ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED LOUISIANA ENERGY SERVICES, URENCO USA URANIUM ENRICHMENT FACILITY CAPACITY EXPANSION IN LEA COUNTY, NEW MEXICO

DOCKET NO. 70-3103

U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

DIVISION OF FUEL CYCLE SAFETY, SAFEGUARDS, AND ENVIRONMENTAL REVIEW

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Acronyms and Abbreviations

AADT	average annual daily traffic
ac	acre(s)
ac-ft	acre-foot (acre-feet)
ACHP	Advisory Council on Historic Preservation
ACP	American Centrifuge Plant
AERMOD	AMS/EPA Regulatory Model
AES	AREVA Enrichment Services, LLC
ALARA	as low as reasonably achievable
ATSDR	Agency for Toxic Substances and Disease Registry
AVLIS	Atomic Vapor Laser Isotope Separation
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	best management practice
BNSF	Burlington Northern and Santa Fe
BTS	Bureau of Transportation Statistics
CAB	Centrifuge Assembly Building
CDC	Centers for Disease Control and Prevention
CEDE	committed effective dose equivalent
CFR	*Code of Federal Regulations*
CH_4	methane
cm	centimeter(s)
cm^2	square centimeter(s)
cm^3	cubic centimeter(s)
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
COL	combined license
CRDB	Cylinder Receipt and Dispatch Building
CTPMF	Centrifuge Test and Post Mortem Facilities
CUB	Central Utilities Building
CVRF	control volume reduction facility
CWA	Clean Water Act
d	day(s)
dB	decibel(s)
dBA	A-weighted decibel(s)
DDE	deep dose equivalent
DNL	day-night average sound level
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPS	distinct population segment
EA	environmental assessment
EEI	Eagle Environmental, Inc.
EF	enhanced Fujita

EFS	Exhaust Filtration System
EIA	Energy Information Administration
EIS	environmental impact statement
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
ER	Environmental Report
EREF	Eagle Rock Enrichment Facility
ESA	Endangered Species Act
FAA	Federal Aviation Administration
ft	foot (feet)
ft^3	cubic foot (feet)
FTE	full-time equivalent worker
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
g	gram(s)
gal	gallon(s)
GDP	Gaseous Diffusion Plant
GEVS	Gaseous Effluent Vent System
GHG	greenhouse gas
GLE	GE-Hitachi Global Laser Enrichment, LLC
gpd	gallon(s) per day
gpm	gallon(s) per minute
gpy	gallon(s) per year
GW	gigawatt(s)
GWP	global warming potential
ha	hectare(s)
HAPs	hazardous air pollutants
HEPA	high-efficiency particulate air
HEU	highly enriched uranium
HF	hydrogen fluoride
HFCs	hydrofluorocarbons
H_2S	hydrogen sulfide
hr	hour(s)
HUD	U.S. Department of Housing and Urban Development
HWB	Hazardous Waste Bureau (NMED)
ICRP	International Commission on Radiological Protection
IIFP	International Isotopes Fluorine Products
in.	inch(es)
$in.^2$	square inch(es)
INIS	International Isotopes
IPH	Iowa Pacific Holdings
IROFS	items relied on for safety
kg	kilogram(s)
kHz	kilohertz

km	kilometer(s)
km^2	square kilometer(s)
kV	kilovolt(s)
kWh	kilowatt hour(s)
L	liter(s)
LAR	License Amendment Request
lb	pound(s)
LCF	latent cancer fatality
L_{dn}	day-night average sound level
LECTS	liquid effluent collection and transfer system
L_{eq}	equivalent continuous sound level
LES	Louisiana Energy Services, LLC
LEU	low enriched uranium
LLRW	low-level radioactive waste
LPES	LPES, Inc.
m	meter(s)
m^3	cubic meter(s)
Mb	body-wave magnitude
MBq	million becquerel
MDA	minimum detectable activity
MEI	maximally exposed individual
mi	mile(s)
mi^2	square mile(s)
µCi	microcurie(s)
µg	microgram(s)
µm	micrometer(s)
mg	milligram(s)
mL	millileter(s)
MLIS	Molecular Laser Isotope Separation
MMt	million metric ton(s)
MOA	Memorandum of Agreement
mph	mile(s) per hour
mrem	millirem
mSv	millisievert(s)
MT	metric ton(s)
NAAQS	National Ambient Air Quality Standards
NaF	sodium fluoride
NCDC	National Climatic Data Center
NCRP	National Council on Radiation Protection and Measurements
NEF	National Enrichment Facility
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NMAC	New Mexico Administrative Code
NMAQB	New Mexico Air Quality Bureau
NMDGF	New Mexico Department of Game and Fish

NMDOT New Mexico Department of Transportation
NMED New Mexico Environment Department
NMSA New Mexico Statutes Annotated
NMSS Office of Nuclear Material Safety and Safeguards (NRC)
N_2O nitrous oxide
NO_2 nitrogen dioxide
NO_x nitrogen oxides
NPDES National Pollutant Discharge Elimination System
NRC U.S. Nuclear Regulatory Commission
NRCS National Resources Conservation Service
NRHP *National Register of Historic Places*
NWCC National Wind Coordinating Committee

O_3 ozone
OEL occupational exposure limit
OSHA Occupational Safety and Health Administration
oz ounce(s)

Pb lead
PEL permissible exposure limit
PFCs perfluorocarbons
PM particulate matter
$PM_{2.5}$ particulate matter with an aerodynamic diameter of 2.5 μm or less
PM_{10} particulate matter with an aerodynamic diameter of 10 μm or less
ppb part(s) per billion
ppm part(s) per million
PSD Prevention of Significant Deterioration

QA quality assurance

RCRA Resource Conservation and Recovery Act
REL reference exposure level
rem roentgen equivalent man
REMP Radiological and Environmental Monitoring Program
ROI region of interest

s second(s)
SAAQS State Ambient Air Quality Standards
SAR Safety Analysis Report
SBM Separations Building Module
SER Safety Evaluation Report
SF_6 sulfur hexafluoride
SHPO State Historic Preservation Office
SILEX Separation of Isotopes by Laser Excitation
SNM Special Nuclear Material
SO_2 sulfur dioxide
SPCC Spill Prevention, Control, and Countermeasures
Sv sievert(s)
SWCPS Solid Waste Collection and Processing System

SWCR	Solid Waste Collection Room
SWPPP	Stormwater Pollution Prevention Plan
SWU	separative work units
TDS	total dissolved solids
TEDE	Total Effective Dose Equivalent
TENEX	JSC Techsnabexport
TLD	thermoluminescent dosimeter
TNMR	Texas–New Mexico Railroad
TRU	transuranic
TSB	Technical Services Building
TSP	total suspended particulates
U	uranium
U-234	uranium-234
U-235	uranium-235
U-238	uranium-238
UBC	Uranium Byproduct Cylinder
UF_5	uranium pentafluoride
UF_6	uranium hexafluoride
UO_2	uranium dioxide
UO_2F_2	uranyl fluoride
U.S.C.	*United States Code*
USDA	U.S. Department of Agriculture
USEC	USEC, Inc.
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
UUSA	URENCO USA
VOC	volatile organic compound
WCS	Waste Control Specialists
WIPP	Waste Isolation Pilot Plant
WNA	World Nuclear Association
WQB	Water Quality Bureau (NMED)
WRCC	Western Regional Climate Center
yr	year(s)

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1 Introduction

1.1 Background

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared this environmental assessment (EA) in response to License Amendment Request 12-10 (LAR-12-10) and a subsequent supplement to LAR-12-10 submitted by Louisiana Energy Services, LLC (LES) (now doing business as URENCO USA [UUSA]) to amend Special Nuclear Material (SNM) License SNM-2010. Under the conditions of License SNM-2010, UUSA operates a gas centrifuge uranium enrichment facility with a nominal capacity of 3 million separative work units[1]/year (SWU/yr). The URENCO USA facility, formerly known as the National Enrichment Facility (NEF), is located near Eunice in Lea County, New Mexico.

NUREG-1790, “Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico” (NEF EIS) (NRC, 2005a), addressed the potential environmental impacts of construction, operation, and decommissioning of the 3 million SWU/yr facility, which was subsequently licensed by the NRC under License SNM-2010. Construction of the 3 million SWU/yr facility was initiated in 2006. Uranium enrichment operations began at the site in June 2010, and the UUSA facility is currently operating at its licensed capacity.

On September 10, 2012, UUSA submitted an Environmental Report (ER) (UUSA, 2012a,b,c) for the license amendment request to the NRC, and on November 9, 2012, UUSA submitted the associated LAR-12-10 (UUSA, 2012d). On January 25, 2013, the NRC accepted the amendment request for formal review (NRC, 2013a). If LAR-12-10 is granted as proposed, the amended license would allow UUSA to expand the facility, in part by increasing its capacity to produce enriched uranium from 3 million to 10 million SWU/yr.

Subsequent to LAR-12-10, UUSA submitted a supplemental license amendment request on June 17, 2014 (UUSA, 2014a). The June 2014 submittal requested an increase in the authorized mass limit for natural and depleted uranium from 136,120,000 kilograms (kg) (300,090,000 pounds [lb]) to 251,000,000 kg (553,000,000 lb), and requested an increase in the authorized mass limit for enriched uranium from 545,000 kg (1,200,000 lb) to 2,180,000 kg (4,810,000 lb). The increased mass limits would give UUSA more flexibility to store natural and depleted uranium onsite, and to store the enriched uranium onsite prior to its shipment to customers. In addition, the June 2014 submittal requested authorization to use a modified enrichment process in Separations Building Module 1005 (SBM-1005) that would utilize depleted uranium instead of natural uranium as the feed material. Both LAR-12-10 and the June 2014 license amendment request are considered in this EA.

As part of its formal review, the NRC’s Office of Nuclear Material Safety and Safeguards (NMSS) staff has prepared this EA following NRC regulations at Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51 that implement the National Environmental Policy Act of 1969 (NEPA), as amended (42 *United States Code* [U.S.C.] 4321 et seq.). NRC staff guidance in

[1] A separative work unit (SWU) is a unit of measurement used in the nuclear industry, pertaining to the process of enriching uranium for use as fuel for nuclear power plants. It describes the effort needed to separate the fissionable uranium-235 from the uranium-238 atoms in natural uranium to create a final product that is richer in uranium-235 atoms.

NUREG-1748, “Environmental Review Guidance for Licensing Actions Associated with NMSS Programs” (NRC, 2003a) was also used in preparing this EA. The purpose of this EA is to assess the potential environmental impacts associated with the construction, operation, and decommissioning of the expanded facility, and consider reasonable alternatives to the proposed action.

1.2 The Proposed Action

This section summarizes the proposed action. A more detailed discussion of the proposed action is provided in EA Sections 2.1 through 2.1.4 below.

The proposed action is for the NRC to grant LAR-12-10 and the supplemental request. UUSA would be authorized to expand its existing gas centrifuge uranium enrichment facility near Eunice in Lea County, New Mexico (Figure 1-1), which would increase its production capacity from 3 million to 10 million SWU/yr. At its expanded facility, UUSA would be authorized to hold up to 251,000,000 kg (553,000,000 lb) of natural and depleted uranium and up to 2,180,000 kg (4,810,000 lb) of enriched uranium. UUSA would also be authorized to use a modified enrichment process in SBM-1005 utilizing depleted uranium instead of natural uranium as the feed material.

Enriched uranium is used to manufacture nuclear fuel for commercial nuclear power reactors. Enrichment is the process of increasing the concentration of the naturally occurring and fissionable uranium-235 isotope (U-235). In the gas centrifuge process, centrifuges spin gaseous uranium hexafluoride (UF_6) at high speeds to separate the lighter U-235 atoms from the heavier uranium-238 (U-238) atoms. To obtain the desired concentration and sufficient volume of U-235 for commercial production, a number of centrifuges are connected in series and parallel.

The proposed expanded UUSA facility would, in general, continue to use the same gas centrifuge process that has been used since 2010. This process separates natural UF_6 feed material containing approximately 0.71 weight percent in isotope U-235 into a product stream enriched up to the UUSA license limit of 5.5 weight percent in U-235 (known as low enriched uranium [LEU]) and a depleted UF_6 stream containing approximately 0.1 to 0.5 weight percent in U-235. Additionally, if LAR-12-10 as supplemented is granted, use of a modified gas centrifuge process would be authorized within SBM-1005. This modified process would use high-assay tails material as feed material.

As part of its proposed facility expansion, UUSA has constructed a new Separations Building Module (SBM), and would construct two additional SBMs. UUSA also plans to construct an additional Cylinder Receipt and Dispatch Building (CRDB) to accommodate the increased UF_6 cylinder handling requirements. Further, UUSA would expand its Uranium Byproduct Cylinder (UBC) Storage Pad to create additional storage space for depleted UF_6 cylinders, including space for the storage of enriched UF_6 cylinders, and would construct two additional UBC basins to manage stormwater runoff. UUSA would increase the capacity of its electric utility substation with the addition of 115-kilovolt (kV) to 13-kV transformers. The existing substation was built to support additional transformers as required to support potential facility expansion.

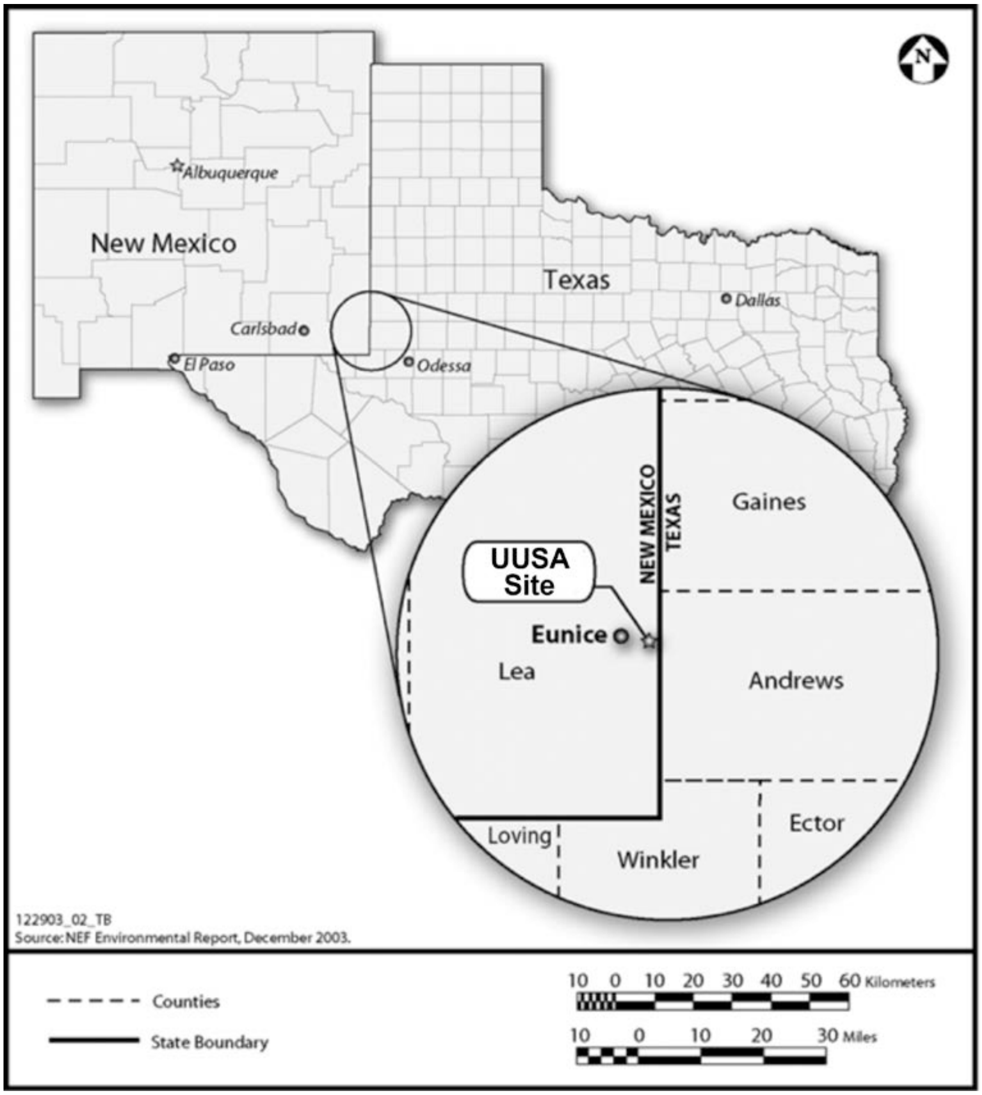

Figure 1-1 Location of the URENCO USA Facility (NRC, 2005a)

The UUSA facility is located within a 220-hectare (ha) (543-acre [ac]) parcel of land. Since construction of the presently licensed facility began in 2006, approximately 160 ha (394 ac) have been disturbed. Site preparation activities[2] and construction activities connected with the proposed facility expansion are taking place, or will take place, in phases over 8 years, from 2012 to approximately 2020. Completion of each phase would result in additional operational capacity and would include adding an SBM. SBM-1005 construction, with one of the two cascades installed, is nearing completion. Initial enrichment operations in SBM-1005 are

[2] Such activities, referred to hereafter in this EA as “preconstruction” activities, are not within the definition of “construction” in 10 CFR 51.4. As discussed in a 2011 final rule amending the 10 CFR 51.4 definition of “construction” (76 Fed. Reg. 56951 et seq., Sept. 15, 2011), preconstruction activities are not considered a part of the proposed action by the NRC because they are not under the NRC’s jurisdictional authority. The preconstruction activities to be conducted as part of the proposed facility expansion are discussed in Section 2.1.3.1, and their environmental impacts are considered in the cumulative impacts analysis in Section 4.1.5.

expected to begin in 2015. Enrichment operations in SBM-1005 using both cascades are expected to begin in 2016. Construction of SBMs 1007 and 1009 are expected to be complete in 2018 and 2020, respectively (UUSA, 2013a). UUSA has indicated that only previously disturbed areas on the site of its existing facility will be used during preconstruction and construction of the expanded facility (UUSA, 2013a).

1.3 Purpose and Need for the Proposed Action

The purpose of UUSA's proposed facility expansion is to give the facility additional capacity to produce domestic LEU to be used in commercial nuclear power plants. The proposed action is needed to meet projected U.S. electricity requirements and contribute to national energy security. The proposed expansion would help satisfy the need for an additional reliable and economical source of domestic enriched uranium.

1.3.1 Need for Enriched Uranium in the U.S.

The Energy Information Administration (EIA), in the "Annual Energy Outlook 2014" (EIA, 2014), in Table 8a, "Electricity Supply, Disposition, Prices, and Emissions," provides estimates that the total U.S. electricity consumption for the reference case (established laws, regulations, and policies remain unchanged) will grow from 3,875 billion kilowatt-hours (kWh) in 2011 to 4,954 billion kWh in 2040 (an average annual rate of 0.9 percent). In 2011, according to the EIA report, U.S. commercial nuclear power plants supplied approximately 19 percent of the nation's electricity requirements (EIA, 2014).

The EIA report also estimates that, for the reference case, electricity generation from nuclear power plants will increase at an annual rate of 0.2 percent, from 790 billion kWh in 2011 to 811 billion kWh in 2040, and that, in 2040, U.S. nuclear power plants will account for approximately 17 percent of total electricity generation (EIA, 2014). The 2014 EIA report also estimates that nuclear generating capacity will remain relatively flat, with an increase from 101 gigawatts (GW) in 2011 to a high of 102 GW in 2012, a small drop by 2020, and then a gradual increase back to 102 GW by 2040. These estimates take into consideration construction of new nuclear power plants, power uprates at existing plants, and plant retirements. The total quantity of enriched uranium purchased by U.S. nuclear power plants in 2012 was 15.6 million SWU, up from 13.8 and 14.8 million SWU in 2010 and 2011, respectively (EIA, 2013).

To date, the NRC has received 18 combined license (COL) applications for new nuclear power plants. On February 10, 2012, the NRC issued the first COLs to Southern Nuclear Operating Company to build and operate two AP1000 reactors at the Vogtle Electric Generating Plant site near Augusta, Georgia. On March 30, 2012, the NRC issued COLs authorizing South Carolina Electric & Gas to build and operate two AP1000 reactors at the Virgil C. Summer site near Columbia, South Carolina. Of the remaining 16 COL applications, the NRC staff is currently reviewing 8 COL applications; 6 COL application reviews have been suspended; and 2 have been withdrawn.

The EIA forecasts of U.S. electricity consumption, electricity generation from nuclear power plants, and nuclear generating capacity, combined with applications from the industry for construction and operation of new nuclear power plants, suggest a continuing U.S. demand for enriched uranium at approximately the current level through the year 2040.

1.3.2 Sources of Enriched Uranium

With respect to the sources that supply the enriched uranium to meet U.S. demand, the EIA report, “2012 Uranium Marketing Annual Report” (EIA, 2013), notes that SWU produced in the United States provided approximately 21 percent of U.S. demand in 2011, while SWU produced outside the U.S. provided the remaining 79 percent. Currently, the UUSA enrichment facility provides the only domestic source of enriched uranium. The Paducah Gaseous Diffusion Plant (GDP) in Paducah, Kentucky, operated by USEC Inc. (USEC), ceased operations in 2013 and is no longer producing enriched uranium (Centrus, 2014a).

In addition to the UUSA enrichment facility, the NRC has issued licenses to USEC to construct and operate the American Centrifuge Plant (ACP) in Piketon, Ohio (NRC, 2007); to AREVA Enrichment Services, LLC (AES) to construct and operate the Eagle Rock Enrichment Facility (EREF) in Bonneville County, Idaho (NRC, 2011b); and to GE-Hitachi Global Laser Enrichment, LLC (GLE) to construct and operate a laser enrichment facility in Wilmington, North Carolina (NRC, 2012b). Table 1-1 provides the proposed production capacities of the four licensed U.S. uranium enrichment facilities. However, of these facilities, only the 3 million SWU/yr UUSA facility has been constructed and is in operation, while construction has not yet begun at the other three facilities. Construction of the EREF is reported to be on temporary hold due to short-term financing uncertainties (AES, 2013); funding for the ACP is uncertain (Centrus, 2014b), and GLE has not yet announced a schedule for construction of its facility. Thus, although Table 1-1 shows a potential U.S. enriched uranium production capacity of 26.4 million SWU/yr, only the 3-million-SWU/yr UUSA facility is operational.

As indicated above, most of the enriched uranium for U.S. nuclear power plants has been coming from foreign sources. The Megatons-to-Megawatts Program fulfilled about 36 and 42 percent of U.S. demand for enriched uranium in 2011 and 2012, respectively (EIA, 2013). Under this program, the United States Enrichment Corporation implemented the 1993 government-to-government agreement between the United States and Russia, in which Russia converted 500 metric tons (MT) (550 tons) of highly enriched uranium (HEU) from dismantled nuclear warheads into LEU (DOE, 2010). The United States Enrichment Corporation purchased the enriched portion of the “downblended” material, adjusted the enrichment level as necessary, and then sold it to its electric utility customers for commercial nuclear power plants. This program expired in 2013 (DOE, 2013) and, therefore, is no longer a source of LEU for U.S. nuclear power plants.

In March 2011, USEC signed an agreement with a Russian corporation, JSC Techsnabexport (TENEX), for LEU to be supplied to USEC from Russian commercial enrichment activities (Centrus, 2014c). The new contract took effect in December 2011, runs through 2022 with 21 million SWU to be purchased under the terms of the agreement, and contains a mutual option for the purchase of up to another 25 million SWU through the same period (Centrus, 2014c).

Other countries that export enriched uranium to the United States include China, France, Germany, The Netherlands, and the United Kingdom. These exports accounted for 37 percent of the U.S. demand for enriched uranium in 2012 (EIA, 2013).

Table 1-1 Existing and Proposed Domestic Sources of Enriched Uranium[a]

Facility	Location	Owner	Proposed Production Capacity (million SWU/yr)	Current Status
UUSA	Lea County, New Mexico	UUSA	10.0	Licensed June 23, 2006, for a nominal capacity of 3 million SWU/yr; currently operating at licensed capacity
ACP	Piketon, Ohio	USEC	3.8	Licensed April 13, 2007; construction not yet begun
EREF	Bonneville County, Idaho	AES	6.6	Licensed October 12, 2011; construction not yet begun
GLE	Wilmington, North Carolina	GLE	6.0	Licensed September 25, 2012; construction not yet begun

[a] Operating and proposed facilities for which a NRC license has been granted, or a license amendment request is under consideration by the NRC.

1.3.3 Conclusion

If all licensed U.S. uranium enrichment facilities (including the proposed expanded UUSA enrichment facility) are operated at their maximum rated or anticipated production capacities, as presented in Table 1-1, and considering that the Paducah GDP is no longer operating, the total projected domestic enrichment capacity in the United States would equal 26.4 million SWU/yr. Assuming a continuing domestic demand for enriched uranium based on the total SWU purchased in support of U.S. nuclear power in 2012 (15.6 million SWU), the annual domestic enrichment capacity would exceed the projected annual demand by approximately 10.8 million SWU/yr. However, as discussed above, the 3-million-SWU/yr UUSA facility is presently the only operating uranium enrichment facility in the United States, and there are uncertainties about the construction and operation schedules for the other three licensed U.S. enrichment facilities. At its currently licensed annual capacity of 3 million SWU/yr, the UUSA facility would provide approximately 19 percent of U.S. demand. This situation creates a reliability risk in U.S. domestic enrichment capacity. Any disruption in the supply of enriched uranium for domestic commercial nuclear reactors could have a negative impact on national energy security because nuclear reactors supply approximately 20 percent of the nation’s electricity requirements. The proposed UUSA facility expansion could play an important role in assuring the nation’s ability to maintain a reliable and economical domestic source of enriched uranium by providing such additional enrichment capacity. Further, this additional capacity would lessen U.S. dependence on enriched uranium produced in foreign countries. Therefore, the proposed expanded production capacity at the UUSA facility, up to 10 million SWU/yr, would provide needed assurance that a domestic source of enriched uranium would be reliably available for U.S. nuclear power production.

1.4 Scope of This Environmental Analysis

To fulfill its responsibilities under NEPA, the NRC staff has prepared this EA to analyze the potential environmental impacts of construction, operation, and decommissioning of UUSA's proposed facility expansion and consider whether there are reasonable alternatives to the proposed action. The scope of this EA includes consideration of both radiological and non-radiological (including chemical) impacts. The resource areas evaluated include:

- Land Use
- Historic and Cultural Resources
- Visual and Scenic Resources
- Climatology, Meteorology, and Air Quality
- Geology, Minerals, and Soil
- Water Resources
- Ecological Resources
- Socioeconomics
- Environmental Justice
- Noise
- Transportation
- Public and Occupational Health
- Waste Management

This EA also addresses cumulative impacts to affected resources. In addition, it identifies UUSA's mitigation measures and monitoring programs. This EA is the result of the NRC staff's review and independent evaluation of the UUSA license amendment request for capacity expansion and the supplement to the license amendment request. This review has been closely coordinated with the NRC staff's safety review of the license amendment request and supplement as documented in the staff's "Review of License Amendment Request and its Supplement for Capacity Expansion of URENCO USA Facility" (LAR Safety Review) (NRC, 2015).

1.5 Applicable Statutory and Regulatory Requirements

1.5.1 Applicable State of New Mexico Laws and Regulations

The responsibility for enforcing certain federal environmental laws and regulations has been delegated to State of New Mexico authorities for implementation, enforcement, or oversight. Table 1-2 provides a list of State of New Mexico environmental requirements.

1.5.2 Permit and Approval Status

Several construction and operation permits must be obtained by UUSA or its agents, and regulatory approvals and/or permits must be received prior to project construction or facility operation. Decommissioning of the UUSA facility would be addressed in the decommissioning plan that will later be required pursuant to 10 CFR 70.38(d) after UUSA has decided to

Table 1-2 State of New Mexico Laws and Regulations Applicable to the Proposed UUSA Facility Expansion

Law/Regulation	Citation	Requirements
New Mexico Cultural Properties Act	New Mexico Statutes Annotated (NMSA), Chapter 18, Libraries, Museums, and Cultural Properties, Article 6, Cultural Properties	Establishes State Historic Preservation Office (SHPO) and requirements to prepare an archaeological and historic survey and consult with the SHPO.
New Mexico Hazardous Chemicals Information Act	NMSA, Chapter 74, Article 4E-1, Hazardous Chemicals Information	Implements the hazardous chemicals information and toxic release reporting requirements of the Emergency Planning and Community Right-to-Know Act of 1986 (SARA Title III) for covered facilities.
New Mexico Radiation Protection Act	NMSA, Chapter 74, Article 3, Radiation Control	Establishes state requirements for worker protection.
New Mexico Solid Waste Act	NMSA, Chapter 74, Article 9, Solid Waste Act, and implementing regulations found in New Mexico Administrative Code (NMAC) Title 20, Environmental Protection, Chapter 9, Solid Waste	Establishes state standards for the management of solid wastes.
New Mexico Water Quality Act	NMSA, Chapter 74, Article 6, Water Quality, and implementing regulations found in NMAC Title 20, Chapter 6, Water Quality	Establishes water quality standards and applies to permitting prior to construction, during operation, closure, post-closure, and abatement, if necessary.
Transportation and Highways	NMAC Title 18, Transportation and Highways, Chapter 31, Classification and Design Standard for Highways	Establishes state highway access management requirements that will protect the functional integrity of, and investment in, the state highway system.

permanently cease licensed operations. Table 1-3 lists the required federal, state, and local permits/approvals and their present status.

1.5.3 Cooperating Agencies

No federal, state, or local agencies or Native American Tribes have come forward as cooperating agencies in the preparation of this EA.

1.5.4 Consultations

The consultation requirements of the Endangered Species Act of 1973 (ESA) and the National Historic Preservation Act of 1966 (NHPA) apply to the NRC regarding the licensing of the proposed UUSA facility expansion.

1.5.4.1 Endangered Species Act of 1973 Consultation

NRC staff consulted with the U.S. Fish and Wildlife Service (FWS) to comply with the requirements of Section 7 of the ESA. On April 1, 2013, the staff sent a letter to the FWS Region 2 describing the proposed action and requesting FWS concurrence with NRC's determination that the license amendment to expand operations at the UUSA would have no effect on any federally listed threatened or endangered species or their critical habitats (NRC, 2013b). In this letter, the NRC also cited its earlier 2004 consultation with the FWS regarding LES' proposed gas centrifuge uranium enrichment facility in Lea County, New Mexico (NRC, 2004c; FWS, 2004), and the subsequent determination, documented in NUREG-1790 (NRC, 2005a), that the construction, operation, and decommissioning of the UUSA facility would have no effect on federally listed threatened or endangered species and their critical habitats. In email correspondence dated September 18, 2013, FWS Region 2 confirmed that consultation was not required based on the NRC's determination of no effect (FWS, 2013).

1.5.4.2 National Historic Preservation Act of 1966 Section 106 Consultation

In February 19, 2013, correspondence to the Advisory Council on Historic Preservation (ACHP) (NRC, 2013c) and the New Mexico State Historical Society (NRC, 2013d), the NRC referenced the April 7, 2005, Memorandum of Agreement (MOA) (NRC, 2005d) executed to formalize plans to resolve adverse impacts to seven historic properties, prehistoric archaeological sites identified in the survey prepared under the auspices of the NHPA related to the original licensing of the UUSA facility (Graves, 2004). Pursuant to the treatment plan referenced in the MOA, several data-recovery approaches were planned to retrieve information from each of the sites prior to excavation for construction of the facility. The approaches included mapping and collecting surface artifacts, subsurface testing of cultural features and artifact concentrations, and mechanical cross-trenching of the site areas. The data collected was to be used to determine the age of the sites, site function, paleoenvironmental setting, and cultural attributes associated with the site occupancy (NRC, 2005a). The MOA stipulations were satisfied in 2007 when the New Mexico State Historic Preservation Office (SHPO) concurred with findings of the treatment plan data-recovery activities (LES, 2007). The New Mexico SHPO acknowledged in

Table 1-3 Applicable Permitting and Approval Requirements and Their Status for the Proposed UUSA Facility Expansion

License, Permit, or Other Required Approval	Responsible Agency	Authority	Status
Federal			
Domestic Licensing of Special Nuclear Material, Domestic Licensing of Source Material, Rules of General Applicability to Domestic Licensing of Byproduct Material	NRC	10 CFR Part 70, 10 CFR Part 40, 10 CFR Part 30 as authorized by the Atomic Energy Act	License amendment requested; under review
National Pollutant Discharge Elimination System (NPDES) Industrial Stormwater Permit	Environmental Protection Agency (EPA) Region 6	40 CFR Part 122 as authorized by the Clean Water Act (CWA)	Existing No Exposure Certification under reevaluation by New Mexico Environment Department (NMED)
NPDES Construction General Permit	EPA Region 6	40 CFR Part 122 as authorized by the CWA	Existing permit is applicable
State			
Ground Water Discharge Permit	NMED/Water Quality Bureau (WQB)	NMSA Chapter 74, Article 6B; NMAC Title 20, Chapter 6	Existing permit was renewed on February 26, 2013 for 5 years
NPDES Industrial Stormwater Permit	NMED/WQB	NMSA Chapter 74, Article 6; NMAC Title 20, Chapter 6	Existing No Exposure Certification under reevaluation by NMED
NPDES Construction General Permit	NMED/WQB	NMSA Chapter 74, Article 6; NMAC Title 20, Chapter 6	Existing permit is applicable
Waste Generator ID Number	NMED/HWB	NMSA Chapter 74, Article 4; NMAC Title 20, Chapter 4	Existing number is applicable
Rare, Threatened & Endangered Species Survey Permit	New Mexico Department of Game and Fish	NMAC Title 19, Chapter 21	Existing permit is applicable
Right-of-Entry Permit	New Mexico State Land Office	NMAC Title 19, Chapter 2	Existing permit is applicable

Table 1-3 Potentially Applicable Permitting and Approval Requirements and Their Status for the Proposed UUSA Facility Expansion (Cont.)

