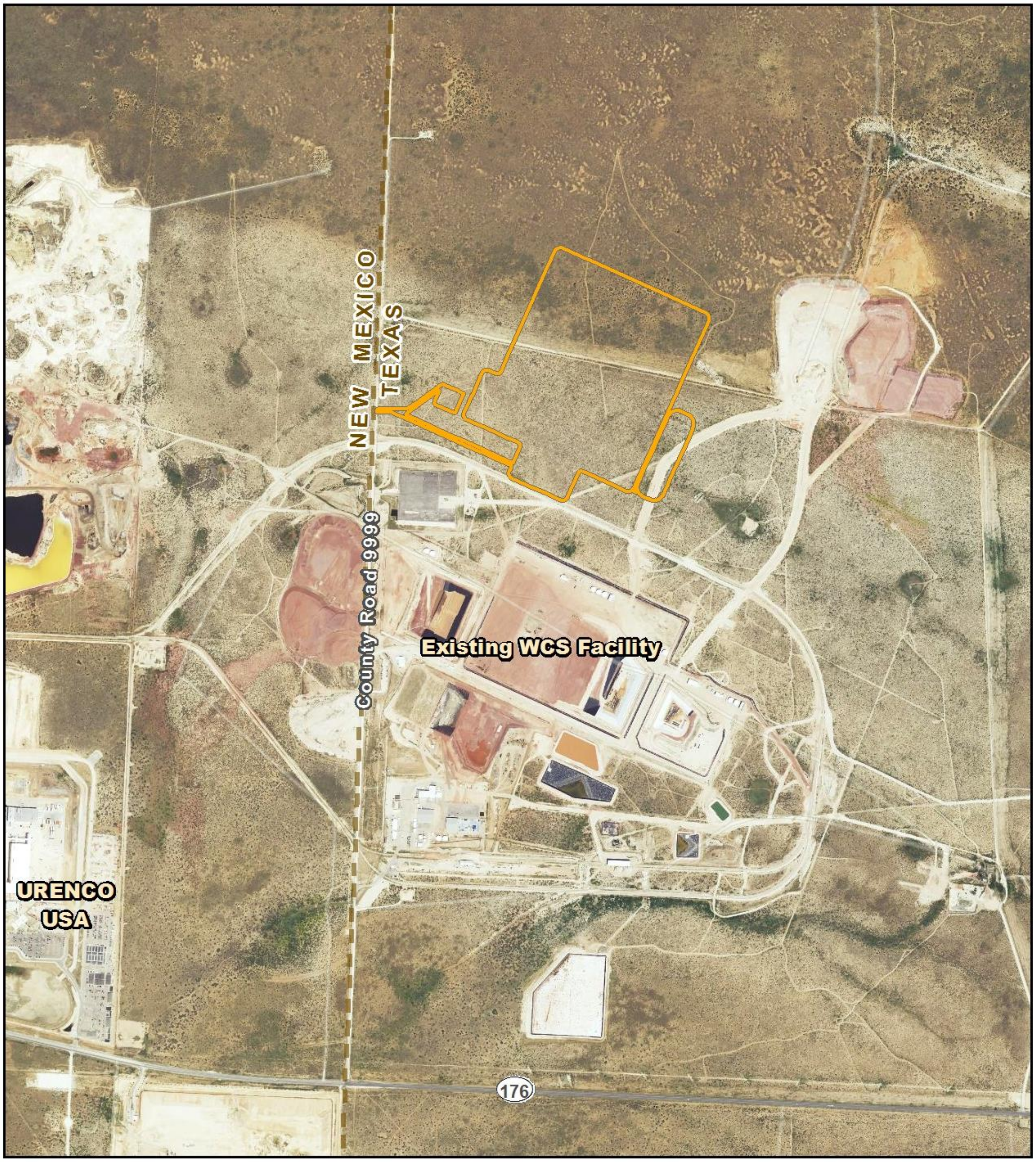
2015 *Texas Archeological Sites Atlas*. Texas Archeological Research Laboratory and the Texas Historical Commission. Available at http://nueces.thc.state.tx.us. Accessed April 22, 2015.



