Enclosure 3 to E-55033

RAI Responses with associated application change pages

(Public Version)

SOCIOECONOMICS (SOC)

RAI SOC-1

Provide tax revenue information on a county and state level over a 40-year period.

Appendix A of the ER provides estimated employee compensation and regional tax impacts of the proposed CISF between 2019 and 2028. The iMpact analysis for PLANning (IMPLAN) model was run for a period of 20 years; however, ISP is requesting a license for a term of 40 years. This additional information is needed to evaluate the potential socioeconomic impacts on the states and the counties within the region during the requested license period.

This information is needed in accordance with 10 CFR 51.45(b)(1), which requires that the ER include a description of the impacts of the proposed action.

Response to RAI SOC-1:

Various assumptions within the Benefit-Cost Analysis (ER Chapter 7) were revised in response to RAIs CB-1 through CB-4, and many of these revisions affected the assumptions in the Socioeconomic Impact Analysis (ER Appendix A). As a result, the Socioeconomic Impact Analysis has been updated using 2017 IMPLAN data for Andrews County, TX. ER Appendix A Chapter 2 has been revised to incorporate this new information, including data through the 40-year license period and new tables that offer more detail or reformatted model results for easier review. This affected the following tables:

- Appendix A Table 2-2 (remains Appendix A Table 2-2)
- Appendix A Table 2-3 (remains Appendix A Table 2-3)
- Appendix A Table 2-4 (remains Appendix A Table 2-4)
- Appendix A Table 2-5 (now Appendix A Table 2-10)
- Appendix A Table 2-6 (now Appendix A Table 2-11)
- Appendix A Table 2-7 (now Appendix A Table 2-12)
- Appendix A Table 2-8 (now Appendix A Table 2-13)

The following tables are added:

- Appendix A Table 2-5: Total Estimated Annual Operating Costs at CISF – New table providing estimated annual operating costs for the CISF by expenditure category.
- Appendix A Table 2-6: Estimated Direct Impacts from Proposed Operations, 2020-2059 (2018 $) – New table with direct impacts from the IMPLAN model for each year of the license.

- Appendix A Table 2-7: Estimated Indirect Impacts from Proposed Operations, 2020-2059 (2018 $) – New table with indirect impacts from the IMPLAN model for each year of the license.

- Appendix A Table 2-8: Estimated Induced Impacts from Proposed Operations, 2020-2059 (2018 $) – New table with induced impacts from the IMPLAN model for each year of the license.

- Appendix A Table 2-9: Estimated Total Impacts from Proposed Operations, 2020-2059 (2018 $) – New table with total impacts from the IMPLAN model for each year of the license.

ER Appendix A Table 2-12 provides updated county and state taxes generated by the proposed action over its 40-year licensure (the standalone IMPLAN program does not disaggregate these data into separate state and local categories). ER Appendix A Table 2-13 provides updated data for federal tax revenue generated by operations at the proposed WCS CISF.

Impact:

ER Appendix A, including updated and new tables and figures, has been revised as described in the response.

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

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8401 Shoal Creek Blvd., Suite 100
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October 2019

Revision 4

Appendix A has been revised in response to RAI SOC-1

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Appendix A has been revised in response to RAI SOC-1

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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.**

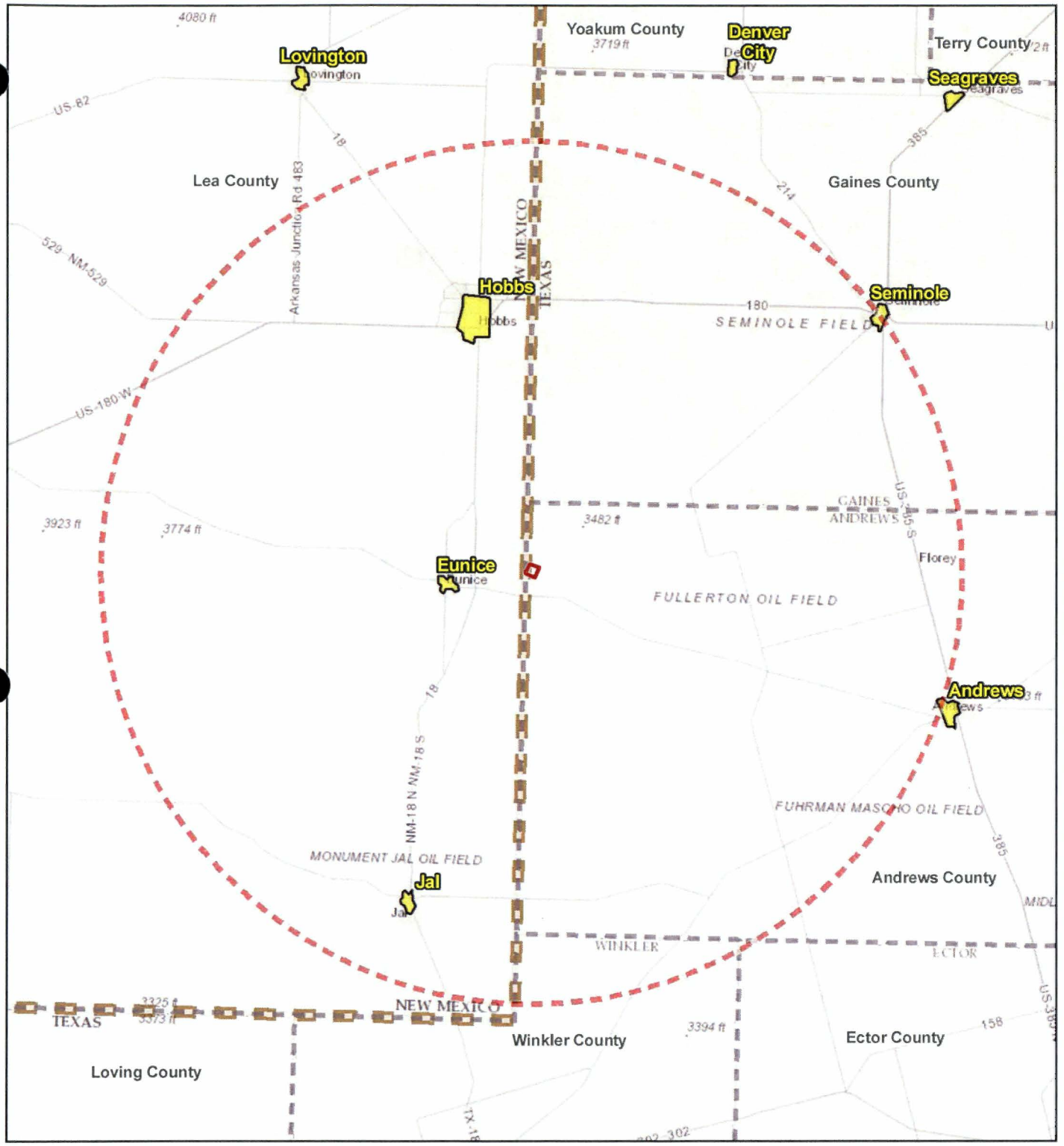
Background

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 2010, 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



Project Location

30-mile Region of Interest

State Boundary

County Boundary

Data Source: US Census Bureau (2010)
Basemap Source: ESRI (2014)

G:\Projects\WCS\Figure 1a_Project Location_20160404.mxd

0 10 Miles
0 15 Kilometers

Figure 1a

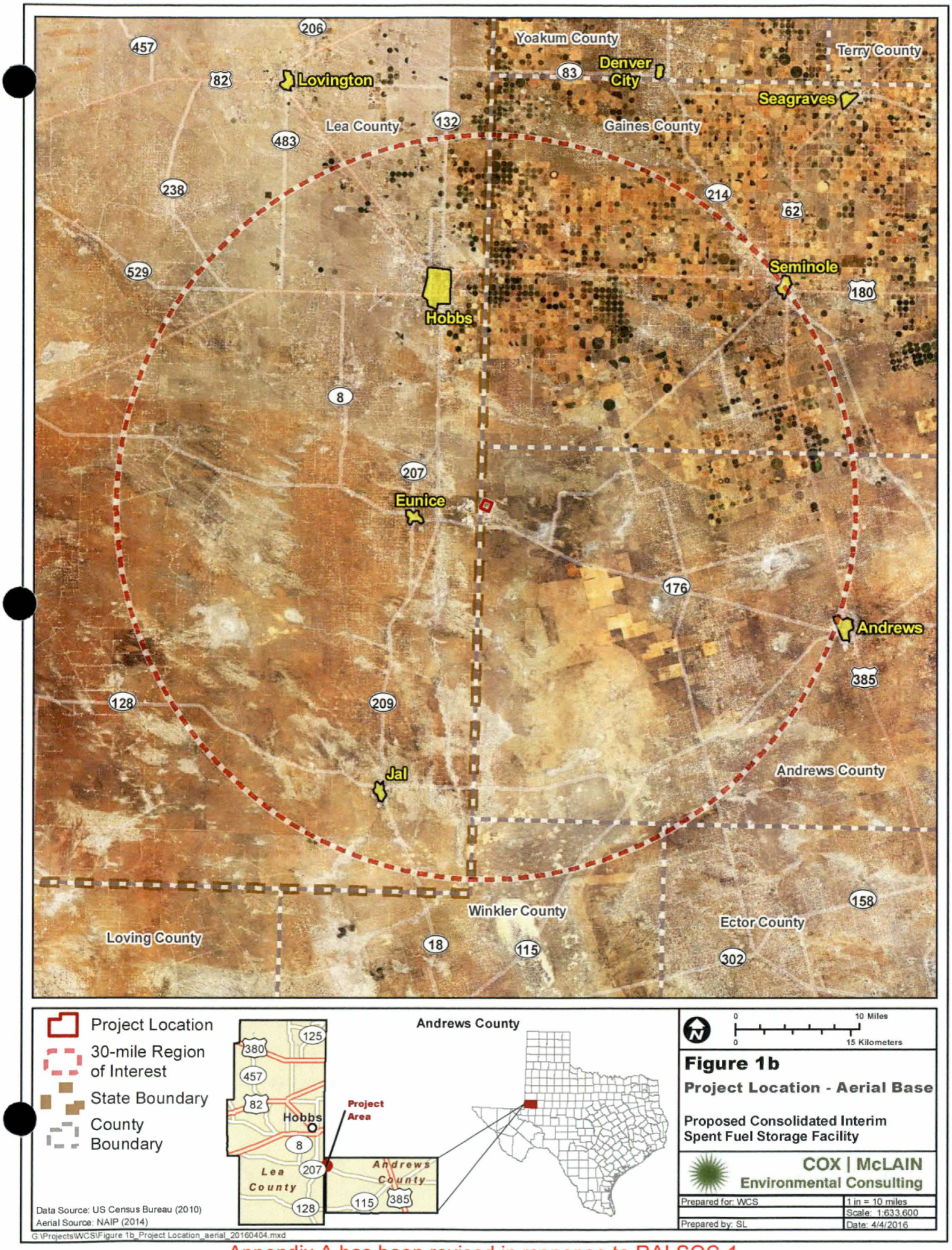
Project Location - Road Base

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

Appendix A has been revised in response to RAI SOC-1



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

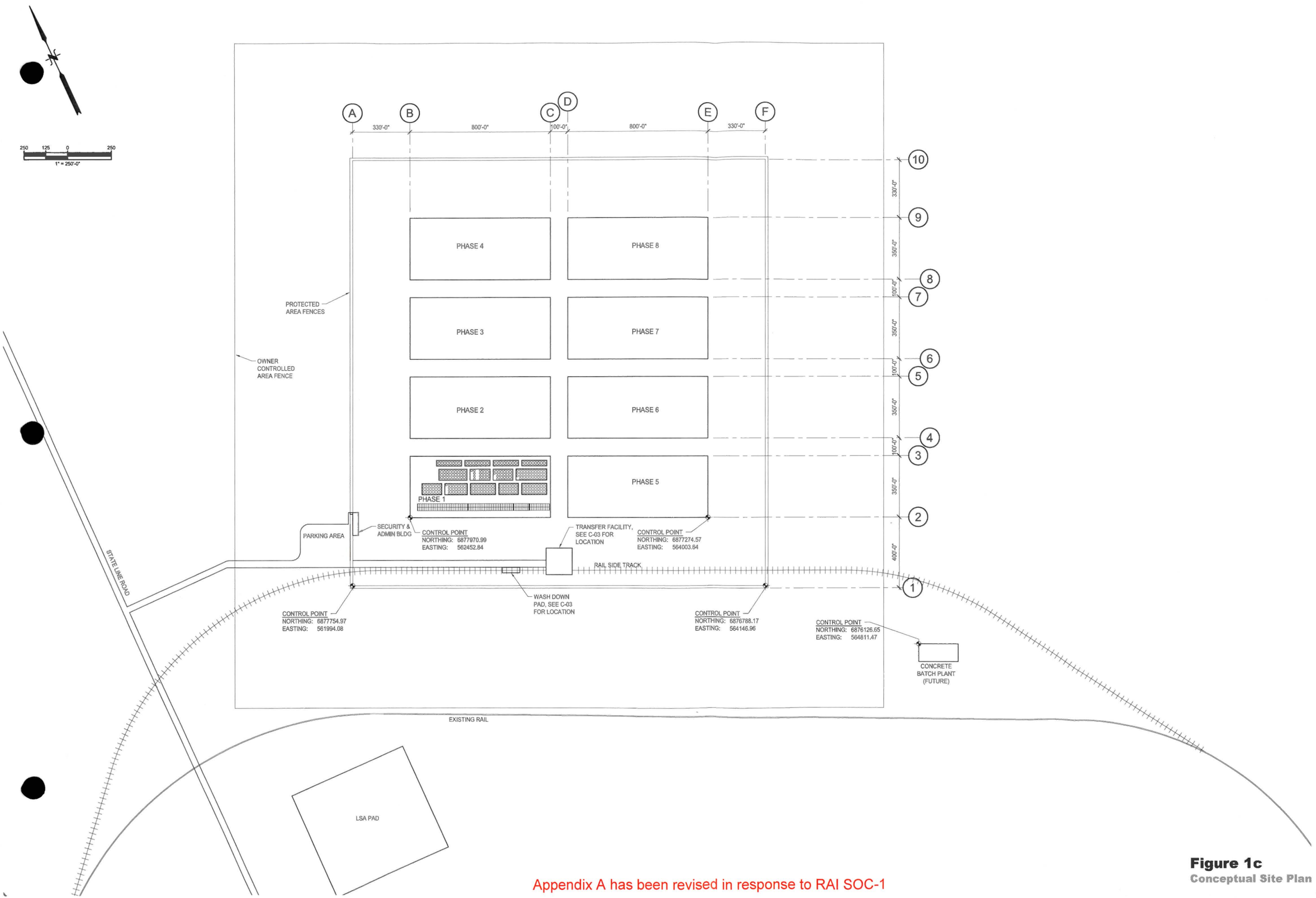


Figure 1c
Conceptual Site Plan

Appendix A has been revised in response to RAI SOC-1

DRAWING RECORD

REV.	DESCRIPTION	DATE	DRAWN	CHECK
A	ISSUED FOR REVIEW		DWH	DMO

AMERICAS NUCLEAR SOLUTION
9998 W. STATE HWY. 176, ANDREWS, TEXAS 79714
Ph: (432) 525-8500 WWW.WCSTEXAS.COM

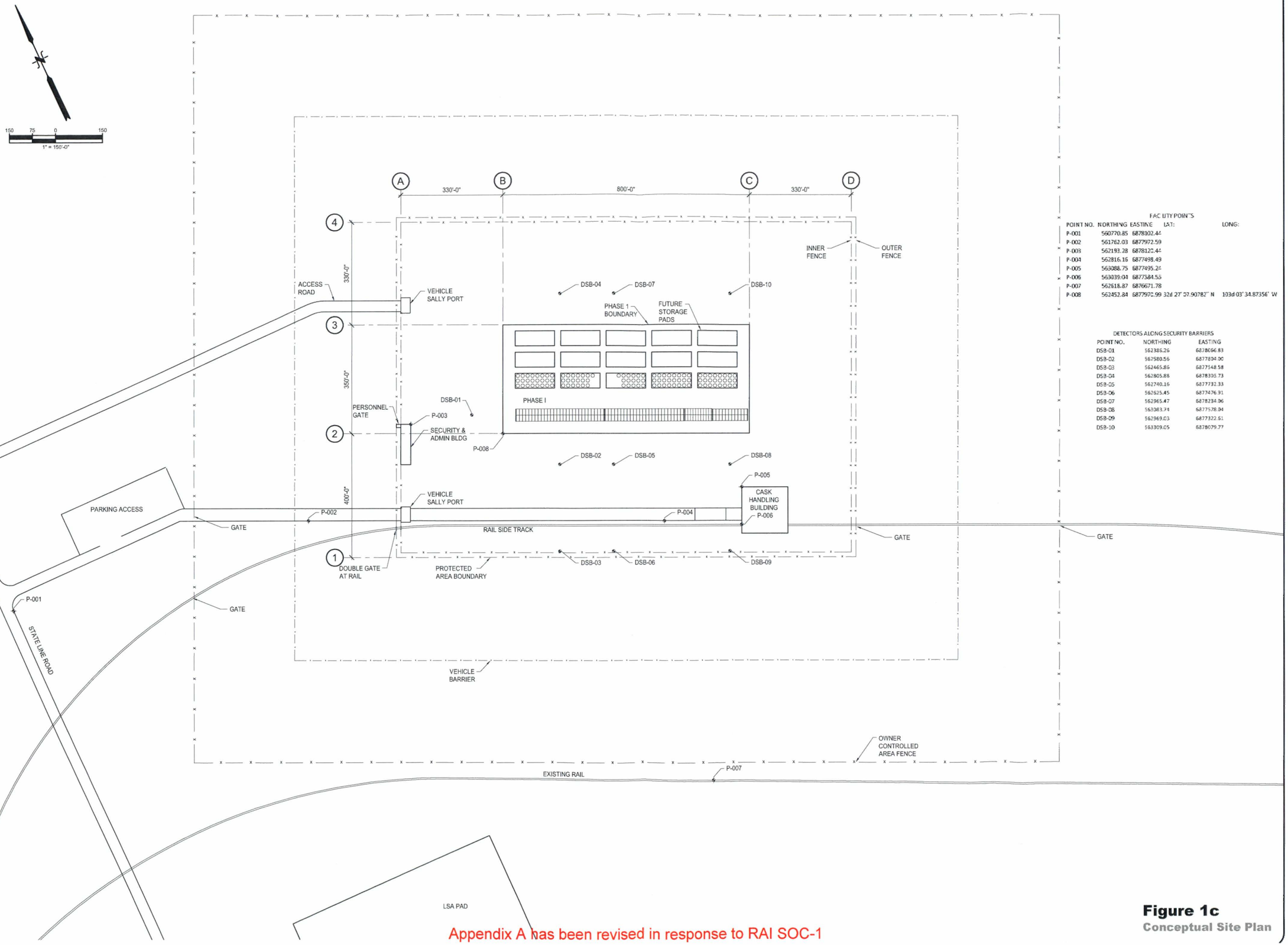
WCS CISF
WASTE CONTROL SPECIALISTS, ANDREWS TEXAS
CONCEPTUAL SITE PLAN

141101

DESIGNED BY:	D.OWEN
DRAWN BY:	D.HAMBLIN
QUALITY REVIEW BY:	D.OWEN
ENGINEERING DIRECTOR	
DOCUMENT CONTROL No.:	
CONTROL COPY No.:	
DWG. SCALE:	1" = 250'-0"

SHEET NUMBER:
C-02

P:\Projects\Revision\Consolidated Projects\2011\141101 - WCS 520 acres\ 141101-C-2007.dwg Jul 15, 2015, 12:57pm



FACILITY POINTS

POINT NO.	NORTHING	EASTING	LAT:	LONG:
P-001	560720.85	6878102.42		
P-002	561762.03	6878972.59		
P-003	562193.28	6878122.42		
P-004	562816.16	6877498.49		
P-005	563088.75	6877495.22		
P-006	563039.04	6877384.55		
P-007	562618.87	6876671.78		
P-008	562452.84	6877972.99	32d 27' 07.90782" N	103d 03' 34.87356" W