License, Permit, or Other Required Approval	Responsible Agency	Authority	Status
Class III Cultural Survey Permit	New Mexico State Historic Preservation Officer	NMAC Title 4, Chapter 10	Existing permit is applicable
Machine Produced Radiation Registration	NMED/Radiological Control Bureau	NMSA Chapter 74, Article 3	Existing registration is applicable

2013 that because no historic properties remain on the UUSA property, no historic properties would be affected by the current licensing action for the proposed facility expansion (Ensey, 2013). On July 24, 2014, the NRC issued its determination that no historic properties would be affected by the facility expansion to the New Mexico SHPO (NRC, 2014). On August 26, 2014, the New Mexico SHPO concurred with the NRC's determination (Ensey, 2014).

To determine if historic properties of concern to Native American Tribes would be affected by the proposed action, the NRC staff also contacted the following tribes: Apache Tribe of Oklahoma (NRC, 2013e), Comanche Tribe (NRC, 2013f), Kiowa Tribe (NRC, 2013g), Mescalero Apache Tribe (NRC, 2013h), and Ysleta del Sur Pueblo (NRC, 2013i). The Ysleta del Sur Pueblo replied that it did not have concerns over the expansion of the plant (Loera, 2013). None of the other tribes responded.

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2 Proposed Action and Alternatives

This chapter describes the proposed action and alternatives to the proposed action. Section 2.1 describes the proposed action, including information on the site location and environs (Section 2.1.1) and the existing 3-million-SWU/yr facility (Section 2.1.2), the proposed expanded uranium enrichment facility (Section 2.1.3), and decommissioning of the expanded facility (Section 2.1.4). Section 2.2 covers other reasonable alternatives considered, including the no-action alternative (Section 2.2.1) and alternatives eliminated from detailed consideration (Section 2.2.2).

2.1 Proposed Action

The proposed action is for the NRC to grant LAR-12-10 and the supplemental request. UUSA would be authorized to expand its existing gas centrifuge uranium enrichment facility near Eunice in Lea County, New Mexico, which would increase the production capacity of enriched uranium from 3 million to 10 million SWU/yr at the UUSA facility. At its expanded facility, UUSA would be authorized to hold up to 251,000,000 kg (553,000,000 lb) of natural and depleted uranium and up to 2,180,000 kg (4,810,000 lb) of enriched uranium. UUSA would also be authorized to use a modified enrichment process in SBM-1005 utilizing depleted uranium instead of natural uranium as the feed material.

2.1.1 Site Location and Vicinity

The site of the present UUSA facility and the proposed facility expansion consists of about 220 ha (543 ac) along New Mexico highway 176 (NM 176), located 8 kilometers (km) (5 miles [mi]) east of the City of Eunice, New Mexico, in Lea County, as shown in Figure 1-1. The Texas border lies 0.8 km (0.5 mi) east of the site, and the City of Hobbs, New Mexico, lies 32 km (20 mi) to the north. The nearest large city is Midland/Odessa, Texas, located 103 km (64 mi) to the southeast. Albuquerque, New Mexico, lies 523 km (325 mi) to the northwest. The site topography is mostly flat, with slope trending slightly to the southwest. The site lies between 1,033 meters (m) and 1,045 m (3,390 feet [ft] and 3,430 ft) above sea level. The predominant vegetation is mesquite bush, yucca, sand sage, and sand dropseed. The surrounding area is mostly open land and industrial areas. Oil and gas operations and cattle grazing are prevalent in the area.

Major transportation routes in the area are NM 176, which runs east-west immediately south of the facility and provides access to the facility, and NM 18, which runs north-south and intersects NM 176 about 4.0 km (2.5 mi) west of the site. The nearest residents to the facility are located near this intersection. A railroad spur lies near the northern boundary of the site. A high-voltage transmission line runs north-south near the Texas border east of the site.

Waste Control Specialists (WCS) operates a low-level radioactive and hazardous waste disposal facility across the border in Texas immediately to the east of the site. The Lea County landfill, a municipal solid waste landfill, lies immediately to the south, on the south side of NM 176, about 1 km (0.6 mi) from the site. Wallach Concrete, Inc. operates a sand/aggregate quarry immediately to the north of the site, including two lagoons holding produced water from the oil and gas operations in the area.

The proposed facility expansion would take place within the footprint of the existing UUSA uranium enrichment facility, as shown in Figure 2-1. The existing UUSA enrichment facility is briefly described in Section 2.1.2 below. No new land will have to be disturbed for the proposed expansion (UUSA, 2013a).

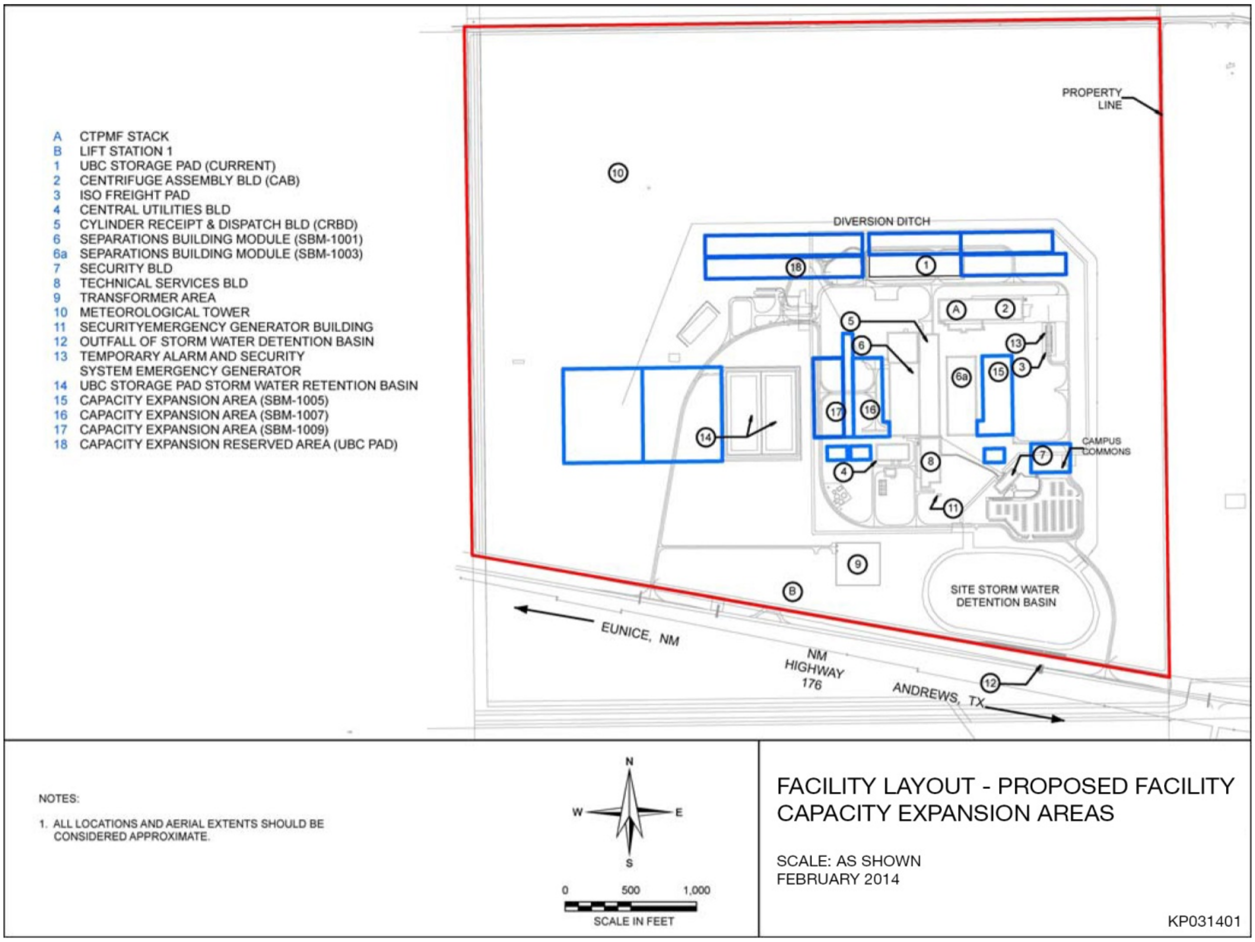

Figure 2-1 Existing UUSA Facility Layout and Proposed Expansion Areas (Existing Facility Areas Shown in Gray and Expansion Areas Outlined in Blue)

2.1.2 Current Facility Description

In the current facility, also shown in Figure 2-1, UUSA uses a gas centrifuge process to separate natural UF_6 feed material containing approximately 0.71 weight percent of U-235 into (1) a product stream enriched up to the UUSA license limit in isotope U-235 of 5.5 weight percent and (2) a depleted UF_6 stream containing approximately 0.1 to 0.5 weight percent U-235. The existing facility has a nominal capacity of 3 million SWU/yr for the production of enriched uranium. UUSA received NRC authorization and began enrichment activities in June 2010 and is now fully operational.

The major facility buildings and structures in the existing UUSA facility are identified and described in Section 2.1.2.1. Operations are summarized in Section 2.1.2.2, and waste management is covered in Section 2.1.2.3. Utilities are discussed in Section 2.1.2.4. The facility's monitoring program is discussed in Section 2.1.2.5, and UUSA's mitigation measures are identified in Section 2.1.2.6. The information in these sections is taken primarily from NUREG-1790, the NRC's Environmental Impact Statement (EIS) for the NEF (NRC, 2005a), unless otherwise noted. Further details on the existing facility's design can be found in the NEF EIS (NRC, 2005a) and the LES ER for the NEF (LES, 2014).

2.1.2.1 Major Facility Buildings and Structures

Buildings and structures within the UUSA facility, as seen in Figure 2-1, include the following:

- Separations Building Modules (SBMs)
- Centrifuge Assembly Building
- Cylinder Receipt and Dispatch Building (CRDB)
- Uranium Byproduct Cylinder (UBC) Storage Pad
- Technical Services Building (TSB)
- Gaseous Effluent Vent Systems (GEVSs)
- Liquid Effluent Collection and Transfer System (LECTS)
- Central Utilities Building
- Security Building
- UBC Storage Pad Stormwater Retention Basin

2.1.2.1.1 Separations Building Modules

The main process facilities at the UUSA plant are two SBMs (SBM-1001 and SBM-1003), each with two Cascade Halls. Each Cascade Hall houses twelve cascades, and each cascade consists of hundreds of centrifuges connected in series and parallel to produce enriched UF_6. Each SBM also houses a UF_6 Handling Area and a Process Services Corridor. Each UF_6 Handling Area contains a Feed System, Product Take-Off System, Tails Take-Off System, and Blending and Liquid Sampling Systems. The Process Services Corridors contain gas transport equipment connecting the cascades to the UF_6 Feed System, Product Take-Off System, Tails Take-Off System, and Contingency Dump System.

2.1.2.1.2 Centrifuge Assembly Building

The Centrifuge Assembly Building is used for the assembly, inspection, and mechanical testing of the centrifuges prior to installation in the Cascade Halls. This building also contains the Centrifuge Test and Postmortem Facilities (CTPMF) that are used to test the functional performance and operational problems of production centrifuges and ensure compliance with design parameters. The air exhaust for these facilities is vented through the CTPMF Exhaust Filtration System (EFS) which contains pre-filters, activated carbon filters, and high efficiency particulate air (HEPA) filters.

2.1.2.1.3 Cylinder Receipt and Dispatch Building

All UF_6 cylinders (feed, product, and UBCs) enter and leave the UUSA facility through the CRDB. In addition, clean, empty product cylinders and UBCs are received, inspected, weighed, and temporarily stored in the CRDB prior to being filled in the SBMs (LES, 2014).

2.1.2.1.4 Uranium Byproduct Cylinder Storage Pad

The UBC Storage Pad is a large concrete pad on which Type 48Y feed cylinders and 30B cylinders are stored. Type 48Y cylinders are used to store and transport natural and depleted uranium, and 30B cylinders are used to store and transport enriched uranium. These cylinders are discussed further below in EA Sections 2.1.2.2.1 and 2.1.2.2.4. The pad is also used to temporarily store empty 48Y and 30B cylinders, as needed.

2.1.2.1.5 Technical Services Building

The TSB contains support areas for the UUSA facility and acts as the secure point of entry to the SBMs and the CRDB. This building contains a number of functional areas including the facility control room and various workshops and laboratories.

2.1.2.1.6 Gaseous Effluent Vent Systems

The GEVSs are designed to collect the potentially contaminated gaseous streams in the facility and treat them before discharge to the atmosphere. The systems route these streams through a filter system prior to exhausting out a vent stack, which contains a continuous monitor to measure radioactivity levels. There are two types of GEVSs for the facility: (1) the TSB GEVS and (2) the GEVS for each SBM.

2.1.2.1.7 Liquid Effluent Collection and Transfer System

The LECTS collects potentially contaminated liquid effluents generated in a variety of facility operations and processes in the Centrifuge Assembly Building (CAB), CRDB, and SBMs. These liquid effluents are collected in holding tanks, sampled, analyzed, and then transferred to bulk storage tanks prior to transfer for solidification or disposal. The LECTS was previously known as the Liquid Effluent Collection and Treatment System prior to a re-design that eliminated the Treated Effluent Evaporative Basin.

2.1.2.1.8 Central Utilities Building

The Central Utilities Building (CUB) houses the electrical switchgear; heating, ventilation, and air-conditioning systems; and two standby generators for emergency power for the UUSA facility.

2.1.2.1.9 Security Building

The main Security Building controls all personnel access to the UUSA facility.

2.1.2.1.10 UBC Storage Pad Stormwater Retention Basin

The UBC Storage Pad Stormwater Retention Basin collects and contains water discharges from a number of sources. The three primary sources are: (1) stormwater runoff from the UBC Storage Pad, (2) cooling tower blowdown discharges, and (3) cooling tower back wash water discharges. Other smaller sources include non-stormwater generated at the facility such as floor wash water from the CAB, the CRDB, the SBM, and the CUB. This basin is designed with a membrane lining to minimize ground infiltration of the water. Evaporation is the primary method to eliminate the water from this basin.

2.1.2.2 Facility Operation

Under the current nominal 3-million-SWU/yr design, the facility can receive approximately 8,600 MT (9,480 tons) of UF_6 feed containing natural uranium isotopic ratios, and can produce 800 MT (882 tons) of low-enriched UF_6 and 7,800 MT (8,600 tons) of depleted UF_6 annually.

Facility operation includes the following primary activities:

- receipt and storage of UF_6 feed cylinders,
- UF_6 enrichment via gas centrifugation,
- collection of enriched and depleted UF_6 streams,
- shipment of enriched UF_6,
- onsite storage of depleted UF_6, and
- waste management.

2.1.2.2.1 Receipt and Storage of UF_6 Feed Cylinders

The current UUSA facility receives feed cylinders from UF_6 production facilities located in Metropolis, Illinois, and Port Hope, Ontario, Canada. Natural UF_6 feed material is shipped to the UUSA facility in standard Type 48Y cylinders. A fully loaded Type 48Y cylinder contains approximately 12.5 MT (14 tons) of material and is shipped one per truck. After receipt and inspection, the cylinder is stored until needed or connected to the gas centrifuge cascade at one of several feed stations in an SBM.

2.1.2.2.2 UF_6 Enrichment via Gas Centrifugation

Once installed in a feed station, a 48Y feed cylinder is heated to sublime the solid UF_6 into a gas that is purified and then fed to the gas centrifuge enrichment cascade. The UF_6 is routed through the centrifuge cascade where enriched and depleted UF_6 streams are created.

After each Type 48Y feed cylinder has been emptied, the empty cylinders are used as tails cylinders to store depleted UF_6 material on the UBC Storage Pad (see below) or are returned to the supplier ("empty" feed cylinder with a "heel"). "Empty" 48Y feed cylinders contain a small amount of residual material, often referred to as a "heel," which contains a concentrated amount of radioactive uranium daughter products that result in a higher external dose rate from a 48Y cylinder than a 48Y cylinder filled with depleted UF_6 or uranium feed.

2.1.2.2.3 Collection of Enriched and Depleted UF_6 Streams

The enriched product stream and the depleted waste stream exit the cascades separately for subsequent desublimation (solidification) in their respective systems. For collection of enriched UF_6 from the cascades (Product Take-Off System), low-enriched product between 3 and 5.5 weight percent of the U-235 isotope is desublimed into Type 30B product cylinders. The enriched UF_6 is piped from the cascades at subatmospheric pressure. The heat of desublimation of the UF_6 is removed by cooling air routed around the collection cylinders. The product stream normally contains small amounts of light gases that may have passed through the centrifuges. Therefore, a UF_6 cold trap and vacuum pump/trap set is provided to vent these gases from the Type 30B product cylinder. Any UF_6 captured in the cold trap is periodically transferred to another product cylinder for use as product or blending stock. Filling of the product cylinders is monitored with a load cell system, and filled cylinders are transferred to the Blending and Liquid Sampling Systems for sampling and to adjust the enrichment and verify the purity of the enriched product.

Depleted UF_6 exiting the cascades is transported for desublimation into Type 48Y tails cylinders at subatmospheric pressure in the Tails Take-Off System. Chilled air is flowed over the cylinders to effect the desublimation. Filling of the Type 48Y cylinders is monitored with a load cell system, and filled cylinders are transferred to the UBC Storage Pad.

2.1.2.2.4 Shipment of Enriched UF_6

Enriched UF_6 product is shipped offsite in Type 30B cylinders, which each hold a maximum of 2.3 MT (2.5 tons) of 5 weight percent enriched UF_6. Enriched product cylinders are shipped to fuel fabrication facilities located in Richland, Washington; Columbia, South Carolina; and Wilmington, North Carolina.

2.1.2.2.5 Onsite Storage of Depleted UF_6

Depleted UF_6 transferred to empty Type 48Y cylinders is stored on the UBC Storage Pad. The UBC Storage Pad can hold up to 15,727 cylinders, which is the maximum projected production of depleted UF_6 cylinders for the 3-million-SWU/yr facility.

2.1.2.3 Waste Management

Operations at the existing UUSA facility generate gaseous and liquid effluents and solid wastes that must be properly treated and disposed.

2.1.2.3.1 Gaseous and Liquid Effluents

The UUSA facility produces only minor effluents to air from uranium enrichment processing. These effluents are processed in the GEVSs to remove uranium compounds and hydrogen fluoride (HF) prior to discharge from rooftop vents.

There are no offsite discharges of liquid waste from the UUSA facility, except for sanitary wastes that are transported by pipeline through a series of lift stations to the City of Eunice wastewater treatment plant. All process liquid wastes, which contain various levels of uranium compounds, are collected and stored in tanks located in the Liquid Effluent Collection and Transfer Room in the CRDB. The aqueous condensate from the concentrator/dryer is solidified with grout prior to offsite disposal as Class A low-level radioactive waste (LLRW) at one of the available licensed LLRW disposal facilities, including at EnergySolutions in Clive, Utah, or potentially at the adjacent WCS facility in Andrews, Texas. Solidification takes place either onsite or at the disposal facility. As the WCS facility is a member of the Texas Compact, which does not include New Mexico, access to this facility would require approval of the Texas Compact Commission.

2.1.2.3.2 Solid Waste

Operations at the existing UUSA facility produce a variety of solid waste streams in a number of waste categories, including LLRW; hazardous waste; mixed waste; and non-hazardous, non-radioactive industrial waste. These wastes are managed under a comprehensive waste management program operating within a waste management organization and under a waste management plan for the facility. The wastes are collected as they are produced, consolidated, packaged, pretreated as appropriate, and shipped to licensed waste disposal facilities for disposal consistent with waste type. In addition, byproduct depleted UF_6 produced in the enrichment process may be ultimately converted to uranium oxide at the existing U.S. Department of Energy (DOE) conversion plants in Paducah, Kentucky, or Portsmouth, Ohio, or the planned commercial conversion facility in Hobbs, New Mexico, and subsequently disposed of as LLRW. UUSA is committed to removing all produced depleted UF_6 by the time of facility closure.

Other large-volume LLRWs include activated carbon, activated alumina, and ventilation filters used in the multiple GEVS units in the facility. These wastes are disposed of as Class A LLRW at one of the available licensed LLRW disposal facilities, including at EnergySolutions in Clive, Utah, or the adjacent WCS facility in Andrews, Texas. These facilities can readily accommodate the volumes of these wastes produced. As the WCS facility is a member of the Texas Compact, which does not include New Mexico, access to this facility would require approval of the Texas Compact Commission.

Hazardous wastes generated from laboratory operations and other activities are disposed offsite at a licensed hazardous waste facility. The current UUSA facility does not treat, store, or dispose hazardous wastes onsite, and thus does not require the acquisition of a New Mexico hazardous waste permit. Minor quantities of mixed waste are generated annually, which are likewise disposed of at an offsite facility licensed to treat and dispose mixed waste.

Non-hazardous and non-radioactive industrial wastes, including packing materials, wood, paper, scrap metal, and rubber and cloth materials, are disposed of at the local Lea County landfill where there is ample capacity for these wastes.

2.1.2.4 Utilities

The UUSA site obtains its water supply from the City of Eunice, New Mexico. Electricity is provided by Xcel Energy, the local electrical service company. Natural gas is obtained from a nearby pipeline.

2.1.2.5 Monitoring Program

The existing UUSA facility employs a three-pronged monitoring program to protect human health and the environment: (1) a Radiological and Environmental Monitoring Program (REMP), (2) Physiochemical Monitoring, and (3) Ecological Monitoring (UUSA, 2013a). This program would also apply to and be implemented for the proposed expanded facility. While it is useful to separate these three programs conceptually, in practice they share a good deal with respect to program management, quality assurance (QA), sampling and analysis principles and practices, response actions, and reporting. Radiological measurement programs are designed to ensure releases of radioactive materials to the environment are within federal and state regulations and are maintained at levels that are as low as reasonably achievable (ALARA) through the implementation of NRC health and environmental regulations and effluent standards, while non-radiological programs conform to the State of New Mexico requirements through permitting. Ecological monitoring program results are reported to both the New Mexico Department of Game & Fish and the FWS. The following summary of UUSA's monitoring programs is adapted from information in Chapter 6 of the Supplemental ER for the proposed facility expansion (UUSA, 2013a).

2.1.2.5.1 Radiological and Environmental Monitoring Program

The REMP is overseen by the facility's QA program and, as such, employs written procedures for all aspects of sampling, analysis, and reporting. These procedures ensure that measurement systems are calibrated and in proper working order and that accurate and high-quality measurement data are produced. In addition, all onsite and contractor laboratories must participate in third-party inter-comparison programs. UUSA is required to submit a Semi-Annual Radiological Effluent Release Report to the NRC. This report must indicate the quantities of specific radionuclides released to unrestricted areas in liquid and gaseous effluents over the previous six months and assess environmental performance against applicable NRC regulations.

Initial monitoring under the REMP included the determination of site baseline conditions prior to June 2010, when enrichment operations began at the site. The site baseline conditions are compared to data collected during operations, to assess potential radiological impacts to the public and compliance with radiation protection standards. The baseline sampling included the pre-2010 ground water aquifer at a depth of 70 m (230 ft) and the dry shallow zone that would be impacted from any significant releases of radiological liquids during enrichment operations. Soil and vegetation were also sampled.

REMP sampling focuses on radioactivity monitoring of facility emissions to the atmosphere and any associated deposition plume. This sampling occurs mainly within 4.8 km (3 mi) of the facility, which corresponds to the expected measureable range of a plume produced by the low-level emissions occurring from facility operations. Sampling is concentrated along the facility boundary and perimeter fence line, as these locations would most effectively detect any excursions from normal emissions. More distant control and reference area measurements are also collected. Emission sources, mainly ventilation stacks from the GEVSs, are located in the central portion of the facility on the roofs of the CRDB, SBMs, and Centrifuge Assembly Building.

Gaseous effluents are monitored using continuous air particulate samplers on the various effluent vent stacks. Filters are analyzed for gross alpha and gross beta activity weekly and for isotopic uranium quarterly. Air monitoring of the site employs six continuous airborne particulate filter samplers arrayed around the facility, which are analyzed for gross alpha and gross beta activity biweekly and for specific uranium isotopes quarterly. In addition, water and sediment samples are collected periodically from the stormwater detection basin and the UBC Storage Pad Stormwater Retention Basin and are subjected to isotopic uranium analysis. The sanitary sewage system is similarly analyzed for isotopic uranium periodically. Soil, vegetation, and ground-water samples from an array of wells are also sampled periodically and compared to baseline levels.

The program also measures direct radiation levels produced from radioactive materials onsite, primarily from stored UBCs on the storage pad. Environmental thermoluminescent detectors are placed along the perimeter fence line and at locations close enough to stored UBCs to detect a measurable radiation dose. Estimates of potential doses to members of the public needed for compliance with applicable health protection standards are performed using a computer model and the data from these direct dose measurements onsite.

2.1.2.5.2 Physiochemical Monitoring

The physiochemical sampling program addresses non-radiological environmental monitoring for the purpose of verifying that facility operations are not producing chemical impacts on the environment. Monitoring chemical concentrations in gaseous and liquid effluents to assure that they remain below levels specified in New Mexico-issued discharge permits is the primary means of implementing the program. Samples are analyzed in the facility's Chemical Laboratory, located in the CRDB, for the presence of hazardous materials and other contaminants in waste samples and liquid effluents. An onsite Environmental Laboratory under development will be able to analyze air, water, soil, flora, and fauna samples, as well as perform bioassays. These services are currently contracted out to offsite laboratories.

Effluent monitoring is performed to confirm that the facility does not release any significant quantities of chemical contaminants during routine operations, and to detect any potential excursions from normal operating conditions. Sanitary sewage is sampled as warranted. In addition, sampling is conducted of stormwater, soil, sediment, vegetation, and ground water. Sampling is focused on onsite discharges and runoff, including soil at the outfall of the Stormwater Detention Basin. Ground-water wells across the site and along the site boundary are sampled to detect the effects of any contamination infiltration from routine operations or releases. As discussed in Section 2.1.2.3.1, the facility does not produce any direct offsite discharges of liquids.

Sampling locations consider meteorological information, land use, and population centers. An onsite meteorological station collects and records wind speed and direction data that can be used for dispersion calculations for routine operations or emergency conditions.

The physiochemical monitoring program operates under a formal QA program following a set of controlled processes and procedures. Written procedures are followed for sample collection, laboratory analysis, chain-of-custody adherence, reporting results, and implementing corrective actions. Action levels for various responses have been established when sample results exceed (1) normal background or baseline levels, (2) an administrative limit, or (3) a regulatory limit for a public health benchmark. Corrective actions are implemented such that the cause of any action level exceedance is identified and corrected, regulatory agencies are identified, and procedures are modified as necessary to prevent recurrences.

2.1.2.5.3 Ecological Monitoring

Ecological monitoring was conducted primarily in an initial study of the pre-2010 site baseline conditions. Surveys performed onsite indicated that there are no important ecosystems onsite that are vulnerable to impacts from the facility, and that no important habitats are present, including seasonal habitats. Initial surveys of vegetation, birds, mammals, reptiles, and amphibians identified no rare, threatened, or endangered species. Appropriate consultation by UUSA with the New Mexico Department of Fish and Game and the FWS will continue. Agency recommendations would be considered in the development of action and/or reporting levels for each monitored element. Additional monitoring of wildlife communities will only be warranted if environmental monitoring indicates a site-related release that could affect an indicator population. Monitoring of the site property and basin waters continues, to detect any impacts to birds and wildlife.

2.1.2.6 Mitigation Program

In its license application for the original NEF, LES proposed a set of mitigation measures designed to control and minimize environmental impacts from construction and operation of the facility. Such measures have been and will be taken in addition to any further actions required under applicable laws, regulations, and permits. The NRC's 2005 EIS included a review of proposed mitigation measures and concluded that any further measures at the NEF would likely produce little additional benefit (NRC, 2005a). UUSA's mitigation measures are summarized in Chapter 5 of the EIS (NRC, 2005a), and are also presented in Tables 2-1 and 2-2 below for construction and operations, respectively. These mitigation measures have been implemented by UUSA for the construction and operation of the existing facility. Additional or expanded mitigation measures addressing the proposed expansion of the facility are presented in Section 5 of UUSA's Supplemental ER (UUSA, 2013a) and are summarized in Table 4-10 of this EA.

2.1.3 Description of the Proposed Action

As summarized in Section 1.2 above, the proposed action is for the NRC to grant LAR-12-10 and its 2014 supplemental request. Doing so would allow UUSA to expand its licensed facility by (1) authorizing increased possession limits for natural, depleted, and enriched uranium; (2) authorizing enrichment operations in SBM-1005, including the use of a modified enrichment process using depleted UF_6 in tails cylinders for feed material, rather than natural uranium; (3) authorizing the later construction and operation of two additional SBMs; (4) authorizing a second CRDB that would be constructed to accommodate additional UF_6 cylinder handling requirements; (5) authorizing the expansion of the UBC Storage Pad to accommodate additional storage for depleted UF_6 cylinders; (6) authorizing the construction of two additional UBC basins to manage stormwater runoff; and (7) authorizing an increase in the capacity of UUSA's utility substation with the addition of 115-kV to 13-kV transformers. The existing substation is built to support additional transformers, as required to support the proposed facility expansion. At the conclusion of operations, the entire facility, including both the original and expanded portions, would be decommissioned by UUSA. The elements of the proposed expanded facility and the existing transformer area are shown in Figure 2-1. Unless otherwise noted, the information in this section is taken largely from the UUSA Supplemental ER (UUSA, 2013a).

Table 2-1 Summary of Mitigation Measures for Construction of the Existing UUSA Facility[a]

Resource Area	Activity	Mitigation Measures
Land Use	Land disturbance	• Use best management practices (BMPs) to develop the smallest area of the site, as practicable, and use water spray on roads to suppress dust. • Limit site slopes to a horizontal-vertical ratio of three to one or less. • Use sedimentation detention basins. • Protect undisturbed areas with silt fencing and straw bales, as appropriate. • Use site stabilization practices such as placing crushed stone on top of disturbed soil in areas of concentrated runoff.
Historic and Cultural Resources	Disturbance of prehistoric archaeological sites and sites eligible for listing on the *National Register of Historic Places* (NRHP)	Implement treatment plan in the Section 106 MOA (NRC, 2005d), developed in coordination with the NRC, New Mexico SHPO, State Land Office, Lea County, ACHP, and affected Native American Tribes for the sites eligible for listing on the NRHP.
Visual Resources	Potential visual intrusions in the existing landscape character	• Use accepted natural, low-water-consumption landscaping techniques. • Consider down-shielding of security lights consistent with security plan requirements. • Conduct prompt re-vegetation or covering of bare areas.
Air Quality	Fugitive dust and construction equipment emissions	• Use BMPs for fugitive dust and for maintenance of vehicles and equipment to minimize air emissions. • In addition to those mitigative measures identified below for Geology, Minerals, and Soil: o Use covers over load beds of open-bodied trucks. o Promptly remove earthen material on paved roads.
Geology, Minerals, and Soil	Soil disturbance	• Use construction BMPs and comply with a fugitive dust control plan and a Spill Prevention, Control, and Countermeasures (SPCC) Plan. BMPs include: o Minimize construction footprint. o Use water to control dust. o Promptly stabilize or cover bare areas once earthmoving activities are completed. o Use earthen berms, dikes, and sediment fences as necessary to limit suspended solids in runoff. o Stabilize and line drainage culverts and ditches with rock aggregate/riprap to reduce flow velocity and prohibit scouring.

Table 2-1 Summary of Mitigation Measures for Construction of the Existing UUSA Facility (Cont.)

Resource Area	Activity	Mitigation Measures
Water Resources	Runoff	• Use BMPs for dust control, fill operations, erosion control measures, maintenance of equipment, stormwater runoff, and erosion controls. • Use staging areas for materials and wastes and retention/detention basins to control runoff. • Implement an SPCC Plan and a site Stormwater Pollution Prevention Plan. • Berm all aboveground diesel storage tanks.
	Water use	• Use low-water-consumptive landscaping techniques and install low-flow toilets, sinks, and showers and other efficient water-using equipment. • Implement a waste management and recycling program to segregate and minimize industrial and hazardous waste.
Ecological Resources	Disturbance of habitats	• Use construction BMPs to minimize the construction footprint and to control erosion and manage stormwater. • Use native, low-water-consumptive vegetation in restored and landscaped areas. • Consult with New Mexico Department of Game and Fish on the design and use of animal-friendly fencing and netting or other suitable material over basins to prevent use by migratory birds. • Minimize the number of open trenches at any given time and keep trenching and backfilling crews close together. • Trench during the cooler months (when possible). • Avoid leaving trenches open overnight. Construct escape ramps at least every 90 m (295 ft) and make the slope of the ramps less than 45 degrees. Inspect trenches that are left open overnight and remove animals prior to backfilling. • Consider down-shielding of security lights consistent with security plan requirements. • Implement pest management controls for mosquitoes, if a significant population develops. • Implement weed control, if a significant intrusion develops.
Noise	Exposure of workers and the public to noise	• Maintain in proper working condition the noise-suppression systems on construction vehicles. • Promote use of hearing protection for workers.
Transportation	Traffic volume	• Use construction BMPs to suppress dust by watering down roads as necessary and maintain temporary roads. • Cover open-bodied trucks when in motion, stabilize or cover bare earthen areas, ensure prompt removal of earthen materials from paved areas, and use containment methods during excavation activities. • Use shift work during construction, operation, and decommissioning to reduce traffic on roadways. • Encourage car-pooling to reduce the number of workers' cars on the road.

Table 2-1 Summary of Mitigation Measures for Construction of the Existing UUSA Facility (Cont.)

Resource Area	Activity	Mitigation Measures
Public and Occupational Health	Non-radiological effects from construction activities	Use BMPs and management programs associated with promoting safe construction practices.
Waste Management	Generation of industrial and hazardous wastes (air and liquid emissions in “Air Quality” and “Water Resources,” above)	• Use waste-staging areas to segregate and store wastes. • Use BMPs that minimize the generation of solid waste. • Perform a waste assessment and develop and use a waste recycling plan for non-hazardous materials. • Conduct employee training on and implement the recycling program.