Appendix A has been revised in response to RAI SOC-1




Appendix A has been revised in response to RAI SOC-1




Project Footprint

0 2,000 Feet
0 600 Meters

**Figure 2**

**Aerial Photograph**

COX | McLAIN
Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 2,000 feet |
| | Scale: 1:24,000 |
| Prepared by: SL | Date: 5/4/2015 |

Aeria Source: NAIP (2014)

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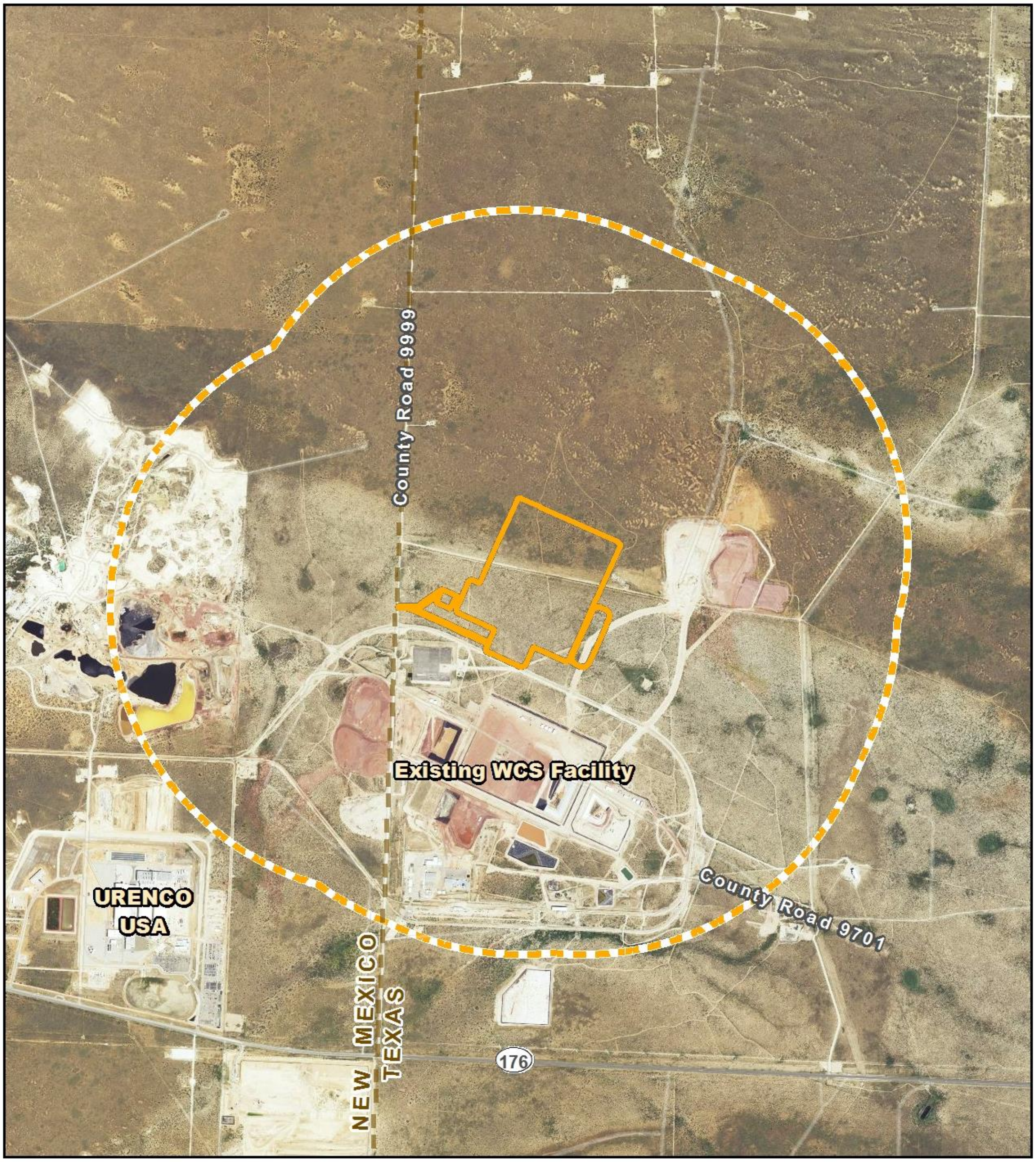
Appendix A has been revised in response to RAI SOC-1