DETECTORS ALONG SECURITY BARRIERS

POINT NO.	NORTHING	EASTING
DSB-01	562386.26	6878086.83
DSB-02	562580.56	6877804.06
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	6877322.51
DSB-10	563309.05	6878079.77

Figure 1c
Conceptual Site Plan

Appendix A has been revised in response to RAI SOC-1

DRAWING RECORD

REV.	DESCRIPTION	DATE	DRAWN	CHECK
A	ISSUED FOR REVIEW		GMH	DMC

AMERICA'S 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
ENGR. MGR.:	
ENG. DIRECTOR:	
DOCUMENT CONTROL No.:	
CONTROL COPY No.:	
DWG. SCALE:	1" = 150'-0"
SHEET NUMBER:	C-03

File name Rock Dadam\141101 - WCS 500 acre l ayout\141101-F_C-003a.dwg Feb 05, 2016 - 6:46am

Figure 1c
Conceptual Site Plan

Appendix A has been revised in response to RAI SOC-1

DRAWING RECORD

REV.	DESCRIPTION	DATE	DRAWN	CHECK
1	ISSUED FOR REVIEW		GWM	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

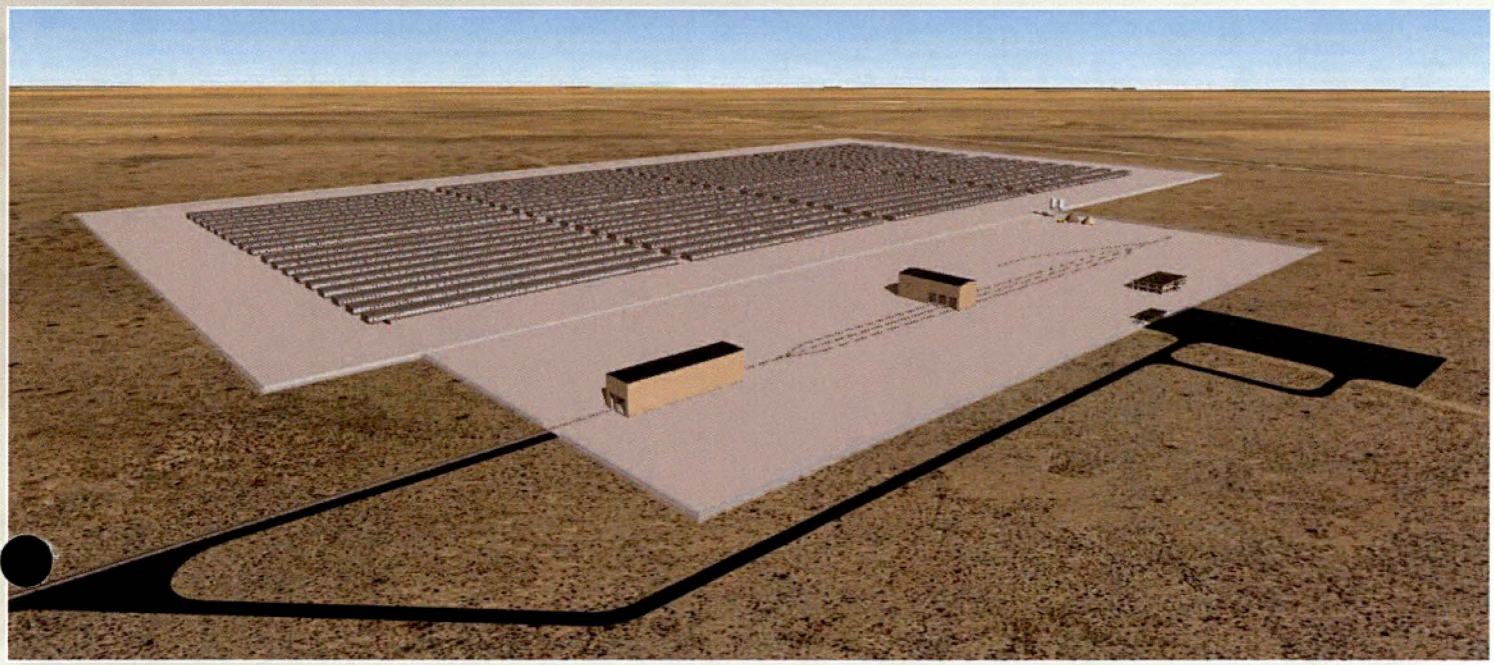
141101

DESIGNED BY:	D.OWEN
DRAWN BY:	G.HAMBLIN
PROJECT MGR:	D.OWEN
ENG. MGR:	
ENG DIRECTOR:	
DOCUMENT CONTROL No.:	
CONTROL COPY No.:	
DWG. SCALE:	1" = 250'-0"
SHEET NUMBER:	C-05

F:\Projects\Rock Tie\down\141101 - WCS 500 acres\1 drawings\141101-C-0005.dwg, Plan 08, 2015, 4:10pm

AMERICA'S NUCLEAR SOLUTION

POTENTUAL ISFSI SITE RENDERINGS



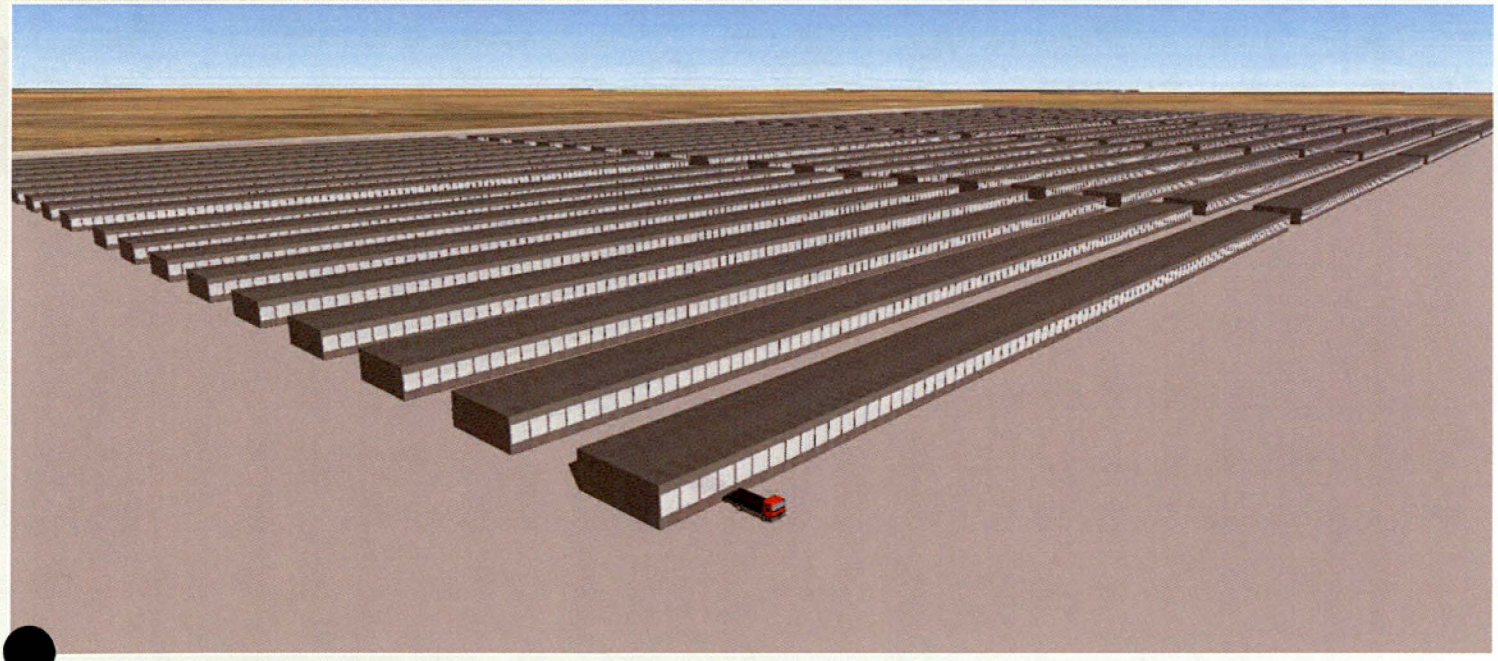


Figure 1d

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.

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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.

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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.

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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).

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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.

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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.

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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.

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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).

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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.

Appendix A has been revised in response to RAI SOC-1

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.

Appendix A has been revised in response to RAI SOC-1

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.

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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.

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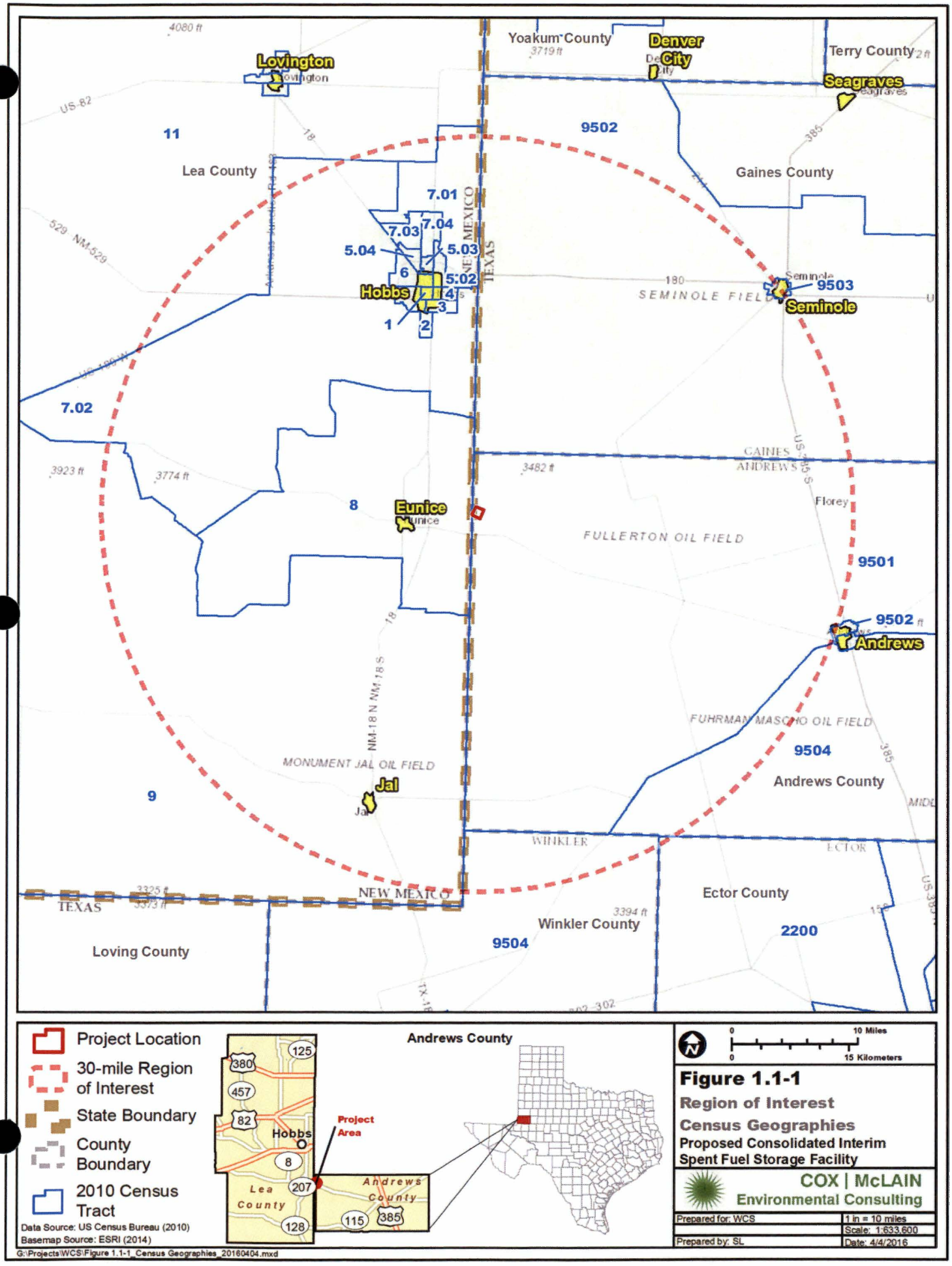

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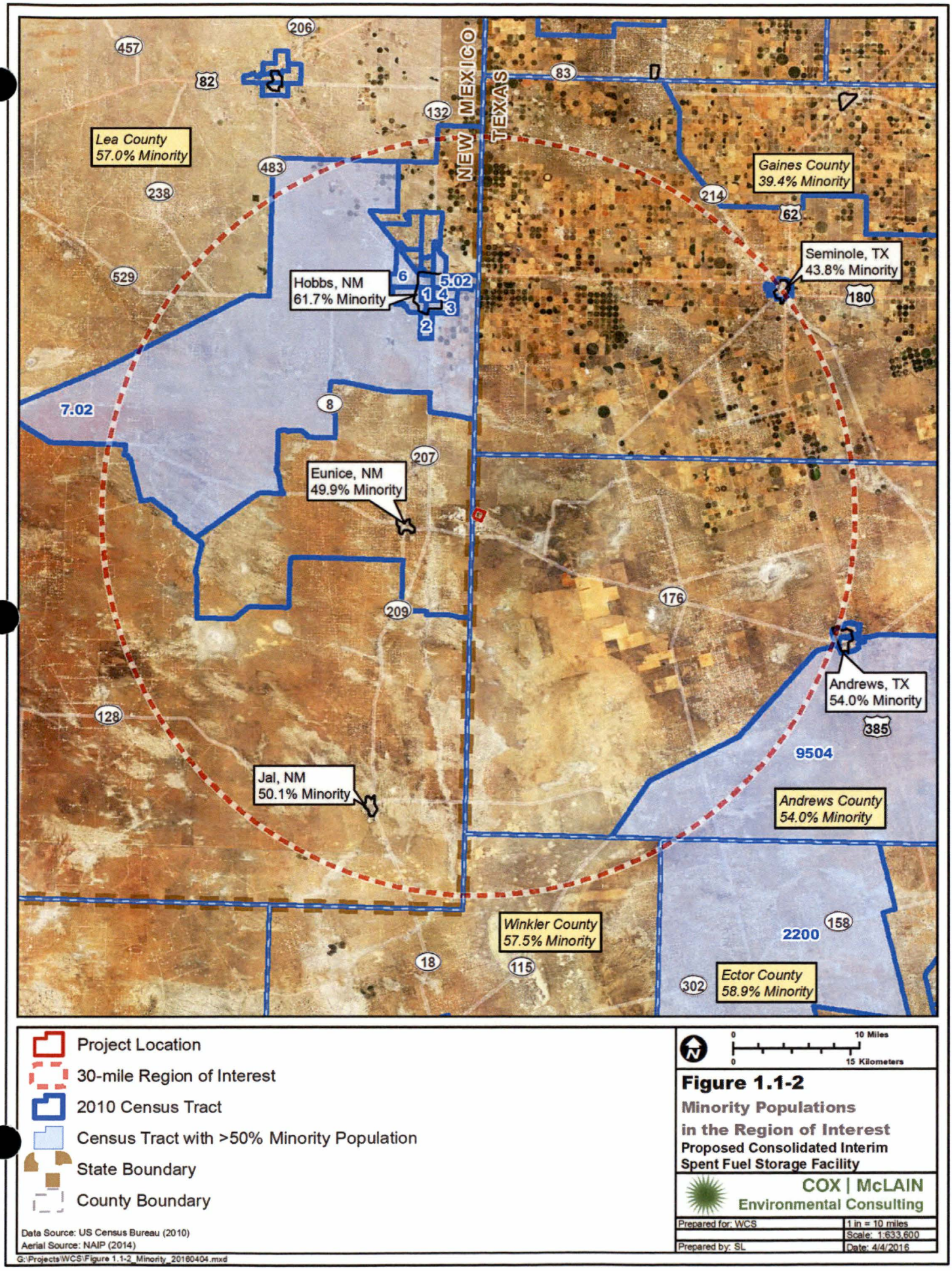

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Gaines County, Texas, contains two census tracts within the ROI (CT 9502 and 9503). Minority populations range from 26.5 to 44.9 percent within these tracts, in comparison to 39.4 percent in Gaines County, and 43.8 percent for the city of Seminole, 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)											
				Languages Spoken by LEP Populations							
Census Tract/ Block Group	Total Population 5 Years and Over	Number of LEP persons	Percent LEP persons	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.

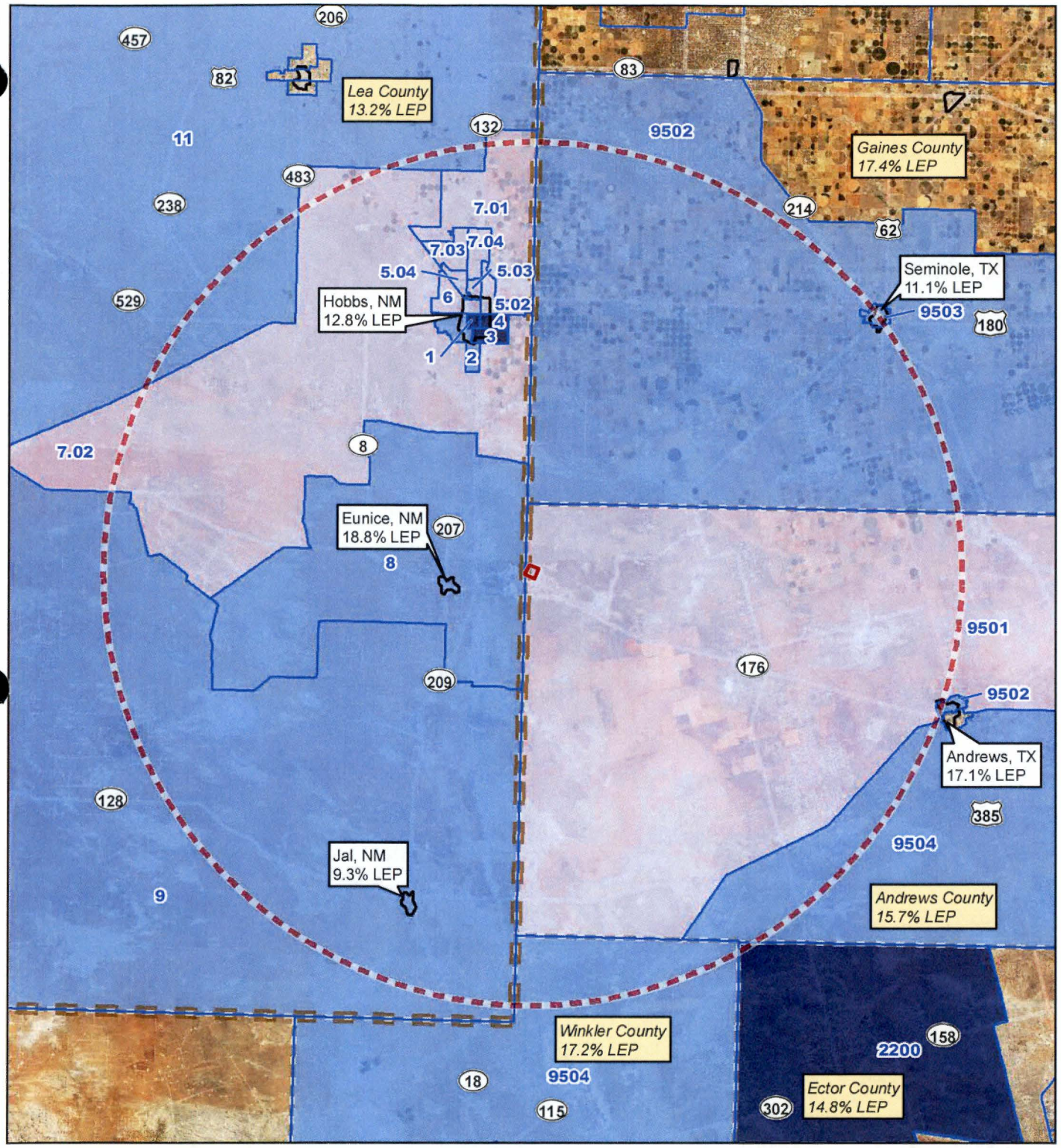
Appendix A has been revised in response to RAI SOC-1

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	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 1.1-3_LEP_20160404.mxd

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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

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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.