[a] Source: Table 5-1 in the NEF EIS (NRC, 2005a).

Table 2-2 Summary of Mitigation Measures for Operation of the Existing UUSA Facility[a]

Resource Area	Activity	Mitigation Measures
Land Use	Land disturbance	Stabilize bare areas with natural, low-water-maintenance landscaping and pavement.
Historic and Cultural Resources	Disturbance of prehistoric archaeological sites and sites eligible for listing on the *National Register of Historic Places*	Same as for construction, where applicable.
Visual Resources	Potential visual intrusions in the existing landscape character	• Use accepted natural, low-water-consumption landscaping techniques. • Consider down-shielding of security lights consistent with security plan requirements. • Conduct prompt re-vegetation or covering of bare areas.
Air Quality	Fugitive dust and construction equipment emissions	Implement control measures (identified in the Natural Events Action Plan (NMAQB, 2004) prepared by the New Mexico Environment Department Air Quality Bureau), as appropriate.
Geology, Minerals, and Soil	Soil disturbance	• Implement an SPCC Plan. • Use water to control dust. • Use permanent retention/detention basins to collect stormwater and process water. • Stabilize bare areas with natural, low-water-maintenance landscaping and pavement.
Water Resources	Runoff	• Use staging areas for materials and wastes and retention/detention basins to control runoff. • Implement an SPCC and a site Stormwater Pollution Prevention Plan during operation. • Perform visual inspections of the basins on a sufficient basis for high water levels and to verify proper functioning. • Implement corrective actions for high water levels as needed to prevent overflowing. • Use low-water-consumptive landscaping techniques. • Use building and maintenance practices designed to reduce water consumption. • Use closed-loop cooling systems.
Ecological Resources	Disturbance of habitats	• Manage unused open areas (i.e., leave undisturbed), including areas of native grasses and shrubs, for the benefit of wildlife. • Conduct pest management and weed control, if the presence of pest or weed intrusion is significant. • Use native, low-water-consumptive vegetation in restored and landscaped areas. • Use animal-friendly fencing and netting or other suitable material over basins to prevent use by migratory birds.
Noise	Exposure of workers and the public to noise	• Maintain in proper working condition the noise-suppression systems on vehicles and any outdoor equipment. • Promote use of hearing protection for workers.

Table 2-2 Summary of Mitigation Measures for Operation of the Existing UUSA Facility (Cont.)

Resource Area		Mitigation Measures
Waste Management	Generation of industrial, hazardous, radiological, and mixed wastes	• Use a storage array that permits easy visual inspection of all cylinders. • Segregate the storage pad areas from the rest of the enrichment facility by barriers (e.g., vehicle guardrails). • Prior to placing the UBCs on the UBC Storage Pad or transporting them offsite, inspect the cylinders for external contamination (a "wipe test") using a maximum level of removable surface contamination allowable on the external surface of the cylinder of no greater than 0.4 becquerel per square centimeter (22 disintegrations per minute per square centimeter) (beta, gamma, alpha) on accessible surfaces averaged over 300 square centimeters (cm^2) (46.5 square inches [$in.^2$]). • Take steps to ensure that UBCs are not equipped with defective valves (identified in NRC Bulletin 2003-03, "Potentially Defective 1-Inch Valves for Uranium Hexafluoride Cylinders" [NRC, 2003b]). • Allow only designated vehicles with less than 280 liters (L) (74 gallons [gal]) of fuel in the UBC Storage Pad area. • Allow only trained and qualified personnel to operate vehicles on the UBC Storage Pad area. • Inspect cylinders of UF_6 prior to placing a filled cylinder on the UBC Storage Pad, and annually inspect UBCs for damage or surface coating defects. Inspections would ensure: o Lifting points are free from distortion and cracking. o Cylinder skirts and stiffener rings are free from distortion and cracking. o Cylinder surfaces are free from bulges, dents, gouges, cracks, or significant corrosion. o Cylinder valves are fitted with the correct protector and cap. o Cylinder valves are straight and not distorted, two to six threads are visible, and the square head of the valve stem is undamaged. o Cylinder plugs are undamaged and not leaking. • If inspection of a UBC reveals significant deterioration or other conditions that may affect the safe use of the cylinder, the contents of the affected cylinder shall be transferred to another cylinder and the defective cylinder shall be discarded. The root cause of any significant deterioration should be determined, and, if necessary, additional inspections of cylinders shall be made. • Monitor all site detention/retention basins. • Use waste staging areas to segregate and store wastes and volume reduce/minimize wastes through a waste management program and associated procedures. • Use operating practices that minimize the generation of solid wastes, liquid wastes, liquid effluents, and gaseous effluents and that minimize energy consumption. • Perform a waste assessment and develop and use a waste recycling plan for non-hazardous materials. • Conduct employee training on the waste recycling program. Implement ALARA concepts and waste minimization and reuse techniques to minimize radioactive waste generation. • Implement an SPCC Plan.

[a] Source: Table 5-2 in the NEF EIS (NRC, 2005a).

2.1.3.1 Preconstruction and Construction of the Expanded Facility

2.1.3.1.1 Preconstruction Activities

Certain site preparation activities are considered outside of the NRC's regulatory authority, as they have no reasonable nexus to radiological health and safety or the common defense and security. These activities are referred to in this EA as "preconstruction" activities, and such activities may be conducted by an applicant or licensee without the NRC's pre-approval and are thus not considered to be part of the proposed action. As indicated in the 10 CFR 51.4 and 70.4 definitions of "construction," the NRC does not typically have the authority to regulate preconstruction activities. Specifically, as relevant to the environmental review of this license amendment request, 10 CFR 51.4 states that "construction" does not include general categories of activities such as (1) preparation of a site for construction of a facility, including clearing of the site, grading, installation of drainage, erosion and other environmental mitigation measures, and construction of temporary roads and borrow areas; (2) excavation; (3) erection of support buildings such as those relating to utilities and unloading facilities; or (4) procurement or fabrication of components or portions of the proposed facility occurring at other than the final, in-place location at the facility.

UUSA has conducted certain preconstruction activities for the facility expansion, such as earthmoving, bulldozing, and excavation work prior to constructing SBM-1005, and has initiated procurement of rebar, structural steel, and equipment (UUSA, 2013a). Similar preconstruction activities would be conducted by UUSA, should it later construct SBM-1007 and SBM-1009 and when it clears vegetation in a 1.2-ha (3-ac) area for the new UBC Storage Pad Stormwater Basins (UUSA, 2013a). In this EA, UUSA's preconstruction activities are assumed to be completed prior to initiation of the construction activities that are part of the proposed action. Since preconstruction activities are not part of the proposed action, this EA only addresses their potential environmental impacts in the Section 4.1.5.1 cumulative impacts analysis below.

2.1.3.1.2 Construction Activities

Construction activities that are occurring, or would occur, under the proposed facility expansion include the construction of SBM-1005, SBM-1007, and SBM-1009. These SBMs would be constructed adjacent to the existing SBMs on previously disturbed lands, all within the current facility fence line, as shown in Figure 2-1. UUSA began construction of SBM-1005 at its own risk, as such construction was undertaken prior to completion of the NRC staff's review of the pending license amendment request for authorization to expand the facility's capacity and increase its material possession limits. As stated in EA Section 1.2 above, SBM-1005 construction, with one of the two cascades installed, is nearing completion. Initial enrichment operations in SBM-1005 are expected to begin in 2015. Enrichment operations in SBM-1005 using both cascades are expected to begin in 2016. Should any changes to the as-built SBM-1005 be necessary to obtain NRC approval, modifications to SBM-1005 would be necessary.

In addition, as shown in Figure 2-1, UUSA plans to construct a second CRDB that would be located between the proposed locations of SBM-1007 and SBM-1009. UUSA also plans to (1) expand the UBC Storage Pad in an area from 1 ha (2.6 ac) to 9.3 ha (23 ac) to accommodate storage of a combined total of 25,000 cylinders, including UBCs and 30B enriched uranium cylinders; (2) construct two additional UBC basins that would be located in the southwest section of the UUSA site to manage stormwater runoff from the storage pad;

and (3) add 115-kV to 13-kV transformers to its existing electrical substation. The substation would require the addition of transformers to handle the additional electrical load created by the expanded facility. The electrical service to the site is considered adequate to accommodate the facility expansion (Xcel, 2014).

Preconstruction and construction of the expanded facility have been conducted concurrently with ongoing enrichment operations at the site. The degree of future onsite construction activity is expected to be similar to what has been taking place between 2006 and 2014. About 800 construction workers would continue to work onsite, with that number dropping to about 700 in 2017 and 300 by 2020 (UUSA, 2013a). Construction of the proposed UUSA facility expansion is anticipated to take 8 years.

2.1.3.2 Operation of the Expanded Facility

Operation of the expanded UUSA uranium enrichment facility at a production capacity of 10 million SWU/yr would consist of the same activities, but on a larger scale, as those discussed in Section 2.1.2.2 for the current facility. The 10-million-SWU/yr facility would require 17,500 MT (19,250 tons) of natural UF_6 feed and would produce 1,850 MT (2,035 tons) of low-enriched UF_6 and 15,700 MT (17,270 tons) of depleted UF_6 annually.

In addition, in its 2014 supplement to LAR 12-10, UUSA is proposing the incorporation of a process for the re-feed of tails material that will be available in the SBM-1005 cascades for use as needed (UUSA, 2014a). This modified enrichment process would use high-assay tails as feed material. The modified process would not be expected to significantly change gaseous emissions and wastes generated by the enrichment process over what was previously considered for the existing facility (UUSA, 2014a). However, additional administrative controls are necessary to ensure the proper uranium assay of the cylinder in the feed system, which would result in slightly higher worker external exposure. This additional exposure is discussed further in Section 4.1.2.12.2.

In addition to the storage of full depleted uranium UBCs on the UBC Storage Pad, UUSA proposes to provide increased storage capacity for 30B cylinders containing enriched uranium on the storage pad, up to a limit of 1,430 30B cylinders. Storage of depleted UF_6 48Y UBCs on the UBC Storage Pad will be expanded from the current limit of 15,727 cylinders to a total of 25,000 cylinders, UBCs and 30B enriched uranium cylinders combined. For the 10-million-SWU facility, a triple-stack arrangement of 48Y cylinders, rather than the double-stack arrangement for the 3-million-SWU facility, will be used to maximize storage capacity on the storage pad. The enriched uranium 30B cylinders will be stored in a single-stack arrangement to avoid criticality issues.

Table 2-3 summarizes the parameters associated with operation of the UUSA uranium enrichment facility and presents the change in consumption and generation of uranium materials and waste between the current and expanded facilities. The operation of the proposed expanded facility would result in an increase in the amounts of these materials by a factor of 2 to 3. However, the number of operations personnel is expected to increase only slightly to about 258 workers from its current level of about 250 workers. This small increase in the number of operations personnel means that there will only be negligible changes in the

Table 2-3 Summary of Parameters Associated with Operation of the UUSA 3 Million and 10 Million SWU per Year Uranium Enrichment Facilities

Operating Parameters	3 Million SWU/yr[a]	10 Million SWU/yr[b]
Natural UF_6 feed/yr	8,600 MT (9,480 tons)	17,500 MT (19,250 tons)
Low-enriched UF_6 product/yr	800 MT (882 tons)	1,850 MT (2,035 tons)
Depleted UF_6/yr	7,800 MT (8,600 tons)	15,700 MT (17,270 tons)
Number of operations workers	250[c]	258
Water consumption	~62,577 L/d (~16,531 gpd)	~62,577 L/d (~16,531 gpd)
Electrical service (MVA)	18.3[b]	53
Air emissions		
Uranium	<10 g/yr (<0.022 lb/yr)	<12 g/yr (<0.026 lb/yr)
HF	<1,000 g/yr (<2.2 lb/yr)	<1,200 g/yr (<2.6 lb/yr)
Waste management		
Low-level radioactive waste	360,300 kg/yr (800,000 lb/yr)	945,800 kg/yr (2,100,000 lb/yr)
Hazardous waste	1,770 kg/yr (3,930[b] lb/yr)	~1,770 kg/yr (~3,930 lb/yr)
Mixed waste	50 kg/yr (110 lb/yr)	~50 kg/yr (~110 lb/yr)
Non-hazardous/non-radioactive industrial wastes	172,500 kg/yr (380,400 lb/yr)	≥172,500 kg/yr (≥380,400 lb/yr)
Sanitary waste	7,253 m^3/yr (1,916,040 gal/yr)	≥7,253 m^3/yr (≥1,916,040 gal/yr)
Maximum UBC Storage Pad capacity (Type 48Y cylinders)	15,727	25,000
Number of shipments/yr		
Natural feed (1 Type 48Y cylinder/truck)	690	1,259
Enriched product	117 (2 Type 30B cylinders/truck)	235 (4 Type 30B cylinders/truck)
UBCs (1 Type 48Y cylinder /truck)	627	1,390
"Empty" 48Y feed cylinders	345 (1/truck)	225 (2/truck)
Low-level radioactive waste[d]	8	104
Non-radiological supplies and waste	2,800	2,800

a Sources: NEF EIS (NRC, 2005a); LES Environmental Report (LES, 2014).

b Sources: UUSA Supplemental Environmental Report (UUSA, 2013a), (LPES, 2014).

c Current number of workers (UUSA, 2013a).

d As discussed in Section 4.1.2.13, the larger increase in LLRW waste shipments between the 3-million-SWU/yr and 10-million-SWU/yr facilities is the result of change made in the method of treating liquid LLRW. Evaporation of the water in the liquid LLRW followed by disposal of the remaining sediment was replaced by grouting of the LLRW followed by disposal, resulting in a large increase (greater than a factor of 2 to 3) in LLRW shipments.

amount of water consumption, non-hazardous waste generation, and sanitary waste generation during the proposed transition to the 10-million-SWU/yr facility.

2.1.4 Decommissioning

UUSA is responsible for the decommissioning of the existing UUSA facility, and would have the same responsibility for an expanded facility. In connection with a decision to permanently cease operations, UUSA would prepare a decommissioning plan for releasing the facility's site for unrestricted use, pursuant to 10 CFR 70.38. For the 10-million-SWU/yr facility, UUSA would remove materials and decontaminate the facility sufficiently to allow unrestricted use, leaving only building shells and site infrastructure. Site basins would be decontaminated to unrestricted use levels; depleted UF_6 stored onsite would be shipped offsite for conversion and disposal in accordance with regulations and established agreements. Excavations and berms would be leveled and the ground surface restored to its natural contour. The proposed schedule for decommissioning the expanded facility involves submitting a License Termination Plan to NRC in 2037 with decommissioning to be completed in 2050.

2.2 Alternatives to the Proposed Action

In this section, the NRC staff describes alternatives to the proposed facility expansion and discusses which of these alternatives will be evaluated in detail in Chapter 4 of this EA.

2.2.1 No-Action Alternative

Under the no-action alternative, the NRC would not grant a license amendment to UUSA for the proposed facility expansion, and the facility capacity would remain as presently licensed for 3 million SWU/yr. It is assumed that the previously described preconstruction activities and the "at risk" construction of SBM-1005 would take place regardless of the NRC's decision on whether to approve UUSA's license amendment request to expand the facility. The no-action alternative provides a basis for comparison of potential environmental impacts with those from the proposed action. The NRC staff considers the impacts of the no-action alternative alongside those of the proposed action in Chapter 4.

2.2.2 Alternatives Eliminated from Detailed Consideration

2.2.2.1 Alternative Sites

Alternatives to the Lea County site that were considered for the additional production capacity were those sites that resulted from the site-selection process to identify viable locations for the initial construction and operation of the NEF. The process used a multi-attribute-utility-analysis methodology that incorporated various technical, safety, economic, and environmental factors. The LES site-selection process initially evaluated 44 sites in a multi-phase approach and resulted in the identification of six candidate sites (including the Lea County site), each of which underwent a detailed evaluation (LES, 2014). The NRC staff reviewed the LES site-selection process to determine if a site considered by LES was obviously superior to the Lea County site (NRC, 2005a). The NRC staff determined that the process used by LES was rational and objective, and that the results were reasonable. None of the candidate sites was obviously superior to the LES preferred site in Lea County, New Mexico. The primary drawbacks associated with the candidate sites eliminated from consideration are presented in Table 2-4.

Table 2-4 Candidate Sites Considered but Eliminated

Site	Primary Drawbacks
Eddy County, New Mexico	Potential delay due to Bureau of Land Management ownership and grazing lease; greenfield site.
Bellefonte, Alabama	Within historic boundaries of Cherokee Indian Reservation; possible need for historic preservation assessment; high-voltage transmission line would require relocation.
Hartsville, Tennessee	Business climate; excise tax on special nuclear material; local approval to rezone the site would be uncertain.
Portsmouth, Ohio	Existing contamination requiring remediation; waterways and ponds on site; American Centrifuge Plant requiring agreement with USEC and DOE; potential delays.
Carlsbad, New Mexico	Former industrial site; potential contamination requiring investigations and surveys and possible remediation.

Sources: NRC (2005a); UUSA (2013a).

Because the other five candidate sites have not changed significantly since 2006 when the construction of the present UUSA facility began (UUSA, 2013a), those sites still represent valid candidates. However, these sites have been eliminated from further consideration. The construction of a new facility for the production of the additional 7 million SWU annually considered in the proposed action, including support and shared facilities, would result in higher economic costs and greater environmental impacts than would result if UUSA's facility in Lea County is expanded as proposed. Construction of the expanded facility would occur on previously disturbed land on which a number of structures already exist that can be used to support an expanded facility.

2.2.2.2 Alternative Technologies

Several different technologies have been developed for enriching uranium. Of these, only three are considered candidates for commercial use: gas centrifuge, gaseous diffusion, and laser excitation (NRC, 2011a). Of these, only gas centrifuge and gaseous diffusion have currently been deployed for large-scale industrial use. Other technologies have proven too costly or remain at the research and development scale, and include electromagnetic isotope separation and liquid thermal diffusion. Various laser enrichment technologies have been developed. Brief descriptions of the various alternative technologies are provided below.

2.2.2.2.1 Electromagnetic Isotope Separation

This technology produces a monoenergetic beam of ions of normal uranium, which travel between the poles of a magnet. The magnetic field causes the beam to split into several streams according to the masses of the isotopes. Each isotope follows a slightly different path with a different radius of curvature. Collection cups at the ends of the semicircular trajectories receive the homogenous streams of each isotope. Because the energy requirements for this process are very high, in excess of 3,000 kWh per SWU, and production is very slow (Heilbron et al., 1981), electromagnetic isotope separation is not considered viable and is not considered further in this EA.

2.2.2.2.2 Liquid Thermal Diffusion

With this technology, a thin, vertical column of UF_6 is cooled on one side and heated on the other, generating thermal convection currents causing the UF_6 molecules to flow upward along the heated side and downward along the cooled side. The lighter molecules with U-235 diffuse toward the warmer surface and heavier molecules with U-238 concentrate near the cooler side. As a result, the molecules with the lighter U-235 concentrate at the top of the column, while the molecules with the heavier U-238 concentrate at the bottom, with taller columns producing better separation. A facility using this process at Oak Ridge, Tennessee, was closed after about a year of operation because of cost and maintenance concerns (Settle, 2004). Because of high operating costs and high maintenance requirements, the liquid thermal diffusion process is not considered further in this EA.

2.2.2.2.3 Gaseous Diffusion

When a gas, such as UF_6, is separated from an evacuated space by a porous barrier, the gas flows from the high-pressure side to the low-pressure side at a rate inversely related to its mass. Thus, molecules with the lighter U-235 pass through the barrier faster than those with the heavier U-238. The gaseous diffusion process consists of thousands of individual stages connected in series to multiply the separation factor.

Gaseous diffusion is the only enrichment technology, other than the UUSA gas centrifuge process, that had been used commercially in the United States for an extended period of time (more than a year), but it has relatively large resource requirements as compared to the gas centrifuge process. The last remaining U.S. gaseous diffusion plant, the Paducah Gaseous Diffusion Plant in Paducah, Kentucky, ceased operations in 2013. The Paducah Plant consumed approximately 2,200 kWh per SWU (DOE, 2000) as compared to approximately 50 to 60 kWh per SWU for the gas centrifuge process (WNA, 2014). Because of its high operating costs, the gaseous diffusion process is not considered further in this EA.

2.2.2.2.4 Atomic Vapor Laser Isotope Separation (AVLIS)

In AVLIS, uranium metal is vaporized, and the vapor stream is illuminated with a wavelength of laser light that is absorbed only by U-235, adding enough energy to ionize (remove an electron from) the U-235 atoms while leaving the other uranium isotopes unaffected. The ionized

U-235 atoms are then condensed as a liquid on negatively charged surfaces and drained to a caster where the liquid solidifies as metal nuggets. Budget constraints compelled USEC to discontinue development of the U.S. AVLIS program in 1999 (USEC, 1999). Because development of the AVLIS process was not continued, the AVLIS process is not considered further in this EA.

2.2.2.2.5 Molecular Laser Isotope Separation (MLIS)

The MLIS process uses a tuned laser to excite U-235 molecules in UF_6 feed gas. A second laser then dissociates excited molecules into uranium pentafluoride (UF_5) and free fluorine atoms. The enriched UF_5 then precipitates and is filtered as a powder from the feed gas. Each stage of enrichment requires conversion of enriched UF_5 back to UF_6. MLIS is less efficient and is up to four times more energy intensive than the AVLIS process. Therefore, the development of MLIS was discontinued in most countries. Because development of the MLIS process was discontinued, MLIS is not considered further in this EA.

2.2.2.2.6 Separation of Isotopes by Laser Excitation (SILEX)

The SILEX technology, developed by Silex Systems Ltd., in partnership with GLE (and formerly, USEC), is similar to the two earlier laser-excitation technologies, MLIS and AVLIS (USEC, 2003; GLE, 2008), in isolating U-235 by optical rather than mechanical means. UF_6 vapor is illuminated with a wavelength of laser light that is absorbed only by U-235.

GLE has received an NRC license to construct and operate an enrichment facility employing the SILEX technology in Wilmington, North Carolina (NRC, 2012b). At present, only GLE has the rights to the SILEX technology, and thus only GLE has the ability to design and build a facility using the technology. At present, this technology has not been made available for license to other companies. Therefore, because this alternative is not available for use by UUSA, it has been eliminated from further consideration.

3 Affected Environment

This chapter describes the existing regional and local environmental conditions at and near the site of the proposed UUSA facility expansion prior to initiation of activities associated with the proposed action. Information is presented on land use; historic and cultural resources; visual and scenic resources; climatology, meteorology, and air quality; geology, minerals, and soil; water resources; ecological resources; noise; transportation; public and occupational health; socioeconomics; environmental justice; and waste management. This information includes material on the existing UUSA facility from the ER (LES, 2014) and the NEF EIS (NRC, 2005a) and forms the basis for assessing the potential environmental impacts of the proposed action in Chapter 4.

3.1 Land Use

The UUSA property is a 220-ha (543-ac) parcel of land in Section 32 T21S R38E. The property is in Lea County in southeastern New Mexico, approximately 8 km (5 mi) east of Eunice, New Mexico, and 0.8 km (0.5 mi) west of the New Mexico/Texas state line (UUSA, 2013a). Lea County covers a total of 1,142,236 ha (2,822,522 ac), with 957,151 ha (2,365,168 ac) of that area dedicated to farming (USDA, 2007). The primary industry in Lea County is the oil and gas industry (U.S. Census Bureau, 2014). Andrews County, Texas, is the closest county in Texas to the project area. Farm land covers 327,178 ha (808,474 ac) in Andrews County, Texas, and the primary land use within 8 km (5 mi) of the UUSA property is grazing. However, the primary industry in Andrews County is the oil and gas industry (U.S. Census Bureau, 2014; NRC, 2005a).

The UUSA property is leased from the State of New Mexico until 2034, at which time UUSA may purchase the land. The property is the site of the presently licensed UUSA uranium enrichment facility. Construction of the enrichment facility as initially licensed is now complete. Approximately 159 ha (394 ac) of the property has been disturbed by construction activities. Section 2.1.2 provides a description of the existing facility. Prior to the construction of the present facility, the land was undeveloped and primarily used for cattle grazing, but grazing ceased when UUSA acquired rights to the property. There are no special land use designations on the UUSA property, and there are no zoning restrictions or land use plans that apply to it. The City of Eunice zones the area east of the city for commercial and heavy industrial use (NRC, 2005a); however, the UUSA property, which is fenced, is outside of the jurisdiction of the City of Eunice.

The UUSA property is bordered by industrial development on the north, east, and west. A railroad line runs along the northern edge of the property and NM 176 borders it to the south. To the north is a sand/aggregate quarry owned by Wallach Concrete, Inc. and an oil reclamation operation owned by Sundance Services. To the east, in Andrews, Texas, is a hazardous waste and LLRW treatment, processing, storage, and disposal facility operated by WCS. Buffer land for the WCS facility is adjacent to the UUSA property. To the west of the UUSA property is a petroleum-contaminated soil treatment facility owned by DD Landfarm. Southeast of the property is the Lea County municipal landfill. The nearest resident to the property is located 4.3 km (2.6 mi) to the west.

3.2 Historic and Cultural Resources

Historic and cultural resources include archaeological sites and historic structures and features that are addressed under the NHPA (Public Law 89-665). Cultural resources also include traditional cultural properties; that is, properties that are important to a community's practices and beliefs and that are necessary for maintaining the community's cultural identity. Cultural resources refer to both man-made and natural physical features associated with human activity and, in most cases, are finite, unique, fragile, and nonrenewable. Cultural resources that meet the eligibility criteria for listing on the *National Register of Historic Places* (NRHP) are considered historic properties. Section 106 of the NHPA identifies the process for considering historic properties for federal undertakings. The issuance of a license amendment to construct and operate an expanded gas centrifuge uranium enrichment facility is a federal undertaking that requires review under Section 106 of the NHPA.

This section describes the prehistoric and historic background of the area and the efforts undertaken by the NRC to satisfy the NHPA Section 106 requirements for the NRC's initial licensing action for construction and operation of the present UUSA facility (formerly known as the NEF) and for the pending license amendment action for the proposed expansion of this facility. The previous Section 106 actions associated with initial licensing have direct relevance for the proposed action.

3.2.1 Cultural History

The cultural history for New Mexico covers approximately 11,500 years (Proper, 2007). This history is divided into numerous periods, which are characterized by various technologies that provide evidence on how people subsisted in the region. The earliest period is known as the Paleoindian Period and ranges from 9500 to 6000 B.C. The Paleoindian Period is further divided into the Clovis, Folsom, and Plano Complexes. These complexes are distinguished by the types of spear points present on the sites, as well as the presence or absence of other materials. Paleoindian peoples followed a nomadic lifestyle, ranging over large geographic areas. Sites from the Paleoindian Period are not common in the region. The next major period is the Archaic Period (6000 B.C. through A.D. 500), which is divided into Early, Middle, and Late Periods. The Archaic Period is characterized by an intensification of resource use as populations increased and people reacted to fluctuations in the climate. Grinding stones become common during the Archaic Period and indicate an increase in plant use for food. There was also a greater reliance on locally obtainable raw materials. Materials from the Late Archaic Period (1000 B.C. through A.D. 500) are most common in the vicinity of the project area. The Formative Period (A.D. 500–1450) is distinguished by the introduction of horticulture and pithouse communities, which are found along major drainages. Regionally produced ceramics were common in this period. The final period extends from the period just before the coming of Europeans to North America to the time when Europeans were on the continent but not directly interacting with most of the native population. It is called the Protohistoric Period (A.D. 1450–1540). During the Protohistoric Period, many of the agricultural communities were abandoned for a return to more nomadic means of subsisting. It is also during this period that Native Americans with a separate linguistic tradition began to enter the region.

The Historic Period (A.D. 1492–1950) is when the influence of European goods and domesticated animals began to affect the lives of the regional inhabitants. Coronado, the first

European to enter the region, arrived in 1541. He was followed by a number of other expeditions, but it was not until the 19th century that people of European descent began to settle in the region. Most of the early settlers engaged in ranching. The introduction of the railroads in the late 19th century increased the rate of settlement of the region, and the discovery of oil in the 1920s instigated additional development. The modern local economy began to develop at that time, and the town of Eunice was incorporated in 1937 (NRC, 2005a). Which Native American groups used the region containing the project area during the Paleoindian to Formative Periods is unknown. The first written accounts of the Native Americans in the region come from the Spanish explorers, who identified the Suma, Tigua, and Jumano peoples. These groups are no longer found in the area. During the Historic Period, the Plains Apaches, the Kiowa, and the Comanche used the region. All of these tribes were removed to reservations in Oklahoma during the 19th century. The Mescalero Apaches also may have come into the region containing the project area. The Mescalero Reservation is located more than 161 km (100 mi) northwest of the project area (NRC, 2005a).

3.2.2 Historic and Cultural Resources on the UUSA Property

The NHPA requires that all historic properties be considered during a federal undertaking. No cultural resources were known to be on the UUSA property prior to the proposal to build the present gas centrifuge uranium enrichment facility (NRC, 2005a). As part of the NHPA review for the original licensing action, UUSA had the entire property being leased surveyed for cultural resources in 2004. The survey identified seven archaeological sites (LA 140701, LA 140702, LA 140703, LA 140704, LA 140705, LA 140706, and LA 140707) (Graves, 2004). The New Mexico SHPO determined that all seven of the sites were eligible for listing on the NRHP and would be adversely affected by the project. These adverse effects required mitigation. The NRC developed an MOA among the NRC, the New Mexico SHPO, the New Mexico State Land Office, Lea County, and LES (now UUSA) that stated that all seven of the sites would be excavated and data recovery would be conducted before construction began in order to mitigate the adverse effects (NRC, 2005a). In the MOA, LES (now UUSA) committed to conducting the excavations and data recovery and documenting the findings.

The excavations revealed that most of the seven sites dated from the Late Archaic Period (900 B.C. through A.D. 800) and the Formative Period (A.D. 900–1300) (Proper, 2007). The material found suggests that the people living in the region had a nomadic lifestyle focused on small game and plants. One site, LA 140707, consisted of multiple subsurface features and evidence of a small pit structure and associated hearth. The site appears to have been used repeatedly and revisited numerous times. The sites found on the UUSA property are typical for the region. Approximately 82 percent of all the archaeological sites found in the region date to the Late Archaic and Formative Periods (Proper, 2007). All seven of the sites were completely excavated, and no historic properties remain on the UUSA property.

3.2.3 Section 106 Consultation

Section 106 of the NHPA also requires that consultations occur between the federal agency (in this case, the NRC), the SHPO, Native American Tribes with an interest in the area, the ACHP (when it was determined that an adverse effect could occur on historic properties), and other interested parties. To fulfill its obligation under the NHPA for the original licensing action, the

NRC contacted the New Mexico SHPO; the Kiowa Tribe of Oklahoma, Comanche Tribe of Oklahoma, Mescalero Apache Tribe, and Yseleta del Sur Pueblo because of their traditional affiliations with the area; the ACHP; and the Lea County Archaeological Society. The tribes all agreed to be concurring parties on the MOA concerning the archaeological sites on the property. In addition to the NRC, the SHPO, the ACHP, and LES were signatories to the MOA. None of the parties consulted by the NRC identified any additional historic and cultural resources on the property.

The NRC contacted the New Mexico SHPO, Kiowa Tribe of Oklahoma, Comanche Tribe of Oklahoma, Mescalero Apache Tribe, and Yseleta del Sur Pueblo, and ACHP for the current licensing activity for the proposed expanded facility. None of the parties contacted for the current licensing action that responded identified any concerns on the property. In addition, the New Mexico SHPO acknowledged that because no historic properties remain on the UUSA property, no historic properties would be adversely affected by the current licensing action (Ensey, 2013).

3.3 Visual and Scenic Resources

The UUSA site is located in an area of relatively flat topography with low shrubs and grasses and scattered, taller mesquite. The area west of the site contains a high density of oil and gas wells, as well as the City of Eunice. Industrial features visible near the UUSA site include WCS to the east, Wallach Concrete and Sundance Services to the north, and the Lea County municipal landfill to the southeast. Prior to construction of the UUSA facility, the site had been assigned the lowest scenic-quality rating, based on the U.S. Bureau of Land Management visual resource inventory process (NRC, 2005a). Scenic quality is a measure of the visual appeal of an area. The UUSA site was given the lowest of three rating levels because of factors such as few interesting landscape features, few major vegetation types, water features absent or not noticeable, muted color tones with subtle variations, visual features common within the region, and cultural modifications that are discordant and promote strong disharmony (LES, 2014). The structures of the present UUSA facility are visible from NM 18, approximately 3 km (2 mi) to the west, and from NM 176 that borders the UUSA site to the south. No recreational resources occur in the immediate area of the site other than a roadside picnic area and historical marker (NRC, 2005a). Views of the UUSA facility are compatible with surrounding land uses.

3.4 Climatology, Meteorology, and Air Quality

3.4.1 Climatology and Meteorology

The UUSA site is located in the southeastern portion of Lea County, in the southeastern corner of New Mexico, with an elevation between 1,033 and 1,045 m (3,390 and 3,430 ft) above mean sea level. The climate in the region around the UUSA site is semi-arid with hot summers, mild winters, low precipitation and relative humidity, high evaporation rate, abundant sunshine, and relatively large annual and diurnal temperature ranges (NCDC, 2013a). In the winter, the weather is often dominated by a high-pressure system in the central part of the western United States and a low-pressure system in north-central Mexico. In the summer, the region is affected by a low-pressure system located over Arizona. Meteorological data collected at

Hobbs, New Mexico, and Midland Regional Airport, Texas, which are located about 30 km (19 mi) north and 98 km (61 mi) southeast of the site, respectively, are summarized below.[3]

For the period from 1912 to 2012, the annual average temperature at Hobbs was 16.6°C (61.9°F) (WRCC, 2013). January was the coldest month, with a mean monthly average of 5.6°C (42.1°F), while July was the warmest, with a mean monthly average of 26.8°C (80.3°F). During the same period, the highest temperature of 45.6°C (114°F) was reached in June 1998 and the lowest, –21.7°C (–7°F), in January 1962. In the summer, daytime maximum temperatures frequently exceed 32.2°C (90°F). Minimum temperatures at or below freezing are common during winter months, but subzero temperatures are very rare. In a typical year, about 94 days have a maximum temperature of at least 32.2°C (90°F), while about 77 days have a minimum temperature at or below freezing.