AMERICA'S NUCLEAR SOLUTION

## POTENTUAL ISFSI SITE RENDERINGS

**Figure 3**
**Potential Storage Facility Site Design Renderings**

Appendix A has been revised in response to RAI SOC-1




APE for Direct Impacts (project footprint)

APE for Indirect/Visual Impacts (1-mile radius)

Note: no previously recorded Texas resources mapped within either APE

Sources: THC (2015), TARL (2015)
Aerial Source: NAIP (2014)

0 3,000 Feet
0 800 Meters

# Figure 4

**Location of Historic Area of Potential Effect**

COX | McLAIN
Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 3,000 feet |
| | Scale: 1:36,000 |
| Prepared by: SL | Date: 5/4/2015 |

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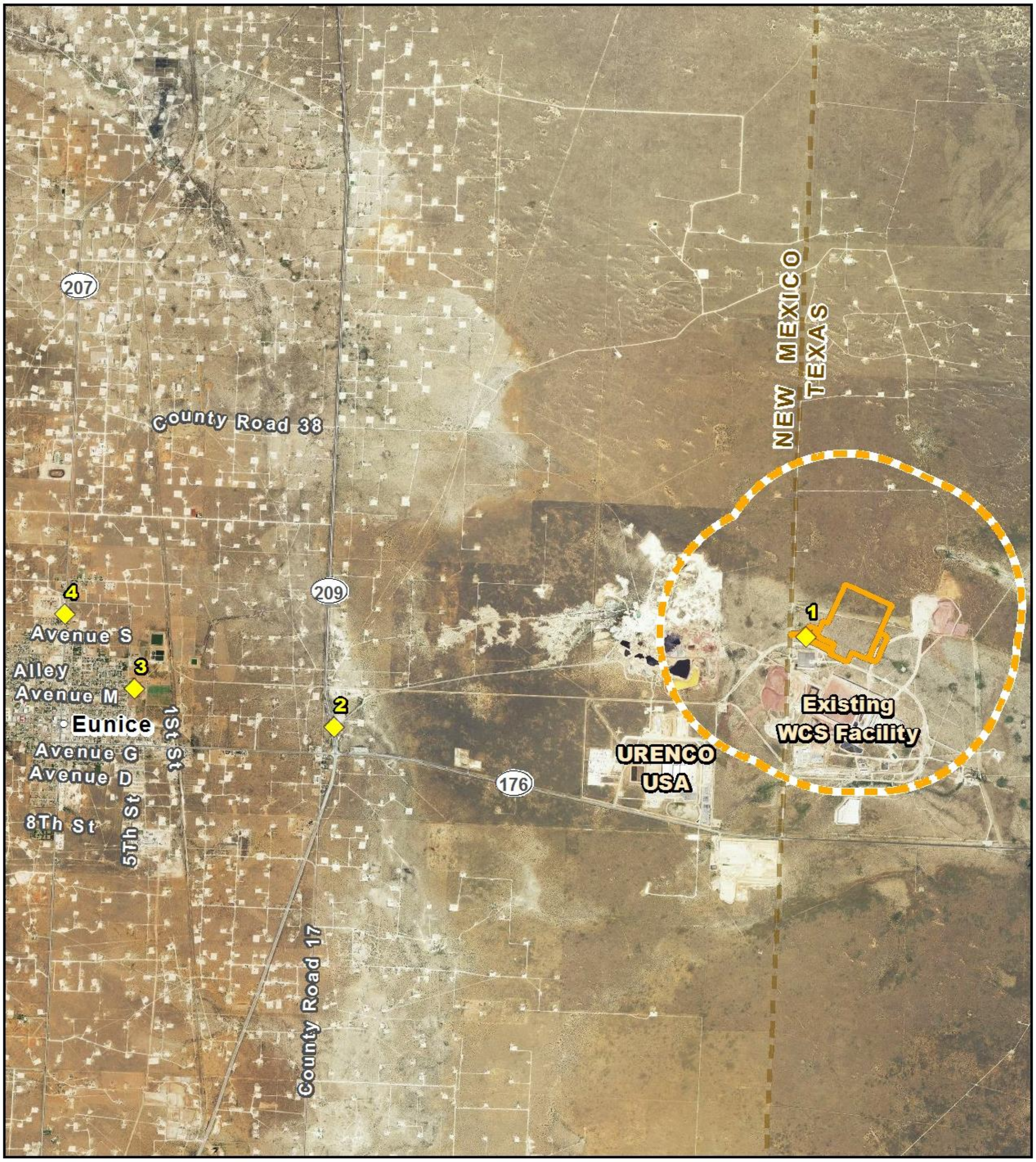
Appendix A has been revised in response to RAI SOC-1