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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

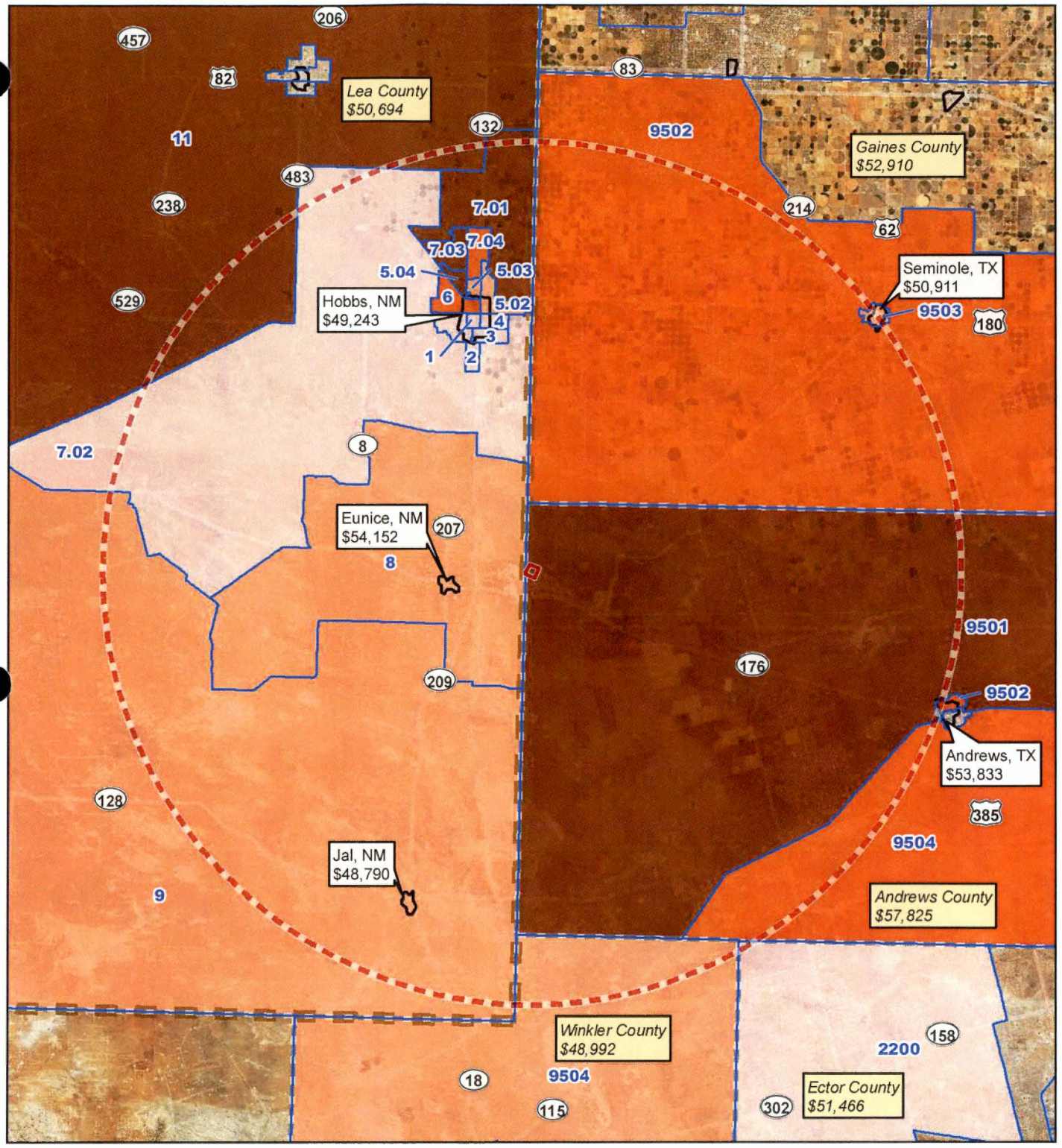
Table 1-22: Median Household Income (2009–2013)

Census 2010 Geography	Total Households	Median Household Income	2015 DHHS Poverty Guideline
Andrews County, TX	5,217	$57,825	
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	$24,250
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.

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

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.

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Table 1-26: Employment Status in the Region of Interest (2009–2013)

Census 2010 Geography	Population 16 years and over	In Labor force	Civilian labor force (CLF)				Armed Forces	Not in labor force
			Civilian labor force	Employed in CLF	Unemployed In CLF	% Unemployed in CLF		
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.

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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."

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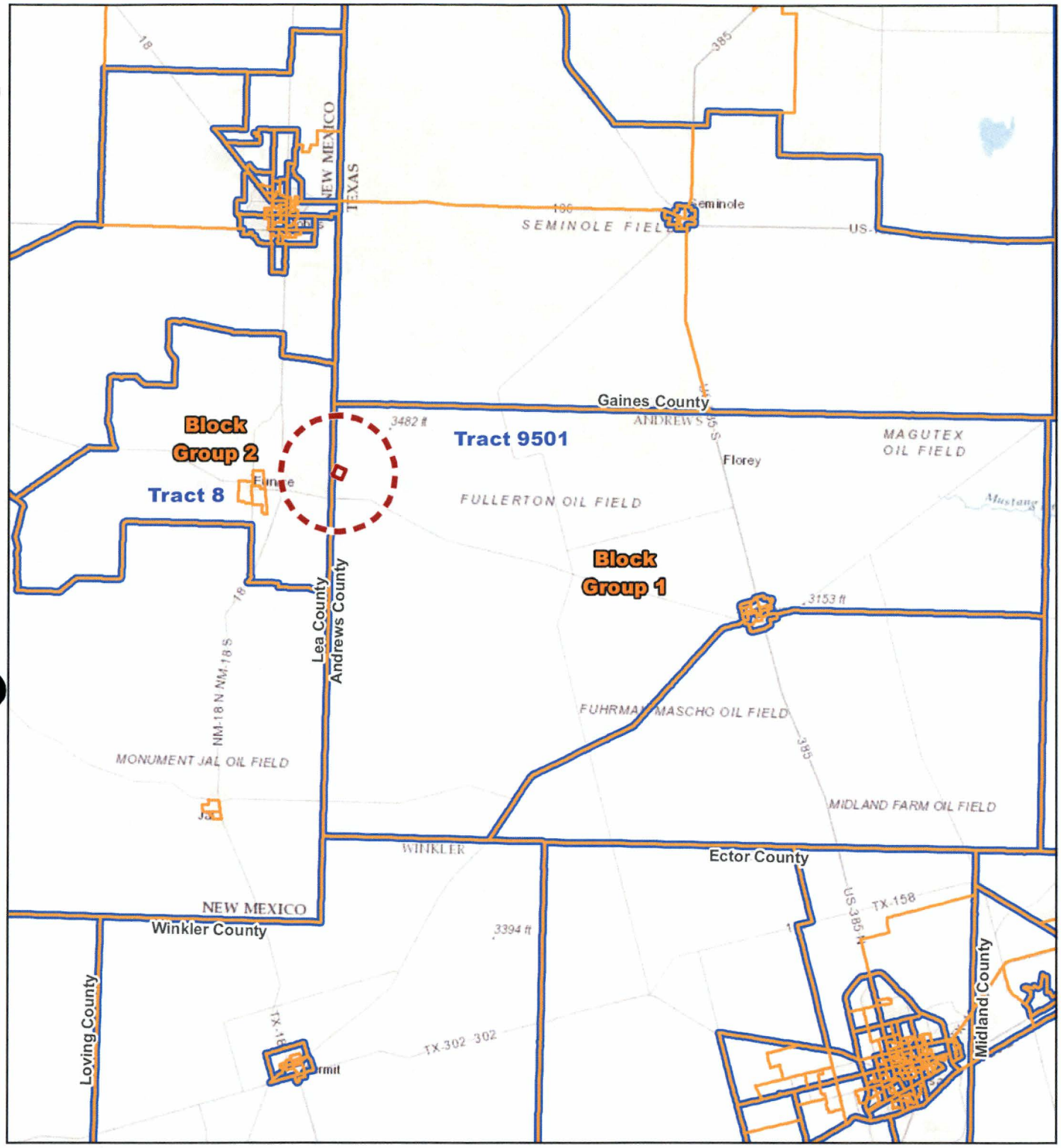

Figure 1.1-5
Overview of Area
Census Geographies
Proposed Consolidated Interim Spent Fuel Storage Facility

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

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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

Prepared for: WCS	1 in = 2 miles
	Scale: 1:126,720
Prepared by: SL	Date: 4/4/2016

Data Source: US Census Bureau (2010)
Basemap Source: ESRI (2014)
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:

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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.cityof andrews.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

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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).

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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.

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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.

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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)

Geographic Area	Domestic In-Migration			Domestic Out-Migration			5-Year Net Migration (Total In-Migration minus Total Out-Migration)
	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

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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.

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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.

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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.

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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

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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.

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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
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	

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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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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
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**

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

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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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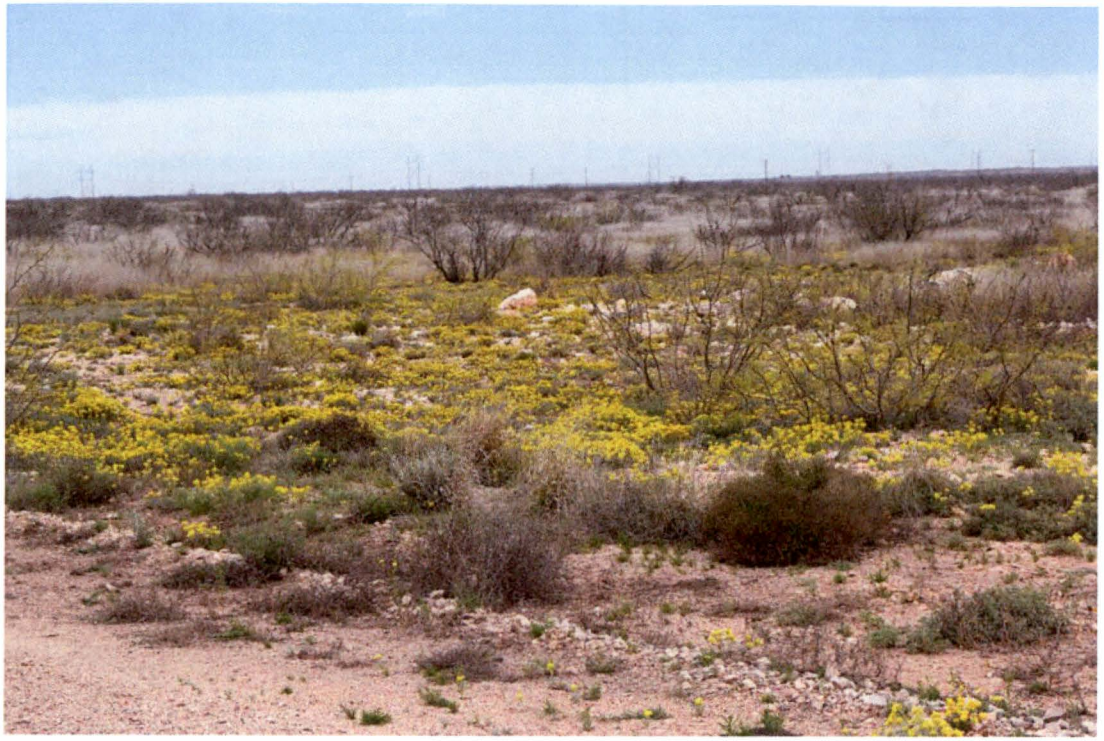

At P5, project area vegetation.

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

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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

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

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.

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:

Commissioner, Pct 2 Brad Young

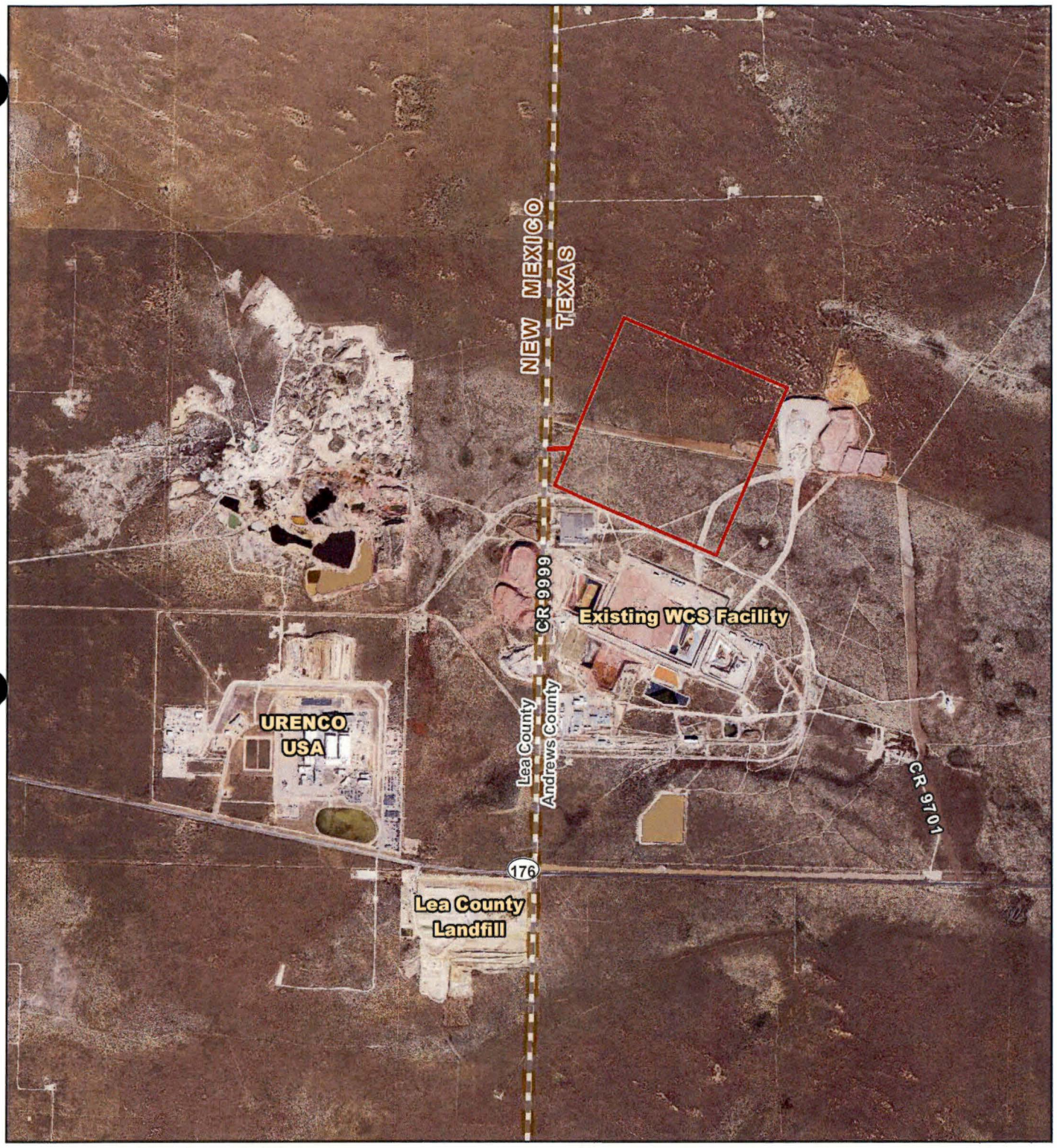
County Clerk

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

Aerial Source: TNRIS (2015)

G:\Projects\WCS\Scenic_Figure C-1_Project Location_20160404.mxd

0 3,000 Feet
0 800 Meters

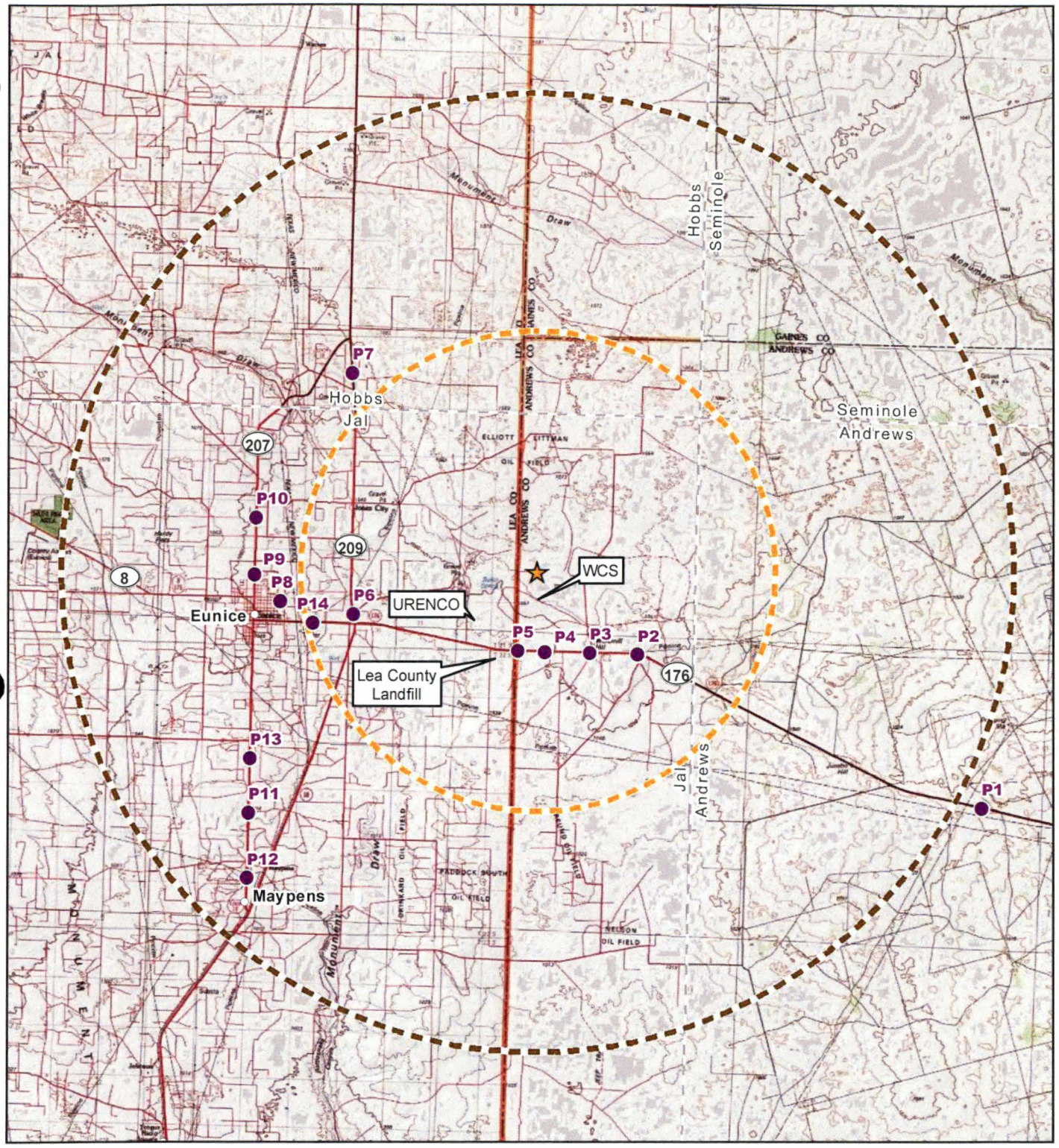
Figure C-1
Project Location

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

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).

Appendix A has been revised in response to RAI SOC-1

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

Appendix A has been revised in response to RAI SOC-1

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

Appendix A has been revised in response to RAI SOC-1

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.