In New Mexico, summer rains fall mostly during brief, but frequently intense, thunderstorms associated with general southeasterly circulation from the Gulf of Mexico (NCDC, 2013a). In contrast, winter precipitation is caused mainly by frontal activity associated with general movement of Pacific Ocean storms. For the period from 1912 to 2012, the annual precipitation at Hobbs averaged about 40.0 centimeters (cm) (15.75 inches [in.]) (WRCC, 2013). On average, 43 days/yr have measurable precipitation (0.025 cm [0.01 in.] or higher). About 80 percent of the precipitation falls in warmer months, from May to October. Snow occurs mostly from October to April and peaks in January. The annual average snowfall was about 13.0 cm (5.1 in.), with the highest monthly snowfall of 41.9 cm (16.5 in.) taking place in November 1980.

A wind rose from Midland Regional Airport, based on data collected at a 10-m (33-ft) level over the 5-year period 2008 to 2012, is presented in Figure 3-1 (NCDC, 2013b). During this period, the annual average wind speed was about 5.0 m/second (s) (11.1 miles per hour [mph]), with the highest at 5.8 m/s (12.9 mph) in spring and the lowest at 4.3 m/s (9.7 mph) in fall. Prevailing wind direction was from the south (about 15.9 percent of the time), and the secondary direction was from the south-southeast (about 14.5 percent of the time). In general, southerly wind components are more frequent than any other wind directions. By monthly average, wind blew from the south throughout the year, except from July through September, when it blew from the south-southeast. Wind speeds categorized as calm (less than 0.5 m/s [1.1 mph]) occurred about 5.7 percent of the time.

Lea County experiences severe weather events, including floods, hails, thunderstorm winds, and tornadoes. Since 1993, 68 floods (mostly flash floods) have been reported in Lea County, with a peak in August (NCDC, 2013c). Also, 352 hail events have been reported there since 1957; these occurred more frequently from April through June. Softball-sized hailstones 11.4 cm (4.5 in.) in diameter were reported near Jal in April 1992 and near Lovington in June 2005. In Lea County, 158 thunderstorm high winds including a maximum wind speed of 41 m/s (92 mph) have been reported since 1955; these peaked in June. Because of the considerable distances to major water bodies, hurricanes never hit New Mexico. On rare occasions, remnants of a tropical storm from the Pacific Ocean or the Gulf of Mexico may dump rains in the area, but there is no record of serious wind damage from these storms (NCDC, 2013a).

[3] Wind data are also available at Lea County/Hobbs Airport, which is located about 30 km (19 mi) north northwest of the site. However, these data are not available for nearly half of the time (mostly nighttime hours) and thus are not presented here.

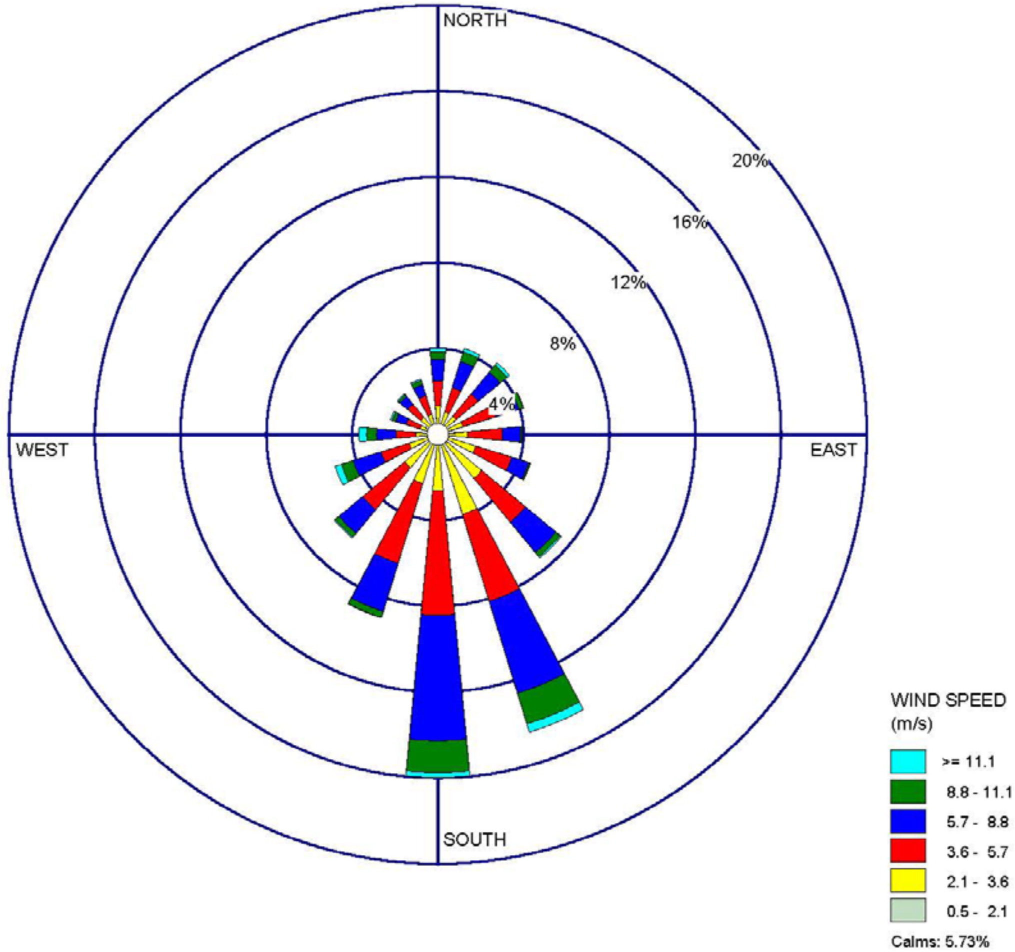

Figure 3-1 Wind Rose at 10-m (33-ft) Level at the Midland Regional Airport, Texas, 2008 to 2012 (Source: NCDC, 2013b)

Since 1954, a total of 92 tornadoes were reported in Lea County (NCDC, 2013c). Most tornadoes occurring in Lea County were relatively weak (i.e., 63 F0, 20 F1, and 8 F2 on the Fujita scale), except for one F3 tornado that occurred near Lovington in May 1954. Several hit Eunice, which is not far from the UUSA site, but all of these were F0 tornadoes. The original Fujita six-point scale (F0 to F5) was used to rate the intensity of a tornado based on the damage it inflicts on structures and vegetation from the lowest intensity, F0, to the highest, F5. In February 2007, the enhanced Fujita (EF) scale replaced the original Fujita scale. The EF scale still uses six categories of tornado intensity (EF0 to EF5), but the new scale more accurately matches wind speeds to the severity of damage caused by a tornado. Since February 2007, four tornadoes have been reported in Lea County on the EF scale (three EF0 and one EF2).

On a larger scale, climate change is a subject of national and international interest. The recent compilation of the state of knowledge in this area by the U.S. Global Change Research Program (USGCRP), a Federal Advisory Committee, is considered here (USGCRP, 2014). The USGCRP has provided valuable insights regarding the state of knowledge of climate change. The projected change in temperature comparing 1971 to 1999 over the period encompassing the present licensing action (i.e., the period from 2021 to 2050 in the USGCRP report) in the vicinity of the UUSA site is an increase of between 0.8 and 1.9°C (1.5 and 3.5°F). While the USGCRP has not incrementally forecast the change in precipitation by decade to align with the present licensing action, the projected change in precipitation from 1970 to 1999 to the period 2071 to 2099 was presented, which is the only period provided in the USGCRP report. The USGCRP report forecasts that northern areas of the United States will become wetter as a result of more northward incursions of storm tracks, while southern areas of the United States will become drier: about 10 to 20 percent decrease in winter, 20 to 30 percent decrease in spring, smaller than natural variations in summer, and a 10 to 20 percent decrease in fall around the UUSA site under the higher emission scenario (continued increases in emissions) (USGCRP, 2014).

3.4.2 Air Quality

Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established the National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) with an aerodynamic diameter of 2.5 micrometers (μm) or less and 10 μm or less (for $PM_{2.5}$ and PM_{10}, respectively), and sulfur dioxide (SO_2) (EPA, 2013a). The Clean Air Act established two types of NAAQS: primary standards to protect human health and secondary standards to protect public welfare (see Table 3-1). Compared with the NAAQS, New Mexico has State Ambient Air Quality Standards (SAAQS) (also shown in Table 3-1) that are more stringent for CO and have different averaging times for NO_2 and SO_2, but no standards for O_3, PM, or Pb (Title 20, Chapter 2, Part 3 of the New Mexico Administrative Code [20.2.3 NMAC], see http://www.nmcpr.state.nm.us/nmac/parts/title20/20.002.0003.htm). In addition, the state has adopted standards for hydrogen sulfide (H_2S) and total reduced sulfur and still retains a standard for total suspended particulates (TSP), which was formerly a criteria pollutant but was replaced by PM_{10} in 1987. Table 3-1 also presents background air concentration levels representative of the UUSA site.

A geographic area that satisfies the NAAQS is called an attainment area. In contrast, an area whose air quality does not meet NAAQS levels is called a nonattainment area. Nonattainment areas in which air quality has subsequently improved to meet the NAAQS can be redesignated as maintenance areas and are subject to an air quality maintenance plan. Lea County, which encompasses the UUSA site, is located administratively within the Pecos-Permian Basin Intrastate Air Quality Control Region (40 CFR 81.242), along with six other counties in east-central and southeastern New Mexico. Lea County is designated as being in attainment for all criteria pollutants (40 CFR 81.332) (EPA, 2013b). The entire State of New Mexico is designated as an unclassifiable[4]/attainment area, except for a small portion of Dona Ana County around Anthony in south-central New Mexico. Anthony, along with El Paso, Texas, which is adjacent to Anthony and located more than 322 km (200 mi) from the UUSA site, has been designated in nonattainment for PM_{10}. In New Mexico, Bernalillo County, including the City of Albuquerque, and Grant County are designated as maintenance areas for CO and SO_2, respectively; both counties are located more than 434 km (270 mi) from the UUSA site. Other nonattainment or maintenance areas in Texas are farther away from the UUSA site.

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4 An unclassifiable area is any area that cannot be classified as attainment or nonattainment, on the basis of available information, as meeting or not meeting NAAQS (e.g., incomplete monitoring data are available to make a firm classification determination).

Table 3-1 National Ambient Air Quality Standards (NAAQS), New Mexico State Ambient Air Quality Standards (SAAQS), and Background Concentration Levels Representative of the UUSA Site (2008–2012)

		NAAQS[b]			Background Level[f]	
Pollutant[a]	Averaging Time	Value[c]	Type[d]	New Mexico SAAQS[c,e]	Concentration[c,g]	Monitoring Location (Year)
CO	1-hour	35 ppm	P	13.1 ppm	4.6 ppm (13%; 35%)	Albuquerque, Bernalillo County (2008)[h]
	8-hour	9 ppm	P	8.7 ppm	2.6 ppm (29%; 30%)	Albuquerque, Bernalillo County (2008)[h]
Pb	Rolling 3-month	0.15 µg/m^3 [i]	P, S	-[j]	0.051 µg/m^3 (34%; -)	Albuquerque, Bernalillo County (2012)[h]
NO_2	1-hour	100 ppb	P	-	44 ppb (44%; -)	Hobbs, Lea County (2011)
	24-hour	-	-	0.10 ppm	-	-
	Annual	53 ppb	P, S	0.05 ppm	-	-
O_3	8-hour	0.075 ppm[k]	P, S	-	0.072 ppm (96%; -)	Hobbs, Lea County (2011)
$PM_{2.5}$	24-hour	35 µg/m^3	P, S	-	25 µg/m^3 (71%; -)	Hobbs, Lea County (2011)
	Annual	12 µg/m^3	P	-	9.6 µg/m^3 (80%; -)	Hobbs, Lea County (2011)
	Annual	15 µg/m^3	S	-	9.6 µg/m^3 (64%; -)	Hobbs, Lea County (2011)
PM_{10}	24-hour	150 µg/m^3	P, S	-	92 µg/m^3 (61%; -)	Hobbs, Lea County (2011)
SO_2	1-hour	75 ppb[l]	P	-	1 ppb (1.3%; -)	Artesia, Eddy County (2009)
	3-hour	0.5 ppm	S	-[m]	-	-
	24-hour	-	-	0.10 ppm[m]	0.001 ppm (-; 1.0%)	Artesia, Eddy County (2009)
	Annual	-	-	0.02 ppm[m]	-	-

[a] NO_2 = nitrogen dioxide; O_3 = ozone; ppm = parts per million; µg/m^3 = microgram per cubic meter; ppb = parts per billion.

[b] Refer to 40 CFR Part 50 and EPA (2013a) for detailed information on attainment determination and reference method for monitoring.

Footnotes continued on next page.

Table 3-1 National Ambient Air Quality Standards (NAAQS), New Mexico State Ambient Air Quality Standards (SAAQS), and Background Concentration Levels Representative of the UUSA Site (2008–2012) (Cont.)

[c] ppm = parts per million; μg/m^3 = micrograms per cubic meter; ppb = parts per billion.

[d] P = primary standards, which set limits to protect public health, including the health of “sensitive” populations such asthmatics, children, and the elderly; S = secondary standards, which set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

[e] In addition, New Mexico has established ambient air quality standards for total suspended particulates, hydrogen sulfide, and total reduced sulfur.

[f] Monitored concentrations are the highest 24-hour average for rolling 3-month Pb (because the EPA currently provides 24-hour Pb only); second-highest for 1-hour and 8-hour CO, 24-hour PM_{10}, and 24-hour SO_2; 98^{th} percentile for 1-hour NO_2 and 24-hour $PM_{2.5}$; fourth-highest daily maximum for 8-hour O_3; 99^{th} percentile for 1-hour SO_2; and arithmetic mean for annual $PM_{2.5}$.

[g] First and second values in parentheses are background concentration levels as a percentage of NAAQS and SAAQS, respectively.

[h] Albuquerque data are not representative of the UUSA site for CO and Pb, but they are presented to show that these pollutants are not generally a concern in New Mexico. CO and Pb data for areas closer to the UUSA site are not available.

[i] Final rule signed October 15, 2008. The 1978 Pb standard (1.5 μg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[j] A hyphen indicates that either no standard exists or no monitoring data are available.

[k] Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 yr) and related implementation rules remain in place. In 1997, the EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard (“anti-backsliding”).

[l] Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in the same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

[m] For the area within 5.6 km (3.5 mi) of the Chino Mines Company smelter furnace stack at Hurley, New Mexico, about 470 km (290 mi) west of the UUSA site, the state has established different ambient air quality standards for SO_2 (0.50, 0.14, and 0.03 ppm for 3-hour, 24-hour, and annual arithmetic averages, respectively).

Sources: EPA (2013a,c); 20.2.3 NMAC (see http://www.nmcpr.state.nm.us/nmac/parts/title20/20.002.0003.htm).

Ambient concentration data representative of the UUSA site are available for some criteria pollutants (NO_2, O_3, $PM_{2.5}$, and PM_{10}) at Hobbs, in Lea County, and for SO_2 at Artesia, in neighboring Eddy County. CO and Pb concentration data near the UUSA site are not available; these data around Bernalillo County, including Albuquerque, are presented to show that these pollutants are not generally a concern in New Mexico. In general, ambient air quality around the UUSA site is relatively good. Except for O_3 (8-hour standard), the background concentration levels for all criteria pollutants around the UUSA site from 2008 through 2012 were less than or equal to 80 percent of their respective standards, as shown in Table 3-1 (EPA, 2013c). However, the monitored 8-hour average O_3 concentrations were approaching the applicable standard (about 96 percent). Ozone is a regional concern, and its concentration level depends on not only local emissions but also on transport of O_3 and its precursors from upwind areas. Elevated O_3 levels in Lea County presumably result from fuel combustion associated with booming oil and gas development and biogenic emissions from vegetation and soil. No measurement data for CO and Pb are available for Lea County, but their levels around the UUSA site are expected to be low, considering that their concentrations in Albuquerque were only one-third of their respective standards.

The Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21), which are designed to limit the growth of air pollution in clean areas, apply to a major new source or modification of an existing major source within an attainment or unclassified area. While the NAAQS (and SAAQS) place upper limits on the levels of air pollution, PSD regulations limit the total increase in ambient pollution levels above established baseline levels for SO_2, NO_2, PM_{10}, and $PM_{2.5}$ to prevent “polluting up to the standard” in clean areas. The allowable increases are the smallest in Class I areas, such as national parks and wilderness areas. The rest of the country is subject to larger Class II increments. As a matter of policy, the EPA recommends that the permitting authority notify Federal Land Managers when a proposed PSD source would locate within 100 km (62 mi) of a Class I area. Several Class I areas are located in New Mexico and Texas, but none is within 100 km (62 mi) of the UUSA site. The nearest Class I area is Carlsbad Caverns National Park (40 CFR 81.421), about 125 km (78 mi) west-southwest of the site. The next nearest Class I areas are Guadalupe Mountains National Park in Texas (40 CFR 81.429) and the Salt Creek Wilderness Area in New Mexico, which are located about 164 km (102 mi) west-southwest and northwest of the site, respectively. These Class I areas are not located downwind of prevailing winds at the site (see Figure 3-1). Considering the distances to nearby Class I areas, topography, the prevailing wind direction from the south, and the minor nature of air emissions from the UUSA site (discussed below), there is little likelihood that currently licensed activities at the UUSA site could adversely affect air quality and air quality-related values (e.g., visibility or acid deposition) in any of the Class I areas. No PSD permit has been required for any emission sources at the UUSA site.

Lea County flourishes not only in oil and gas production but also in agriculture, cattle, and the dairy industry. Recently, the area has diversified its economy to include uranium processing (i.e., at the present UUSA facility), wind energy, and biofuel production. Data on annual emissions of criteria pollutants and volatile organic compounds (VOCs) in Lea County for 2008 are presented in Table 3-2 (EPA, 2013d). For CO, mobile (on-road and non-road) sources were primary contributors to total county emissions (about 38 percent), followed by biogenic sources from vegetation and soil (about 37 percent). For nitrogen oxides (NO_x), fuel combustion sources accounted for about 72 percent of total county emissions and biogenic and mobile sources accounted for the rest. Biogenic sources contributed to most VOC emissions, while fugitive dust emissions (primarily from unpaved roads) contributed to most PM_{10} and $PM_{2.5}$

Table 3-2 Annual Emissions of Criteria Pollutants and VOCs in Lea County, New Mexico, 2008

	Annual Emissions	
Pollutant	(MT)	(tons)
CO	22,884	25,225
NO_x	15,875	17,499
VOCs	31,061	34,238
$PM_{2.5}$	3,177	3,502
PM_{10}	26,299	28,990
SO_2	8,252	9,096

Source: EPA (2013d).

emissions. Fuel combustion accounted for about two-thirds of SO_2 emissions, and petroleum and related industries accounted for the rest.

Fossil fuel combustion from sources such as power generation, other industrial activities, transportation, and certain agricultural activities produce greenhouse gases (GHGs), which can trap heat and make the planet warmer. The most important GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and certain fluorinated substances, such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The first three of these GHGs have both anthropogenic and natural sources, while certain fluorinated GHGs are purely anthropogenic in origin. These GHGs vary in their ability to trap heat; their global warming potential (GWP) is used to compare the ability of each GHG to trap heat in the atmosphere relative to a reference gas, CO_2. For example, CH_4 has a GWP of 21 and SF_6 has a GWP of 23,900; in other words, one ton of SF_6 is equivalent to 23,900 tons of CO_2 (EPA, 2014). Thus, GHG emission levels are expressed as CO_2 equivalent (CO_2e) to reflect the varying heat-trapping capacity of different GHGs. In 2010, New Mexico was projected to produce about 89.4 million metric tons (MMt) (98.5 million tons) of *gross* CO_2e emissions[5] (Bailie et al., 2006), which is about 1.3 percent of total U.S. GHG emissions of 6,874.7 MMt (7,578.1 million tons) CO_2e (EPA, 2014). During the 1990–2010 period, gross GHG emissions in New Mexico increased by about 31 percent, compared with 10 percent growth in the United States. In 2010, about 89.1 percent of GHG emissions in New Mexico were from the energy sector: electric power production (about 37.2 percent), fossil fuel industry (about 22.7 percent), transportation (about 19.7 percent), and fuel use in the residential, commercial, and industrial sectors combined (about 9.5 percent). New Mexico's *net* emissions in 2010 were about 68.5 MMt CO_2e, considering carbon sequestration from forestry and other land uses throughout the state.

[5] Excluding carbon sequestration, the process by which living (e.g., forests, vegetation) or non-living reservoirs (e.g., soil, geologic formation, oceans) capture carbon (as CO_2) from the atmosphere and store it.

A Title V operating permit is required for a “major” source that has a potential to emit more than 100 tons per year for any criteria pollutant or for landfills greater than 2.5 million cubic meters (20.2.70 NMAC). In addition, any source that has the potential to emit greater than ten tons per year of a single hazardous air pollutant (HAP) or 25 tons per year of any combination of HAPs are required to obtain a Title V operating permit. The total amount of each criteria pollutant, a single HAP or a combination of HAPs from the existing and proposed facility capacity expansion, would be less than their respective limit. Therefore, neither the existing nor expanded operation would be classified as a major source or be required to obtain an air operating permit subject to 20.2.70 NMAC (UUSA, 2013a).

3.5 Geology, Minerals, and Soil

3.5.1 Regional and Site Geology, Seismicity

The UUSA facility is located within the Southern High Plains section of the Great Plains physiographic province. The Southern High Plains is a large flat mesa that slopes uniformly to the southeast. It is separated from the Pecos Plains section by Mescalero Ridge, a distinct topographic feature about 6.2 to 9.3 km (10 to 15 mi) to the west of the site with a relief of about 9 to 15 m (30 to 50 ft) (NRC, 2005a; UUSA, 2013a).

The dominant geologic feature in the region is the Permian Basin, a subsurface, bowl-shaped bedrock structure that extends as much as 4,880 m (16,000 ft) below mean sea level. The UUSA facility overlies the portion of the basin known as the Central Basin Platform, an area that marks the divide between its two subbasins (Midland Basin to the east and Delaware Basin to the west). The top of the Permian deposits occurs at a depth of about 434 m (1,425 ft) below the site; these deposits are overlain by sedimentary rocks of the Triassic Age Dockum Group. The uppermost unit of the Dockum Group is the Chinle Formation (also known as Red Bed), a micaceous claystone with interbedded siltstone and fine-grained sandstone. The Chinle Formation crops out along Mescalero Ridge, a southeast-trending escarpment comprised of resistant claystones and capped by a thick layer of caliche (locally called caprock). The formation is overlain by alluvial deposits and dune sands of Tertiary and Quaternary age, respectively. Soft caliche is interbedded with alluvium in these upper layers and has been identified near the surface in the vicinity of the UUSA facility (NRC, 2005a; Nicholson and Clebsch, 1961).

Site stratigraphy has been characterized to a depth of 250 ft based on logs of monitoring wells at the UUSA site (UUSA, 2013a). In order of increasing depth, strata include:

- Quaternary dune sand (1.5 to 3.0 m [5 to 10 ft] thick);
- Quaternary caliche (3.0 to 9.1 m [10 to 30 ft] thick);
- Alluvial sand and gravel (Quaternary age), weakly cemented (0 to 6.1 m [0 to 20 ft] thick);

- Cooper Canyon Formation (Triassic age) consisting of reddish, moderately indurated claystone interbedded with discontinuous layers of siltstone and silty sandstone, occurring at a depth of about 12.2 m (40 ft) below the UUSA site.

The UUSA site terrain ranges in elevation from about 1,033 to 1,045 m (3,390 to 3,430 ft) above mean sea level, with a gentle slope (less than 0.5 percent) to the southwest. Localized topographic highs occur to the north and northeast and are associated with Red Bed Ridge (UUSA, 2013a).

There are no Quaternary age faults within 161 km (100 mi) of the UUSA facility (USGS, 2013a). Since 1963, there have been 16 earthquakes detected within 161 km (100 mi) of the site. The largest of these occurred on August 1, 1975 (body-wave magnitude [Mb] 4.8) about 145 km (90 mi) to the southwest near Pecos, Texas, and on January 2, 1992 (Mb 4.6), less than 16 km (10 mi) to the south-southwest; all others were less than Mb 4.0 (USGS, 2013b). Most of the low- to moderate-size earthquakes occurring near the UUSA site are thought to be caused by oil and gas recovery methods and are not of tectonic origin (NRC, 2005a).

3.5.2 Mineral and Energy Resources

In 2009, the top nonfuel raw minerals in New Mexico were (in order of descending production value) potash, copper, construction sand and gravel, crushed stone, and portland cement. Production of these minerals accounted for about 94 percent of the state's total nonfuel production value in 2009, a 46 percent decrease from 2008. New Mexico was the nation's top producer of crude perlite, potash, and zeolites in 2009. The top nonfuel minerals produced in Lea County were sand and gravel, salt, sulfur (from natural gas), and crushed stone (USGS, 2011).

The oil and gas industry has developed the areas to the north, south, and west of the UUSA site and numerous pump jacks are located in the region. The New Mexico Bureau of Geology and Mineral Resources estimates that Lea County produced 84 million barrels of oil and 1.4 trillion cubic feet of gas from the Permian Basin in 2012 (Petroleum Recovery Research Center, 2013).

There are no known significant nonfuel mineral deposits within the UUSA site, and no existing or former petroleum wells have been located within the site (NRC, 2005a).

3.5.3 Site Soils

A U.S. Department of Agriculture (USDA) soil survey indicates that soils within the existing UUSA facility footprint consist mainly of the fine sands and loamy fine sands of the Brownfield-Springer Association (BO, BS), and the Kermit Series and Dune Land (KM) map units (Figure 3-2; see also Section 3.6.3 of the NEF EIS [NRC, 2005a]). Most of the proposed facility expansion areas, also shown on Figure 3-2, overlap these units. The UBC Storage Pad Stormwater Retention Basin also partly covers loose sands of the Active Dune Land (Aa) unit. These soils, derived mainly from eolian deposits, are typically well- to excessively-drained and are not prone to flooding (i.e., flooding occurs less than once in 500 years). None of the soil

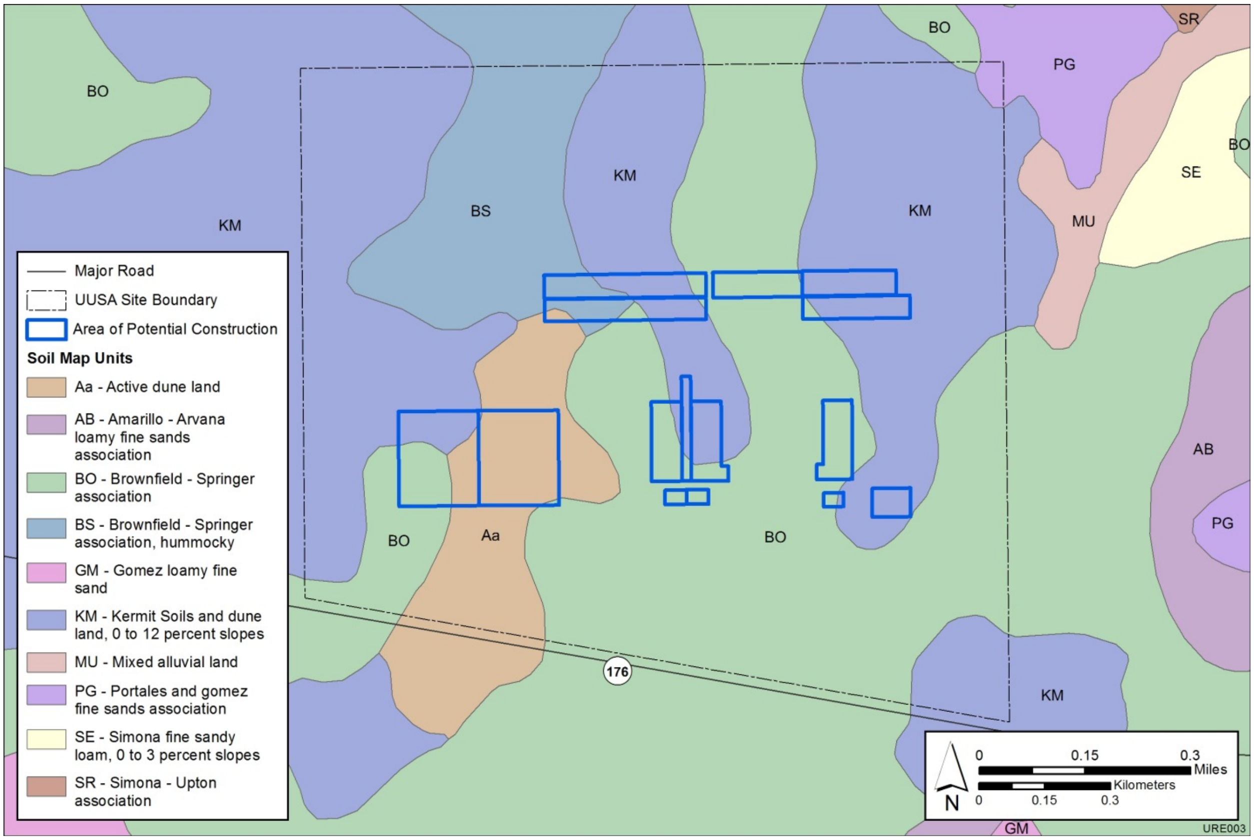

Figure 3-2 Soils at the UUSA Facility (NRCS, 2013)

units are prime or unique farmland[6]; however, the soils of the Brownfield-Springer Association are considered farmland of statewide importance[7] (USDA, 2013).

[6] Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management and acceptable farming methods are applied, and the water supply is dependable and of adequate quality. Unique farmland is land other than prime farmland that is used for the production of specific high-value food or fiber crops (e.g., citrus, tree nuts, olives) (USDA, 1981).

[7] Land with soils of statewide importance doesn't meet the criteria for prime or unique farmland but could meet the requirements to economically produce high yields of crops when treated and managed according to acceptable farming methods. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate state agencies, and such land may include tracts that have been designated for agriculture by state law (USDA, 1981).

3.6 Water Resources

3.6.1 Surface-Water Resources

There is little developed surface water in Lea County because there are only a few small springs in the county and storm runoff is low. Surface water that is developed is used mainly for stock watering, supplemental domestic service, and irrigation (Lea County Water Users Association, 1999). No surface water sources are used by the present UUSA facility (NRC, 2005a).

The UUSA site is located within the Monument Draw watershed. Local surface water features in the region include Monument Draw, Baker Spring, and several ponds on nearby properties.

There are no surface water bodies or drainage features and no U.S. Army Corps of Engineers jurisdictional waters within the UUSA facility footprint (Mace, 2004). The nearest surface water body is Monument Draw, an intermittent stream located about 4 km (2.5 mi) to the west. Although it is typically dry, a maximum historical flow of 36.2 cubic meters (m^3)/s (1,280 cubic feet (ft^3)/s) occurred on June 10, 1972. There is no direct outfall to Monument Draw on the UUSA site (NRC, 2005a; Mace, 2004).

The site is not located within or near any floodplains. Its elevation is above that of the 100- and 500-year floods (NRC, 2005a).

Stormwater is presently diverted to two surface impoundments at the existing UUSA facility: (1) the Site Stormwater Detention Basin and (2) the UBC Storage Pad Stormwater Retention Basin. The detention basin is located at the south side of the site. It collects stormwater runoff from developed areas of the site (covering about 39 ha [96 ac]), including roads, parking areas, and building roofs. The basin has 123,350 m^3 (100 acre-feet [ac-ft]) of storage capacity with 0.6 m (2 ft) of freeboard beyond the design capacity. It is unlined and has an outlet structure to control discharges above the design level. Normal discharge via this basin is evaporation and infiltration to the ground (LES, 2014).

The retention basin receives cooling tower blowdown discharges and stormwater runoff from the UBC Storage Pad. This basin is lined with synthetic fabric and is designed to contain a volume of 77,700 m^3 (63 ac-ft) and serves an area of 9.2 ha (22.8 ac). Normal discharge via this basin is evaporation of effluents and impoundment of the residual dry solids after evaporation (LES, 2014).

3.6.2 Ground-Water Resources

3.6.2.1 Site and Regional Hydrology

Regional ground water recharge occurs mainly by infiltration from drainage ways and temporary lakes that form after heavy rains and averages 0.64 to 1.27 cm (0.25 to 0.50 in.) per year (Nicholson and Crebsch, 1961; McAda, 1984). Low precipitation and high evaporation rates characteristic of the semi-arid climate in southeastern New Mexico and the absence of surface water bodies within the UUSA facility footprint, however, indicate that infiltration rates at the site are likely very low. Studies have shown that there is little to no precipitation recharge (i.e., infiltration of rainfall directly to ground water) in dry desert areas with vegetation, such as the UUSA site, because what little water does infiltrate the ground is efficiently held in the soil matrix or transpired by native vegetation (NRC, 2005a). Underlying the surficial dune sands at the UUSA site is a caliche layer that also limits infiltration, occurring at depths of 3.0 to 9.1 m (10 to 30 ft) (UUSA, 2013a). Caliche is a partly hardened zone of calcium carbonate accumulation formed in the upper layers of surficial deposits. The most shallow ground water below the site occurs within an undifferentiated siltstone seam of the Chinle Formation at depths of 65 to 68 m (214 to 222 ft) below the ground surface (UUSA, 2013a). Recharge rates for this water-bearing strata were noted to be relatively low, based on observations from onsite monitoring wells (UUSA, 2013a).