APE for Direct Impacts (project footprint)
APE for Indirect/Visual Impacts (1-mile radius)
Photo Location

0 — 1.25 Miles
0 — 1.5 Kilometers

# Figure 5
## Viewshed Analysis

COX | McLAIN Environmental Consulting

| | |
|---|---|
| Prepared for: WCS | 1 in = 1.25 miles |
| | Scale: 1:79,200 |
| Prepared by: SL | Date: 5/1/2015 |

Source: CMEC (2015)
Aerial Source: NAIP (2014)
G:\Projects\WCS\Hist_Figure 5_Viewshed Analysis_20150430.mxd

Appendix A has been revised in response to RAI SOC-1

**Contextual Photographs**

Photo 1. View of proposed site, looking north.

Appendix A has been revised in response to RAI SOC-1

Photo 2. View from proposed site on WCS property looking southwest towards red soil pile (see Photo Point 1 on **Figure 5**).

Appendix A has been revised in response to RAI SOC-1

Photo 3. View looking east towards the proposed site from Photo Point 2 (see **Figure 5**). Note the URENCO facility barely visible on the horizon.

Appendix A has been revised in response to RAI SOC-1

Photo 4. View looking east from Photo Point 3 (see **Figure 5**).

Appendix A has been revised in response to RAI SOC-1

Photo 5. View looking east from Photo Point 4 (see **Figure 5**).

Photo 6. Looking east near east side of archeological APE with eastern sand/gravel pit in background. Note disturbed, highly visible surface with common caliche fragments.

Appendix A has been revised in response to RAI SOC-1

Photo 7. View west from east side of archeological APE. Red fill pile across Texas/New Mexico state line is visible in the background.

Appendix A has been revised in response to RAI SOC-1

Photo 8. Close-up of typical ground surface. Note burrows. Also note mesquite stump fragment at lower left from previous clearing.

Susana Martinez
Governor

STATE OF NEW MEXICO
**DEPARTMENT OF CULTURAL AFFAIRS**
**HISTORIC PRESERVATION DIVISION**

BATAAN MEMORIAL BUILDING
407 GALISTEO STREET, SUITE 236
SANTA FE, NEW MEXICO 87501
PHONE (505) 827-6320 FAX (505) 827-6338

August 12, 2015

Emily Reed
Cox/McLain Environmental Consulting
6010 Balcones Drive ~~New Mexico State Parks Division~~ Ste 210
~~1220 South St. Francis~~ Dr.
~~Santa Fe, NM 87501~~ Austin, TX 78731

RE: Consolidated Interim Spent Fuel Storage Facility (HPD log 101784)

Dear Ms. Reed,

On behalf of the New Mexico State Historic Preservation Officer (NMSHPO) I have completed a review of the information provided by Cox/McLain Environmental Consulting concerning the Consolidated Interim Spent Fuel Storage Facility in Andrews County, Texas. The NMSHPO appreciates your efforts to provide us with this information and to comment on the project's potential to affect historic properties in New Mexico. This letter provides NMSHPO comments for the project.

The SHPO concurs that no additional cultural resources identification efforts are needed for this undertaking with the condition that all new ground-disturbing and construction activities are confined to Texas. If, however, any construction related ground- disturbances such as staging areas, equipment or materials storage yards, or access roads are needed in New Mexico, then a cultural resource survey will be required to identify and evaluate historic properties in the area of potential effects.

If you have any questions or comments, please feel free to call me directly at (505) 827-4225 or email me bob.estes@state.nm.us.

Sincerely,

Bob Estes Ph.D.
HPD Staff Archaeologist

Appendix A has been revised in response to RAI SOC-1