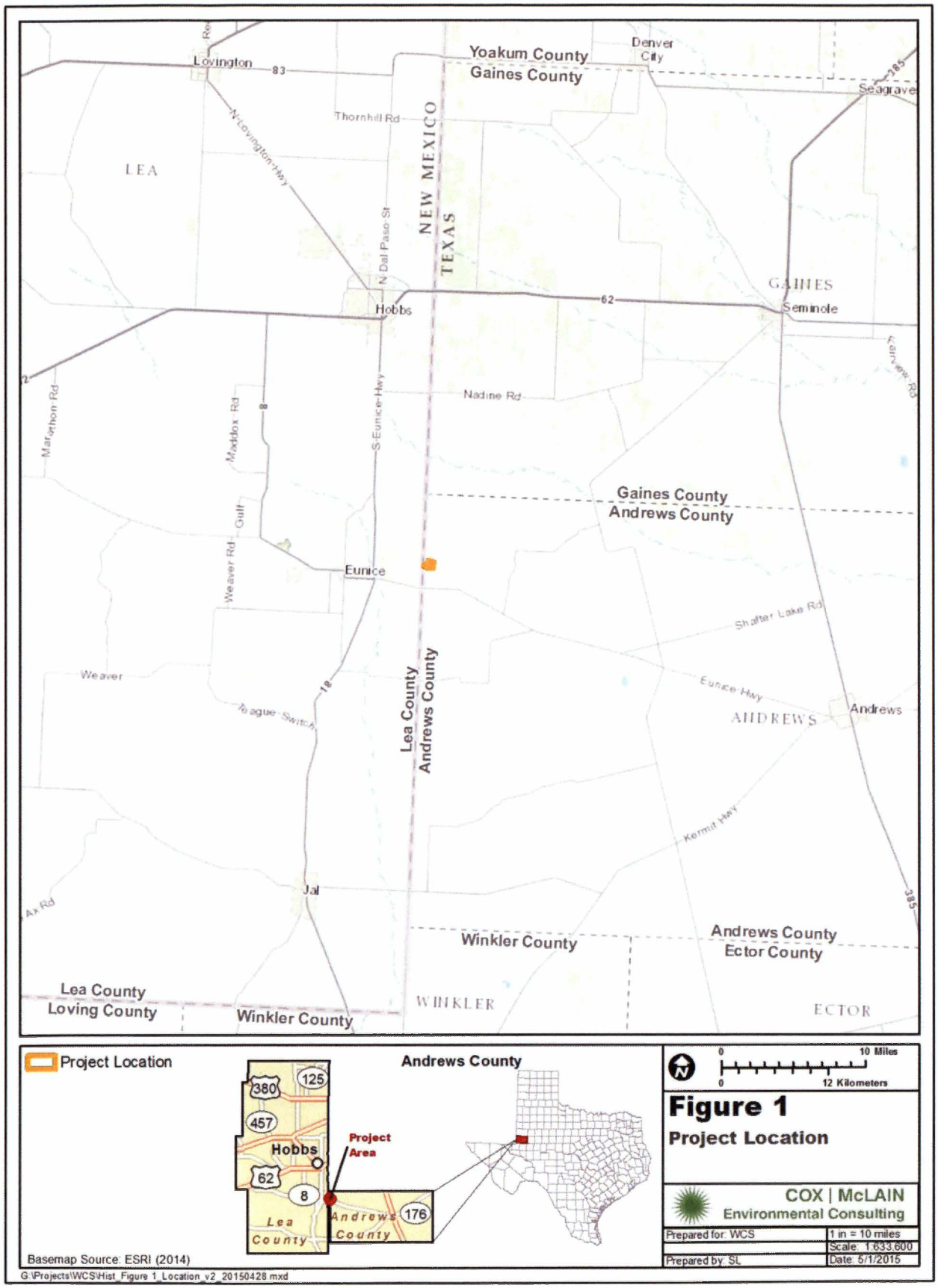
Sincerely,

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



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

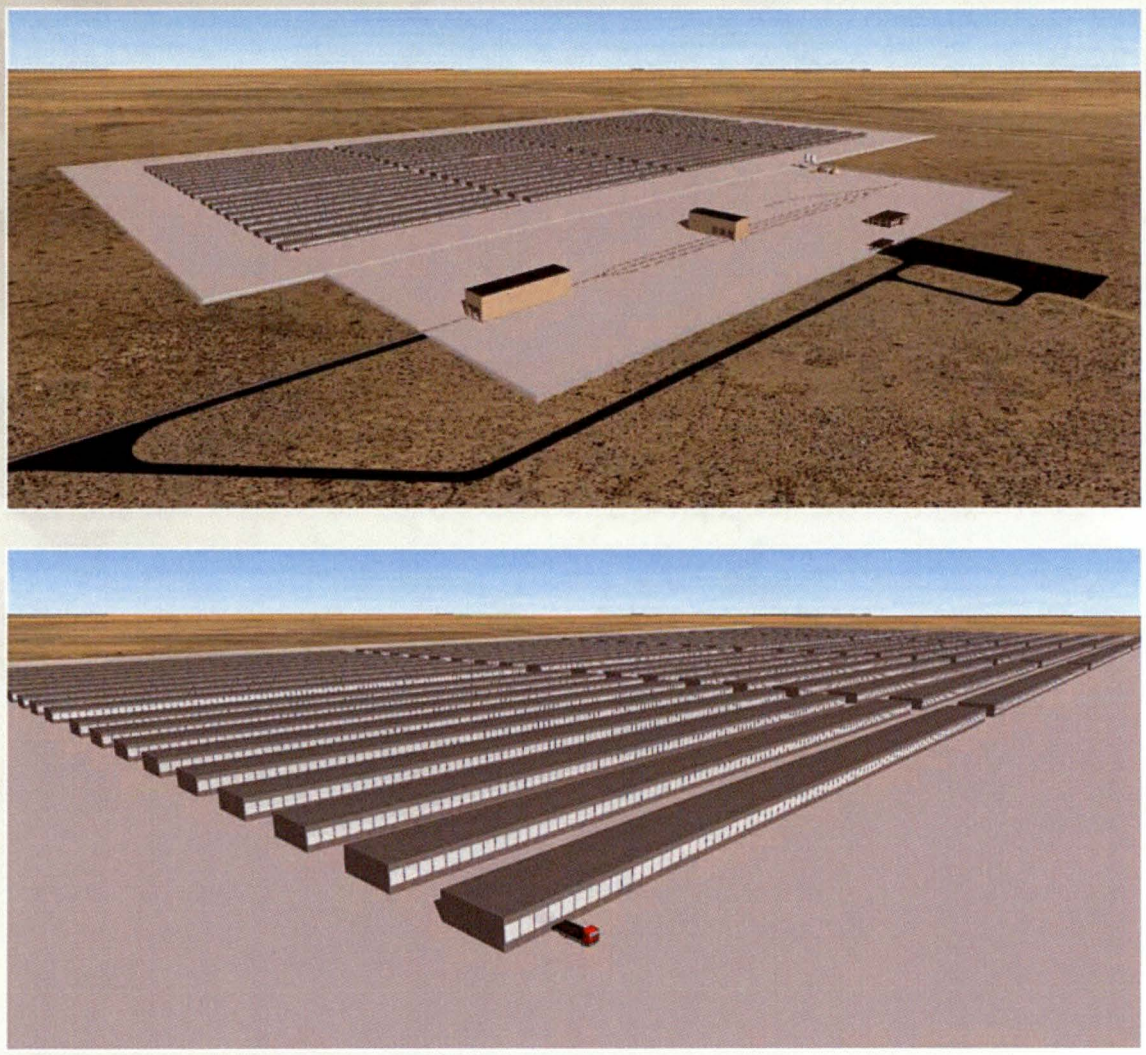


Figure 3
Potential Storage Facility Site Design Renderings

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)

G:\Projects\WCS\Hist_Figure 4_APE_20150428.mxd

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

Appendix A has been revised in response to RAI SOC-1

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**).

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).

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

Appendix A has been revised in response to RAI SOC-1

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

TEXAS HISTORICAL COMMISSION

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 _____ 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.

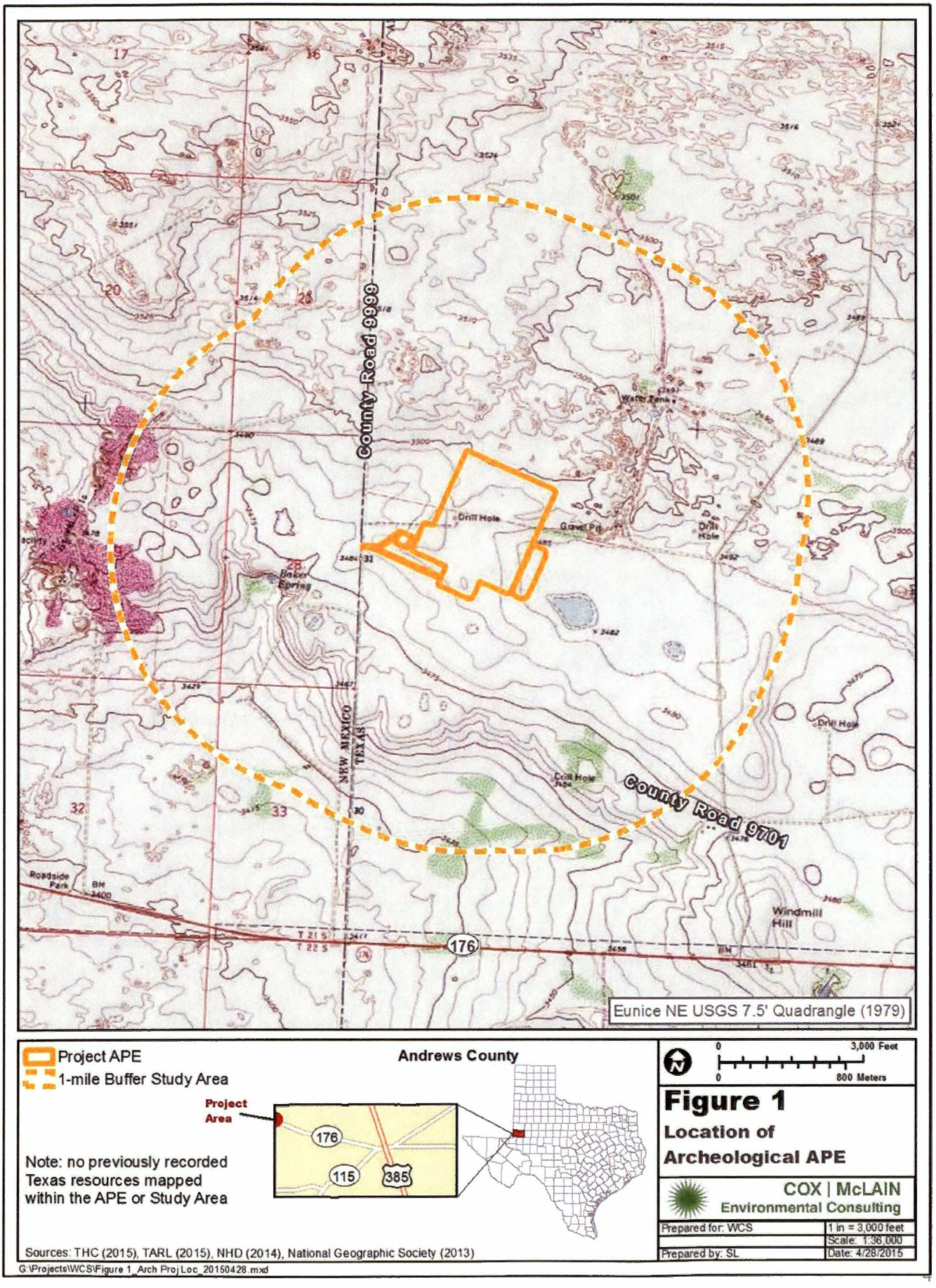
Texas Historical Commission (THC)

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

TRANSMITTAL MEMO

Cox|McLain Environmental Consulting, Inc.
6010 Balcones Drive, Suite 210
Austin, TX 78731
www.coxmclain.com
(512) 338-2223

To: Tiffany Osburn, THC

CC: Scott Kirk, WCS

RECEIVED
JUL 02 2015

From: Chris Dayton, CMEC

Date: 07/02/15

RE: Draft Report Submittal: *Intensive Archeological Survey of the Proposed Waste Control Specialists Spent Nuclear Fuel Consolidated Interim Storage Facility, Andrews County, Texas* (NRC)

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

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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

Appendix A has been revised in response to RAI SOC-1

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

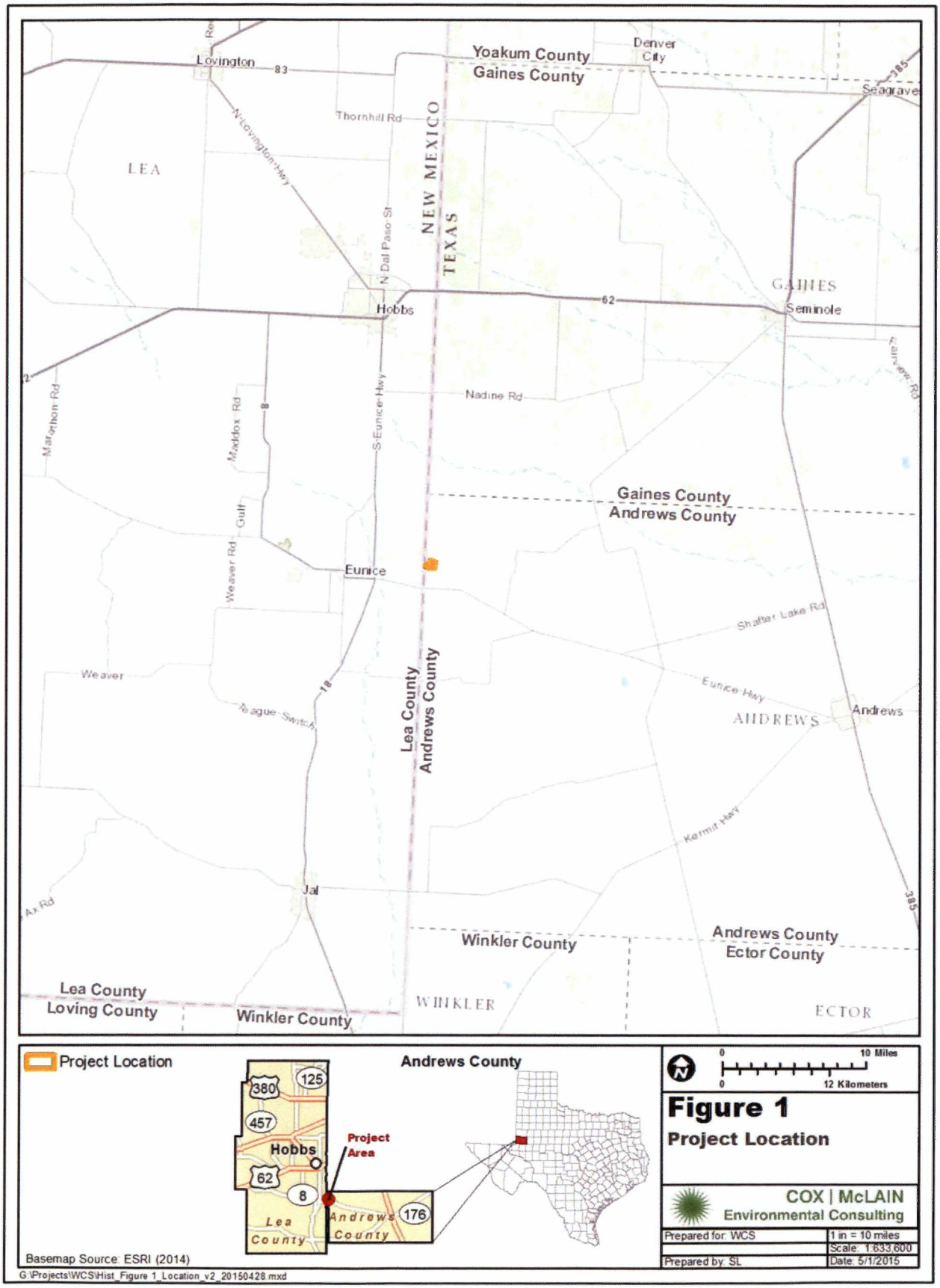
New Mexico Department of Cultural Affairs (NMDCA)

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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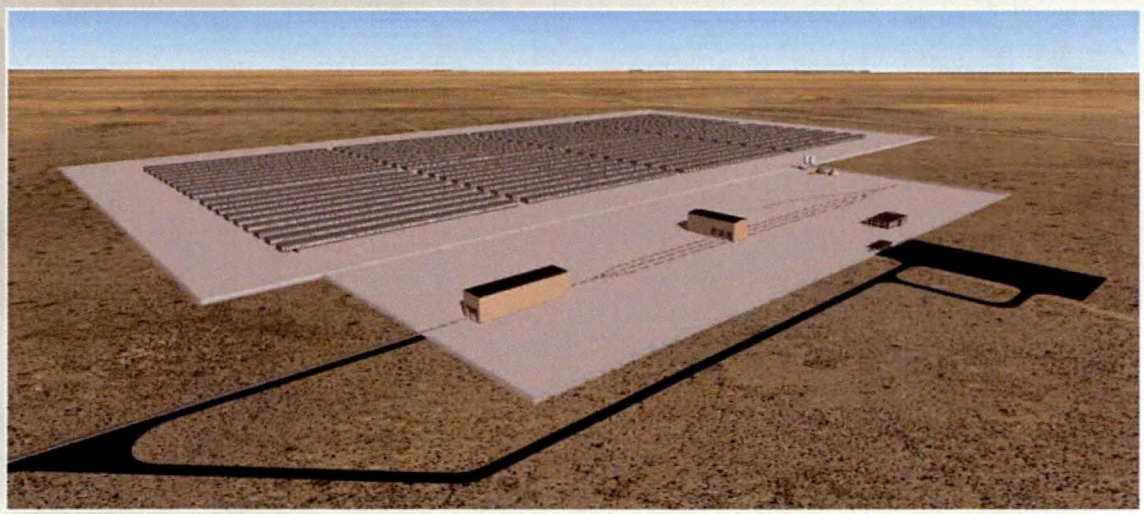
Appendix A has been revised in response to RAI SOC-1