The principal aquifer in Lea County is the High Plains Aquifer, formerly known as the Ogallala Aquifer (Lea County Water Users Association, 1999; McAda, 1984). The High Plains Aquifer consists of hydraulically connected clay, silt, sand, and gravel (alluvial and wind-blown) deposits of late Tertiary or Quaternary age (mainly the Ogallala Formation) and is unconfined in Lea County (Dugan et al., 1994). The Ogallala Formation is not present below the UUSA site, according to well logs provided in UUSA (2013a); however, it is the principal formation from which Lea County municipal well fields draw their potable water supply (Lea County Water Users Association, 1999).

3.6.2.2 Ground-Water Use

The High Plains Aquifer underlies parts of eight states in the High Plains, covering an area of about 450,000 square kilometers (km^2) (174,000 square miles [mi^2]) and extending from west of the Mississippi River to just east of the Rocky Mountains (NRC, 2005a). Most of the withdrawals from the aquifer (almost 97 percent) were used for irrigation in 2000; public-supply and self-supplied industrial withdrawals accounted for only 2 percent and 1 percent, respectively (Maupin and Barber, 2005).

Localized (perched) ground water under the UUSA site is not considered sufficient to supply the site due to its discontinuity and low permeability (NRC, 2005a). The present UUSA facility obtains its water supply from the Eunice Municipal Water Supply System, which withdraws water from highly productive ground-water sources in the High Plains Aquifer near the City of Hobbs, about 32 km (20 mi) north of the UUSA site (UUSA, 2012b).

3.7 Ecological Resources

3.7.1 Terrestrial and Aquatic Ecology

The UUSA site is located within the Plains-Mesa Sand Scrub vegetation type, which is characterized by grasses and shrubs tolerant of, or even adapted to, the deep sand environment (Dick-Peddie, 1993). Studies of the UUSA site conducted prior to construction of the facility indicated that red lovegrass (*Eragrostis secundiflora* ssp. *oxylepis*) was the dominant grass within this community, with purple three awn (*Aristida purpurea*) and species of dropseed

(*Sporobolus* sp.) also present; the most abundant shrub was shin oak (*Quercus havardii*), with soapweed yucca (*Yucca glauca*), sand sage (*Artemisia filifolia*), and honey mesquite (*Prosopis glandulosa*) being less common (NRC, 2005a). Small scattered areas classified as shinnery oak-sand sage grassland habitat occur in the vicinity of the site (BLM, 2007). Wildlife species associated with Plains-Mesa Sand Scrub and potentially occurring on the site and in the vicinity are described in the NEF EIS (NRC, 2005a). No wetlands or aquatic communities occur on the UUSA site or in its vicinity (NRC, 2005a).

Much of the UUSA site was cleared and graded as part of the initial construction of the presently licensed facility. Fragmented areas of Plains Sand Scrub habitat remain on the site, primarily in the northern section of the site, with smaller areas in the southwest portion (UUSA, 2013a). These areas are designated as undeveloped areas and contain Plains-Mesa Sand Scrub habitat with various levels of disturbance. Wildlife use of much of the site is limited due to the general lack of habitat within the areas affected by construction and disturbance from the operation of heavy equipment and other ongoing human activities. Wildlife continues to use the undeveloped areas, although some species are likely excluded from the site by the boundary fence. The UBC Storage Pad Stormwater Retention Basin and basin shoreline are used by several avian species including doves, shorebirds, and waterfowl.

3.7.2 Threatened and Endangered Species

One species listed by the FWS occurs in Lea County (FWS, 2014a): the lesser prairie chicken (*Tympanuchus pallidicinctus*), associated with shinnery oak-sand sage grassland and listed as threatened (FWS, 2014b); no species in Lea County is listed by FWS as endangered. The northern aplomado falcon (*Falco femoralis septentrionalis*) is designated as an experimental non-essential population. In addition, Sprague's pipit (*Anthus spragueii*), a grassland bird that winters in New Mexico, also occurs in Lea County and is designated as a candidate for listing (FWS, 2010). Three species listed as endangered and six listed as threatened by the State of New Mexico also occur in Lea County (NMDGF, 2014).

Federal and state rare, threatened, and endangered species known to occur in Lea County are shown in Table 3-3. However, no state- or federally listed threatened or endangered species in Table 3-3 were identified at or near the UUSA site during surveys conducted prior to construction of the present UUSA facility (NRC, 2005a; EEI, 2004). No subsequent surveys have been conducted; however, because of the continuous disturbance by construction activity and associated reduction of habitat, these species would not be expected to occur at the site.

3.8 Socioeconomics

This section discusses the socioeconomic environment for a region of influence (ROI) surrounding the UUSA site. The ROI includes two counties, Lea County, New Mexico (the location of the UUSA site, see Figure 3-3), and Andrews County, Texas. These counties are more likely to experience socioeconomic impacts, given that most employees of the present UUSA facility live in these counties (UUSA, 2013a). The socioeconomic environment is described in terms of population, employment, unemployment, income, and poverty. Because expansion of the UUSA facility would employ existing construction workers already residing in the ROI, no in-migrating workers would be required, and no impacts would be expected on local

Table 3-3 Federal and State Special Status Species Known to Occur in Lea County, New Mexico

Common Name	Scientific Name	Federal Status[a]	State Status[a]
Birds			
American peregrine falcon	*Falco peregrinus anatum*	SC	T
Arctic peregrine falcon	*Falco peregrinus tundrius*	SC	T
Baird's sparrow	*Ammodramus bairdii*	SC	T
Bald eagle	*Haliaeetus leucocephalus*	-	T
Bell's vireo	*Vireo bellii*	SC	T
Broad-billed hummingbird	*Cynanthus latirostris magicus*	-	T
Least tern	*Sternula antillarum athalassos*	E[b]	E
Lesser prairie-chicken	*Tympanuchus pallidicinctus*	T	S
Northern aplomado falcon	*Falco femoralis septentrionalis*	ENE	E
Northern goshawk	*Accipiter gentilis*	SC	S
Sprague's pipit	*Anthus spragueii*	C	-
Western burrowing owl	*Athene cunicularia hypugaea*	SC	-
Yellow-billed cuckoo	*Coccyzus americanus*	SC[c]	S
Reptiles			
Dunes sagebrush lizard	*Sceloporus arenicolus*	-[d]	E
Mammals			
Black-tailed prairie dog	*Cynomys ludovicianus*	SC	S
Swift fox	*Vulpes velox*	SC	S

[a] C = Candidate, E = Endangered, ENE = Experimental Non-Essential, PT = Proposed Threatened, S = Sensitive, SC = Species of Concern, T = Threatened; - = No special status designated.

[b] Lea County is not included by the FWS in the area in which the least tern is known to occur or believed to occur.

[c] Only the western distinct population segment (DPS) of the yellow-billed cuckoo is listed as threatened. The FWS does not include Lea County in the area in which this DPS is known to occur or believed to occur.

[d] The proposed rule to list the dunes sagebrush lizard as endangered was withdrawn June 19, 2012 (FWS, 2012).

Sources: FWS (2012b, 2014a); NMDGF (2014).

housing markets or on the provision of local public and educational services, so no data are presented for these variables.

3.8.1 Demographics

Table 3-4 shows the population for each county in the ROI, the State of New Mexico, the State of Texas, and the towns of Hobbs, Lovington, and Andrews (the largest population centers near

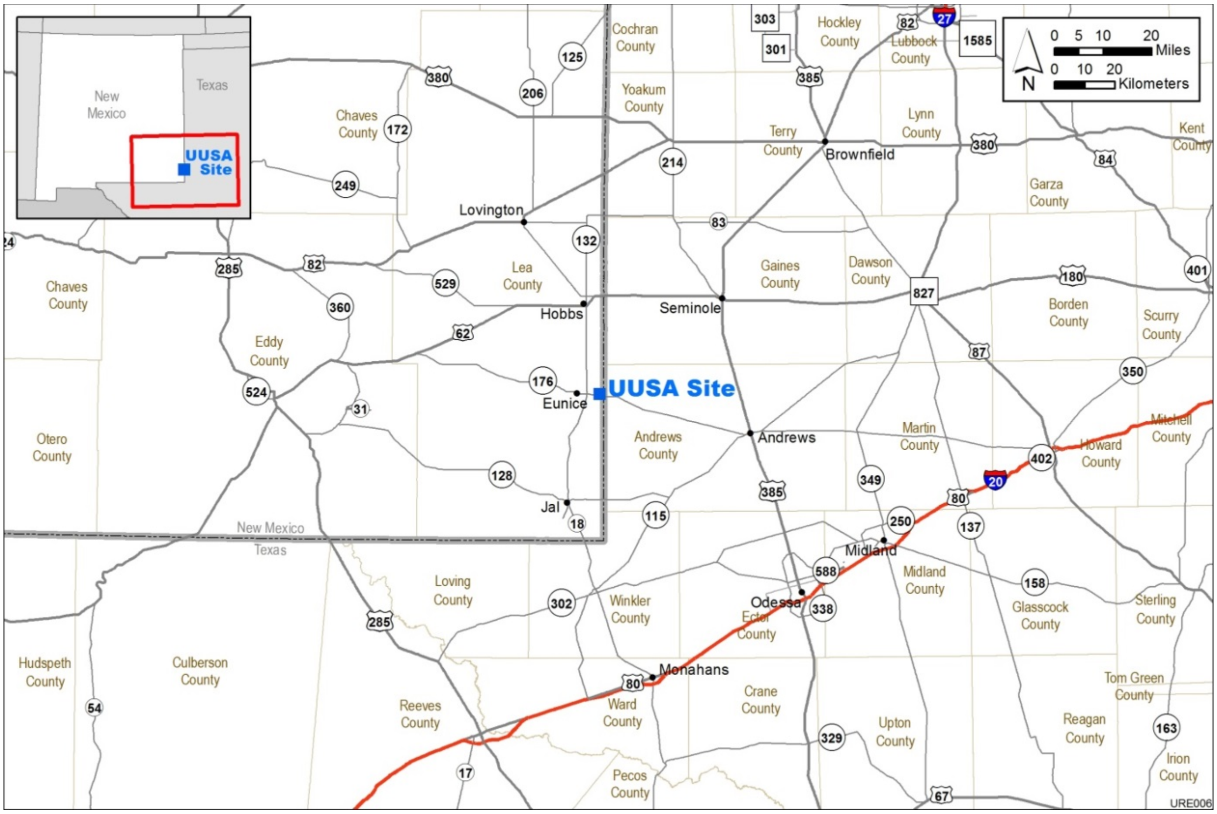

Figure 3-3 Counties in the Vicinity of the UUSA Site

Table 3-4 ROI and New Mexico and Texas State Population Characteristics

Location	2000 Population	2010 Population	Percent Change, 2000–2010	2030 Population Projection	Percent Change, 2010–2030
Lea County, New Mexico	55,511	64,727	16.6	93,712	44.8
Andrews County, Texas	13,004	14,786	13.7	17,989	20.0
Total Region of Influence	68,515	79,513	16.1	111,701	40.5
State of New Mexico	1,819,046	2,059,179	13.2	2,613,332	26.9
State of Texas	20,851,820	25,145,561	20.6	29,289,940	16.5
Hobbs, New Mexico	28,657	34,122	19.1	Not available	Not available
Lovington, New Mexico	9,471	11,009	16.2	Not available	Not available
Andrews, Texas	9,652	11,088	14.9	Not available	Not available

Sources: U.S. Census Bureau (2013a); University of New Mexico (2013); Texas State Data Center (2013).

the UUSA site). Eunice, New Mexico, the closest city to the site, had a population of 2,922 in 2010 (U.S. Census Bureau, 2013a). The majority of the population in the ROI is located in Lea County (81 percent), which had 64,727 people in 2010; the remainder consists of 14,786 people located in Andrews County. Population grew more rapidly in Lea County (16.6 percent) between 2000 and 2010 than in Andrews County (13.7 percent). The population growth rate in Lea County has been, and is expected to be, slightly higher than the rate for New Mexico as a whole over the period 2010 to 2030, while population growth in Andrews County is expected to overtake growth rates in Texas as a whole.

Population in the three small towns located near the UUSA site also increased markedly between 2000 and 2010; the fastest growth was in Hobbs (19.1 percent), the largest town in the ROI, which grew from 28,657 to 34,122. Smaller growth rates occurred in Lovington (16.2 percent), which had a population of 11,009 in 2010, and Andrews (14.9 percent), which had 11,088 inhabitants in 2010.

Selected racial characteristics for the ROI are presented in Table 3-5. The U.S. Census Bureau defines race as a self-identification data item; individuals choose the category with which they most closely identify themselves. There is a large minority population in the two counties,

Table 3-5 ROI and New Mexico and Texas State Race and Ethnicity Data, 2010

Location	White	Hispanic	African American	Native American	Asian	Native Hawaiian and Other Pacific Islander	Two or More Races
Lea County, New Mexico	27,845	33,063	2,399	468	302	18	581
Andrews County, Texas	7,083	7,195	199	95	85	1	111
Total Region of Influence	34,928	40,258	2,598	563	387	19	692
State of New Mexico	833,810	953,403	35,462	175,368	26,305	1,246	29,835
State of Texas	11,397,345	9,460,921	2,886,825	80,586	948,426	17,920	319,558
Hobbs, New Mexico	13,059	18,317	1,924	270	199	14	315
Lovington, New Mexico	3,487	7,076	220	83	38	0	90
Andrews, Texas	5,101	5,566	183	70	69	1	84

Source: U.S. Census Bureau (2013a).

making up 56.9 percent of the total in Lea County and 52.0 percent in Andrews County. The minority proportion of the total population is slightly lower in the ROI (56.0 percent) than for the State of New Mexico (59.4 percent) and slightly higher than in Texas (54.6 percent), meaning that the demographic characteristics of the two counties are similar to those in the two states as a whole.

3.8.2 Employment Information

Unemployment rates for 2012 in Lea County (4.3 percent) and Andrews County (3.7 percent) were lower than in New Mexico (6.6 percent) and Texas (6.2 percent) as a whole (Table 3-6). Two of the three towns in the ROI, Hobbs (4.4 percent) and Andrews (4.0 percent), also had unemployment rates that were lower than the state average in 2011, while the rate for Lovington was higher, at 8.3 percent.

Table 3-6 ROI and New Mexico and Texas State Employment Data, 2012

Location	2012 Labor Force	2012 Number of Persons Employed	2012 Percent Unemployed
Lea County, New Mexico	30,822	29,512	4.3
Andrews County, Texas	8,839	8,508	3.7
Total Region of Influence	39,661	38,020	4.1
State of New Mexico	938,565	876,741	6.6
State of Texas	12,630,244	11,848,020	6.2
Hobbs, New Mexico	15,589	14,896	4.4
Lovington, New Mexico	4,233	3,882	8.3
Andrews, Texas[a]	5,045	4,844	4.0

[a] Data are averages for 2007–2011.

Sources: BLS (2013); U.S. Census Bureau (2013a).

Employment in Lea County in 2011 was concentrated in mining (18.0 percent of total county employment), retail (13.7 percent), and health and social assistance (10.8 percent) (U.S. Census Bureau, 2013b). Employment in mining (22.1 percent) in Andrews County was slightly more important than in Lea County, followed by construction (14.8 percent), retail (6.8 percent), and accommodation (6.8 percent).

3.8.3 Income

Median household income on average between 2007 and 2011 in Lea County ($46,781) was slightly higher than the average for New Mexico ($44,631), and incomes in Andrews County ($51,598) were slightly higher than those for Texas ($50,920) (Table 3-7). Per capita income in Lea County, at $20,578, was slightly lower than the average for New Mexico as a whole ($23,537), while in Andrews County ($29,126), per capita incomes were higher than those in Texas as a whole ($25,548).

Table 3-7 ROI and New Mexico and Texas State Income and Poverty Data, 2007–2011

Location	Median Household Income	Median Family Income	Per Capita Income	Percent of Families below Poverty Level	Percent of Individuals below Poverty Level
Lea County, New Mexico	$46,781	$53,219	$20,578	13.1	16.7
Andrews County, Texas	$51,598	$60,878	$29,126	12.5	17.0
State of New Mexico	$44,631	$53,956	$23,537	14.4	19.0
State of Texas	$50,920	$60,004	$25,548	13.2	17.0
Hobbs, New Mexico	$45,121	$51,815	$20,526	15.4	19.5
Lovington, New Mexico	$40,655	$43,399	$15,581	18.0	20.0
Andrews, Texas	$49,408	$56,279	$27,758	14.1	18.1

Source: U.S. Census Bureau (2013a).

Poverty data are also presented in Table 3-7. The U.S. Census Bureau defines poverty using a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered to be in poverty. Using U.S. Census Bureau definitions, on average between 2007 and 2011, a family of four people with less than $22,891 in income was determined to be living in poverty (U.S. Census Bureau, 2013b). Poverty in Lea County affected slightly fewer families (13.1 percent) than in New Mexico as a whole (14.4 percent); similarly in Andrews County, slightly fewer families (12.5 percent) were living in poverty than in Texas as a whole (14.4 percent). Overall, 16.7 percent of individuals in Lea County and 17.0 percent in Andrews County were living in poverty on average between 2007 and 2011.

On average between 2007 and 2011, poverty affected more families and individuals in the three towns than in the counties in which they were located, with higher poverty rates in Lovington and Hobbs than in Andrews.

3.9 Environmental Justice

In 2004, the NRC published a final policy statement on the treatment of environmental justice (EJ) matters in NRC regulatory and licensing actions (NRC, 2004a). The policy statement provides that one of the first steps in the EJ analysis is to identify the geographic area for which to obtain demographic information. Current staff guidance in NUREG-1748 (NRC, 2003a), which the 2004 policy statement affirms, provides that the potentially affected area is normally determined to be within a 1.0-km (0.6-mi) radius of the center of the proposed project site in urban areas and within a 6.4 km (4 mi) radius, if the proposed site is located in a rural area. The proposed UUSA facility expansion project is considered to be located in a rural area. Once the potentially affected area is identified, demographic data for the area are collected from the U.S. Census Bureau at the census block group level. The goal is to evaluate the communities, neighborhoods, or areas that may be disproportionately affected (NRC, 2003a).

Census data are obtained to identify both minority and low-income populations, if present, and this is done by determining the percentages of these individuals within each of the census block groups. These percentages are next compared to percentages at the county and state levels. If the percentage of the block groups significantly exceeds that of the state or county percentage for either minority or low-income individuals, EJ must be analyzed in greater detail. Generally, a difference of 20 percent or more, or alternately, a block group percentage of 50 percent or more, for either minority or low-income individuals is considered to be significant (NRC, 2003a). If these percentages or differences in percentage are not present, then a detailed EJ review is not considered to be warranted.

For the purposes of this review, the NRC staff used the low-income and minority data for a 6.4-km (4-mi) area around the UUSA site provided in Table 3-8. As shown in the table, the percentages of minority or low-income individuals in the New Mexico or Texas portions of the 6.4-km (4-mi) area do not exceed 50 percent, nor do they exceed the corresponding percentages for either the county or the state by 20 percentage points or more. Therefore, based on 2010 Census data and NRC guidelines, there are no minority or low-income populations in the 6.4-km (4-mi) area around the site and a detailed EJ review is not warranted for the proposed action. Nonetheless, EJ topics are discussed in various sections within Chapter 4 of this EA.

3.10 Noise

Any pressure variation that can be detected by the human ear is considered sound, and noise is defined as unwanted sound. Sound is described in terms of amplitude (perceived as loudness) and frequency (perceived as pitch). Sound pressure levels are typically measured by using the logarithmic decibel (dB) scale. A-weighting (denoted by dBA) (Acoustical Society of America, 1983, 1985) is widely used to account for human sensitivity to frequencies of sound (i.e., less sensitive to lower and higher frequencies and most sensitive to sounds between 1 and 5 kilohertz [kHz]), which correlates well with a human's subjective reaction to sound. Several sound descriptors have been developed to account for variations of sound with time. The equivalent continuous sound level (L_{eq}) is a sound level that, if it were continuous during a specific time period, would contain the same total energy as a time-varying sound. In addition, human responses to noise differ depending on the time of the day (e.g., higher sensitivity to noise during nighttime hours because of lower background noise levels). The day-night

Table 3-8 Minority and Low-Income[a] Individuals within 6.4 Kilometers (4 Miles) of the UUSA Site, 2010

Category	New Mexico	Texas
Total population	2,303	1,678
White, Non-Hispanic	1,280	1,142
Hispanic or Latino	977	483
Non-Hispanic or Latino minorities	1,326	1,195
One race	1,303	1,181
Black or African American	10	6
American Indian or Alaska Native	5	5
Asian	2	26
Native Hawaiian or other Pacific Islander	2	0
Some other race	4	2
Two or more races	23	14
Total minority	1,023	536
Total low-income population	819	122
Low-income	74	0
Percent minority	44.4	31.9
County percent	57.0	52.1
State percent	59.5	54.7
Percent low-income	9.0	0.0
County percent	16.7	17.0
State percent	19.0	17.0

[a] Poverty status of the entire population was not determined in the 5-year American Community Survey data, meaning that the number of individuals whose poverty status can be determined is less than the total population.

Sources: U.S. Census Bureau (2013c,d).

average sound level (L_{dn}, or DNL) is a single dBA value calculated from hourly L_{eq} over a 24-hour period, with the addition of 10 dBA to sound levels from 10 p.m. to 7 a.m. to account for the greater sensitivity of most people to nighttime noise. Generally, a 3-dBA change over existing noise levels is considered to be a “just noticeable” difference; a 10-dBA increase is subjectively perceived as a doubling in loudness and almost always causes an adverse community response (NWCC, 2002).

There are no city, county, or New Mexico state noise ordinances or regulations. The EPA has a noise guideline (not a regulatory goal) that recommends an L_{dn} of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typically quiet outdoor and residential areas (EPA, 1974). NUREG-1555 (NRC, 1999) states that noise levels are acceptable if the L_{dn} outside a residence is less than 65 dBA, which is consistent with U.S. Department of Housing and Urban Development (HUD) regulations for exterior noise standards (24 CFR 51.101(a)(8)).

Primary noise sources around the UUSA site include ongoing construction and operation activities at the UUSA site; road traffic along NM 176; activities from neighboring industrial facilities and distant oil and gas industry; infrequent railroad traffic; aircraft flyover; livestock; and natural sounds such as bird chirping or wind gusts. Considering the activities mentioned above, the overall character around the UUSA site is considered rural to light industrial. The nearest residences are located along the west side of NM 18, just south of its intersection with NM 176, which is about 4.0 km (2.5 mi) west of the center of the UUSA site. No other sensitive receptors (e.g., hospitals, schools, or nursing homes) exist around the site.

LES conducted a background noise-level survey at the four corners of the site boundary on September 16–18, 2003, which was before the initial facility construction (NRC, 2005a). The measured background noise levels ranged between 40.1 and 50.4 dBA L_{eq}. Even considering ongoing construction and operation activities at the UUSA site, noise levels at the nearest residences are anticipated to be below the noise guideline levels.

3.11 Transportation

3.11.1 Roads

As shown in Figure 3-4, NM 176 passes along the southern boundary of the UUSA site with Eunice, New Mexico, 8 km (5 mi) to the west and the New Mexico–Texas state line 0.8 km (0.5 mi) to the east. NM 176 becomes Texas highway 176 (TX 176) at the state line, continuing 48 km (30 mi) eastward to Andrews, Texas. NM 176 provides direct access to the UUSA site, and is a two-lane highway that widens at the present UUSA facility location to provide acceleration and deceleration lanes in both directions for the two site entrances. Four kilometers (2.5 mi) to the west of the site, NM 176 intersects NM 18, which runs 27 km (17 mi) north to Hobbs, New Mexico, and 35 km (22 mi) south to Jal, New Mexico. NM 18 is a four-lane divided highway that crosses south into Texas, becoming TX 18, and connects with Interstate 20 (I-20) in Monahans, Texas, 105 km (65 mi) south of its intersection with NM 176.

The average annual daily traffic (AADT) on the portion of NM 176 that passes by the UUSA site is about 2,800 vehicles (NMDOT, 2014). The high percentage of heavy vehicles (vehicles other than cars, passenger trucks, or motorcycles) on this section of road, 52 percent (NMDOT, 2014), is reflective of the intense oil and gas development in the Permian Basin area. Traffic volumes for segments of roads near the UUSA site are summarized in Table 3-9.

3.11.2 Railroads

The nearest operating railroad to the UUSA site is the Texas–New Mexico Railroad (TNMR), which runs 167 km (104 mi) north to Lovington, New Mexico, from its origin to the south in Monahans, Texas, where it connects with the Union Pacific Railroad (IPH, 2014). Nearest to the UUSA facility, the TNMR has sidings in Jal, New Mexico; Eunice, New Mexico; and Hobbs,

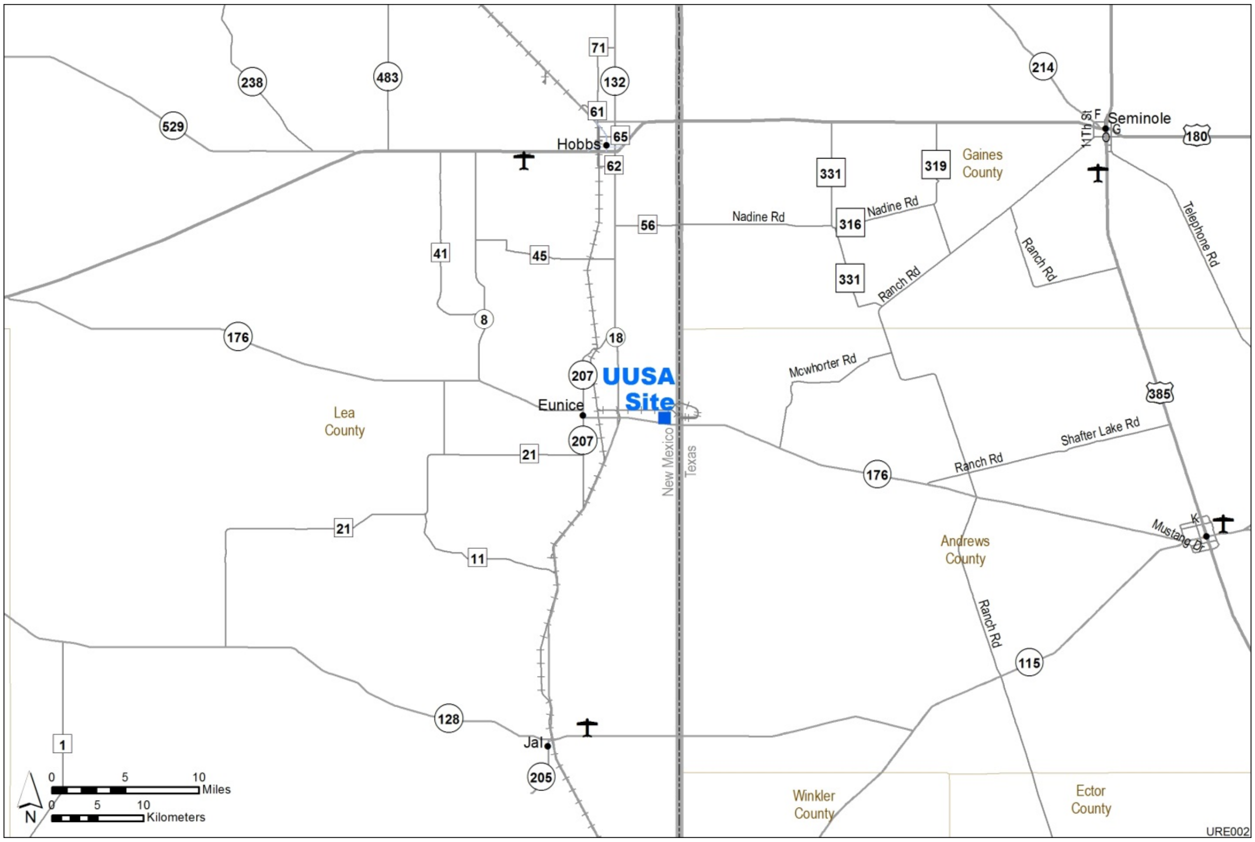

Figure 3-4 Roads in the Vicinity of the UUSA Site

New Mexico, available for liquid and/or bulk transfer. A freight dock and warehouse are also available in Hobbs. The TNMR hauls chemicals, waste soil, petroleum products, rock, and scrap (IPH, 2014), primarily in support of the regional oil and gas industry.

The neighboring WCS facility to the east has a private rail spur that connects to the TNMR on the eastern edge of Eunice. This rail spur passes along the northern boundary of the UUSA site as it runs from the TNMR to the WCS facility.

The nearest major railroads in the region are the Union Pacific, which has a mainline running through Monahans, Texas, approximately 105 km (65 mi) south of the UUSA site, and the Burlington Northern and Santa Fe (BNSF), which has a mainline running through Lubbock, Texas, about 193 km (120 mi) to the northeast of the UUSA site.

3.11.3 Airports

The nearest airport with scheduled commercial airline passenger service is the Lea County Regional Airport near Hobbs, New Mexico, 53 km (33 mi) northwest of the UUSA site. Other public airports within a 129-km (80-mi) driving distance of the UUSA site are listed in Table 3-10. The nearest major airport is the Midland International Airport, about 121 km (75 mi) southeast of the UUSA facility, located between Midland, Texas, and Odessa, Texas.

Table 3-9 AADT for 2011–2013 on Major Roads near the Proposed UUSA Facility Expansion

Road	General Direction	Location	AADT (Vehicles) 2013	2012	2011	Percent Heavy Commercial[a]
NM 176	East–west	East of NM 207 in Eunice	2,881	2,915	2,903	55
		Between NM 18 and Texas state line	2,800	3,100	3,100	52
NM 18	North–south	North of junction with NM 128 in Jal and south of junction with NM 207	2,449	2,451	2,450	63
		Between junctions with NM 207 (south of Eunice) and NM 176	1,930	1,931	1,930	56
		Between junctions with NM 176 and NM 207 (north of Eunice)	5,840	5,844	5,841	31
		North of junction with NM 207 north of Eunice and south of Hobbs	10,145	9,799	9,331	51

[a] Percentage of heavy commercial vehicles larger than a car, passenger truck, or motorcycle.

Source: NMDOT (2014).

Table 3-10 Airports Open to the Public in the Vicinity of the UUSA Site

Airport	Location	Owner/Operator
Andrews County	On eastern edge of Andrews, TX, on TX 176/115, about 53 km (33 mi) to the east-southeast of UUSA.	Andrews County
Cavern City Air Terminal	Just south of Carlsbad, NM, about 129 km (80 mi) west of UUSA off of US 62/180.	City of Carlsbad
Denver City	On western edge of Denver City, TX, approximately 90 km (56 mi) to the northeast of UUSA.	Exxon Corp., USA
Gaines County	On US 385 south of Seminole, TX, 77 km (48 mi) northeast of the UUSA site.	Gaines County
Lea County Regional	Off US 62/180 on the western edge of Hobbs, NM, about 53 km (33 mi) from the UUSA site.	Lea County
Lea County – Jal	Just east of Jal, NM, on NM 128, about 45 km (28 mi) from the UUSA site.	Lea County
Lea County – Zip Franklin Memorial	Off US 82 to the west of Lovington, NM, about 76 km (47 mi) from the UUSA site.	Lea County
Midland International	On I-20 between Midland and Odessa, TX, 121 km (75 mi) to the southeast of UUSA.	City of Midland
Odessa-Schlemeyer	On US 385 in Odessa, TX, 98 km (61 mi) southeast of UUSA.	Ector County
Tatum	East of Tatum, NM, on US 380, 106 km (66 mi) to the north of the UUSA site.	Town of Tatum
Yoakum County	By TX 214 north of Plains, TX, 108 km (67 mi) to the north-northeast of UUSA.	Yoakum County

Source: FAA (2013).

The Preston Smith International Airport in Lubbock, Texas, is the next nearest major airport and is located about 161 km (100 mi) northeast of the UUSA site. Table 3-11 summarizes the commercial passenger and freight traffic at the airports closest to the UUSA site.

3.11.4 Current UUSA Facility-Related Transportation

Current UUSA facility-related transportation includes commuting of construction and operations workers; deliveries to the site of non-radiological equipment and supplies and UF_6 feed cylinders; and offsite shipments of UF_6 product cylinders and non-radiological and radiological waste shipments.

Table 3-11 Commercial Passenger and Freight Traffic for 2012 at Airports Closest to the Proposed UUSA Facility Expansion

	Passengers		Freight [kg (lb)]	
Airport	Arrived	Departed	Arrived	Departed
Cavern City Air Terminal	2,160	2,341	0	0
Lea County Regional	14,269	14,065	0	0
Midland International	407,732	414,428	1.61 million (3.55 million)	1.27 million (2.79 million)
Preston Smith International	398,398	399,331	17.8 million (39.2 million)	11.7 million (25.7 million)

Source: BTS (2012).

3.11.4.1 Worker Commutes

During times of peak construction, as many as 800 construction workers on average are at the site on a daily basis, along with approximately 250 operations workers (UUSA, 2013a). Many of the workers live nearby in Hobbs, Eunice, and Jal, New Mexico, while some come from Andrews, Texas. All access to the UUSA site is obtained through the two site entrances on NM 176.

3.11.4.2 Non-Radiological Shipments

Current operational deliveries to and waste shipments from the present UUSA facility result in about a maximum of 2,800 shipments annually (UUSA, 2013a). Assuming such shipments would occur during the regular 5-day work week (250 days/year), the average daily number of these shipments would be about 11.

3.11.4.3 Radiological Shipments

The annual number of shipments of feed cylinders to the present UUSA facility is 690, and the annual numbers of shipments of product cylinders and uranium waste anticipated from the facility are 122 and 8, respectively (LES, 2014). At present, the depleted UF_6 in UBCs is temporarily being stored onsite. When a conversion facility becomes available, they will be shipped offsite for conversion to a uranium oxide.

3.12 Public and Occupational Health

This section describes existing physical worker hazards, including occupational injuries and potential health effects from exposure to radioactive materials and chemicals that are associated with the proposed UUSA facility expansion. Several different media in and around the proposed expansion contain radionuclides and chemicals, both naturally occurring and anthropogenic (i.e., human-made) from current operations at the UUSA site and other sources. These media include soil, surface water, sediment, ground water, and air.

3.12.1 Occupational Injuries

The most common occupational injuries that occur at facilities like the existing UUSA facility are hand and finger injuries; slips, trips, and falls; burns; and striking objects or being struck by falling objects. Injury data from URENCO's Capenhurst Limited enrichment facility in the U.K. for the years 2003–2007 provides an indication of the rate and nature of occupational injuries that might be expected at the current facility, which only started operation in June 2010 and thus has a fairly limited operational record from which to draw. Operational lost-time accident rates at the Capenhurst facility ranged from 0 to 5 per year between 2003 and 2007. Major injuries or those resulting in an absence of more than 3 days ranged from 0 to 4 per year during this period. Accounting for the number of worker hours expended per year, such accidents occurred at a rate of 0–0.65 per 100,000 work hours, or roughly 0–0.65 accident injuries per 50 full-time workers per year (AES, 2010).

3.12.2 Radiological Exposure

Humans are exposed to ionizing radiation from many naturally occurring sources in the environment, as well as man-made sources that include human enhancement of natural sources of radiation. For the proposed facility expansion, the current sources of background radiation at the proposed UUSA site include natural background sources and the existing UUSA uranium enrichment operations (a man-made source). Humans may also be exposed to man-made radiation sources other than the present UUSA facility operations.

3.12.2.1 Regulatory Requirements for Public and Occupational Exposure

NRC regulations in 10 CFR Part 20 identify maximum allowable concentrations of radionuclides in air and water above background at the boundaries of unrestricted areas, to control radiation exposures of the public and releases of radioactivity. The most restrictive maximum allowable concentrations in air and water for uranium isotopes are 5×10^{-14} and 3×10^{-7} microcuries per cubic centimeter ($\mu Ci/cm^3$), respectively, as stated in 10 CFR Part 20, Appendix B, Table 2. Other NRC requirements in 10 CFR 20.1301 are that the sum of the external and internal doses, the total effective dose equivalent (TEDE) [8], for a member of the public must not exceed 1 mSv/yr (100 mrem/yr) and the radiation levels at any unrestricted area must not exceed 0.02 mSv (2 mrem) in any 1 hour.

[8] Total effective dose equivalent (TEDE) means the sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

In addition to keeping within NRC requirements for public exposure, releases to the environment must comply with EPA standards in 40 CFR Part 190, "Subpart B – Environmental Standards for the Uranium Fuel Cycle." These standards specify limits on the annual dose equivalent from normal operations of uranium fuel-cycle facilities (except mining, waste disposal operations, transportation, and reuse of recovered special nuclear and byproduct materials). The public dose limit for the annual whole body and organ is 0.25 mSv (25 mrem), and for the thyroid it is 0.75 mSv (75 mrem).

10 CFR 20.1201 establishes occupational dose limits for adults. Table 3-12 provides occupational dose limits for radiation workers who work at nuclear facilities.

Table 3-12 Occupational Dose Limits for Adults Established by 10 CFR 20.1201(a)

Tissue	Dose Limit
Whole body or any individual organ or tissue other than the lens of the eye	More limiting of 0.05 Sv/yr (5 rem/yr) TEDE to whole body or 0.5 Sv/yr (50 rem/yr) sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye
Lens of the eye	0.15 Sv/yr (15 rem/yr) dose equivalent
Extremities, including skin	0.50 Sv/yr (50 rem/yr) shallow dose equivalent

3.12.2.2 General Background Radiation

Radioactivity from naturally occurring elements in the environment is present in soil, rocks, and living organisms. A major proportion of natural background radiation comes from naturally occurring airborne sources such as radon. The natural radiation sources contribute approximately 3.11 millisieverts per year (mSv/yr) (311 millirem/yr [mrem/yr]) to the radiation dose that a member of the U.S. population receives annually (NCRP, 2009). The majority of this exposure – approximately 2 mSv/yr (200 mrem/yr) – is from inhalation of naturally occurring radon gas from soil, rock, and water. The other sources of exposure include external exposure from terrestrial sources and natural radiation of cosmic origin and exposure from radionuclides that exist in the body.

Background monitoring data at the UUSA site was gathered from September 2006 to December 2009, prior to the start of uranium enrichment operations at the site in 2010. The environmental sampling media collected in the vicinity of the site and at distant locations included air particulate filters, vegetation, soils, and ground water. The exposure measurements were obtained using environmental thermoluminescent dosimeters (TLDs) at 16 locations around the UUSA site. Offsite ambient radiation measurements using environmental TLDs ranged from 0.88 mSv to 1 mSv/yr (88 to 100 mrem/yr) (UUSA, 2009).

Man-made sources of radiation include computed tomography scans, nuclear medicine procedures, interventional fluoroscopy, and X-rays for medical purposes; certain consumer products; and industrial uses. A person living in the United States received an average effective dose of about 6.2 mSv (620 mrem) in 2006 from all sources (natural and man-made) (NCRP, 2009). Figure 3-5 shows the percentage contribution to the total dose from different sources.

3.12.2.3 Radiological Exposure from Existing UUSA Facility Operations

The radiation sources from existing enrichment operations at the UUSA site include the gaseous effluent releases from the SBMs and CRDB and direct radiation from the cylinders stored on the UBC Storage Pad and in the CRDB. The gaseous effluent discharges come from the CTPMF EFS and SBMs' Pumped Extract GEVSs.

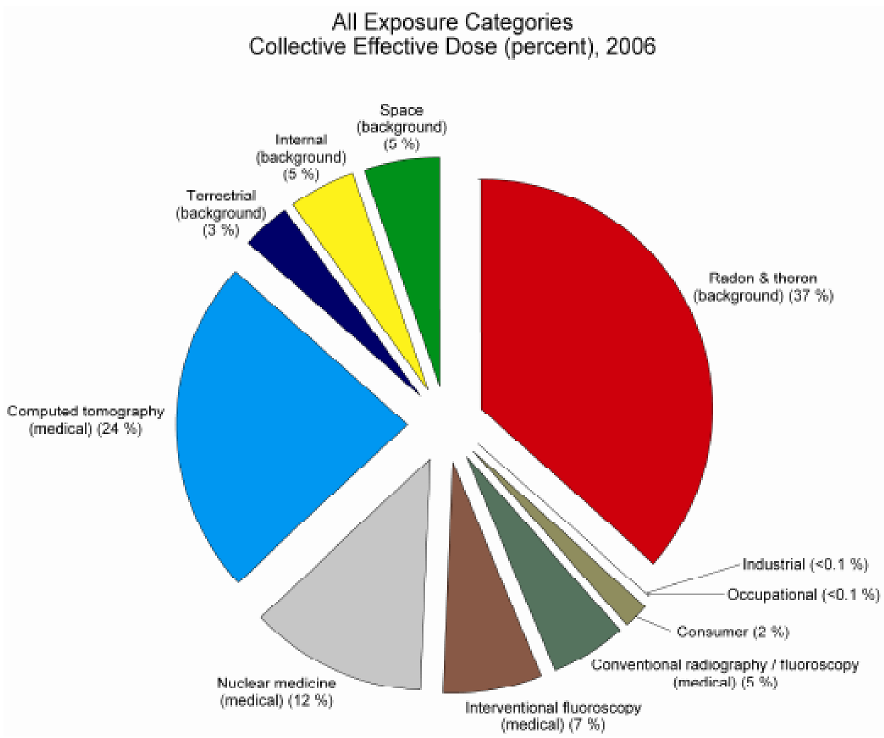

Figure 3-5 Percentage Contribution to the Effective Dose in the U.S. Population for 2006 from General Background Radiation (NCRP, 2009)

The total amount of uranium released to the environment through air effluent discharge is less than 10 grams (g) per year (UUSA, 2013a). As part of the assessment of radiological impacts to the general public from current UUSA operations, it is conservatively assumed that 240 microcuries (µCi) of uranium (~350 g [0.77 lb]) are released per year through air effluent discharge (UUSA, 2013a). There is no direct liquid effluent discharge offsite except sanitary waste. An estimated average of about 49,200 L (13,000 gallons [gal]) of waste water is discharged to the Eunice Waste Water Treatment Plant each day (UUSA, 2013b). Uranium-234 (U-234), U-235, and U-238 are the primary nuclides of concern in both gaseous and liquid effluent discharges from the facility. Resulting radiological exposures to the general public and occupational workers at the UUSA site from gaseous effluents and direct radiation are discussed below.

3.12.2.3.1 Radiological Exposure to the General Public

Airborne and liquid effluent releases of radionuclides from the existing uranium enrichment operations at the UUSA site result in radiation exposure to people in the vicinity of the site. The public is exposed to airborne effluents by inhalation and immersion in the effluent plume, direct dose from ground deposition, and ingestion of food products grown or raised at the nearest resident location. The public is also exposed to liquid effluent releases by ingestion pathways and to direct radiation from storage of feed, product, and UBCs at the site. The UBC Storage Pad and CRDB are two sources of direct exposure.

For gaseous effluents, the CTPMF is maintained at a negative pressure with respect to adjacent areas. The EFS is located in the CAB. The GEVSs are designed to route gaseous streams from the SBMs through filters for treatment before discharge to the atmosphere. There are two redundant air monitoring devices in the GEVSs. The radioactivity levels within the GEVS stacks are continuously monitored. The filters in the EFS and GEVSs are changed weekly and are sent for gross alpha, gross beta, and isotopic uranium analysis. It is ensured that the particulate matter collected on the filters is representative of the particulate matter being released to the environment (LES, 2014). The administrative action levels are set for effluent samples and monitoring instrumentation to allow corrective actions to be taken before regulatory limits are exceeded (LES, 2014).

The sanitary wastewater generated is discharged offsite to the Eunice Waste Water Treatment Plant and is sampled quarterly at Lift Station 1 for U-234, U-235, and U-238 analysis. The UBC Storage Pad results in the highest potential for direct radiation impacts on the public at or beyond the site boundary.

Radiological doses are estimated in each of the 16 sector compass directions at the site boundary locations, at the nearest businesses for the adult member of the public, and at nearest residence locations for the member of the public in four age groups (adult, teen, child, and infant) (LES, 2014). Table 3-13 lists the estimated doses to the maximally exposed individual (MEI) at the site boundary from gaseous effluent releases. The maximum dose at the site boundary from gaseous effluent releases occurs to the south. Table 3-14 lists the estimated annual doses (TEDE) to the MEI at the site boundary, nearest business, and nearest residence from gaseous effluent releases and the direct exposure from the fixed sources (UBC Storage Pad and CRDB). The doses are listed by the direction where the maximum occurs. All estimated doses to members of the public referenced above are well below the NRC TEDE limit of 1 mSv/yr (100 mrem/yr), as established by 10 CFR 20.1301(a)(1).

Environmental monitoring at the existing UUSA facility is ongoing for the purpose of ensuring protection of the public (see Section 2.1.5). A Semi-Annual Report is required under 10 CFR 70.59 and 10 CFR 40.65 to report the quantity of principal radionuclides released to

Table 3-13 Maximum Radiological Impacts from Gaseous Effluent Releases from the Present UUSA Facility

Location	Category	Gaseous Effluents, mSv (mrem)
Site boundary (south, 417 m [1,368 ft])	Maximum Effective Dose Equivalent	1.7×10^{-4} (1.7×10^{-2})
Site boundary (south, 417 m [1,368 ft])	Maximum Thyroid Committed Dose Equivalent	9.2×10^{-7} (9.2×10^{-5})
Site boundary (south, 417 m [1,368 ft])	Maximum Organ Committed Dose Equivalent	1.4×10^{-3} (1.4×10^{-1})

Source: Section 4.12.2.2 of LES (2014).

Table 3-14 Maximum Annual Total Effective Dose Equivalents from All Existing UUSA Facility Sources at Different Locations

	Fixed Sources			
Location	Storage Pad, mSv (mrem)	CRDB, mSv (mrem)	Gaseous Effluents, mSv (mrem)	TEDE, mSv (mrem)
Site boundary[a,b] (N, 435 m [1,427 ft])	0.188 (18.8)	<0.001 (0.1)	8.8×10^{-5} (8.8×10^{-3})	0.189 (18.9)
Nearest business[a,c] (NNW, 1.9 km [1.17 mi])	6×10^{-5} (6×10^{-3})	2×10^{-10} (2×10^{-8})	2.3×10^{-5} (2.3×10^{-3})	8.3×10^{-5} (8.3×10^{-3})
Nearest residence (W, 4.3 km (2.6 mi])[c]	8×10^{-12} (8×10^{-10})	9×10^{-20} (9×10^{-18})	1.7×10^{-5} (1.7×10^{-3})[d]	1.7×10^{-5} (1.7×10^{-3})

[a] Dose at the site boundary and nearest business is estimated for the adult member of the public, and the exposure duration is 2,000 hours.

[b] Distance from the closest edge of the pad.

[c] Distance from the center of the site.

[d] Teen receives the maximum dose from gaseous effluent releases at nearest resident location.

Source: Tables 4.12-1, 4.12-5B, 4.12-6B, and 4.12-7B in LES (2014).

unrestricted areas from licensed nuclear facilities. In February 2009, UUSA began testing centrifuges using small quantities of UF_6. In June 2010, UUSA received feed material onsite for uranium enrichment activity, officially initiating the first cascade online.

The REMP reports and semi-annual effluent release reports for the period 2009 through June 30, 2014 (UUSA, 2010a,b; 2011a,b,c; 2012e,f,g; 2013b,e; 2014c,d) were reviewed by the NRC staff to assess the radiological impacts from the existing operations at the UUSA site. Many weekly samples collected from the CTPMF EFS and the SBM's GEVS had gross alpha and beta measurements less than the respective minimum detectable activity (MDA). The maximum weekly gross alpha concentration in the filters collected from the EFS and SBM's GEVS was 9.56×10^{-15} µCi/millileter (mL) (October 6, 2010; sample collected from CTPMF EFS; UUSA, 2011b) and the maximum weekly gross beta concentration in the filters was 4.44×10^{-14} µCi/mL (June 2, 2010; filter collected from SBM's GEVS; UUSA, 2010b). Many quarterly samples collected for uranium isotopic analysis from the EFS and GEVS also had activities less than the MDA. The maximum detected concentrations for U-234, U-235, and U-238 were 1.63×10^{-16}, 1.1×10^{-16}, and 1.81×10^{-16} µCi/mL, respectively. The measured gaseous effluent concentrations were at least three orders of magnitudes less than the value in Table 2 of Appendix B to 10 CFR Part 20, "Effluent concentrations – Class D Air" (3×10^{-12} µCi/mL[9]) for uranium isotopes. The maximum detected concentrations in quarterly wastewater effluent samples collected at Lift Station 1 for U-234, U-235, and U-238 were 3.8×10^{-9}, 1.23×10^{-10}, and 2.03×10^{-9} µCi/mL, respectively. Although wastewater would not be used for human consumption, the measured wastewater concentrations were three orders of magnitude less than the value in Table 3 of Appendix B to 10 CFR Part 20, "Releases to Sewer" (3×10^{-6} µCi/mL[10]) for uranium isotopes.

For the period from 2009 through June 30, 2014, a review of the data for gaseous and liquid effluents shows that there was no release that would have exceeded the 10 CFR 20.1101 ALARA requirements for air emissions, or the more general public dose limits set forth in 10 CFR 20.1301 and 10 CFR 20.1302. The potential maximum TEDE directly at the point of gaseous effluent discharges (calculated by using the maximum uranium isotope concentration measured and assuming that the person is located at the gaseous effluent discharge location) was <1 mrem/yr. Because of the dispersion of the plume at the site boundary and beyond, the potential maximum TEDE for a member of the public would be much less than 1 mrem/yr.

Doses from the existing liquid effluent releases at the site were calculated from the liquid effluent's quarterly samples collected at Lift Station 1. The potential maximum TEDE directly at the point of liquid effluent discharges (calculated by using the maximum uranium isotope concentration measured and assuming that the wastewater is the only source of water ingested by a reference man during a year) was <1 mrem. Ground water is the main source of drinking water in the area, and the site features negate any significant potential that the drinking water pathway could be impacted by routine liquid effluent releases (Section 3.4.1 of LES, 2014); therefore, the actual dose at the receptor location would be much less than 1 mrem/yr.

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[9] Continuous inhalation over the course of a year at this concentration level would result in a committed effective dose equivalent (CEDE) of 50 mrem. CEDE is the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues.

[10] If the wastewater released by the licensee at these concentrations is the only source of water ingested by reference man during a year, it would result in a CEDE of 500 mrem.

3.12.2.3.2 Radiological Exposure to Occupational Workers

Occupational radiation exposure data from uranium fuel cycle facilities in the United States from the last 11 years (2002–2012) (Brock et al., 2014) was reviewed. The annual average measurable TEDE to the average worker dose during this time period varied from 1.2 mSv (120 mrem) to 1.9 mSv (190 mrem). Most of the workers received an annual dose less than 1 mSv (100 mrem). One worker received a dose between 20 and 30 mSv (2 and 3 rem), and no worker received a dose greater than 30 mSv (3 rem) (Brock et al., 2014). The average measurable doses are well below the NRC limit of 0.05 Sv/yr (5 rem/yr) for occupational exposure stated in 10 CFR 20.1201 and the present UUSA facility's administrative limit of 0.01 Sv/yr (1 rem/yr) (NRC, 2005b). Most of the exposures came from inhalation of uranium dust and direct contact with uranium.

UUSA started reporting occupational exposure data for the Lea County facility in 2009. The TEDE to the average worker for FY 2012 was 0.32 mSv (32 mrem). Since 2011, construction of the present facility was ongoing, so the collective radiation exposure is expected to increase as all operations are brought on-line. Table 3-15 lists the estimated individual occupational exposures for typical occupational receptors form existing operations at the UUSA site (LES, 2014).

Table 3-15 Estimated Individual Occupational Exposure from Existing Operations at the UUSA Site

Position	Annual Dose Equivalent, mSv (mrem)
General office staff	<0.05 mSv (<5.0 mrem)
Typical operations and maintenance technician	1 mSv (100 mrem)
Typical cylinder handler	3 mSv (300 mrem)

Source: Table 4.12-14 in LES (2014).

3.12.2.4 Health Effects from Radiological Exposure

Radiation interacts with the atoms that form cells in the body. There are two mechanisms by which radiation affects cells: direct action and indirect action. In a direct action, the radiation interacts directly with the atoms of the DNA molecule or some other component critical to the survival of the cell. Since the DNA molecules make up a small part of the cell, the probability of direct action is small. Because most of each cell is made up of water, there is a much higher probability that radiation would interact with water. In an indirect action, radiation interacts with water and breaks the bonds that hold the water molecule together, producing reactive free radicals that are chemically toxic and destroy the cell. The body has mechanisms to repair damage caused by radiation. Consequently, the biological effects of radiation on living cells may result in one of three outcomes: (1) injured or damaged cells repair themselves, resulting in no residual damage; (2) cells die, much like millions of body cells do every day, being replaced through normal biological processes and causing no health effects; or (3) cells incorrectly repair themselves, which results in damaging or changing the genetic code (DNA) of the irradiated cells. Stochastic effects, that is, effects that may or may not occur according to probability, may occur when an irradiated cell is modified rather than killed. The most significant stochastic effect of radiation exposure is that a modified cell may, after a prolonged delay, develop into a cancerous cell (ICRP, 2007).

The biological effects on the whole body from exposure to radiation depend on many factors, such as the type of radiation, total dose, time interval over which the dose is received, and part of the body that is exposed. Not all organs are equally sensitive to radiation. The blood-forming organs are most sensitive to radiation; muscle and nerve cells are relatively insensitive to radiation. Health effects may be characterized according to two types of radiation exposure: (1) a single accidental exposure to high doses of radiation for a short period of time (acute exposure), which may produce biological effects within a short time after exposure; and (2) long-term, low-level overexposure, commonly called continuous or chronic exposure. High doses of radiation can cause death. Other possible effects of a high radiation dose include erythema, dry desquamation, moist desquamation, hair loss, sterility, cataracts, and acute radiation syndromes. Currently there are no data to unequivocally establish the occurrence of cancer following exposure to low doses and dose rates below about 100 mSv (10,000 mrem) (NRC, 2004b).

In estimating the health impacts from low-dose or low-dose-rate exposure to occupational workers and the general public, the nominal probability for total detriment per unit of radiation exposure recommended by International Commission on Radiological Protection (ICRP) Publication 103 (ICRP, 2007) was used. The value of this coefficient is 570 fatal cancers, nonfatal cancers, and severe hereditary effects per 10,000 person-Sv (1,000,000 person-rem), which is equal to 0.057 effect per person-Sv (ICRP, 2007).

The National Program of Cancer Registries is the Centers for Disease Control and Prevention (CDC) state-based cancer control program. Under this program, states collect, manage, and analyze data about cancer incidence and mortality. The CDC and the National Cancer Institute release U.S. cancer statistics annually. Table 3-16 lists the cancer incidence and death rates for all cancers for 2005 to 2009 for New Mexico and the United States.

3.12.3 Chemical (Non-Radiological) Exposure

Chemical exposures of greatest concern for the present UUSA facility are exposures to uranium compounds and to HF, which is a product of the reaction of UF_6 and moisture in air (UUSA, 2013a). Other chemical exposures of possible concern in certain circumstances could be to solvents, acids, or corrosive chemicals used in equipment decontamination; laboratory solvents and toxic chemicals used in the analytical laboratory; paint solvents used for site maintenance; and cleaning agents used in housekeeping.

Table 3-16 Cancer Incidence and Death Rates for All Cancers for 2005 to 2009[a]

Area	All Cancer Incidence Rate	All Cancer Death Rate
United States	472.0	178.7
New Mexico	418.8	158.2

[a] Per 100,000 persons and are age adjusted to the 2000 U.S. standard population.

Source: CDC (2013).

Uranium is present at the UUSA site almost entirely in the form of UF_6, because this is the form in which uranium is used in the enrichment process. Enrichment is a purely physical process; no chemical reactions are involved. Only when small quantities of UF_6 are released into the facility air during normal operations involving brief opening of lines or connection or disconnection of cylinders does UF_6 convert to other forms within the facility. When released into air, UF_6 reacts with moisture in the air to produce uranyl fluoride (UO_2F_2) and HF. Process lines do not leak under normal circumstances; however, if a leak developed, releases would be limited by the fact that process lines run at reduced pressure, so any process line leaks would flow inward. Minor releases during normal operations noted above are controlled using localized ventilation systems that capture UF_6 releases and route them through a collection system, limiting worker exposure to acceptable levels. The trap/filter system, referred to as the GEVS, collects any UF_6, UO_2F_2, or HF released using a combination HEPA filters and activated carbon traps. The GEVS outlet runs to a roof stack. HF is monitored upstream and downstream of the filter trains and in the exhaust stack; uranium is monitored in the exhaust stack. Detection of non-routine operations activates alarms in the control room (LES, 2014). Current estimated total site annual emissions are no more than 10 g (0.022 lb) of uranium and no more than 1 kg (2.2 lb) of HF.

Worker exposures to uranium at URENCO's enrichment facilities in the Netherlands from 1972 to 1984 resulted in 13 reportable events (>50 micrograms [μg] uranium in urine) involving 14 workers, or about one per year, and resulted in no detectable uranium in urine after two days (LES, 2014). No reportable exposures have occurred at these facilities since 1984 or at the Capenhurst Limited facility in the U.K., which has been in operation since 1998 (LES, 2014).

Exposure to UF_6 or its breakdown products, UO_2F_2 and HF, would be primarily through inhalation of vapors or particulates. Toxic effects occur at relatively low exposure concentrations for these compounds. Uranium exerts heavy metal toxicity, primarily targeting the kidney. Soluble forms of uranium, including UO_2F_2, exhibit the greatest toxicity (ATSDR, 1999). Exposure to HF vapors, a strong acid, can cause burns to skin and severe irritation to the lung and respiratory system at sufficiently high concentrations. Lung irritation is the primary effect at low concentrations. Worker and public exposure limits and guidelines for these compounds are set at levels to protect against the described health effects (ATSDR, 2003).

Other potential chemical exposures to workers and members of the public who might also be affected by exposures from the UUSA facility include exposures to air pollutants, water pollutants, and household chemicals. Such exposures would be low. Air quality in the region is generally qualified as very good and in compliance with EPA standards for criteria pollutants (LES, 2014); potential exposures would be to VOCs in air resulting from oil and gas production. Drinking water is sourced from wells located near Hobbs, New Mexico, out of reach of any effects from the facility. Process liquid effluents produced by the facility are treated entirely onsite. The only liquid wastes that go offsite are sanitary wastes, which are piped to the City of Eunice Wastewater Treatment Plant.

Measures taken to prevent or minimize worker exposures include engineered controls, personal protective equipment, and the implementation of the facility's Environment, Health, and Safety Program, which conforms to Occupational Safety and Health Administration (OSHA) requirements (29 CFR Part 1910). Engineered controls include flexible exhaust hoses and ventilation hoods connected to the GEVS (UUSA, 2013a). In addition, to handle transient emergencies, a Contingency Dump System employing sodium fluoride (NaF) traps is in place to collect UF_6 and HF from process lines (LES, 2014). These measures are expected to maintain worker exposures to uranium to below the occupational limit for chemical toxicity of 10 mg/week (10 CFR 20.1201(e)) and HF exposures below OSHA's 8-hour (hr) permissible exposure limit (PEL) of 3 parts per million (ppm) (2.5 milligrams (mg)/m^3) (29 CFR 1910.1000, Table Z-2) and below New Mexico's occupational exposure limit (OEL) for fluoride of 2.5 mg/m^3 (20.2.72.502 NMAC) (LES, 2014; UUSA, 2013a).

Exposures to members of the public from chemical emissions from the existing UUSA facility are maintained at very low levels through engineered controls and adherence to the facility operating plans and procedures. Estimated annual emissions of 1 kg of HF for the current facility equates to an average air concentration of 3.9 μg/m^3 at the rooftop stack, without accounting for any dispersion (LES, 2014). This concentration is below the New Mexico OEL/100 of 25 μg/m^3 for fluorides, a value used to compare the results of dispersion modeling in the assessment of toxic air pollutants (NMAQB, 2010). The vent stack concentration is also below the most stringent available comparison standard for exposures to the public, the California inhalation reference exposure level (REL) of 14 μg/m^3 (California Office of Environmental Health Hazard Assessment, 2003). Concentrations would be much lower at the site boundary and beyond due to the effects of dispersion.

3.13 Waste Management

The following discussion of waste management operations pertains to the existing UUSA facility having a 3 million SWU/yr capacity, and encompasses gaseous effluents, liquid effluents, and solid and liquid waste streams produced within the operating facility. Estimated waste stream volumes are those that UUSA projected for its original design of the facility.

Table 3-17 summarizes all of the major effluents and waste streams and the disposition of wastes produced within the current facility. Effluent streams include gaseous effluents that vent through the GEVSs, liquid effluents managed within the LECTS, sanitary wastewater, and various waste streams that fall into the categories of industrial, radioactive, hazardous, and mixed wastes, depending on presence or absence of radioactive or hazardous chemical constituents.

Table 3-17 Current Waste Streams and Disposition at the UUSA Facility

Waste Stream or Effluent	Description	Collection/Storage/Transfer	Treatment/Handling/Packaging	Waste Class	Volume	Disposal Facility
Gaseous Effluents						
GEVS	Filter train/ventilation system for air in (1) SBMs, pumped extract; 646 m^3/hr; and (2) CRDB areas; 18,700 m^3/hr	GEVS; activated carbon and HEPA filters	See activated carbon, below	Permitted gaseous effluent	<10 g/yr (<0.022 lb/yr) uranium; <1 kg/yr (<2.2 lb/yr) HF emitted	Not applicable
Liquid Effluents and Wastes						
LECTS	Collects and treats aqueous liquid effluents from various operations in the CRDB and SBMs	Bulk storage and treatment tanks in the LECTS room in the CRDB	Aqueous liquids with <15 g ^{235}U/batch sent offsite for solidification; liquids with >15 g ^{235}U/batch (90 percent of liquids) treated onsite by solidification with grout	Aqueous and solid LLRW; sanitary wastewater	312,528 kg/yr (689,000 lb/yr) solidified wastes from the LECTS	Solidified LECTS wastes disposed at a licensed LLRW disposal facility
Laboratory effluent	Hydrolyzed UF_6 and other aqueous lab wastes	LECTS; miscellaneous effluent collection tank; bulk storage tank	Solidification with grout	LLRW	Included in LECTS volume	Included in LECTS
Degreaser water	Produced in degreasing Fomblin oil-coated pump and plant components	LECTS; precipitation treatment tank; bulk storage tank	Solidification with grout	LLRW	Included in LECTS volume	Included in LECTS
Citric acid	Used to remove uranic material from surfaces of pump and plant components	LECTS; precipitation treatment tank; bulk storage tank	Potassium hydroxide treatment; liquids solidified with grout; solids removed in filter press and containerized for disposal	LLRW	Included in LECTS volume	Included in LECTS
Floor washings	Floor washings in active plant areas; contains water, detergents, and uranic material	LECTS; miscellaneous effluent collection tank; bulk storage tank	Solidification with grout	LLRW	Included in LECTS volume	Included in LECTS
Miscellaneous condensates	Produced in defrost cycle of low-temperature take-off stations	LECTS; miscellaneous effluent collection tank; bulk storage tank	Solidification with grout	LLRW	Included in LECTS volume	Included in LECTS
Radiation area hand washing and shower water	Uncontaminated water from personnel washing and showering	LECTS; hand wash and shower monitor tanks	Solidification with grout	Wastewater	Included in LECTS volume	Included in LECTS

TABLE 3-17 Current Waste Streams and Disposition at the UUSA Facility (Cont.)

Waste Stream or Effluent	Description	Collection/Storage/Transfer	Treatment/Handling/Packaging	Waste Class	Volume	Disposal Facility
Cooling tower blow-down	Portion of cooling water drawn off and replaced to maintain total dissolved solids (TDS) at sufficiently low levels	Discharged to the onsite UBC Storage Pad evaporation retention basin	Water evaporated from retention basin; dissolved solids remain in basin	Wastewater	8,168,000 L/yr (2.16 Mgal/yr)	Not applicable
Sanitary wastewater	Non-radioactive, sanitary wastewater	8-in. sewer line and lift station to City of Eunice	Sanitary wastewater treatment	Sanitary wastewater	7,253,000 L/yr (1.9 million gal/yr)	City of Eunice Wastewater Treatment Plant
Solid Wastes						
Solid Waste – Industrial – Wet						
Wet trash	Paper, packing material, clothing, rags, wipes, mop heads, absorption media that contain water, oil, or solutions	Trash is collected in plastic bags, inspected for radioactivity, stored in large containers around the plant, and disposed offsite	Excess liquids drained	Non-hazardous, non-radioactive solid waste	Included with dry trash, below	Licensed sanitary waste landfill
Oil filters	From diesel generators and plant vehicles	Collected in containers and transported to waste storage area of the CRDB	Oil filters are drained and placed in a drum; oil is disposed as hazardous waste	Non-hazardous, non-radioactive solid waste	250 oil filters/yr; 3,400 L/yr (895 gal/yr) used motor oil	Filters to offsite waste disposal contractor; waste oil to hazardous waste contractor
Water treatment resins	Water demineralizer resin in mixed bed for liquid waste treatment	Disposed during decommissioning	To be determined; spent resins would not be produced on an annual basis	To be determined at close of plant	Contents of the mixed-bed demineralizer at end of plant life	Appropriate licensed offsite facility
Solid Wastes – Dry						
Solid Waste Collection and Processing System (SWCPS)	Collects, identifies, stores, and prepares for shipment dry radiological, hazardous, mixed, and industrial solid wastes from plant operations	Wastes are collected, labeled, recorded, and stored for shipment as described below	Wastes are containerized, sampled as necessary, sealed, labeled, and recorded as described below	See waste type below	See waste type below	See waste type below

TABLE 3-17 Current Waste Streams and Disposition at the UUSA Facility (Cont.)

Waste Stream or Effluent	Description	Collection/Storage/Transfer	Treatment/Handling/Packaging	Waste Class	Volume	Disposal Facility
Solid Waste – Industrial – Dry						
Dry trash	HVAC air filters, paper, packing material	See wet trash, above	No treatment	Non-hazardous, non-radioactive solid waste	172,500 kg/yr (380,400 lb/yr) for all industrial waste 160,650 kg/yr (354,200 lb/yr) HVAC filters	Licensed sanitary waste landfill
Solid Waste – Radioactive Waste						
Radioactive trash	Trash with radiological contamination	Collected in plastic bag-lined drums, separate from dry trash; stored in the radioactive waste storage area	Packaged in a sealed plastic bag; treated offsite at a CVRF and repackaged	LLRW	2,100 kg/yr (4,631 lb/yr)	Licensed LLRW disposal facility
Oil recovery sludge	Sludge produced in the recovery of Fomblin oil using absorbents	Collected and sent to the radioactive waste storage area	Shipped to an offsite radioactive waste processor or to a CVRF for volume reduction	LLRW	Part of 10,660 kg/yr (23,500 lb/yr) total liquid radioactive waste	Licensed LLRW disposal facility
Uranic waste precipitate	Filter solids produced from the precipitation of uranium from aqueous wastes produced from decontamination and laboratory activities	Collected and sent to the radioactive waste storage area	No treatment	LLRW	Part of 10,660 kg/yr (23,500 lb/yr) total liquid radioactive waste	Licensed LLRW disposal facility
Activated carbon	Used in the GEVS to trap uranium compounds and HF prior to building venting	Removed from GEVS, packaged, and sent to the ventilated room in the CRDB; transferred to geometrically safe containers, sampled, sealed, and sent to the radioactive waste storage area	Depending on uranic content, may be sent to an offsite CVRF for volume reduction and repackaging prior to disposal	LLRW	300 kg/yr (662 lb/yr)	Licensed LLRW disposal facility
Activated alumina	Used in alumina traps to remove HF from exhaust gases	Removed from traps in the ventilated room in the CRDB, placed in containers, and sampled; stored in the radioactive waste storage room	No treatment	LLRW	2,160 kg/yr (4,763 lb/yr)	Licensed LLRW disposal facility

TABLE 3-17 Current Waste Streams and Disposition at the UUSA Facility (Cont.)