AMERICA'S NUCLEAR SOLUTION

POTENTUAL ISFSI SITE RENDERINGS



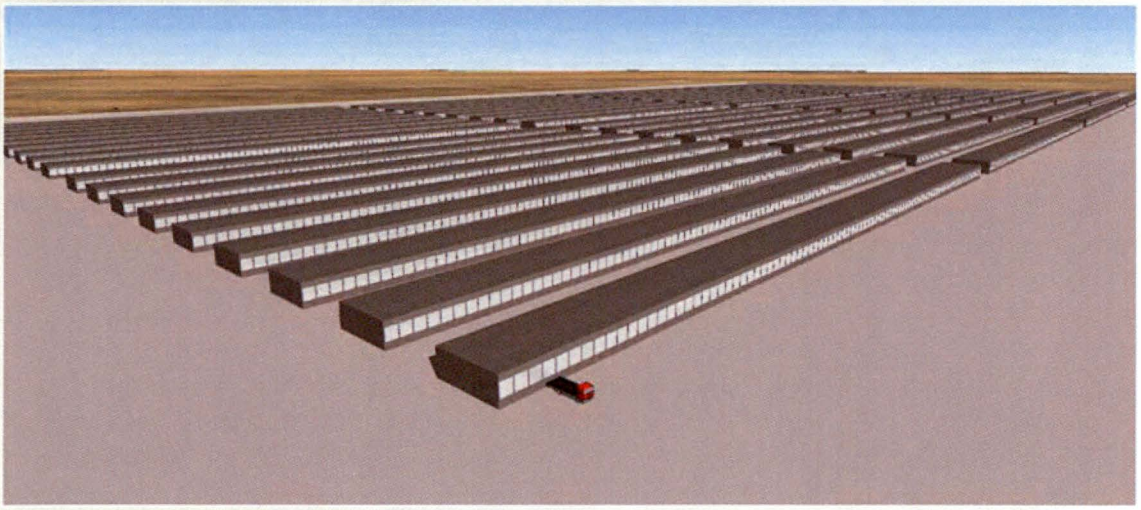
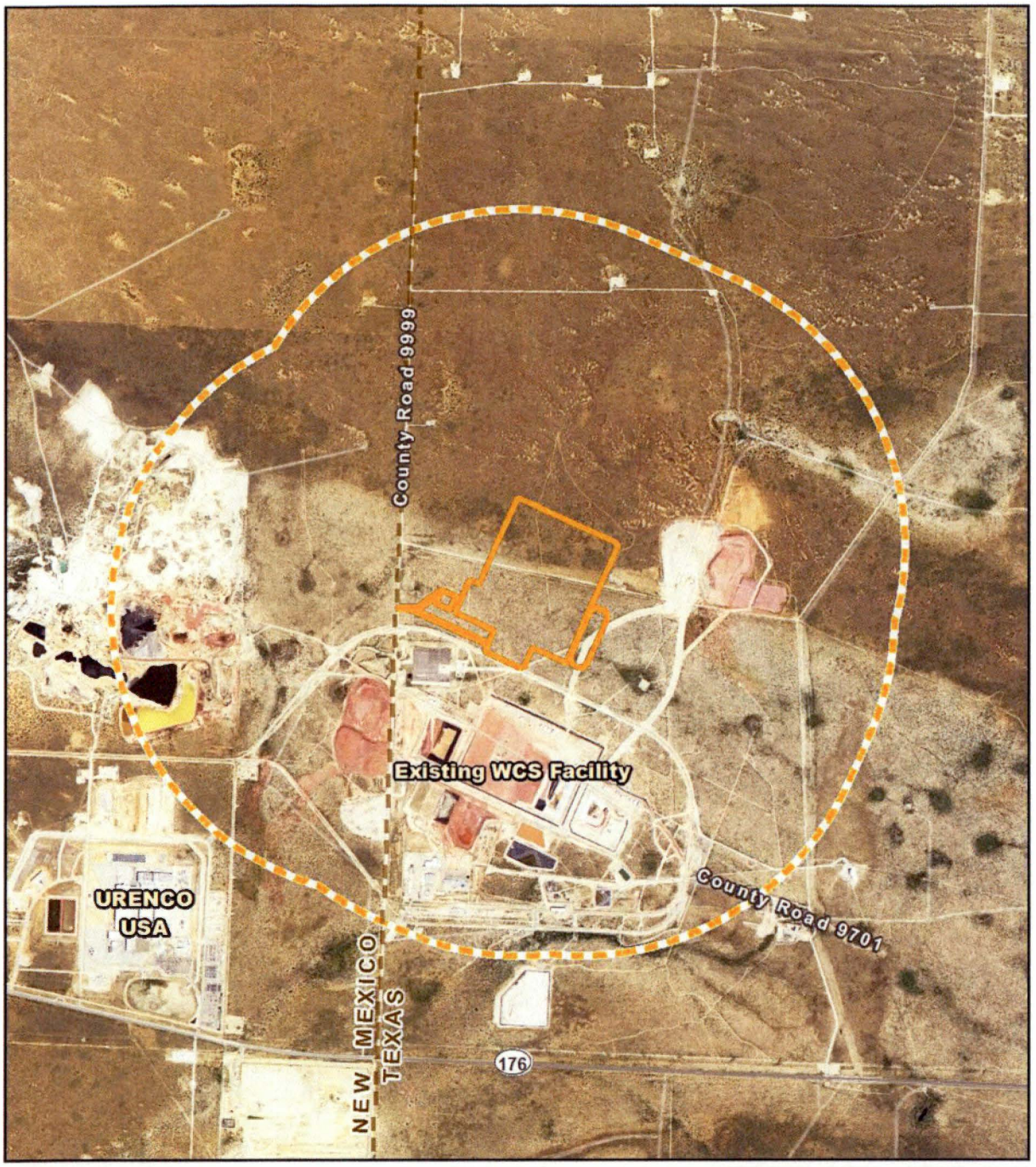


Figure 3
Potential Storage Facility Site Design Renderings

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)

G:\Projects\WCS\Hist_Figure 4_APE_20150428.mxd

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

Appendix A has been revised in response to RAI SOC-1

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**).

Appendix A has been revised in response to RAI SOC-1

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

Bob Estes Ph.D.
HPD Staff Archaeologist

Appendix A has been revised in response to RAI SOC-1

CUMULATIVE IMPACTS (CI)

RAI CI-1

Identify and describe past, present, and reasonably foreseeable future actions that may result in a potential for cumulative environmental impacts within an 80-km [50-mi] radius of the proposed CISF.

ER Section 2.6 provides a description of present actions within a 48-km [30-mi] radius of the proposed CISF that have a potential for cumulative environmental impacts. However, other past, present, and reasonably foreseeable future actions within and outside an 80-km [50-mi] radius of the proposed CISF have the potential for cumulative environmental impacts. For example, oil and gas development and production activities, livestock grazing, renewable energy projects (e.g., wind and solar farms), and a number of reasonably foreseeable future actions (e.g., the proposed Eddy Lea Energy Alliance/Holtec CISF, the Ochoa Potash Mine Project, and the DK Disposal E & P Landfill and Processing Facility) all have the potential for cumulative environmental impacts. The requested information is needed to support the NRC staff's evaluation of cumulative impacts in the EIS.

This additional information is needed in accordance with 10 CFR 51.45(c), which requires that the ER contain an analysis of cumulative impacts that may result from the proposed action.

Response to RAI CI-1:

New ER Section 4.15 has been added to address past, present, and reasonably foreseeable future actions within and outside an 80-km [50-mi] radius of the proposed WCS CISF. This includes such activities as oil and gas development and production activities, livestock grazing, renewable energy projects, the proposed Eddy Lea Energy Alliance/Holtec CISF, the Ochoa Potash Mine Project, and the CK Disposal E & P Landfill and Processing Facility. It also includes current and proposed future activities of the Lea County Landfill Facility, proposed Sundance West Surface Waste Management Facility, proposed Rice Operating Company Railroad Bore Easement (for a saltwater disposal pipeline), proposed Sprint Andrews County Disposal Facility, permitted OWL Landfill Services LLC Facility, Urenco USA National Enrichment Facility, Department of Energy Waste Isolation Pilot Plant, and International Isotopes Fluorine Products Inc. licensed but unbuilt Depleted Uranium Deconversion Plant (FEP/DUP). Potential cumulative impacts to the resource areas previously discussed in the ER are also discussed.

New ER Tables 4.15-1, 4.15-2, and 4.15-3 have been added to provide information on cumulative impacts to (1) land use, (2) nuclear-related transportation, and (3) cumulative radiological doses to the maximally exposed individual resulting from past, present, and reasonably foreseeable future actions within and outside an 80-km [50-mi] radius of the proposed WCS CISF, respectively.

New ER Figures 4.15-1, 4.15-2, 4.15-3, 4.15-4, 4.15-5, 4.15-6, and 4.15-7 have been added to provide information on the (1) road transportation, (2) projects and facilities, (3) land use, (4) land cover, (5) location of proposed Sundance West Surface Waste Management Facility, (6) location of proposed Sprint Andrews County Disposal Facility, and (7) location of proposed Holtec Hi-Store CIS Facility within the 50-miles Region of Interest, respectively.

ER Section 4.0 has been revised to refer to New ER Section 4.15, and ER Section 9.0 has been updated with new references discussed in Section 4.15.

Impact:

ER Section 4.0 and 9.0 have been revised, and ER Section 4.15, ER Tables 4.15-1, 4.15-2, and 4.15-3, and ER Figures 4.15-1, 4.15-2, 4.15-3, 4.15-4, 4.15-5, 4.15-6, and 4.15-7 have been added as described in the response.

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

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

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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

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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.

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.*

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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.

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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

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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).

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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

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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

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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.

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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

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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

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(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.

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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.*

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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

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

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.

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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 CISF 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	4.3×10^{-2}	4.3×10^{-4}	WCS CSIF ER
HOLTEC HI-STORE CIS	2.5	2.5×10^{-2}	Holtec 2019
WIPP	0.24	2.4×10^{-3}	DOE 2015
URENCO (UUSA) NEF	1.3×10^{-1}	1.3×10^{-6}	NRC 2005b
IIFP FEP/DUP	1.4×10^{-2}	1.4×10^{-5}	NRC 2005
Total	**2.8**	**2.8×10^{-3}**	

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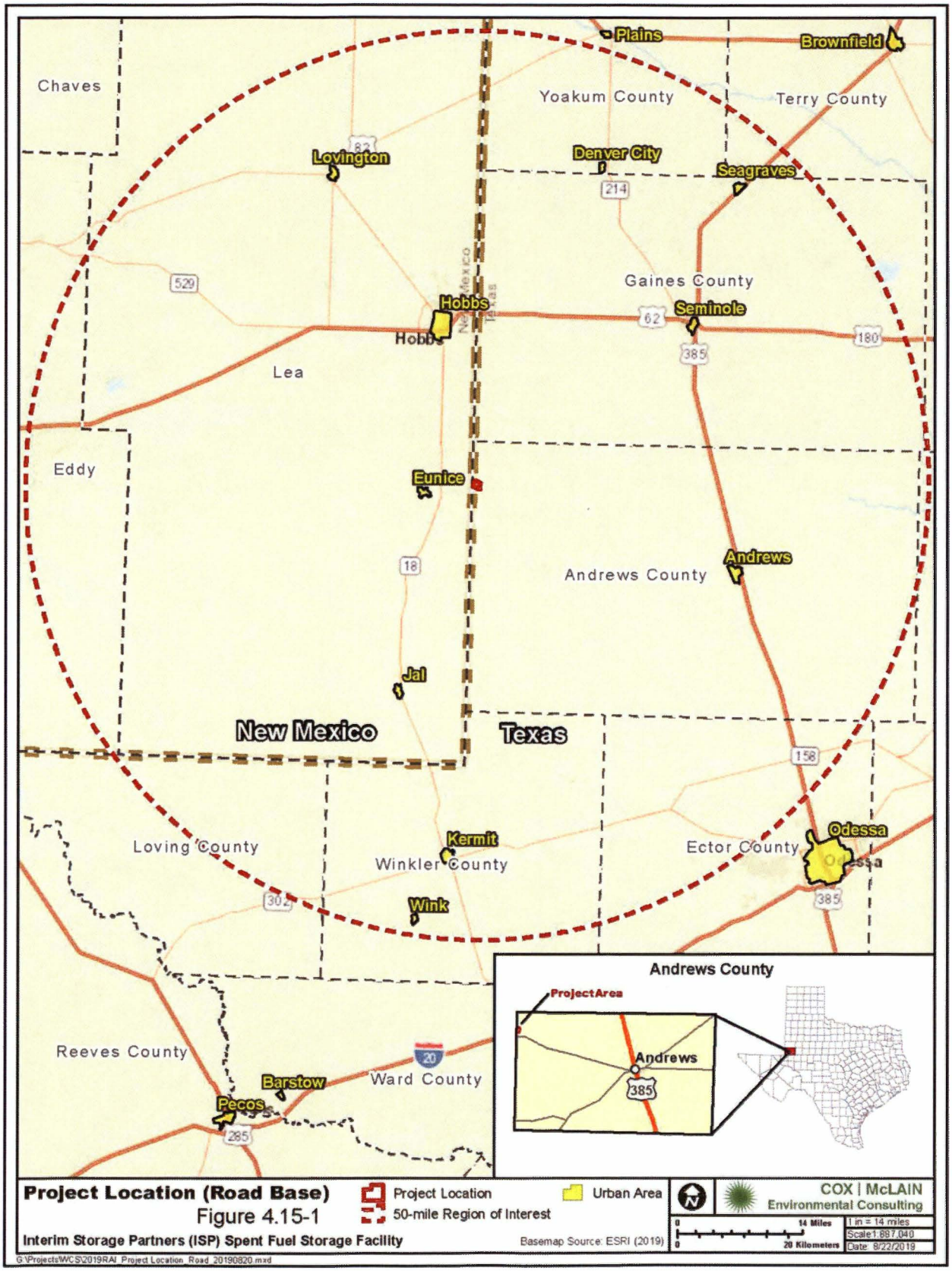

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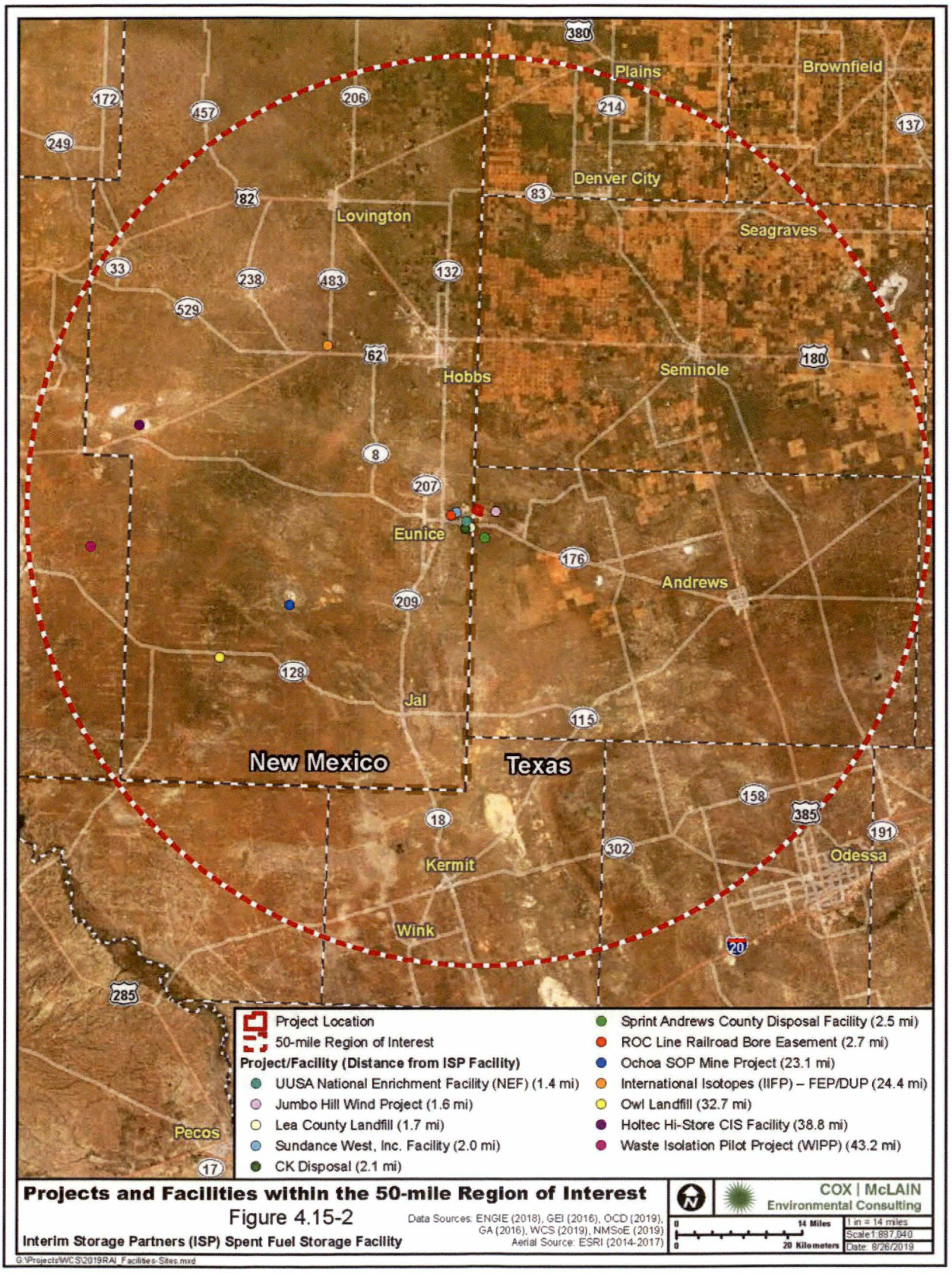

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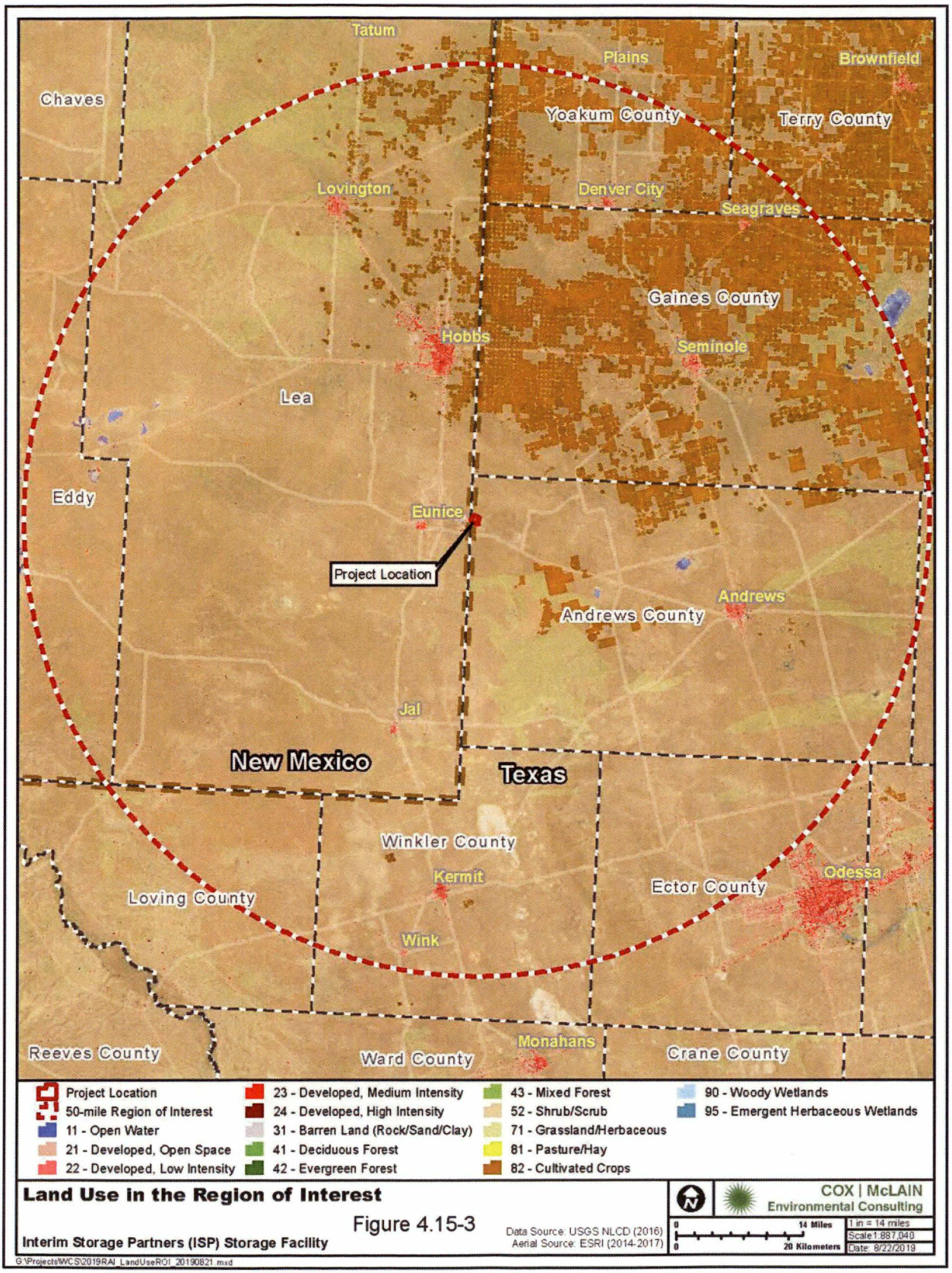

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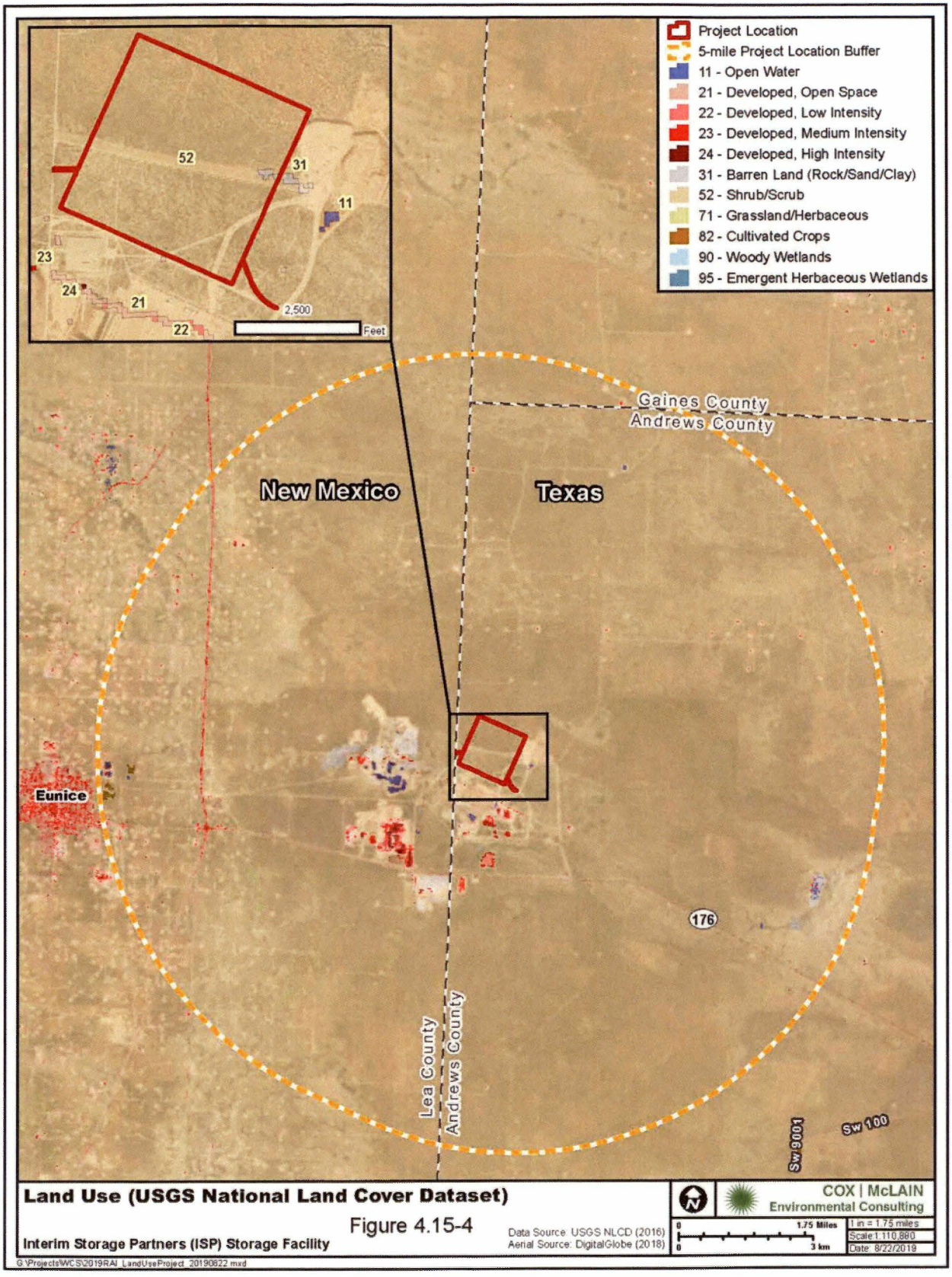

Figure 4.15-4

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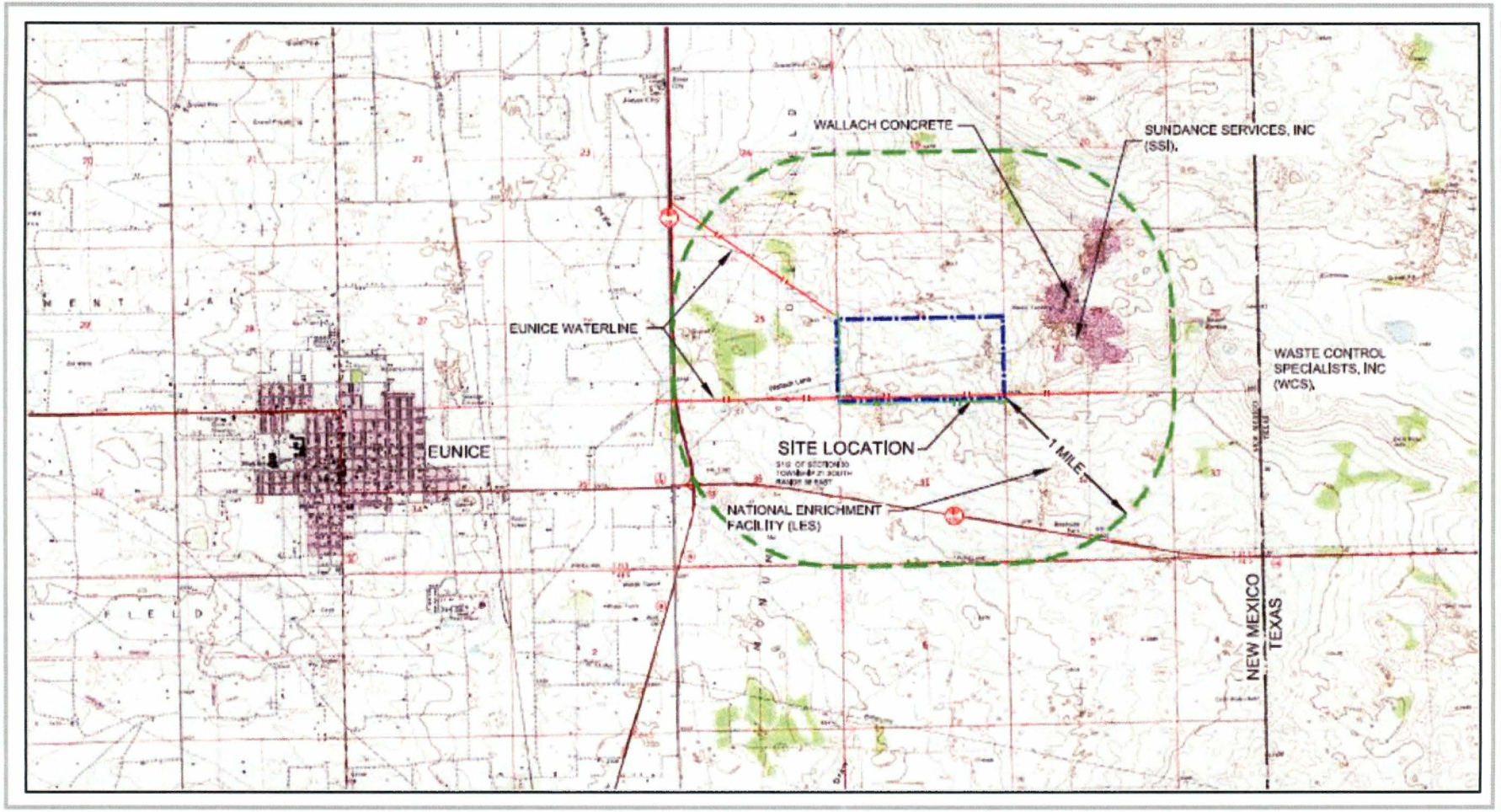

Figure 4.15-5 Location of Proposed Sundance West Surface Waste Management Facility (GEI 2016)

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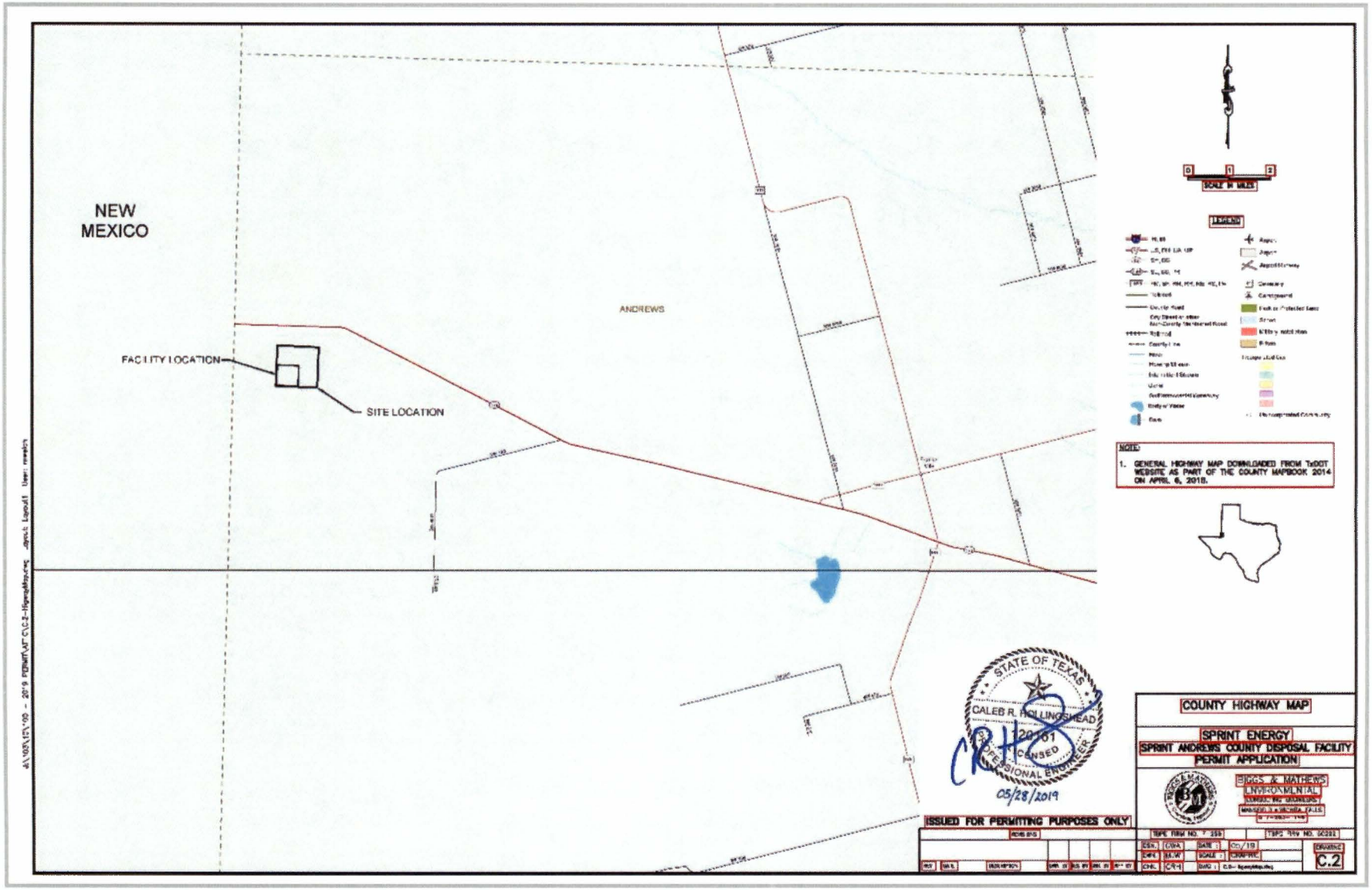

Figure 4.15-6 Location of Proposed Sprint Andrews County Disposal Facility (BME 2019)

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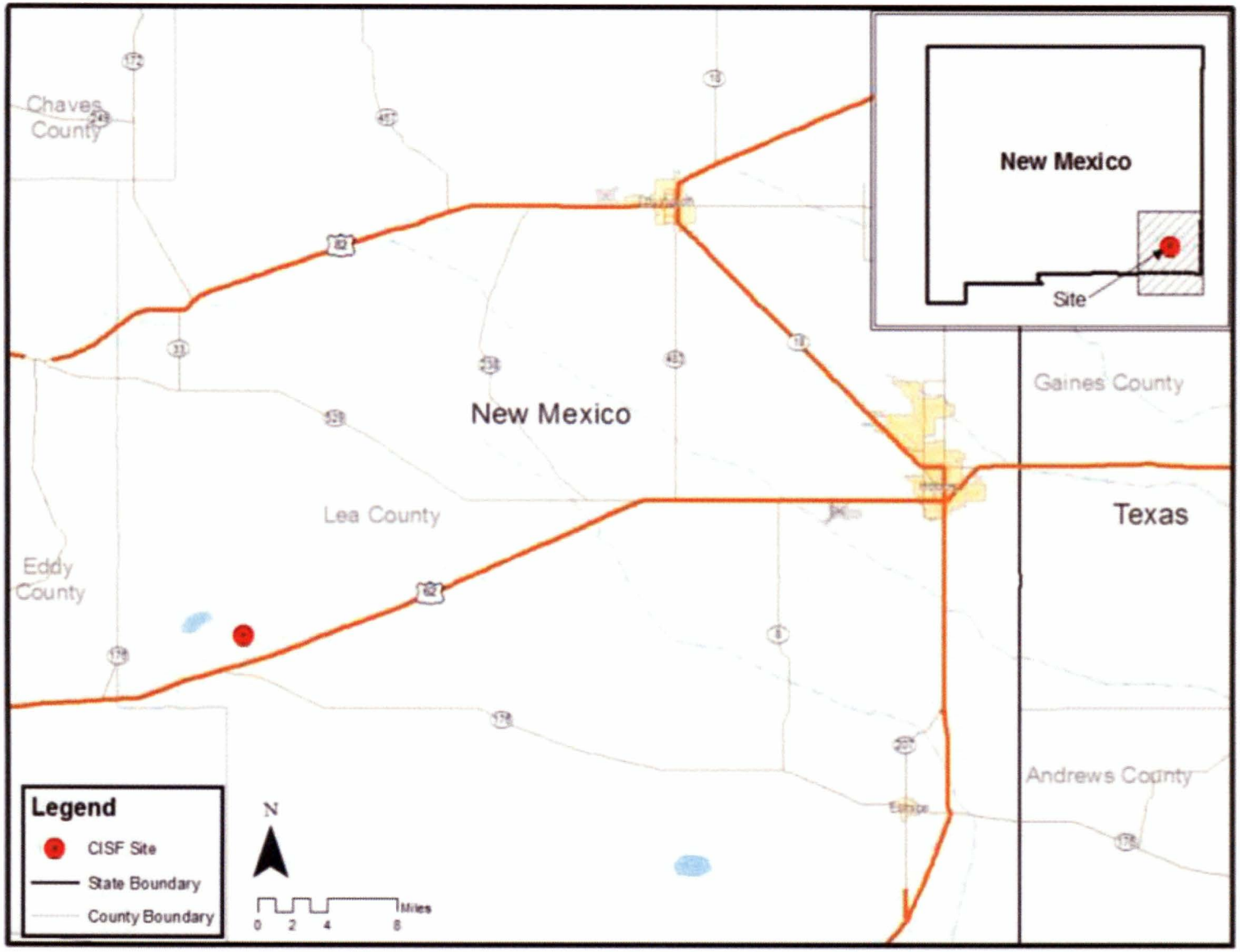

Figure 4.15-7 Location of Proposed Holtec Hi-Store CIS Facility (Holtec 2019)

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CHAPTER 9

LIST OF REFERENCES

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RAI CI-2

Provide additional information to support the analysis of cumulative impacts of both nuclear and non-nuclear past, present, and reasonably foreseeable future activites for all resource areas.

The analysis of cumulative impacts presented in ER Section 2.6 is limited to brief statements regarding (i) air quality attributable to expansion of the WCS-Controlled Compact Waste Facility and Federal Waste Facility, operations at Permian Basin Materials, and manufacture of concrete at WCS's existing concrete batch plant; (ii) competition for and use of aggregate, crushed rock, and other mineral resources; and (iii) radiological doses attributable to the nearby URENCO USA uranium enrichment facility and WCS's low-level radioactive waste disposal facilities. To support the NRC staff's analysis of the potential cumulative impacts of the proposed action, address potential cumulative impacts relevant to all resource areas, including an evaluation with supporting information of the environmental impacts of nuclear acitivities (e.g., URENCO USA, WCS's low-level radioactive waste facilities, and the proposed Eddy Lea Energy Alliance/Holtec CISF) and non-nuclear activities (e.g., oil and gas exploration and development, potash mining, and livestock grazing) within an 80-km [50-mi] radius of the proposed CISF. The requested information is needed to support the NRC staff's evaluation of cumulative impacts in the EIS.

This additional information is needed in accordance with 10 CFR 51.45(c), which requires that the ERs contain an analysis of cumulative impacts that may result from the proposed action.

Response to RAI CI-2:

Because cumulative impacts result from direct and indirect impacts, the resources that would be minimally affected by the proposed CISF are listed in RAI CI-1, followed by the resources that would potentially result in more than minimal impacts. Those are the resources that could potentially contribute to cumulative impacts. A discussion has been provided in RAI Response CI-1 considering facilities in the Region of Influence and their potential to contribute to cumulative impacts to resources affected by the CISF. New Section 4.15 was added to the Environmental Report as part of the response to RAI CI-1.

Impact:

No change as a result of this RAI.

COST–BENEFIT (CB)

RAI CB-1

Revise the quantitative cost and benefit estimates in ER Chapter 7 to include discounting and provide details and assumptions (e.g., a project schedule by year specifying when activities occur) or provide a basis for not doing so for any of the cost factors.

Discounting was not used for any of the estimated costs and benefits of the proposed action and no-action alternative presented in ER Chapter 7. ER Section 7.2.1 explains that discounting was not used because ISFSI operations include substantial labor, technological, and regulatory compliance expenditures, and it was assumed that these expenses remain relatively constant. The justification for not discounting appears to focus only on ISFSI operational costs associated with the eliminated storage costs presented in ER Section 7.2.1. However, this only represents one of the three key cost factors presented in the analysis and the nature of the other two costs is somewhat different than the ISFSI operation cost. The cost for the development of the CISF and relocation of SNF described in ER Section 7.3 includes significant capital and infrastructure costs (see ER Table 7.4-2). The cost-benefit analysis for the repurposed land in ER Section 7.2.2 accounts for the future estimated value of the land at decommissioned nuclear-purposed land once the license is terminated (see ER Table 7.2-6). The net benefit calculation in ER Section 7.4.1 uses the undiscounted values from all three of these key qualitative estimates. Discounting is appropriate when analyzing this proposed action because of the 40-year timeframe and the nature of some of the costs. Specifically, discounting the quantitative estimates is needed to support the description of the costs and benefits in the NRC's EIS. Discounting requires specifying the timing (i.e., the specific years) in which activities occur. Key "high dollar" activities include the construction, operation, and decommissioning of the CISF as well as the SNF transportation. The details and assumptions associated with the calculation (e.g., a project schedule by year specifying when activities occur) are needed to support NRC's staff's understanding of how the discounting calculations were performed and for evaluation of cost and benefits of the proposed action and no action alternative.

The requested information is needed in accordance with 10 CFR 51.45(c), which requires that the ER include consideration of the benefits and costs of the proposed action and its alternatives as well as contain sufficient data to aid the NRC in its development of an independent analysis.

Response to RAI CB-1:

The costs and benefits for the proposed action have been recalculated to take into account revisions to the spent nuclear fuel (SNF) transportation schedule, plant closure assumptions, and updated cost estimates for storing SNF. Additionally, the benefit and cost estimates were recalculated using a discount rate of 3.4 percent, which is based on a December 2018 update to the treasury rates, and an inflation rate of 2.4 percent, based upon the latest Congressional Budget Office (CBO) forecast. These assumptions align with the method described in the U.S. Department of Energy's (DOE) 2016 report, *Cost Implications of an Interim Storage Facility in the Waste Management System.* The analysis did not assume cost escalations that would exceed the rate of inflation. The revised benefit-cost ratio of the proposed action is estimated to be 1.73. Additional details about the assumptions in the revised estimates are provided in the paragraphs below.

SNF Storage Cost Revisions

The assumed costs of storing SNF were updated to 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 SNF 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. [

]

Transportation Schedule for SNF

The SNF transportation schedule and associated assumptions have been updated to be congruent with revisions to the Transportation section of the ER in response to RAIs TR-1 through TR-10. Additional details about the transportation schedule, which affects the timing of the proposed action's costs and SNF storage costs, are provided in the response to RAI CB-2.

Plant Shutdown Schedule

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 also likely that other plants will choose to shutdown prior to reaching the end of their licensed operating period. Additional details about the plant shutdown schedule, which affects the timing of the proposed action's costs and SNF storage costs, are provided in the response to RAI CB-2.

Revised Benefits of the Proposed Action

The revised estimate of benefits from the proposed action, calculated by year, is found in new ER Table 7.2-2, based upon the new assumptions for fuel storage costs and discounting. A detailed description of storage cost by year and by plant is provided in the response to RAI CB-3. 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. ER Table 7.2-14 shows the discounted value of land at each plant.

Revised Benefits and Costs of the Proposed Action

The revised estimate of costs from the proposed action were recalculated and are presented by year and by expense category in ER Table 7.4-2. All costs in the table have been discounted.

The following summarizes the changes to Chapter 7 of the ER.