Waste Stream or Effluent	Description	Collection/Storage/Transfer	Treatment/Handling/Packaging	Waste Class	Volume	Disposal Facility
Activated NaF	Used in the contingency dump system to trap uranium compounds and HF from exhaust gases; NaF is not expected to saturate during the life of plant operations	Emptied, if necessary, and placed in plastic bags	Spent NaF, if produced, would be processed by a contractor to remove uranic material prior to disposal at the end of the life of the plant; spent NaF will not be produced on an annual basis	LLRW	Contents of the contingency dump filter system at end of plant life	Licensed LLRW disposal facility
Ventilation filter elements	Air filters used as pre-filters within the GEVS and other air treatment trains	Removed and wrapped in plastic; sent to the Solid Waste Collection Room (SWCR) in the CRDB and sampled	Shipped to an offsite radioactive waste processor or to a CVRF for volume reduction	LLRW	30,735 kg/yr (67,753 lb/yr)	Licensed LLRW disposal facility
Scrap metal	Surface contaminated metal waste produced in maintenance and repair operations	Sent to the decontamination workshop; large items may be decontaminated in place at the end of plant operations; clean scrap metal is collected in bins outside the TSB	Scrap metal is decontaminated, if feasible, or may be processed at a CVRF prior to disposal; clean scrap metal is sent to a local vendor for disposal	LLRW and clean scrap metal	12,000 kg/yr (26,460 lb/yr) LLRW; 2,800 kg/yr (6,147 lb/yr) clean scrap metal	Radioactive scrap metal disposed at a licensed LLRW disposal facility; clean scrap metal is disposed by a local vendor
Solid Waste – Hazardous Waste						
Trash with hazardous waste	Trash classified as hazardous waste as defined under RCRA (40 CFR Part 261) due to the presence of listed hazardous constituents or hazardous characteristics	Collected in specially marked plastic-lined drums; full drums sent to SWCR and then to the hazardous waste area	No treatment	Hazardous waste	Portion of 1,770 kg/yr (3,930 lb/yr) total hazardous waste	Licensed hazardous waste disposal facility
Laboratory carbon filters and laboratory waste	Small quantities of unused chemicals and materials, as well as carbon exhaust air filters with residual hazardous constituents	Collected, sampled, and stored in the waste storage room of the CRDB	Sent offsite to a hazardous waste processing facility to be prepared for disposal	Hazardous waste	Portion of 1,770 kg/yr (3,930 lb/yr) total hazardous waste	Licensed hazardous waste disposal facility

TABLE 3-17 Current Waste Streams and Disposition at the UUSA Facility (Cont.)

Waste Stream or Effluent	Description	Collection/Storage/Transfer	Treatment/Handling/Packaging	Waste Class	Volume	Disposal Facility
Vacuum pump degreaser waste	Vacuum pump workshop degreaser solids and sludge	Collected, surveyed, labeled, and stored as hazardous waste	No treatment	Hazardous waste	Portion of 1,770 kg/yr (3,930 lb/yr) total hazardous waste	Licensed hazardous waste disposal facility
Solid Waste – Mixed Waste						
Trash with radioactive and hazardous waste	Solvent-soaked wipes used on radioactive components	Collected, surveyed, labeled, and stored as mixed waste	Shipped to a facility for processing to meet RCRA land disposal restrictions; or pretreated onsite in collection containers	Mixed waste	Portion of 50 kg/yr (<110 lb/yr) total mixed waste	Licensed LLRW mixed waste facility
Solvent recovery sludge	Solids and sludge from radioactive component degreasers and solvent-recovery stills	Collected, surveyed, labeled, and stored as mixed waste	Shipped to a facility for processing to meet RCRA land disposal restrictions, or pretreated onsite in collection containers	Mixed waste	Portion of 50 kg/yr (<110 lb/yr) total mixed waste	Licensed LLRW mixed waste facility
Laboratory carbon filters and laboratory waste	Such materials described above under hazardous wastes that are also radioactive	Collected, surveyed, labeled, and stored as mixed waste	Shipped to a facility for processing to meet RCRA land disposal restrictions, or pretreated onsite in collection containers	Mixed waste	Portion of 50 kg/yr (<110 lb/yr) total mixed waste	Licensed LLRW mixed waste facility
Depleted UF_6						
Depleted UF_6 (depleted UF_6) tails	Depleted UF_6 stream containing 0.1 to 05 percent by weight U-235	Depleted UF_6 is collected in UBCs at the Tails Take-Off System in each SBM	UBCs are transferred to the CRDB and then to the onsite outdoor UBC Storage Pad to be stored for a period not exceeding the life of the plant	UUSA does not consider depleted UF_6 to be a waste, but rather a byproduct with residual value for reprocessing	627 UBCs, or 7,800 MT (8,600 tons), per year	UBCs to be ultimately sent offsite for conversion of depleted UF_6 to uranium oxide with subsequent disposal at a licensed LLRW facility

Sources: LES (2014), UUSA (2013a).

The GEVSs treat effluents from two main sources: (1) the pumped extract from permanently connected vacuum pump and trap sets in the SBMs, as well as from temporary ventilation connections used during maintenance and sampling operations; and (2) exhausts from several operations in the CRDB, including the ventilation room, decontamination workshop, contaminated material handling room, Fomblin oil recovery system, decontamination system, chemical laboratory, and vacuum pump rebuild workshop. Treatment trains within the GEVSs remove uranium compounds and HF using a combination of fiberglass or cellulose pre-filters, activated carbon (impregnated with potassium carbonate/potassium hydroxide), and HEPA filters. The CTPMF EFS in the CAB employs a similar filter system. Spent pre-filters and activated carbon from these systems are managed as LLRW. All solid radioactive wastes generated at the facility are Class A LLRW as defined in 10 CFR Part 61 (LES, 2014).

The LECTS handles all radioactive and potentially radioactive process-related aqueous waste streams produced at the facility. All such aqueous wastes are collected and stored in bulk storage tanks located in the CRDB. Effluents containing recoverable levels of uranium are first treated to precipitate uranium, which is removed by filtration and containerized for disposal as LLRW. As shown in Table 3-17, aqueous wastes handled by the LECTS include laboratory wastes, degreaser water, citric acid, floor washings, miscellaneous condensates, and hand-washing and shower water produced in radiation areas. The contents of the bulk storage tanks are periodically removed and treated by solidification prior to disposal as LLRW. In compliance with U.S. Department of Transportation (DOT) regulations, tank batches with U-235 content equal to or less than 15 g (0.53 ounce [oz]) are shipped offsite for solidification and disposal; batches with greater than 15 g (0.53 oz) U-235 are solidified onsite with grout by the disposal vendor prior to disposal offsite (UUSA, 2013a).

Sanitary wastewater produced at the facility is transported by pipeline to the City of Eunice Wastewater Treatment Plant a few miles to the west of the facility. An estimated 20,000 L/day (d) (5,300 gal/d), or 7.2 million L/yr (1.9 million gal/yr), of sanitary wastewater is produced from a workforce of approximately 210 (LES, 2014). The facility produces no other direct liquid effluent discharges outside the site boundary.

Additional waste streams fall into categories that reflect how the wastes must be handled and disposed: industrial wastes, radioactive wastes, hazardous wastes, and mixed hazardous and radioactive wastes. Table 3-17 describes the major waste types in these categories, discusses the handling and treatment of each waste type prior to disposal, and lists the type of facility where each waste type is or will be disposed offsite.

Industrial wastes are, by definition, wastes that may be disposed in a sanitary landfill, because they do not contain radioactive or hazardous chemical constituents. These wastes are the second-largest waste stream at the facility after solidified aqueous wastes, and include paper and packing material, building ventilation air filters, and absorbent materials. Wet industrial wastes are handled separately from dry wastes.

Radioactive wastes include the GEVS pre-filters and activated carbon described above, the EFS filters from the CTPMF in the CAB, activated alumina from exhaust traps used in the Ventilated Room in the CRDB, radioactive trash, sludge produced in the treatment and recovery of Fomblin oil, and filter solids from the precipitation of uranium from aqueous wastes in the LECTS. Radioactive trash may be treated offsite at a Control Volume Reduction Facility (CVRF) to reduce volume prior to disposal. Sodium fluoride used in the contingency dump system is not expected to saturate over the life of the facility and will be disposed at facility closing. Scrap metal that cannot be decontaminated is disposed as LLRW as it is produced, or during facility decommissioning for major systems (LES, 2014). An estimated 312,528 kg/yr (689,006 lb/yr) of solidified wastewater from the LECTS and 45,955 kg/yr (101,313 lb/yr) of other solid and liquid radioactive wastes are generated at the present facility (UUSA, 2013a).

Hazardous wastes as defined by the Resource Conservation and Recovery Act (RCRA) must be disposed in a licensed hazardous waste facility. Liquid hazardous wastes must be treated to meet land disposal restrictions prior to disposal. The main hazardous wastes produced at the facility are trash contaminated with hazardous chemical constituents, various laboratory wastes, and degreaser wastes produced in the vacuum pump workshop. UUSA estimated that 1,770 kg/yr (3,902 lb/yr) of hazardous wastes would be generated by its enrichment facility as originally designed (LES, 2014).

Mixed wastes that are classified as both radioactive and hazardous wastes include primarily mixed-waste trash and solvent recovery sludge produced from degreasers treating radioactive components and in solvent recovery stills. Certain laboratory air filters and other wastes may also be classified as mixed waste. These wastes are sent to a disposal facility qualified to accept and treat mixed wastes as necessary, including treatment to meet land disposal restrictions for hazardous wastes. Mixed wastes represent a relatively small volume of waste generated at the facility, an estimated 50 kg/yr (110 lb/yr) (LES, 2014).

In the uranium enrichment process, feed UF_6 is split into two product streams, enriched product and depleted UF_6 byproduct, or tails. The sum of product and tails produced thus equals the amount of UF_6 feed processed. Byproduct depleted UF_6 is collected at the Tails Take-Off System in each of the SBMs, where it is de-sublimed (condensed to a solid from the vapor phase) into UBCs, which are Type 48Y cylinders, similar to feed cylinders. UBCs are transferred to the CRDB, where they are inspected and prepared for storage. From there, UBCs are transferred via a mobile transporter to the outdoor UBC Storage Pad, where they are placed in cradles for storage. The storage pad currently has design capacity to store 15,727 UBCs. UUSA estimated that approximately 627 UBCs/yr containing 7,800 MT (8,600 tons) of depleted UF_6 would be produced by its enrichment facility as originally designed (LES, 2014).

Because depleted UF_6 contains residual U-235, it is not considered by UUSA to be waste, but a process byproduct with continued value for reprocessing (UUSA, 2013a). However, UUSA is committed to only temporary storage of UBCs onsite, with no long-term storage beyond the life of the facility (LES, 2014). The fate of depleted UF_6 shipped offsite could include conversion to uranium oxide or uranium metal, depending on market conditions for uranium metal and the availability of a conversion facility. Uranium oxide would be disposed in a licensed repository as LLRW. Possible depleted UF_6 conversion facilities include the NRC-licensed, but as yet unbuilt, facility to be operated by International Isotopes (INIS). Known as the International Isotopes Fluorine Products (IIFP) facility, it would be located about 32 km (20 mi) west of Hobbs, New Mexico (UUSA, 2013a). More distant depleted UF_6 conversion facilities, operated by Babcock and Wilcox Conversion Services for the DOE, are located in Paducah, Kentucky, and in Portsmouth, Ohio, 1,670 km (1,037 mi) and 2,243 km (1,393 mi) from the UUSA facility, respectively (LES, 2014).

4 Environmental Impacts

This chapter assesses the potential environmental impacts associated with the proposed action and also those for the no-action alternative. The NRC has established a standard of significance for use in assessing environmental impacts (NRC, 2003a). Based on the Council on Environmental Quality's regulations, each impact in this EA is assigned one of the following significance levels:

- SMALL: The environmental effects are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource.

- MODERATE: The environmental effects are sufficient to noticeably alter but not destabilize important attributes of the resource.

- LARGE: The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

4.1 Proposed Action

For the proposed action, this EA assesses potential environmental impacts from construction activities, normal operations, credible accidents, and decommissioning, as well as cumulative impacts. The environmental impacts associated with preconstruction activities are discussed under cumulative impacts because, as discussed in Section 2.1.3.1 of this EA, preconstruction is not part of the proposed action.

The impacts associated with construction, operation, and decommissioning of the proposed UUSA facility expansion are assessed in Sections 4.1.1, 4.1.2, and 4.1.3, respectively. Mitigation measures proposed by UUSA for construction and operation of the expanded facility, in addition to those identified in Section 2.1.2.6 for the present UUSA facility, are summarized in Table 4-10. Cumulative impacts are assessed in Section 4.1.5.

4.1.1 Environmental Impacts of Construction

4.1.1.1 Land Use

The NRC staff's analysis of potential environmental impacts on land use from the proposed action considers any changes in land use that would result from the proposed action.

UUSA plans to construct new structures to support expanding the facility's capacity to 10-million-SWU/yr. Such construction would occur on previously disturbed land, and the proposed expanded facility would not exceed the boundaries of the original 220 ha (543 ac) parcel of land leased by UUSA (see Figure 4-1; UUSA, 2013a). The primary land uses in the region are farming and grazing. Approximately 84 percent of Lea County is used for farming (USDA, 2007). Grazing ceased on the 220 ha (543 ac) piece of land when UUSA began constructing the current facility in 2006.

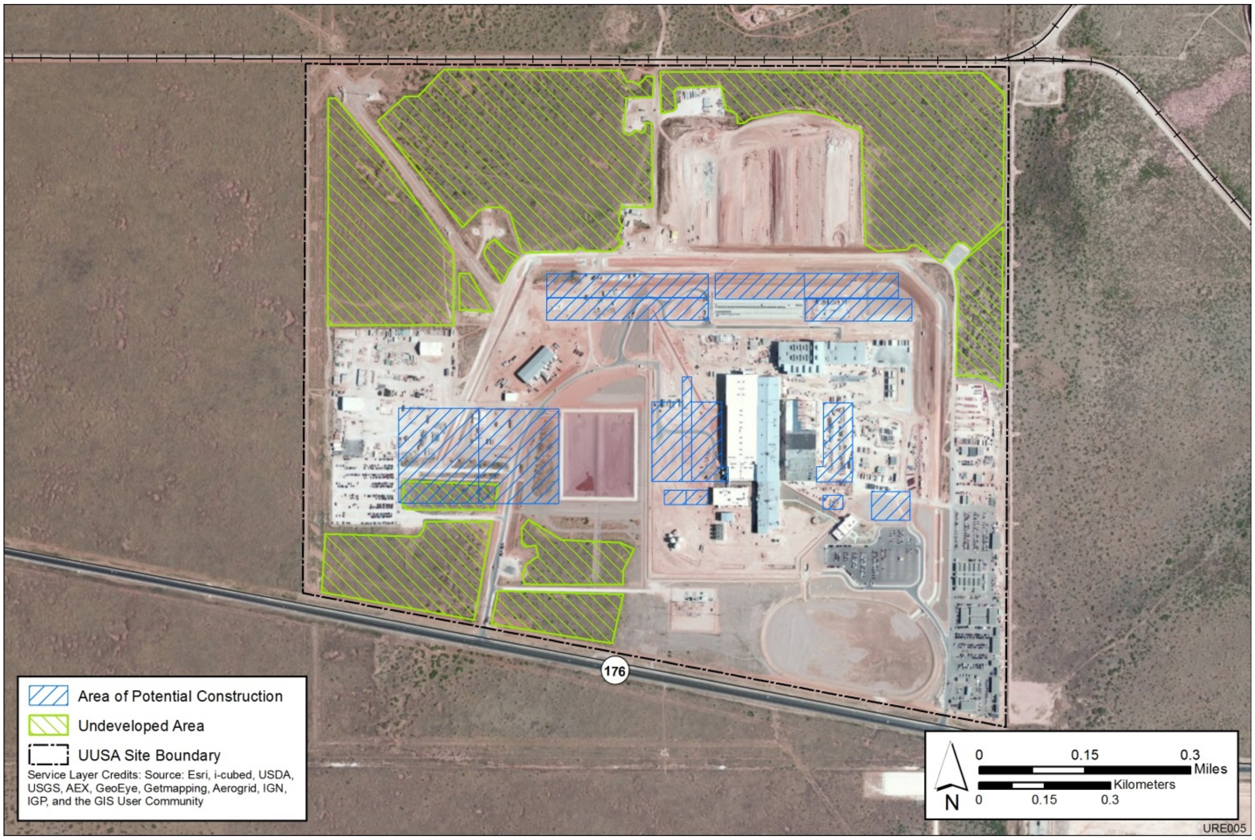

Figure 4-1 Undeveloped Areas and Areas of Potential Construction for the Proposed UUSA Facility Expansion (UUSA, 2013a)

The UUSA property is bordered on the west, north, and east by industrial developments, and to the south by rangeland. The nearest community, Eunice, New Mexico, is 8 km (5 mi) to the west. The Texas state line is 0.8 km (0.5 mi) to the east. No zoning ordinances apply to the UUSA leased land. Based on the NRC staff's review of land uses and zoning ordinances for the region, the expansion of the existing UUSA facility is not anticipated to alter any of the surrounding land uses. Therefore, impacts on land use from construction of the proposed facility expansion would be SMALL.

4.1.1.2 Historic and Cultural Resources

As discussed in Section 3.2, no NRHP-eligible cultural resources are present on the UUSA property. During the original licensing of the facility, seven archaeological sites designated as NRHP-eligible were identified on the property, but all were completely excavated as part of the mitigation developed for facility construction. The New Mexico SHPO concurred with the findings of the mitigation excavation, thus concluding the Section 106 process for the original licensing action (Ensey, 2013). No intact archaeological remains from the seven NRHP-eligible sites are present on the UUSA property. As part of the Section 106 review for the current project, the NRC contacted the New Mexico SHPO. The SHPO stated that it does not anticipate that the proposed capacity expansion will have an effect on historic properties

(Ensey, 2013). On July 24, 2014, the NRC issued its determination that no historic properties would be affected by the proposed facility expansion (NRC, 2014). On August 26, 2014, the New Mexico SHPO concurred with the NRC's determination (Ensey, 2014).

In an effort to identify other cultural resource concerns during the current review, the NRC also contacted the Apache Tribe of Oklahoma, Comanche Tribe, Kiowa Tribe, Mescalero Apache Tribe, and Ysleta del Sur Pueblo to determine whether additional resources of concern to the tribes would be affected by the proposed action (see Section 5.2). The only response came from the Ysleta del Sur Pueblo, stating that the tribe did not have concerns about the expansion of the facility (Loera, 2013).

Construction for the expanded UUSA facility would be within the existing footprint of the presently licensed facility, where no historic properties are present. In addition, no properties of importance to Native American Tribes were identified on or near the UUSA property. Therefore, based on the analysis conducted by the NRC staff and interactions with the New Mexico SHPO and Native American Tribes, the NRC staff has determined that construction activities associated with the proposed facility expansion would have no adverse effect on historic properties. The construction impact of the proposed action on historic and cultural resources would thus be SMALL.

4.1.1.3 Visual and Scenic Resources

Although fugitive dust from construction activities associated with the facility expansion has the potential to affect visibility, fugitive dust emissions would not violate air quality standards (see Section 4.1.1.4). In addition, any impacts of fugitive dust emissions would be temporary, and mitigation measures to minimize fugitive dust emissions would be implemented. Therefore, impacts from construction on visual and scenic resources due to fugitive dust emissions would be SMALL.

Construction activities and equipment used during the facility expansion, and the new buildings to be constructed, would be similar in appearance to those that were used for the construction of the presently licensed facility. The level of construction activity maintained during the expansion would be similar to that which occurred during construction of the present facility. Visual impacts from construction of the original facility were determined not to be significantly different from other excavation activities in the surrounding area (NRC, 2005a). Further, much of the UUSA site would remain undeveloped. For these reasons, the overall impacts from construction would be SMALL.

4.1.1.4 Climatology, Meteorology, and Air Quality

Construction activities for the proposed action include land clearing, building construction activities (erection of main buildings and ancillary buildings and structures), start-up and final construction activities (concurrent indoor construction with staged testing and start-up of process units as completed), and landscaping. Air quality impacts would be the highest during the road construction and land clearing phases, which would include intense soil disturbance by heavy construction equipment over a short period of time. However, most of these activities were performed during the initial phases of the construction of the currently licensed facility. In addition, as discussed in Section 2.1.3.1, site preparation work such as land clearing and excavations are considered preconstruction activities and are not part of the proposed action. Potential impacts of preconstruction activities for the proposed facility expansion are addressed in the cumulative impacts analysis in Section 4.1.5.

Air emissions from building construction, such as erection of structures and equipment installation, would typically be lower than those from road construction, land clearing, and excavation. During the construction phase, air emissions of criteria pollutants, VOCs, a small amount of HAPs (e.g., benzene), and GHGs such as CO_2 would be released. The primary sources for these pollutants are engine exhaust and fugitive dust emissions. Engine exhaust emissions would be from heavy equipment and commuter, delivery, and support vehicular traffic traveling to, within, and from the facility. Fugitive dust emissions would be from soil disturbed by heavy construction equipment (e.g., earthmoving, bulldozing) and vehicle traffic on unpaved surfaces, along with wind erosion to a lesser extent. Small quantities of additional VOCs and HAP emissions would also be released from the refueling and onsite maintenance of the heavy construction equipment, and from certain painting and other construction-finishing activities. In addition, fugitive dust could result from wind erosion of material stockpiles and disturbed areas, especially under relatively high-wind conditions. Where there is a short-distance buffer to the property boundary, potential impacts of these emissions on ambient air quality would be high because they would originate near ground level, although these impacts would be intermittent and temporary in nature.

Criteria pollutant and VOC emissions associated with construction of the proposed facility expansion were estimated for exhaust and fugitive dust using emission factors provided in AP-42, the EPA's "Compilation of Air Pollutant Emission Factors" (EPA, 1985, 1995). Total emissions, including ozone precursors, from construction activities accounted for up to 0.4 percent of Lea County total emissions in 2008 (Section 3.4.2) (UUSA, 2013a), and thus their contributions to the county-wide and regional air quality are considered small. Ozone precursor (NO_x and VOC) emission from construction activities would be relatively small, about 0.4 percent and 0.02 percent of the Lea County NO_x and VOC emissions, respectively, and would be much lower than those for the regional airshed in which emitted precursors are transported and transformed into O_3.

Further, to evaluate potential impacts of construction activities on ambient air quality, emissions were modeled to estimate both short-term and annual-average air concentrations at the facility property boundary. The Industrial Source Complex Short-Term air dispersion model, which was replaced with, but comparable to, the AMS/EPA Regulatory Model (AERMOD) currently recommended by the EPA, was used for this analysis. Detailed information on emission inventories, air dispersion modeling, and meteorological data is available in Appendix B of the ER (LES, 2014).

The estimated air concentrations at the property boundary from construction-related emissions provided in the Supplemental ER (UUSA, 2013a) were reviewed and independently verified by the NRC staff. After careful consideration of the relevant emission factors, emission inventories, and meteorological data, the NRC staff assessment concluded that all criteria air pollutant concentrations at the property boundary associated with construction activities would be below the NAAQS/SAAQS.

Peak annual GHG emissions from construction activities associated with the proposed facility expansion are expected to be comparable to those of other projects with construction activities similar to those for the proposed action. Estimated CO_2 emissions from construction activities would be about 13,000 MT/yr (14,000 tons/yr) CO_2 (NRC, 2012a), which is well below the threshold for the EPA's Mandatory GHG Reporting Rule of 25,000 MT/yr (28,000 tons/yr) of CO_2e (40 CFR Part 98). This amounts to about 0.015 percent of the total projected GHG emissions in New Mexico of 89.4 MMt (98.5 million tons) of CO_2e in 2010 (Bailie et al., 2006). This also equates to about 0.0002 percent of the total CO_2e emissions in the United States of about 6,874.7 MMt (7,578.1 million tons) in 2010 (EPA, 2014). Thus, GHG emissions from the proposed construction activities at the UUSA site are anticipated to be negligible, and potential impacts on climate change would be negligible.

Construction activities associated with the proposed facility expansion are expected to generate air emissions that would be in compliance with the NAAQS/SAAQS, and would have negligible GHG emissions. In addition, best management practices (BMPs), such as those identified under Air Quality and Transportation in EA Table 2-1 above, would be implemented by UUSA to minimize potential impacts on ambient air quality and GHG emissions. Also, construction emissions would be relatively small compared with county total emissions, as discussed above, and would thus have minimal effects on climatology and meteorology. Therefore, the potential impacts of construction activities on climatology, meteorology, and air quality as a result of the proposed facility expansion would be SMALL.

4.1.1.5 Geology, Minerals, and Soil

There are no unique geologic features or Quaternary faults within or in close proximity to the UUSA site (see Section 3.5.1). Also, there are no significant nonfuel mineral deposits within the UUSA site and no existing or former petroleum wells within the site (see Section 3.5.2). Therefore, the NRC staff concludes that the proposed action would not affect site geology and mineral resources.

Under the proposed action, construction activities such as earthmoving (leveling) and bulldozing could increase the potential for short-term erosional impacts. However, these impacts would be mitigated by the use of construction BMPs (as described in Section 3.1.2 of UUSA [2013a] and listed in Table 4-10 of this EA). These BMPs include using a sedimentation detention basin, erosion control structures (e.g., earth berms, dikes, and sediment fences), fugitive dust suppression (by watering), and stabilization of disturbed and stockpiled soil (by covering). In addition, UUSA would continue to implement its stormwater monitoring program (to retain sediments within property boundaries) and comply with the requirements of its National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Stormwater (from EPA Region 6)[11] and Storm Water Pollution Prevention Plan (SWPPP) (UUSA, 2013a). Once construction is complete, the site soils would be stabilized with natural, low-maintenance landscaping and pavement. Soil contamination as a result of accidental fluid releases from trucks and mechanical equipment (e.g., fuels, lubricating oils, hydraulic fluids, coolants, and battery acid) or use of potentially hazardous materials (e.g., paints and chemicals) would be localized, and such impacts would be minimized by adherence to the BMPs detailed in Section 5.2 of the Supplemental ER (UUSA, 2013a) and listed in Table 4-10 of this EA.

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[11] UUSA is eligible to claim the "no exposure" exclusion under the NPDES Stormwater Phase II Final Rule and submitted a "No Exposure" Certification to the EPA prior to initiating operational activities. The certificate will be reevaluated following facility expansion (UUSA, 2013a).

Therefore, the NRC staff concludes that the impact of the construction on soils would be SMALL.

4.1.1.6 Water Resources

4.1.1.6.1 Surface Water

There are no permanent or jurisdictional surface waters or drainage features within the UUSA site (see Section 3.6.1), and there are no receiving waters for site runoff derived from the facility other than the detention/retention basins that control stormwater discharges (under Groundwater Discharge Permit 1481). Therefore, the NRC staff concludes that construction activities would not affect surface water.

4.1.1.6.2 Ground Water

<u>Ground-Water Quality</u>

Under the proposed action, UUSA would continue to divert stormwater runoff to an unlined, onsite surface impoundment (the site stormwater detention basin) and send its domestic sanitary wastes to the City of Eunice Wastewater Treatment Plant. The quality of stormwater discharging to the detention basin (which ultimately seeps into the ground) is typical of drainage from building roofs and paved surfaces and may contain small amounts of oil and grease.

The presence of construction vehicles and equipment and the use of potentially hazardous materials during construction (e.g., paints and chemicals) could increase the potential for ground-water contamination as a result of accidental spills or releases of hazardous materials or fuels. These impacts, however, would be mitigated by the use of construction BMPs (as described in Section 3.1.2 of UUSA [2013a] and listed in Table 4-10 of this EA). UUSA would mitigate impacts through compliance with the requirements of its NPDES General Permit, SWPPP, and Ground Water Discharge Permit/Plan (UUSA, 2013a). Furthermore, the depth at which ground water occurs below the site (greater than 61 m [200 ft]) and factors such as low precipitation and high evaporation rates that reduce recharge rates in the area (see Section 3.6.2.1) serve to protect ground water from contamination via surface infiltration. Therefore, the NRC staff concludes that the impact of construction on ground-water quality would be SMALL.

<u>Ground-Water Use</u>

Ground water from below the site would not be used during construction; therefore, no impacts on local ground-water users would be expected. The UUSA site obtains its water supply from the City of Eunice, New Mexico (see Section 3.6.2). The current capacity of the Eunice municipal water supply is 11,125 m^3/d (2.94 million gallons per day [gpd]); its current usage is 4,680 m^3/day (1.23 million gpd) (as reported by the New Mexico Office of the State Engineer for 2010 [Longworth et al., 2013]). UUSA does not provide water use values during the construction period; however, water use during this period would not exceed its peak facility consumption rate of 4,149 m^3/d (761.2 gallons per minute [gpm]) for the 10-million-SWU/yr facility, which is well within the capacity of the Eunice municipal water system including other usage of the system (UUSA, 2013a). Therefore, the NRC staff concludes that the impact of construction on ground-water availability would be SMALL.

4.1.1.7 Ecological Resources

The land area required for the proposed facility expansion has previously been disturbed for the construction of the currently licensed facility (UUSA, 2013a) and provides little habitat for wildlife. Activities associated with proposed construction would be similar to those evaluated for the current facility in the NEF EIS (NRC, 2005a).

Sixteen special status species (endangered, threatened, candidate, experimental, or species of concern) occur in Lea County (see Section 3.7.2). Only one of these species is listed by the FWS as endangered or threatened: the lesser prairie chicken, which is listed as threatened. No state- or federal-listed species have been identified as occurring at or near the UUSA site, and the site has poor habitat potential for most of these species (NRC, 2005a), including the lesser prairie chicken. Therefore, these species would not be affected by the proposed facility expansion.

The Sprague's pipit, designated in 2010 as a candidate species under the Endangered Species Act, is a grassland bird species that avoids areas with shrub encroachment (FWS, 2010). Due to the presence of shrubs on the UUSA site, habitat there would generally be unattractive to Sprague's pipit, and this bird was not observed during surveys of the site (NRC, 2005a; EEI, 2004). Therefore, impacts on this species from the proposed facility expansion would not be expected. Although the site was initially marginally attractive to the swift fox and may have been attractive to the western burrowing owl (NRC, 2005a), the loss of habitat and reduction of prey base over most of the site (due to construction and operation of the present facility) make it unlikely that the swift fox would be directly affected by the proposed facility expansion. Burrowing owl burrows were not found on the site in previous surveys (NRC, 2005a), and would not be expected to occur in areas that would be disturbed by construction activities; therefore, this species would not be directly affected by the expansion.

Construction of the presently licensed facility began in 2006. The proposed facility expansion would require 8 additional years of construction beyond the 8 years that was required for the construction of the present facility. Indirect impacts on adjacent habitats and wildlife from construction would be primarily associated with noise and fugitive dust. Fugitive dust emissions associated with construction activities would not violate air quality standards (see Section 4.1.1.4), and mitigation measures to minimize fugitive dust emissions would continue to be implemented (see Section 2.1.2.6). The impacts from noise associated with construction would be expected to be small, and mitigation measures to minimize noise would continue to be implemented (see Section 2.1.2.6). Therefore, impacts on vegetation and wildlife from construction of the proposed facility expansion would be SMALL.

4.1.1.8 Socioeconomics

Socioeconomic impacts were considered in the ROI that consists of Lea County, New Mexico, and Andrews County, Texas. These two counties are where the majority of construction and operations employees currently reside. NRC staff considered each of the following socioeconomic factors for determining socioeconomic impacts: population and employment growth, and impacts on housing, education, health, and social services.

UUSA anticipates employment levels to be fairly stable at 800 construction employees during the first 5 years of construction of the proposed facility expansion, before falling to 700 in the sixth and seventh years, 500 in the eighth year, and 300 in the ninth year (see Table 4.10-1 in UUSA [2013a]). During the early stages of the construction phase, the workforce is expected to consist primarily of structural craft labor, with mechanical and electrical craft labor employed in the later stages. More than 60 percent of the construction workers are expected to have annual salaries exceeding $50,000 during the first 5 years of construction. Assuming that construction employees would be distributed across the ROI in proportion to county population size, an estimated 622 jobs would be located in Lea County and 178 in Andrews County. UUSA construction employment would make up about 2.1 percent of the ROI labor force in the first 5 years of construction, falling to 1.3 percent by the eighth year and to less than 1 percent by the ninth year. Additional, indirect economic activity, amounting to $53 million annually on average, and producing $38 million on average annually in earnings, would occur as a result of the spending of wages and salaries and expenditures associated with procurement of equipment, supplies, and services in the ROI economy (UUSA, 2013a).

UUSA would be expected to pay applicable gross receipts, corporate income, franchise, state and federal income, and property taxes in addition to unemployment insurance to the appropriate local, county, state, and federal taxing authorities. Given that UUSA anticipates only modest changes in employment during construction, that UUSA construction employment represents a relatively small percentage of the total labor force in the ROI, and that all UUSA construction employees are likely to come from communities within the ROI (this would be essentially the same, already-present labor force that was used for the construction of the presently licensed facility, meaning no in-migrating population), the NRC staff expects impacts on available housing and on education, health, and social services to be small. Therefore, the NRC staff concludes that the socioeconomic impact of the proposed construction activities for the proposed facility expansion would be SMALL.