The modification of assumptions used in the analysis resulted in a number of changes to the document. All values in the benefit-cost analysis were updated from 2015 to 2018 dollars, adjusted by the consumer price index from the U.S. Bureau of Labor Statistics. The revision of cost estimates to 2018 dollars affected the following tables:

- Table 7.2-2 (remains Table 7.2-2) and Table 7.2-3 (remains Table 7.2-3)
- Table 7.2-4 (now Table 7.2-12) , Table 7.2-5 (now Table 7.2-13), and Table 7.2-6 (now Table 7.2-14)
- Tables 7.3-1 through 7.3-7 (remain Tables 7.3-1 through 7.3-7)
- Table 7.3-9 and Table 7.3-10 (remain Table 7.3-9 and Table 7.3-10)
- Tables 7.4-1 and 7.4-2 (remain Tables 7.4-1 and 7.4-2)
- Tables 7.4-3 (now Table 7.4-6), Tables 7.4-4 (now Table 7.4-7), Tables 7.4-5 (now Table 7.4-8), and Tables 7.4-6 (now Table 7.4-9)

The following tables are added:

- Table 7.2-4: Assumed Schedule of SNF Canister Transfers from Plant Site to CISF
- Table 7.2-5: Storage Cost Assumptions in the Benefit Cost Analysis
- Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted (2018 $)
- Table 7.2-7: Estimated Indirect Impacts from Proposed Operations, 2020-2059 (2018 $)
- Table 7.2-8: Estimated Induced Impacts from Proposed Operations, 2020-2059 (2018 $)
- Table 7.2-9: Estimated Total Impacts from Proposed Operations, 2020-2059 (2018 $)
- Table 7.2-10: Summary of Economic Impacts from Operations, 2020-2059 (2018$)
- Table 7.2-11: Local, State, and Federal Estimated Tax Impacts of Construction (2018 $)
- Table 7.4-3: Estimated Costs to Operate Phase 1 of the Proposed Action over 40-Year Licensure, Discounted
- Table 7.4-4: Summary of Benefit Cost Analysis Assuming Market Value of Land, Discounted
- Table 7.4-5: Summary of Benefit Cost Analysis without Including Market Value of Land, Discounted

Impact:

ER Chapter 7, including updated and new tables and figures, has been revised as described in the response.

RAI CB-2

Clarify and supplement the SNF transportation schedule and associated assumptions as appropriate in the ER to

- Ensure the SNF transportation schedule and associated assumptions used for the cost benefit analysis are consistent with this information, as described in other parts of the ER or revise the analyses accordingly.
- To the extent it is known, provide greater detail for the assumptions for the shipment of SNF to the proposed CISF in future potential expansions of the CISF beyond the currently proposed 5000 MTU's ER Section 7.2.1 describes that SNF transport occurs over a 31 year period. ER Section 4.2.7.1 states that the SNF would be transported over a 20 year period, assuming up to 200 canisters of SNF being transported to the CISF annually. The detailed assumptions for the SNF transport in ER Section 7.2.1 address the initial transportation at a greater level of detail than the potential future expansion (e.g., ER Table 7.2-3).

This information is needed in accordance with 10 CFR 51.45(b) and 10 CFR 51.45(c), which require that the ER include a description of the proposed action and sufficient data to aid the NRC in its development of an independent analysis.

Response to RAI CB-2:

The spent nuclear fuel (SNF) transportation schedule and associated assumptions have been updated to be congruent with recent revisions to the Transportation section of the ER.

The assumed schedule of plant shutdowns is based upon the expiration date of each plant's existing permit (see ER Table 7.2-3). Although it is recognized that some plants may seek to extend their operating license, it also likely that other plants will choose to shutdown 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 SNF canisters to the CISF.

The assumed transportation schedule for SNF canisters by year is shown in ER Table 7.2-4. 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 the year. 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 SNF. [

] It is assumed in the analysis that SNF 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 plant sites to achieve cost savings for the federal government. [

]

Table 7.2-3 is added to the ER and provides the assumed shutdown date for each of the 36 facilities (as opposed to the eight shutdown plants in the original table) and the assumed completion date for the removal of spent fuel from the power plant and its transfer to the CISF. Updated ER Table 7.2-4 provides detailed assumptions about the removal of spent fuel from each facility, according to timing (as outlined in ER Table 7.2-3), number of canisters and MTU removed, number of trains required to move the spent nuclear fuel, and the number of plants closed each year.

The revised transportation schedule affects additional tables in the document, which include:

- Table 7.2-2 (remains Table 7.2-2) Estimated Net Benefits of the Proposed Action, Discounted – The costs of SNF storage under the proposed action have changed to reflect the revised transportation schedule. The response to RAI CB-1 provides additional details.

- Table 7.3-2 (remains Table 7.3-2) Estimated Costs of Transportation Infrastructure – the number of rail cars acquired has been updated to reflect the new configuration and number of trains. References to table updated in Section 7.3.2.1.

- Table 7.3-5 (remains Table 7.3-5) Administrative Operating Costs – a train configuration with more cars will require fewer train trips, which reduces the expenses for the train crew's travel and living expenses. References to table updated in Section 7.3.3.1.

- Table 7.3-9 (remains Table 7.3-9) Assumptions for Other Operating Costs – The revised train configuration reduces the total number of trips required to move the fuel canisters. References to table updated in Section 7.3.3.5.

- Table 7.4-2 (remains 7.4-2) Summary of Costs for CISF over 40-Year Licensure, Discounted – Adjustments to the estimated costs in the aforementioned tables are reflected in this summary table.

- Table 7.4-5 (now Table 7.4-8) Summary of Quantified Benefits from CISF over 40-Year Licensure- Adjustments to the estimated costs in the aforementioned tables are reflected in this summary table.

- Table 7.4-6 (now Table 7.4-9) Summary of Costs for Eliminated Alternative CISFs over 40-Year Licensure, Discounted - Adjustments to the estimated costs in the aforementioned tables are reflected in this summary table for alternate CISF sites.

Additional tables have been added to the ER, which are affected by the changes requested under CB-2. The table numbering refers to the new Table numbers.

- Tables 7.2-7 through 7.2-11 have been added to the ER to provide additional detail on the assumptions behind spent fuel storage costs. These tables detail storage costs by plant and by each year of the license under the proposed action.

- Table 7.4-3 - Estimated Costs to Operate Phase 1 of the Proposed Action over 40-Year Licensure, Discounted – Table added in response to RAI CB-4. Incorporates the revised transportation schedule.

- Table 7.4-9 - Summary of Costs for Eliminated Alternative CISFs over 40-Year Licensure, Discounted - Incorporates the revised transportation schedule.

- Figure 7.2-1 - Federal Expenditures No Action Scenario vs. Proposed Action Scenario, Discounted - Incorporates the revised transportation assumptions.

Impact:

ER Chapter 7, including updated and new tables and figures, has been revised as described in the response.

RAI CB-3

Provide additional information, supplement the calculation and associated assumptions for the total SNF storage costs presented in ER Table 7.2-2. This should include the following:

- Provide the detailed calculation and associated assumptions for the total SNF storage cost for both potential future expansions (all eight phases) and no action currently presented in ER Table 7.2-2.
- Supplement the current information in ER Table 7.2-2 to provide the cost estimates for implementing just phase 1 (i.e., the initial license request) and the detailed calculation and associated assumptions or provide a basis for not doing so.
- Supplement ER Table 7.2.2 to also include cost estimates, which assume no additional reactors are shutdown (i.e., use an annual cost of storing SNF for an operating reactor) and revise the cost benefit analyses in ER Chapter 7 accordingly or provide a basis for not doing so.
- Identify the reference for the statement in ER Section 7.2 that by 2053 there will be a total of 71 shutdown reactor sites in the United States according to NRC data (see AIN-1).

ER Table 7.2-2 contains the assumed total cost of storing SNF storage at the various generation sites over the 40 years (i.e., the proposed CISF 40-year license period) for both the full build out (i.e. all eight phases) (with a CISF) and no-action alternative (without a CISF). The difference between these two values is the avoided reimbursement cost. ER Section 7.2.1 provides a general description on how these values were calculated based on the transition of SNF from the current storage locations to the proposed ISP site. However, the ER does not provide sufficient information for the NRC staff to determine exactly how the particular values in Table 7.2-2 (and the associated Figure 7.2-1) were calculated. ER Table 7.2-2 also does not provide the cost estimate information for just phase 1 (i.e., the initial license request).

ER Table 7.2-2 assumes an annual cost of storing SNF at each generation site based on this activity occurring at a shutdown reactor. NRC staff requests that this table be supplemented to also include estimates assuming an annual cost of storing SNF based on this activity occurring at an operating reactor (i.e., no additional reactors are shut down). Using an annual storage cost based on a value for an operating reactor could alter the estimated benefit as calculated in ER Table 7.2-2. NRC staff consider this an important component for characterizing the costs and benefits. As requested in this RAI for the current estimate in ER Table 7.2-2, provide the detailed calculation and associated assumptions for the calculation so NRC staff can follow exactly how theses cost estimates were generated. Specifically, this additional information is needed to support NRC staff's description of the total cost for the proposed action and the no-action alternative in the NRC's EIS.

The requested information is needed in accordance with 10 CFR 51.45(c), which requires that the ER include consideration of the benefits and costs of the proposed action and its alternatives as well as contain sufficient data to aid the NRC in its development of an independent analysis.

Response to RAI CB-3:

The costs and benefits for the proposed action have been recalculated to take into account revisions to the spent nuclear fuel (SNF) transportation schedule, plant closure assumptions, and updated cost estimates for storing SNF. Additionally, the benefit and cost estimates for the proposed action were recalculated using a discount rate of 3.4 percent, which is based upon a December 2018 update to the treasury rates, and an inflation rate of 2.4 percent, which is based upon the latest Congressional Budget Office (CBO) forecast. These assumptions align with the method used in the U.S. Department of Energy's (DOE) 2016 report, *Cost Implications of an Interim Storage Facility in the Waste Management System*. The analysis did not assume cost escalations that would exceed the rate of inflation.

SNF Storage Cost Revisions

The assumed costs of storing SNF were updated to 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 (SNF) 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 (see ER Table CB-3-1). 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. [

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Table CB-3-1
Summary of Assumptions for Benefit Cost Analysis

AMOUNT	ASSUMPTIONS
$1,060,703	Plant in operation/Annual cost of storing SNF in pool post-closure [ ]
$10,607,030	Spent fuel transferred to dry storage to continue cooling over initial post-closure period for [ ]
$10,607,030	Annual cost of dry storage of SNF beyond initial post-closure period, at which point it is available for removal [ ]
25	Maximum canisters moved during Year 3 of CISF accepting SNF
100	Maximum canisters moved during Year 4 of CISF accepting SNF
200	Maximum canisters moved to CISF during Year 5 and subsequent years
36	Average number of canisters moved from initial eight closed plants
110	Average number of canisters moved from all closed plants after initial eight

Transportation Schedule for SNF

The SNF transportation schedule and associated assumptions have been updated to be congruent with recent revisions to the Transportation section of the ER. Additional details about the transportation schedule, which affects the timing of the proposed action's costs, are provided in the response to RAI CB-2.

Plant Shutdown Schedule

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 also likely that other plants will choose to shutdown prior to reaching the end of their licensed operating period. Additional details about the plant shutdown schedule, which affects the timing of the proposed action's costs, are provided in the response to RAI CB-2.

Revised Benefits and Costs of the Proposed Action

A summary of the revised estimate of benefits from the proposed action, calculated by year, is found in ER Table 7.2-14 updated in RAI CB-1. ER Table 7.2-5 provides a key to the colored coding of ER Tables 7.2-6 through 7.2-11, which provide the detailed assumed costs of SNF storage under the No Action scenario and the Proposed Action scenario, respectively.

ER Table 7.2-6 provides the detailed assumptions of the storage costs by plant and by year under the No Action scenario. ER Table 7.2-7 provides the assumptions of storage costs by plant and year under the Proposed Action scenario for all eight phases of the CISF.

The estimated storage costs of the No Action scenario, assuming only implementing Phase 1 are provided in ER Table 7.2-8. The estimated storage costs of the Proposed Action scenario, assuming only implementation of Phase 1 are provided in ER Table 7.2-9. The associated assumptions for calculating these values are outlined in this RAI (CB-3), as well as RAI CB-2.

The estimated storage costs of the No Action scenario, which assumes only implementing Phase 1 and that no additional power plants are shut down (in addition to those already shutdown) is provided in ER Table 7.2-10. Table 7.2-11 shows the assumed storage costs by facility for Phase 1 only and assuming no additional plant closures. The estimated storage costs of the Proposed Action scenario, assuming only implementation of Phase 1 are provided in ER Table 7.2-8. The associated assumptions for calculating these values are outlined in this RAI (CB-3), as well as RAI CB-2.

The sentence in ER Section 7.2 that indicates that by 2053 there will be a total of 71 shutdown reactor sites in the United States according to NRC data (see AIN-1) is removed.

The changes to the spent fuel storage cost assumptions used in the analysis (summarized in Table CB-3-1), resulted in a number of tables being added to Chapter 7 of the ER, which include:

- New ER Table 7.2-5: Storage Cost Assumptions in the Benefit Cost Analysis – This table details the assumptions for cost incurred by the federal government to store spent fuel at the power plant.

- New ER Table 7.2-6: Assumed Storage Costs by Facility of No Action, Discounted – Provides detailed information about the assumed storage costs incurred by the federal government under the No Action Scenario, by plant.

- New ER Table 7.2-7: Assumed Storage Costs by Facility of Proposed Action, Discounted - Provides detailed information about the assumed storage costs incurred by the federal government under the Proposed Action Scenario for all eight phases.

- New ER Table 7.2-8: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Discounted - Provides detailed information about the assumed storage costs incurred by the federal government under the No Action Scenario for Phase 1 of the CISF.

- New ER Table 7.2-9: Assumed Storage Costs by Facility of No Action – Phase 1 Only, Discounted - Provides detailed information about the assumed storage costs incurred by the federal government under the Proposed Action Scenario for Phase 1 of the CISF.

- New ER Table 7-2.10: Assumed Storage Costs by Facility of No Action and No Additional Plant Closures, Discounted - Provides detailed information about the assumed storage costs incurred by the federal government under the No Action Scenario for Phase 1 of the CISF and assuming currently operating plants do not shutdown.

- New ER Table 7.2-11: Assumed Storage Costs by Facility of Phase 1 and No Additional Plant Closures, Discounted - Provides detailed information about the assumed storage costs incurred by the federal government under the Proposed Action Scenario for Phase 1 of the CISF and assuming currently operating plants do not shutdown.

- New ER Table 7.4-4: Summary of Benefit Cost Analysis, Discounted – Summarizes benefits and costs for each of the three scenarios and provide the benefit/cost ratio.

- New ER Table 7.4-5: Summary of Benefit Cost Analysis without Including Market Value of Land, Discounted – Summarizes benefits and costs for each of the three scenarios without including the market value of land and provides the benefit/cost ratio.

Impact:

ER Chapter 7, including updated and new tables and figures, has been revised as described in the response.

RAI CB-4

Provide additional information, supplement the descriptions in ER Section 7.3 concerning the calculation, and associated assumptions for the costs of constructing, operating, and decommissioning the facility. This should include the following:

- Supplement the current information to provide the cost estimates for implementing just phase 1 (i.e., the initial license request) or provide a basis for not doing so.
- Clarify whether the staffing estimates in ER Table 7.3-10 represent the total number of employees supporting the ISP operations or only the additional new hires augmenting the existing WCS staff.

ER Section 7.3 explains that the costs for developing the proposed CISF, relocating the SNF to this facility, and operating the ISFSI incorporates the assumptions and cost estimates from a 2009 EPRI report (EPRI, 2009) and adjusts values, where appropriate, for the circumstances of the proposed CISF. However, the cost estimates in ER Section 7.3 appear to include future expansions (i.e. all eight phases) and do not include such estimates for just phase 1 (i.e., the initial license request). It is unclear whether the staffing estimates in Table 7.3-10 represent the total number of employees supporting the ISP operations or only the new employees augmenting the existing WCS staff. Specifically, this additional information is needed to support the NRC staff's description of the total cost for developing the proposed CISF, relocating the SNF to this facility, and operating this facility in the NRC's EIS.

The requested information is needed in accordance with 10 CFR 51.45(c), which requires that the ER include consideration of the benefits and costs of the proposed action and its alternatives as well as contain sufficient data to aid the NRC in its development of an independent analysis.

Response to RAI CB-4:

Updated calculations and assumptions on the estimated costs to construct, operate, and decommission the facility are provided in the response to RAI-1 and ER Table 7.4-2.

New ER Table 7.4-3 shows the estimated costs for Phase 1 only, assuming three operating trains. The total estimated cost for Phase 1 only would be $1,229,288,991 in discounted dollars. The facility would store 427 canisters or 4,996 MTUs transported over a 10-year period. This number of canisters would remove all spent nuclear fuel (SNF) from nine shutdown power plants and 29 additional canisters from another interim storage facility (ISF).

The staffing estimates in ER Table 7.3-10 represent the total number of new hires. Section 7.3.3 Labor Costs has been updated to clarify the number of workers who are new hires.

Impact:

ER Chapter 7, including updated and new tables and figures, has been revised as described in the response.

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. 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.

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 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 *39,406* 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. [

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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.

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.

[

] *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.* [

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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.

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

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

CISF PHASE	Year	Fiscal Year	MTUs Stored	Total Canisters Moved	Trains	ISFs Closed	Cumulative Canisters Moved
1	1	FY 2020	0	0	0	0	0
	2	FY 2021	0	0	0	0	0
	3	FY 2022	293	25	5	0	25
	4	FY 2023	1,463	100	20	3	125
	5	FY 2024	3,370	163	32	5	288
	6	FY 2025	3,370	0	0	0	288
	7	FY 2026	3,370	0	0	0	288
	8	FY 2027	4,657	110	22	1	398
	9	FY 2028	4,657	0	0	0	398
2	10	FY 2029	5,944	110	22	1	508
	11	FY 2030	8,284	200	40	1	708
	12	FY 2031	9,805	130	26	2	838
3	13	FY 2032	11,092	110	22	1	948
	14	FY 2033	12,379	110	22	1	1,058
	15	FY 2034	12,379	0	0	0	1,058
	16	FY 2035	12,379	0	0	0	1,058
	17	FY 2036	13,666	110	22	1	1,168
4	18	FY 2037	16,006	200	40	1	1,368
	19	FY 2038	16,240	20	4	1	1,388
	20	FY 2039	17,527	110	22	1	1,498
	21	FY 2040	19,867	200	40	1	1,698
5	22	FY 2041	22,207	200	40	2	1,898
	23	FY 2042	23,962	150	30	2	2,048
6	24	FY 2043	26,302	200	40	1	2,248
	25	FY 2044	28,642	200	40	2	2,448
7	26	FY 2045	30,982	200	40	2	2,648
	27	FY 2046	33,322	200	40	2	2,848
8	28	FY 2047	35,662	200	40	2	3,048
	29	FY 2048	38,002	200	40	1	3,248
	30	FY 2049	39,406	120	24	2	3,368
CISF AT CAPACITY	31	FY 2050	39,406	0	0	0	3,368
	32	FY 2051	39,406	0	0	0	3,368
	33	FY 2052	39,406	0	0	0	3,368
	34	FY 2053	39,406	0	0	0	3,368
	35	FY 2054	39,406	0	0	0	3,368
	36	FY 2055	39,406	0	0	0	3,368
	37	FY 2056	39,406	0	0	0	3,368
	38	FY 2057	39,406	0	0	0	3,368
	39	FY 2058	39,406	0	0	0	3,368
	40	FY 2059	39,406	0	0	0	3,368

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

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*

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	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**

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	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**

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	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**

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 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**

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 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**

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 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**

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
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
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

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
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		$353,249,648	$353,249,648	$353,249,648	$353,249,648	$353,249,648	$353,249,648	$353,249,648	$353,249,648	$334,249,318
							COST OF NO ACTION FOR PHASE 1			$3,160,246,502

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									$10,103,943
2026	Year 7									$10,006,226
2027	Year 8									$9,909,454
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									

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
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	$52,019,198	$52,019,198	$52,019,198	$63,038,491
							COST OF PROPOSED ACTION FOR PHASE 1			$448,584,233

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	**$353,249,648**	**$353,249,648**	**$353,249,648**	**$353,249,648**	**$353,249,648**	**$353,249,648**

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	$1,060,703	$1,060,703
2022	Year 3	$10,402,857	$10,402,857	$10,402,857	$1,040,286	$1,060,703	$1,060,703
2023	Year 4	$10,302,249	$10,302,249	$10,302,249	$1,030,225	$1,060,703	$1,060,703
2024	Year 5	$10,202,614	$10,202,614	$10,202,614	$10,202,614	$1,060,703	$1,060,703
2025	Year 6	$10,103,943	$10,103,943	$10,103,943	$10,103,943	$1,060,703	$1,060,703
2026	Year 7	$10,006,226	$10,006,226	$10,006,226	$10,006,226	$1,060,703	$1,060,703
2027	Year 8	$9,909,454	$9,909,454	$9,909,454	$9,909,454	$1,060,703	$1,060,703
2028	Year 9	$9,813,618	$9,813,618	$9,813,618	$9,813,618	$1,060,703	$1,060,703
2029	Year 10	$9,718,709	$9,718,709	$9,718,709	$9,718,709	$1,060,703	$1,060,703
2030	Year 11	$9,624,717	$9,624,717	$9,624,717	$9,624,717	$1,060,703	$1,060,703
2031	Year 12	$9,531,635	$9,531,635	$9,531,635	$9,531,635	$1,060,703	$1,060,703
2032	Year 13	$9,439,453	$9,439,453	$9,439,453	$9,439,453	$1,060,703	$1,060,703
2033	Year 14	$9,348,162	$9,348,162	$9,348,162	$9,348,162	$1,060,703	$1,060,703
2034	Year 15	$9,257,754	$9,257,754	$9,257,754	$9,257,754	$1,060,703	$1,060,703
2035	Year 16	$9,168,221	$9,168,221	$9,168,221	$9,168,221	$1,060,703	$1,060,703
2036	Year 17	$9,079,553	$9,079,553	$9,079,553	$9,079,553	$1,060,703	$1,060,703
2037	Year 18	$8,991,743	$8,991,743	$8,991,743	$8,991,743	$1,060,703	$1,060,703
2038	Year 19	$8,904,783	$8,904,783	$8,904,783	$8,904,783	$1,060,703	$1,060,703
2039	Year 20	$8,818,663	$8,818,663	$8,818,663	$8,818,663	$1,060,703	$1,060,703
2040	Year 21	$8,733,376	$8,733,376	$8,733,376	$8,733,376	$1,060,703	$1,060,703
2041	Year 22	$8,648,914	$8,648,914	$8,648,914	$8,648,914	$1,060,703	$1,060,703
2042	Year 23	$8,565,269	$8,565,269	$8,565,269	$8,565,269	$1,060,703	$1,060,703
2043	Year 24	$8,482,432	$8,482,432	$8,482,432	$8,482,432	$1,060,703	$1,060,703
2044	Year 25	$8,400,397	$8,400,397	$8,400,397	$8,400,397	$1,060,703	$1,060,703
2045	Year 26	$8,319,156	$8,319,156	$8,319,156	$8,319,156	$1,060,703	$1,060,703
2046	Year 27	$8,238,699	$8,238,699	$8,238,699	$8,238,699	$1,060,703	$1,060,703
2047	Year 28	$8,159,022	$8,159,022	$8,159,022	$8,159,022	$1,060,703	$1,060,703
2048	Year 29	$8,080,114	$8,080,114	$8,080,114	$8,080,114	$1,060,703	$1,060,703
2049	Year 30	$8,001,970	$8,001,970	$8,001,970	$8,001,970	$1,060,703	$1,060,703
2050	Year 31	$7,924,581	$7,924,581	$7,924,581	$7,924,581	$1,060,703	$1,060,703
2051	Year 32	$7,847,941	$7,847,941	$7,847,941	$7,847,941	$1,060,703	$1,060,703
2052	Year 33	$7,772,043	$7,772,043	$7,772,043	$7,772,043	$1,060,703	$1,060,703
2053	Year 34	$7,696,878	$7,696,878	$7,696,878	$7,696,878	$1,060,703	$1,060,703
2054	Year 35	$7,622,440	$7,622,440	$7,622,440	$7,622,440	$1,060,703	$1,060,703
2055	Year 36	$7,548,722	$7,548,722	$7,548,722	$7,548,722	$1,060,703	$1,060,703
2056	Year 37	$7,475,717	$7,475,717	$7,475,717	$7,475,717	$1,060,703	$1,060,703
2057	Year 38	$7,403,418	$7,403,418	$7,403,418	$7,403,418	$1,060,703	$1,060,703
2058	Year 39	$7,331,818	$7,331,818	$7,331,818	$7,331,818	$1,060,703	$1,060,703
2059	Year 40	$7,260,911	$7,260,911	$7,260,911	$7,260,911	$1,060,703	$1,060,703
	TOTAL	**$353,249,648**	**$353,249,648**	**$334,249,318**	**$315,614,723**	**$42,428,120**	**$42,428,120**

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

Table 7.2-10: 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	$1,060,703	$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 7.2-10: 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	$1,060,703	$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 7.2-10: 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	$1,060,703	$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 7.2-10: 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	$1,060,703	$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 7.2-11: 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						
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**

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			$10,103,943	$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				$9,813,618	$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	**$52,019,198**	**$52,019,198**	**$63,038,491**	**$315,614,723**	**$35,324,965**	**$35,324,965**

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	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**

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 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	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**

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	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**

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	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**	**$35,324,965**

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***

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 eight 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 *Rail Cask Car @ $2.1 million:35* *Transportation Casks @ $6.4 million: 35* *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. 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). 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. All these items will have a collective cost of almost $323.8 million and, with a $97.2 million contingency, will total $421.0 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 @ 3,368 canisters stored	*$299.10*
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	***$323.83***
Contingency 30%	***$97.15***
Total Fuel Storage Facility	***$420.98***

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 $2.30 million. This expense assumes 673 rail shipments that will remove 3,368 casks of spent fuel. 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 $53.4 million.

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

CISF Administrative Operating Costs	*Estimated Costs (Millions $)*
Travel and Living Expenses	
Security Crew *673 rail shipments for 3,368 casks* *$4,079 per rail shipment*	*$2.30*
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	***$41.11***
Contingency: 30%	***$12.33***
Total Administrative Operating Costs	***$53.45***

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 $*855.4* million.

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

Concrete Overpack Costs	*Estimated Costs (Millions $)*
Concrete Overpack Costs	
$233,078 per overpack: 3,368 canisters	*$658.0*
Contingency: 30%	*$197.4*
Total Costs	***$855.4***

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.

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	*$68.9*
Identify shutdown site existing infrastructure, constraints, & transportation resource needs and develop interface procedures.	*$91.9*
Conduct Preliminary Logistics Analysis and Planning	
Develop specs, solicit bids, issue contracts, & initiate preparations for shipping campaigns	*$11.5*
Revisions to certificates of compliance as may be needed	*$23.0*
Conduct Preliminary Logistics Analysis and Planning	
Determine fleet size, transport requirements, and modes of transport for shutdown site	*$9.2*
Coordinate with Stakeholders	
Assess and select routes & modes of transport	*$13.8*
Support training of emergency response personnel	*$90.1*
Develop Campaign Plans	
Develop plans, policies, & procedures for at-site operational interfaces, support operations, and in-transit security operations	*$41.5*
Conduct Readiness Activities	
Assemble & train at-site operations interface team & shutdown site workers	*$46.0*
Includes readiness reviews, tabletop exercises, and dry run operations	*$68.9*
Local Transportation	
Portable transportation equipment – 7 sets @ $2.1 million	*$14.8*
Local transportation improvements – 36 sites @ $1.1 million.	*$33.1*
Transfer cask to site to railroad - $264,862 per cask: 3,368 casks	*$747.8*
Subtotal: On-Site Transportation Planning and Transport Costs	***$1,260.4***
Contingency: 30%	***$378.1***
Total Transportation Planning and Transport Costs	***$1,638.5***

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 $*179.9* 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 $*457.4* 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 673 shipments of 5 SNF transport casks by dedicated train @ $87.40 per mile round-trip; average trip length 1,824 miles	*$179.9*
State Inspection Fees	*$38.8*
Equipment, spare parts, and maintenance	*$74.1*
Regulatory fees and license fees	*$28.2*
Utilities	*$28.2*
LLW Disposal (50 cubic feet per year; $1,500 per cubic foot)	*$2.6*
Subtotal: Other Operating Costs	*$351.9*
Contingency: 30%	*$105.6*
Total: Other Operating Costs	***$457.4†***

† 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 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).

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	*10*	*$81.6*	*$6.8*
Subtotal: Labor during Caretaker	***46***		*$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 $270.3 million. EPRI's cost estimate of site decommissioning is based upon 20 percent of the cost for the fuel storage facility ($84.2 million) and 20 percent of the cost for the concrete overpacks ($171.1 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 *$4,429,200,328*. *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 $1,268,855,866 in discounted dollars. It would store 427 canisters or 4,996 MTUs transported over a 10-year period, assuming three operating trains. This number of canisters would remove all SNF from nine shutdown power plants and 29 additional canisters from another interim storage facility (ISF).*

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	$10,900,272	$6,714,245	$3,652,592	$169,481,838
2	$38,859,254	$217,210,816	$11,457,274	$13,408,079	$1,500,357	$0	$25,331,083	$6,649,311	$3,617,267	$318,033,441
3	$0	$186,406,267	$0	$3,376,925	$1,511,849	$7,429,235	$39,697,600	$8,617,643	$3,806,304	$250,845,823
4	$0	$0	$0	$13,377,065	$1,574,481	$29,429,543	$55,490,076	$14,573,242	$3,769,492	$118,213,899
5	$0	$0	$0	$21,593,740	$1,620,458	$47,506,228	$53,984,349	$19,216,733	$4,392,161	$148,313,668
6	$0	$0	$0	$0	$1,443,153	$0	$11,050,747	$6,395,791	$4,567,266	$23,456,957
7	$0	$0	$0	$0	$1,429,196	$0	$12,243,142	$6,333,937	$3,445,702	$23,451,976
8	$0	$0	$0	$14,153,740	$1,524,358	$31,138,227	$46,222,381	$14,792,099	$3,412,378	$111,243,182
9	$0	$0	$0	$0	$1,401,686	$0	$31,522,414	$6,212,016	$3,590,707	$42,726,823
10	$0	$0	$0	$13,881,297	$1,495,016	$30,538,853	$69,115,353	$14,507,368	$3,346,693	$132,884,580
11	$0	$0	$0	$28,189,259	$1,567,163	$54,988,192	$86,703,472	$21,137,211	$3,521,590	$196,106,889
12	$0	$0	$0	$16,089,388	$1,485,298	$35,396,655	$62,310,735	$15,718,045	$3,692,791	$134,692,913
13	$0	$0	$0	$13,482,434	$1,452,058	$29,661,354	$45,255,749	$14,090,516	$3,657,077	$107,599,187
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	$10,125,265	$5,860,154	$3,387,322	$20,695,032
16	$0	$0	$0	$0	$1,309,503	$0	$29,449,329	$5,803,480	$3,157,130	$39,719,441
17	$0	$0	$0	$12,968,387	$1,396,695	$28,530,451	$54,639,586	$13,553,285	$3,126,596	$114,215,001
18	$0	$0	$0	$23,350,850	$1,464,098	$51,371,869	$69,999,510	$19,747,113	$3,289,991	$169,223,432
19	$0	$0	$0	$2,312,502	$1,289,682	$5,087,504	$34,384,391	$7,028,665	$3,449,933	$53,552,677
20	$0	$0	$0	$12,595,755	$1,356,563	$27,710,662	$68,852,353	$13,163,847	$3,226,663	$126,905,842
21	$0	$0	$11,453,344	$25,578,663	$1,422,029	$49,895,758	$89,359,641	$19,179,702	$3,195,457	$200,084,595
22	$0	$0	$0	$22,460,549	$1,408,276	$49,413,207	$87,372,401	$18,994,212	$3,350,803	$182,999,448
23	$0	$0	$0	$16,682,496	$1,351,838	$36,701,492	$77,995,624	$15,463,340	$3,502,845	$151,697,636
24	$0	$0	$0	$22,028,209	$1,381,169	$48,462,061	$91,008,945	$18,628,596	$3,286,304	$184,795,283
25	$0	$0	$0	$21,815,171	$1,367,811	$47,993,375	$90,128,781	$18,448,435	$3,254,521	$183,008,095
26	$0	$0	$0	$21,604,192	$1,354,583	$47,529,223	$89,257,130	$18,270,017	$3,402,195	$181,417,339
27	$0	$0	$0	$21,395,254	$1,341,482	$47,069,559	$88,393,908	$18,093,325	$3,369,292	$179,662,820

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	$79,989,746	$17,918,341	$3,336,707	$170,375,979
29	$0	$0	$0	$20,983,421	$1,315,660	$46,163,525	$63,148,383	$17,745,049	$3,304,437	$152,660,475
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**	**$420,984,708**	**$53,445,850**	**$855,436,047**	**$1,638,483,203**	**$457,414,954**	**$131,105,332**	**$4,158,938,425**
								Decommissioning		**$270,261,903**
								COSTS - GRAND TOTAL		**$4,429,200,328**

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	$5,378,682	$6,714,245	$3,652,592	$163,960,247
2	$38,859,254	$138,101,068	$11,457,274	$13,408,079	$1,500,357	$0	$18,786,360	$6,649,311	$3,617,267	$232,378,970
3	$0	$0	$0	$3,376,925	$1,511,849	$7,429,235	$31,068,616	$8,617,643	$3,806,304	$55,810,572
4	$0	$0	$0	$12,039,359	$1,564,180	$26,486,589	$50,454,529	$13,768,050	$4,435,053	$108,747,759
5	$0	$0	$0	$11,922,924	$1,549,053	$26,230,432	$40,876,567	$13,634,897	$4,172,453	$98,386,326
6	$0	$0	$0	$10,889,245	$1,529,021	$23,956,339	$36,221,883	$13,108,185	$4,132,100	$89,836,772
7	$0	$0	$0	$0	$1,429,196	$0	$10,934,465	$6,333,937	$3,445,702	$22,143,299
8	$0	$0	$0	$11,580,332	$1,504,543	$25,476,731	$35,051,876	$13,243,114	$3,412,378	$90,268,973
9	$0	$0	$0	$2,548,519	$1,421,309	$5,606,742	$10,475,224	$7,746,021	$3,590,707	$31,388,522
10	$0	$0	$0	$3,659,615	$1,417,280	$8,051,152	$9,149,036	$8,430,692	$3,555,980	$34,263,756
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**	**$88,167,060**	**$50,889,207**	**$123,237,221**	**$248,397,237**	**$257,558,474**	**$124,487,475**	**$1,229,288,991**
								Decommissioning		**$39,566,874**
								COSTS - GRAND TOTAL		**$1,268,855,865**

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 2.31. If only Phase 1 were implemented and it was assumed that no other reactors were shut down, the net benefit of Phase 1 would be $1.8 billion and the C/B ratio would be 2.45. 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	$2,711,662,269	$215,485,165	$2,927,147,434	$1,268,855,865	2.31
Phase 1 Only, No Other Reactors Shut Down	$2,896,344,304	$215,485,165	$3,111,829,469	$1,268,855,865	2.45
Proposed Action	$6,695,763,515	$766,819,521	$7,462,583,036	$4,429,200,328	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	Spent Fuel Storage Costs Avoided	Cost of Facility Construction, Operations, and Decommissioning	Benefit/ Cost Ratio
Phase 1 Only	*$2,711,662,269*	*$1,268,855,865*	*2.14*
Phase 1 Only, No Other Reactors Shut Down	*$2,896,344,304*	*$1,268,855,865*	*2.28*
Proposed Action	*$6,695,763,515*	*$4,429,200,328*	*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*).

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

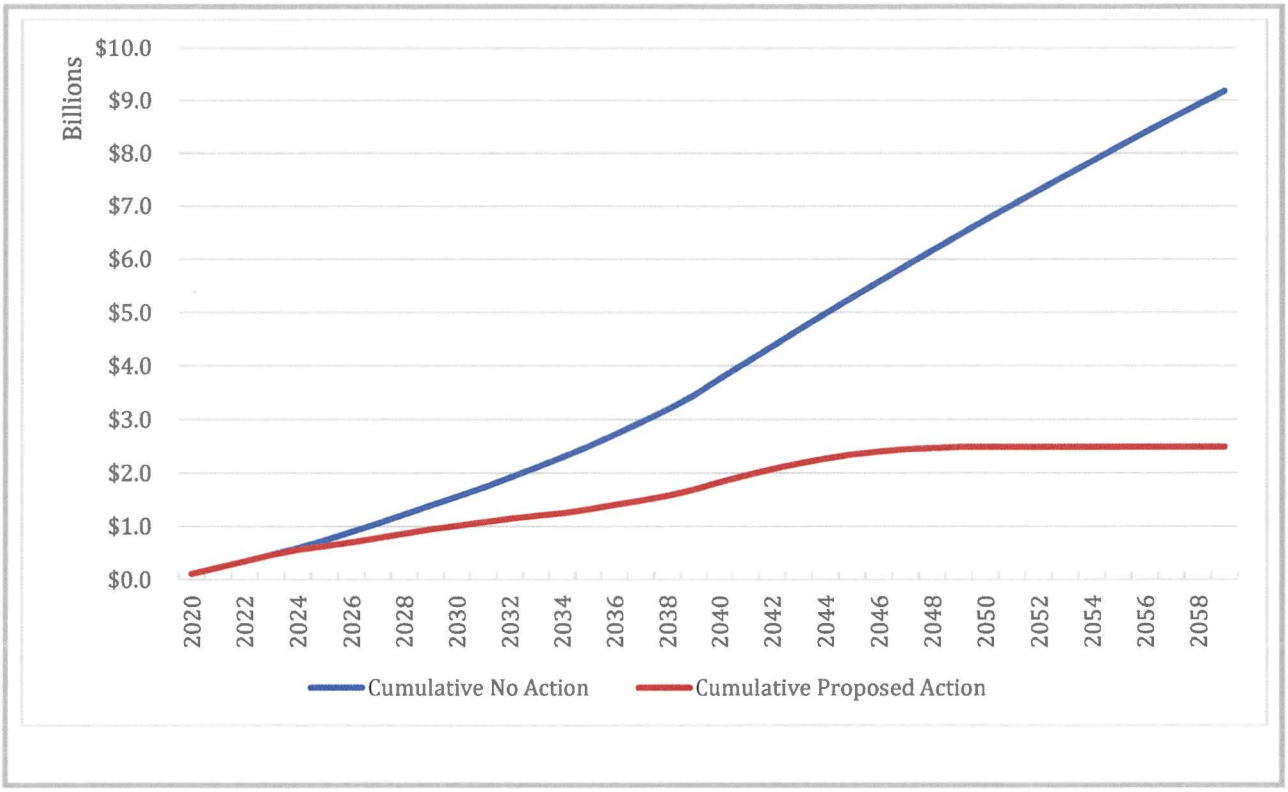
	Loving County, TX	*Lea County, NM*	*Eddy County, NM*
Rail Distance	*35 miles*	*4 miles*	*56 miles*
Rail Cost @ $1.59 million per mile and 30% contingency	*$72.0 million*	*$8.2 million*	*$115.7 million*
Road Distance	*4 miles* *2 lanes*	*4 miles* *2 lanes*	*4 miles* *2 lanes*
Road cost @ $6.36 million 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 $4.63 billion to $4.74 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	*$78.1*	*$78.1*	*$78.1*
Transportation Infrastructure	*$612.1*	*$548.3*	*$655.8*
CISF Infrastructure	*$60.9*	*$60.9*	*$60.9*
Fuel Storage Facility	*$421.0*	*$421.0*	*$421.0*
Administrative Operating Costs	*$53.4*	*$53.4*	*$53.4*
Concrete Overpacks	*$855.4*	*$855.4*	*$855.4*
On-site Transportation Planning and Transportation Costs	*$1,638.5*	*$1,638.5*	*$1,638.5*
Other: Transportation, License Fees	*$457.4*	*$457.4*	*$457.4*
Annual Operating Labor Costs	*$249.5*	*$249.5*	*$249.5*
Decommissioning	*$270.3*	*$270.3*	*$270.3*
Total Costs for CISF over 40-Year Licensure	***$4,696.60***	***$4,632.80***	***$4,740.30***

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