4.1.1.9 Environmental Justice

As described in Section 3.9, for the purposes of this review, the NRC staff used low-income and minority data for a 6.4-km (4-mi) area around the UUSA site. As described elsewhere in Section 4.1.1, the impacts of the UUSA facility in a 6.4-km (4-mi) area are expected to be SMALL for all of the resource areas evaluated during construction. In addition, because there are no minority or low-income populations in the 6.4-km (4-mi) area as defined by U.S. Census data and NRC guidelines (see Section 3.9), the impacts in each of these resource areas would not affect minority or low-income populations; therefore, no detailed EJ review is warranted.

Even where environmental impacts are generally SMALL, the behaviors of some subpopulations may lead to disproportionate exposure through inhalation or ingestion (e.g., higher participation in outdoor recreation, home gardening, subsistence fishing). Because no measurable releases of total uranium and UF_6 from construction activities are expected (see Section 4.1.1.12, Public and Occupational Health Impacts), no impacts on subsistence behavior would occur.

Overall, therefore, construction of the proposed UUSA facility expansion is not expected to result in disproportionately high or adverse impacts on minority or low-income populations.

4.1.1.10 Noise

The proposed facility expansion at the UUSA site would require the continued use of a variety of construction equipment. Equipment would include backhoes, front-end loaders, bulldozers, and dump trucks; materials-handling equipment, such as cement mixers and cranes; and compressors, generators, and pumps. Other noise sources include commuter, delivery, and support vehicular traffic traveling, to, within, and from the construction site.

In general, the dominant noise source for most construction equipment is an insufficiently muffled diesel engine. However, noise from activities such as pile driving or pavement breaking would dominate in cases where these activities were involved. Average noise levels for typical construction equipment range from 74 dBA for a roller to 101 dBA for a pile driver (impact) at a distance of 15 m (50 ft) from a source (Hanson et al., 2006). Accordingly, except for pile drivers and rock drills, most construction equipment has noise levels of 74 to 90 dBA at a distance of 15 m (50 ft) from the source.

Because the UUSA site is relatively flat and no heavy earthmoving activities are needed, a maximum composite noise level of 95 dBA from construction activities is estimated at a distance of 15 m (50 ft). This level corresponds to about five heavy-duty trucks (about 88 dBA) operating simultaneously at a distance of 15 m (50 ft). To estimate noise levels at receptors, only geometric spreading and ground effects are considered (Hanson et al., 2006), and a 10-hour daytime work schedule is assumed. Predicted noise levels would attenuate to the guideline levels of 65 and 55 dBA L_{dn} at distances of 152 m (500 ft) and 372 m (1,220 ft) from the construction site, respectively. These guideline levels are recommended by HUD (24 CFR 51.101(a)(8)) and EPA for residential areas (EPA, 1974), respectively. The nearest residence is located about 4.3 km (2.6 mi) west of the center of the UUSA site. If other sound attenuation considerations such as air absorption and screening effects such as topography and natural or man-made barriers are considered, noise attenuation to these guideline levels would occur at shorter distances than the aforementioned distances. Most construction activities would occur during the day, when noise is better tolerated than at night because of the masking effects of relatively high background noise. Thus, most construction activities would have minor short-term impacts on the nearest residences.

On occasion, during the peak construction period (e.g., concrete pouring), construction activities would occur continuously for 24 hours per day, but over a short time period. Afterwards, the estimated distances to arrive at the HUD and EPA guideline levels would be extended to 375 m (1,230 ft) and 914 m (3,000 ft), respectively. Again, the nearest residences are located far beyond these distances. However, on a calm, clear night, air temperature would likely increase with height (temperature inversion) because of strong radiative cooling of the Earth's surface. Under such a temperature profile, sound waves tend to bend downward toward the ground. Thus, there would be little, if any, shadow zone[12] within 1.6 or 3.2 km (1 or 2 mi) of the noise source in the presence of a strong temperature inversion (Beranek, 1988). In particular, such conditions add to the effect of noise being more discernible during nighttime hours, when the

[12] A shadow zone is defined as the region into which the direct sound wave cannot penetrate.

background levels are the lowest. Even if noise from the UUSA construction site can propagate to the nearest residences, it would be considerably lowered and mostly masked by sporadic traffic noise from NM 18 and 176, which have higher-than-average distributions of heavy commercial vehicles (see Table 3-9), and thus higher noise levels than highways with similar traffic volumes.

Associated with the proposed facility expansion, potential noise impacts on the nearest residences would be minimal due to the considerable distance between the residences and the UUSA site. Construction activities for the proposed action are anticipated to be similar to those that have occurred from 2006 to date, and construction noise would be typical of the light industrial character of the surrounding area. Therefore, the potential noise impacts of construction activities would be SMALL, and no mitigation measures would be warranted.

4.1.1.11 Transportation

This section discusses the potential transportation impacts associated with construction of the proposed facility expansion. The transportation impacts considered include the following:

- the commute to and from the site for construction workers,
- shipments of construction materials to the site, and
- shipments of construction debris from the site.

During construction of the expanded facility, approximately 800 construction workers will commute to the site for work each day, a continuation of the current situation that involves construction of the originally licensed facility (UUSA, 2013a). In addition, approximately 3,400 annual shipments of construction-related deliveries and waste shipments are expected during the expanded facility construction, the same as the number during construction of the present facility (UUSA, 2013a). Because the annual traffic impacts for the construction of the expanded facility are expected to remain the same as they have been for the construction of the presently licensed facility (i.e., no expected traffic impacts due to facility expansion), transportation impacts from construction of the expanded UUSA facility would be SMALL.

4.1.1.12 Public and Occupational Health Impacts

This section analyzes the potential impacts on the public and on occupational health from the construction of the proposed UUSA facility expansion. The analysis is divided into two main sections: non-radiological impacts and radiological impacts.

4.1.1.12.1 Non-Radiological Impacts

Occupational injuries and exposures during construction would be typical of industrial facility construction projects and would include physical hazards associated with vehicle and heavy equipment operation, material handling hazards, electrical hazards, heat stroke, and trips and falls. Exposure hazards would include inhalation of fugitive dusts, vehicle emissions, and industrial solvent vapors. Implementation of a construction health and safety plan, including required safety reviews of all hazardous activities; adherence to applicable OSHA regulations; and use of personal protective equipment would limit such injuries and exposures to acceptable rates. Given these protective measures, the fact that the nature of the construction work is fairly routine, and the construction work is essentially at the same level as (and a continuation of) the construction work on the presently licensed facility (NRC, 2005a), occupational impacts would be SMALL. Impacts of construction on the offsite public would consist of temporary, minor fugitive dust impacts (see Section 4.1.1.4) and, therefore, would also be SMALL.

4.1.1.12.2 Radiological Impacts

For members of the public, this EA considered the affected population within an 80-km (50-mi) radius of the UUSA facility, with the primary exposure pathway associated with particulate emissions. Operations and construction workers at the proposed UUSA facility expansion could similarly be exposed to airborne releases of particulates.

Construction activities would not generate any radiological contamination, but these activities could disturb areas contaminated from existing operations at the UUSA site. However, no onsite soil contamination from existing UUSA operations has been detected (UUSA, 2012e). Therefore, there are no expected radiation doses to the construction workers or to operations workers at the presently licensed facility from inhalation of contaminated dust resuspended by construction activities. The dose to construction workers due to operations is discussed in Section 4.1.2.12. Likewise, the offsite public would not be exposed to airborne radiological releases resulting from construction. Therefore, the radiological impact on construction and operations workers and the offsite public from construction would be SMALL.

4.1.1.13 Waste Management

Construction waste volumes for the expanded facility would continue to be generated at about the same rate as were generated by construction of the presently licensed facility, including SBM-1001 and SBM-1003, for which the waste management impacts were estimated to be small (NRC, 2005a, Section 4.2.14.1). However, for the facility expansion, the duration of this waste generation will be extended approximately 8 years (UUSA, 2013a). Disposal facilities are expected to have adequate capacity for the duration of the extended construction. Thus, waste management impacts from construction would be SMALL.

4.1.2 Environmental Impacts of Operation

4.1.2.1 Land Use

The NRC staff’s analysis of potential environmental impacts on land use from operation of the proposed expanded UUSA facility considers any changes to land use that would result from the proposed action. Operation of the expanded facility at the site of the present UUSA facility and within the same footprint would be consistent with the current use of the land. It would not be in violation of any applicable zoning ordinances. Therefore, operational impacts on land use would be SMALL.

4.1.2.2 Historic and Cultural Resources

Operation of the expanded UUSA facility would not result in any ground-disturbing activities outside the currently leased land. No historic properties remain on the UUSA leased property (see Section 3.2). As a result, it is not anticipated that operation of the expanded facility would affect any historic properties. Based on the review conducted by the NRC staff of historic and cultural resources information for the project area and the responses from the Ysleta del Sur Pueblo and the New Mexico SHPO (see Section 4.1.1.2), the NRC staff has determined that operation of the expanded facility would have no effect on historic properties. Therefore, the impact of such operations on historic and cultural resources would be SMALL.

4.1.2.3 Visual and Scenic Resources

The proposed new buildings, UBC Storage Pads, and retention ponds would be similar in appearance to those now on the site. Buildings added as part of the expansion would be no greater in height than those evaluated for the currently licensed facility and would be generally collocated with them (UUSA, 2013a). The visual appearance of the UUSA facilities from nearby roads and properties would be roughly similar to that of the currently licensed facility, and would continue to be similar in character to other industrial facilities in the area. No new cooling towers would be added to the facility, and there would thus be no impacts from fog or mist clouds beyond those previously evaluated (see Section 4.2.3 in NRC [2005a]). Lighting for aviation safety would not be required on any of the new buildings, and security lighting would be down-shielded to keep light within the boundaries of the site. Visual impacts from lights would not be substantially different than those already present, and impacts from operations would therefore be SMALL.

4.1.2.4 Climatology, Meteorology, and Air Quality

During operation of the proposed expanded facility, primary emission sources would include process building stacks, stationary sources (diesel generators and associated diesel fuel storage), and mobile source (i.e., vehicular) emissions.

Process building stacks would release gaseous effluents that would be both radioactive (UF_6) and non-radioactive (HF). The principal function of the GEVSs is to protect both the operators during the connection/disconnection of UF_6 process equipment and the environment, by collecting and cleaning all potentially hazardous gases from the facility prior to release to the atmosphere. Releases to the atmosphere would be in compliance with regulatory limits. Although not required in this case, a dispersion modeling analysis was performed to evaluate the ambient impacts of uranium and HF in comparison to one one-hundredth of the respective OEL (i.e., OEL/100) listed in section 20.2.72.502 of New Mexico’s air permitting requirements (UUSA, 2013a). Modeled maximum 8-hour uranium compounds and HF concentrations were lower than the corresponding OEL/100 by several orders of magnitude. Potential health effects from process stack emissions are discussed in Section 4.1.2.12.

The addition of three diesel generators and associated diesel fuel storage tanks for the proposed facility expansion would increase emissions over those from the existing stationary sources at the present facility (i.e., 6 diesel generators for use as standby power sources, 12 cooling towers, and 5 diesel fuel tanks). Since the thermal load associated with the proposed facility expansion would be reduced via closed-loop chiller units, no additional cooling towers are required. The three diesel generators and associated diesel fuel storage tanks would emit criteria pollutants, VOCs, small amounts of HAPs, and GHGs. However, additional emissions from the three diesel generators are expected to be minor because they would not operate unless there is need for emergency power to the new buildings. The diesel generators would be subject to routine maintenance testing, and they are exempt from air permitting requirements of the State of New Mexico specified in 20.2.72.202B (3) NMAC (UUSA, 2013a). Diesel storage tanks produce evaporative emissions during storage and loading/unloading operations, but these emissions would be minimal due to the low vapor pressure of diesel fuel.

Offsite mobile sources consist of passenger vehicles with UUSA workers commuting to the site, feed and enriched product UF_6 cylinder shipment trucks and other delivery trucks, and waste removal trucks. These vehicles would also move within the UUSA site. Also within the site, mobile sources would include vehicular traffic such as commuter and material delivery vehicles, as well as vehicles hauling material to and from the cylinder yards and process buildings.

Fugitive dust emissions from vehicular traffic during operations would be minimal because most working areas and roadways within the site would be paved; and offsite, vehicles would generally move on paved roadways.

GHGs would be generated as a result of combustion of fossil fuel in the diesel generators, but use of the generators during routine maintenance testing and to produce emergency power would be minimal, so GHG emissions associated with these facility operations would be relatively small as well. Based on the small amount of GHG emissions compared to the total New Mexico and United States GHG emissions, atmospheric impacts of GHG emissions from expanded facility operations would not be noticeable and mitigation would not be warranted.

As discussed above, those facility operations associated with the facility capacity expansion would have relatively low potential impacts on ambient air quality. Modeled concentrations of uranium and HF stack emissions are well below the OEL/100. Given the small magnitudes of other pollutant and GHG emissions from operations associated with the facility expansion (i.e., diesel fuel storage tanks and infrequent operation of diesel generators), these other operation emissions would be relatively minor, and thus would have a minimal impact on climatology, meteorology, and air quality. Furthermore, all existing UUSA emission control measures would be in place. Therefore, the potential impacts of proposed expanded facility operation on climatology, meteorology, and air quality would be SMALL.

4.1.2.5 Geology, Minerals, and Soil

Operations under the proposed action would cause no land use changes that could cause adverse impacts on geology, minerals, or soil. Soil contamination as a result of accidental fluid releases related to use of trucks and mechanical equipment (e.g., fuels, lubricating oils, hydraulic fluids, coolants, and battery acid) and use of potentially hazardous materials during operations (e.g., cleaning fluids and chemicals) would be localized. Such impacts would also be minimized by adherence to the BMPs detailed in Section 5.2 of UUSA (2013a) and listed in Table 4-10 of this EA. Therefore, the NRC staff concludes that the impact of operations on soils would be SMALL, and there would be no effects on geology and mineral resources.

4.1.2.6 Water Resources

4.1.2.6.1 Surface Water

There are no permanent or jurisdictional surface waters or drainage features within the UUSA site (see Section 3.6.1), and there are no receiving waters for site runoff derived from the facility, other than the detention/retention basins that control stormwater discharges (under Groundwater Discharge Permit 1481). Therefore, the NRC staff concludes that expanded operations would not affect surface water.

4.1.2.6.2 Ground Water

<u>Ground-Water Quality</u>

UUSA would continue to divert stormwater runoff from site roads, parking areas, and building roofs to an onsite, unlined surface impoundment (the site stormwater detention basin). Stormwater from the UBC Storage Pads would be diverted to a lined retention basin (the UBC Storage Pad Stormwater Retention Basin), where it would be evaporated and dry solids would be collected. Although radioactivity could be released into runoff from these pads, the levels are expected to be very low (see Section 3.12.2). UUSA would continue to implement its stormwater monitoring program (to prevent the contamination of stormwater) and comply with the requirements of its NPDES General Permit. It would also follow the requirements of its ground-water discharge permit/plan, as required by New Mexico Water Quality Control Commission regulations (for the direct or indirect discharge of effluents and/or leachate to ground water). The use of potentially hazardous materials during operations (e.g., cleaning fluids and chemicals) could increase the potential for ground-water contamination as a result of accidental spills or releases of hazardous materials or fuels. These potential impacts, however, would be mitigated by the use of BMPs (as described in Section 3.1.2 of UUSA [2013a] and listed in Table 4-10 of this EA). Furthermore, the depth at which ground water occurs below the site (greater than 61 m [200 ft]) and the configuration of the retention basin (lined and designed to prevent overflow) protect ground water from contamination via surface infiltration. Other factors, such as low precipitation and high evaporation rates that reduce recharge rates in the area (see Section 3.6.2.1), also serve to protect ground water from contamination via surface infiltration. Sanitary wastewater would be sent to the City of Eunice Wastewater Treatment Plant. Therefore, the NRC staff concludes that the impact of expanded operations on ground-water quality would be SMALL.

<u>Ground-Water Use</u>

Ground water from below the site would not be used during the facility’s expanded operation; therefore, no impacts on local ground-water users would be expected. The UUSA site obtains its water supply from the City of Eunice, New Mexico. Water availability is not likely to be affected by the expansion because water use associated with the expansion is a small fraction of the projected normal consumption rates at the UUSA site (168 m^3/d [44,500 gpd]) (UUSA, 2013a), which is well within the capacity of the Eunice municipal water system, estimated at 11,125 m^3/d (2.94 million gpd) (Longworth et al., 2013). The facility’s peak consumption rate of 4,149 m^3/d (761.2 gpm) (UUSA, 2013a) is also well within this capacity. Therefore, the NRC staff concludes that the impact of expanded operations on ground-water availability would be SMALL.

4.1.2.7 Ecological Resources

Facility operations associated with the capacity expansion would be similar to ongoing operational activities. The types of impacts on wildlife that would be associated with the expansion operations are expected to be similar to those evaluated for the currently licensed facility (see Section 4.2.7.2 in NRC [2005a]), and mitigation measures to minimize impacts would be implemented (see Sections 2.1.2.6 and 4.1.4 of this EA). Vehicle traffic on the UUSA site associated with the expanded facility would increase over that expected for the currently licensed facility, and vehicle collisions with wildlife on the site would also potentially increase. The presence of additional structures constructed for the facility expansion, in addition to those for the currently licensed facility, would potentially result in an increase in avian collisions, although the additional buildings would be similar in height to the height of those of the currently licensed facility. Mitigation measures, such as the absence of lights on buildings and downward-pointing lights where needed on the site, would continue to minimize wildlife attraction to the site and minimize impacts on wildlife. Impacts on migratory travel corridors would not increase beyond those for the currently licensed facility due to the existing boundary fence and structures. Therefore, impacts on habitats and wildlife populations from operation of the expanded facility would be similar to those already occurring and would remain SMALL.

The existing UBC Storage Pad would be expanded and five new storage pads would be added. Wildlife radiological exposures from stored UBCs would potentially increase over those for the currently licensed facility. Periodic surveys of the UBCs would minimize wildlife exposures on the UBC Storage Pad (NRC, 2005a). Radiological emissions would increase with the facility expansion; however, levels would be far below levels of health concern for the public (see Section 4.1.2.12.2). Because the level of protection for humans is adequate for wildlife and vegetation (see Section 4.2.7.2 in NRC [2005a]), radiological impacts on ecological resources from the expanded storage pads would be SMALL.

4.1.2.8 Socioeconomics

During operations, UUSA anticipates that employment at the facility as a whole, including the original and expanded facility, would rise slightly, from 250 to 258, with the completion of capacity to 10 million SWU/yr (UUSA, 2013a). Average salaries at the facility would be approximately three times the individual per capita income in the two-county ROI and roughly 50 percent higher than the median household income for the two counties. Assuming that operations employees would be distributed across the ROI in proportion to county population size, about 201 jobs would be located in Lea County and about 57 would be located in Andrews County. UUSA operations employment would make up about 0.7 percent of the labor force. Additional, indirect economic effects would occur as a result of the spending of wages and salaries and expenditures associated with procurement of equipment, supplies, and services in the ROI economy.

UUSA would be expected to pay applicable gross receipts, corporate income, franchise, state and federal income, and property taxes in addition to unemployment insurance to the appropriate local, county, state, and federal taxing authorities. Given that UUSA anticipates only minor changes in employment during operations, that UUSA operations employment represents a relatively small percentage of the total labor force in the ROI, and that all employees are likely to come from communities within the ROI (meaning no in-migrating population), the NRC staff expects no impacts on available housing, or on education, health, or social services. Therefore, the NRC staff concludes that the socioeconomic impact of the proposed expanded facility operations would be SMALL.

4.1.2.9 Environmental Justice

As described in Section 3.9, for the purposes of this review, the NRC staff used low-income and minority data for a 6.4-km (4-mi) area around the UUSA site. As described elsewhere in Section 4.1.2, the impacts of operation of the proposed UUSA facility expansion in a 6.4-km (4-mi) area would be expected to be SMALL. The EA's finding of SMALL operational impacts applies to all of the resource areas evaluated except for the waste management conversion of depleted UF_6 to a depleted uranium oxide, where the expanded operations would have potentially SMALL to MODERATE impacts. However, because there are no minority or low-income populations in the 6.4-km (4-mi) area defined by U.S. Census data and NRC guidelines (see Section 3.9), there would be no operational impacts that would disproportionately affect minority or low-income populations.

Even where potential environmental impacts are generally SMALL, the behaviors of some subpopulations may lead to disproportionate exposure through inhalation or ingestion (e.g., higher participation in outdoor recreation, home gardening, subsistence fishing). The analysis assessed the potential for indirect exposure to radiological material due to releases and subsequent uptake by fish. If radiation was released, there would be no increased risk of exposure due to their fish-consumption patterns. The releases of total uranium and UF_6 are projected to be extremely low (see Section 4.1.2.12, Public and Occupational Health; Section 4.1.2.6, Water Resources; and Section 4.1.2.13, Waste Management), and any indirect exposure, even if it were to occur through fish consumption, would be even lower.

As discussed in Section 4.1.2.12 (Public and Occupational Health), the radiological doses to the nearest residents resulting from expanded operations of the UUSA facility are projected to be well below the EPA 10-mrem/yr standard (40 CFR Part 190) and the NRC TEDE 100-mrem/yr (1-mSv/yr) limit (10 CFR Part 20).

Therefore, expanded UUSA facility operations would not be expected to result in disproportionately high or adverse impacts on minority or low-income populations.

4.1.2.10 Noise

During operations at the expanded facility, a variety of noise sources (point versus mobile and continuous versus intermittent) would exist at the UUSA site. Stationary noise sources for the expanded facility include process-related and auxiliary equipment, such as cascade halls, diesel generators, pumps, transformers, rooftop fans, HVAC systems, and cooling units, with intermittent contributions from loudspeakers of a public-address system. Mitigation of operational noise sources occurs primarily from the facility design; cooling systems, valves, transformers, pumps, generators, and other facility equipment will generally be located inside facility structures. Other noise sources from the site would include vehicular traffic such as commuter and material delivery vehicles, as well as vehicles hauling material around the facility and to and from the cylinder yards and the process buildings.

No noise measurement data associated with facility operations are available around the UUSA site, but a noise survey was performed at the property boundary of the Almelo Enrichment Plant in Almelo, The Netherlands, which is comparable in size to the UUSA facility (LES, 2014). Measured noise levels ranged from 30 to 47 dBA with an average of 39.7 dBA (neither L_{eq} nor L_{dn}, as defined in Section 3.10, is provided). This survey indicated that the majority of the noise sources were vehicle traffic from adjacent roadways rather than facility operations. Assuming that the highest level, 47 dBA, remains the same during a 24-hour period, it corresponds to a 54 dBA L_{dn}, which is lower than both the HUD guideline of 65 dBA L_{dn} (24 CFR 51.101(a)(8)) and the EPA guideline of 55 dBA L_{dn} (EPA, 1974) for residential areas. Thus, the noise contribution associated with expanded facility operations is anticipated to be minimal at the nearest residences about 4.3 km (2.6 mi) from the western UUSA property boundary. Although the facility layout and the distance to the property boundary at the Almelo Enrichment Plant are not the same as at the UUSA site, this noise survey provides the general noise levels around an enrichment facility, which is similar in size to the UUSA facility.

In general, noise levels from expanded facility operations would be much lower than noise from construction activities, and would be typical of the light industrial character of the surrounding area. Even considering that facility operations would occur continuously for 24 hours per day, they would contribute minimally to the L_{dn} levels at the nearest residences. Increasing traffic volume along NM 18 and 176 would slightly increase the noise level. Due to high background levels at the nearest residences along the highways, the noise level associated with the proposed facility expansion would be almost the same as the noise level from ongoing operations at the site. Therefore, potential noise impacts during expanded operations would be SMALL, and no mitigation measures would be warranted.

4.1.2.11 Transportation

This section discusses the potential impacts from transportation to and from the UUSA site as a result of the proposed facility expansion operations. The transportation impacts considered include the following:

- the commute to and from the site for operations workers,
- shipments of operational supplies to the site,
- shipments of UF_6 feed material to the site, and
- shipments of enriched UF_6 product, depleted UF_6, and other LLRW and non-radiological wastes from the site.

Potential transportation impacts during operations are associated with shipments of both non-radiological and radiological material. Non-radiological transport includes commuting workers and truck shipments of non-radioactive materials and supplies to the UUSA facility, as well as non-radiological waste shipments from the facility. Radioactive material shipments include UF_6 feed material being shipped to the site and shipments of enriched UF_6 product and depleted UF_6 and other LLRW from the site.

4.1.2.11.1 Non-Radiological Transportation

As discussed in Section 3.11.4.1, the current number of operational workers is approximately 250 (UUSA, 2013a), which is 40 more than that originally considered prior to facility construction

(NRC, 2005a) and about eight less than the total of 258 expected upon completion of the proposed facility expansion (UUSA, 2013a). Based on the AADT of 3,100 on NM 176, which serves the UUSA facility (Table 3-9), the additional commuter traffic due to the UUSA facility expansion is not expected to result in any traffic congestion impacts. Given a total of 258 commuting workers per day, 250 days per year, potential accident injuries and fatalities would remain less than one for each annually, given a 64-km (40-mi) roundtrip commute per worker as compared to the previous analysis for 210 operations workers (NRC, 2005a). This analysis is conservative because not all workers would be present at the UUSA facility on a given day and some workers may carpool.

Approximately 2,800 annual non-radiological shipments – supplies and waste shipments – are anticipated during operation of the expanded facility (UUSA, 2013a). This number is the same as what was anticipated for the existing facility (NRC, 2005a). The risks from the same number of shipments were previously estimated to result in less than one traffic injury per year and less than one traffic fatality per year (NRC, 2005a). In total, since there are only eight more workers expected to be commuting and the number of non-radiological shipments is not expected to change, the impacts from non-radiological transportation for the proposed expansion of operations at the UUSA facility would be SMALL.

4.1.2.11.2 Radiological Transportation

Operation of the proposed expanded UUSA facility would require the shipment of various radioactive materials to and from the facility:

- natural UF_6 (i.e., not enriched) feed to the facility,
- enriched UF_6 product from the facility to a fuel fabrication facility,
- depleted UF_6 to a conversion facility,
- return of empty feed cylinders with residual contamination, and
- LLRW for disposal.

All shipments are anticipated to occur via heavy-haul tractor-trailer combination trucks.

This assessment of potential radiological transportation impacts from expanded operations is based on the transportation assessment presented in the NRC's *Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico* (NRC, 2005a), which included an estimate of the transportation risks associated with an uranium enrichment facility with an annual production capacity of 3 million SWU (i.e., the presently licensed UUSA facility). The proposed UUSA facility expansion to 10 million SWU/yr would result in additional radioactive material shipments of the same types using the same shipment origins and destinations. Thus, the additional impacts were estimated by scaling the previously reported risks (NRC, 2005a) by the number of shipments for each type of shipment. Note that in the case of the enriched product shipments, the total shipments are anticipated to only double because the average number of Type 30B cylinders per shipment is assumed to have increased from three (NRC, 2005a) to four (UUSA, 2014e). For assessment of routine (normal) transport, risks were calculated for the collective populations of all potentially exposed individuals, as well as for an MEI receptor (defined as being located 30 m [98 ft] away from a shipment passing at a speed of 24 km/hr [15 mph] [NRC, 1977]). Potentially exposed populations include those persons living and working along the transport route, those present at vehicle stops, and those along the road near the shipment. For public exposures to "empty" feed cylinder and LLRW shipments, impacts were also scaled based on revised external dose rates at 1 m from the shipment, and were estimated to be 0.02 mSv/hr (2 mrem/hr) (NRC, 2012a) and 0.00044 mSv/hr (0.044 mrem/hr) (UUSA, 2014e), respectively. The transportation accident assessment included consideration of the probabilities and consequences of a range of possible transportation-related accidents, including low-probability accidents that have high consequences and high-probability accidents that have low consequences.

A number of the anticipated shipments associated with expanded operations may have multiple origins or destinations. UF_6 feed may be obtained from a U.S. facility (Honeywell International, Metropolis, Illinois) or from a Canadian source (Cameco, Port Hope, Ontario, Canada). UF_6 product may be shipped to and used at fuel fabrication facilities in Wilmington, North Carolina (Global Nuclear Fuels-Americas); Columbia, South Carolina (Westinghouse Electric); and Richland, Washington (AREVA NP Inc.). The depleted UF_6 tails could be sent to facilities in Paducah, Kentucky; Portsmouth, Ohio; or Hobbs, New Mexico, for conversion to an uranium oxide for disposal. Since the Hobbs facility has not started construction yet, and the Hobbs facility is closer than the Portsmouth and Paducah facilities, only the impacts for shipments to Portsmouth and Paducah are analyzed for a conservative assessment. If shipments are made to Hobbs in the future, any transportation impacts would be bounded by those for shipments to Portsmouth and Paducah. In the case of other LLRW generated at the UUSA facility, only one destination is evaluated, the EnergySolutions disposal facility in Clive, Utah. In the future, some LLRW could be sent to the WCS facility in Andrews County, Texas, if an agreement with UUSA were reached, but such shipments would be bounded by the impacts for shipments to EnergySolutions, since the WCS facility is adjacent to the UUSA facility. Annual impacts are evaluated for all potential shipment routes from the UUSA site to the above identified destinations.

For all shipments, risks were estimated for truck transport for both routine or normal (incident-free) and accident conditions. In both cases, “vehicle-related” and “cargo-related” impacts were evaluated. Vehicle-related risks result simply from moving any material from one location to another, independent of the characteristics of the cargo. For example, accidents during transportation may cause fatalities from physical trauma. Cargo-related risk, on the other hand, refers to risk attributable to the characteristics of the cargo being shipped. The radiological cargo-related risks from the transportation of UF_6 feed and product materials, depleted UF_6 tails, empty cylinders with residual heels, and LLRW would be caused by exposure to ionizing radiation. Exposures to radiation occur during both normal transportation and during accident conditions. In the case of the uranium materials considered, cargo-related risks also include chemical hazards during accident conditions.

The risks from exposure to hazardous chemicals during transportation-related accidents, which include consideration of the formation of HF from the reaction of UF_6 with moisture in the air for this assessment, can be either acute (result in immediate injury or fatality) or latent (result in cancer that would present itself after a latency period of several years). However, none of the chemicals that might be released in any of the transportation accidents involving UF_6 are carcinogenic. As a result, no excess chemically induced latent cancers would be expected from accidental chemical releases. The acute health end point – potential irreversible adverse effects – was considered for the assessment of cargo-related population impacts from transportation accidents.

<u>Routine Transportation</u>

Radiological risks during routine transportation would result from the potential exposure of people to low levels of external radiation near a loaded shipment. NRC and DOT regulations – 10 CFR 71.47 (External Radiation Standards for All Packages) and 49 CFR 173.441 (Radiation Level Limitations), respectively – were set to maintain these external radiation levels at a value considered to be protective of the public. The maximum allowable external dose rate is 0.1 mSv/hr (10 mrem/hr) at 2 m (6.6 ft) from the outer lateral sides of the transport vehicle. In this analysis, the external dose rates range from approximately 0.00044 mSv/hr (0.044 mrem/hr) to 0.02 mSv/hr (2 mrem/hr), depending on the shipment type (NRC, 2005a, 2012a; UUSA, 2014e). Therefore, the external dose rates from the UUSA facility shipments are expected to be approximately 20 percent of the regulatory maximum, or less.

The potential annual radiological risks from operational shipments to the transportation crew (truck drivers) and the collective population along the transportation routes are provided in Table 4-1. The estimated number of shipments for each shipment type is considered to be a peak annual number during facility operations at 10 million SWU/yr. Where multiple origins or destinations are possible for a given shipment type, the total number of annual shipments is assumed in each case. For example, the analysis evaluated all feed cylinder shipments coming from Metropolis or Port Hope. The actual impacts would vary between the two cases, or be less if fewer shipments occurred, depending on the actual distribution of shipments from the two sources of feed cylinders. The maximum impacts would occur if the number of peak annual shipments occurred in the same year (3,213 shipments total) for all shipment types for the origin or destination that incurs the highest impact for that shipment type (all feed cylinders from Port Hope, product cylinders to Wilmington, depleted UF_6 cylinders to Portsmouth, empty cylinders to Port Hope, and LLRW to Clive). This situation may be considered an upper bound on the potential impacts and, as shown in Table 4-1, no latent cancer fatalities (LCFs) would be expected for either crew members (4×10^{-3} LCF) or the general public (0.01 LCF) along the route. In addition, the exposure would be spread out among all transportation crew members and people along the transportation routes. Thus, radiological transportation impacts to the transportation crews and collective population during expanded operations would be SMALL for the entire 10 million SWU facility. As the incremental routine transportation impacts due to facility expansion (see Table 4-2, with impacts from the 3-million-SWU/yr facility subtracted from those of the 10-million-SWU/yr facility) would be part of the total expanded facility impacts, the incremental routine transportation impacts would be SMALL.

As shown in EA Table 4-3, for an MEI member of the public, the greatest radiological risk from transportation-related activities would be from shipments of 48Y cylinders containing heels. The remaining heels in such cylinders contain a concentration of residual daughter radionuclides that pose a greater external radiation hazard than that present in full UF_6 cylinders. In this case, a risk of 5×10^{-11} (a chance of less than 1 in 20 billion) of contracting a fatal cancer is estimated. This risk is 0.00003 percent of the value for an annual exposure to natural background radiation, and accordingly the risk would be SMALL. However, the value for potential exposure to multiple shipments would be correspondingly higher. For example, if the same MEI were present for four shipments of 48Y cylinders with heels, that individual would have an LCF risk of approximately 2×10^{-10}. Such a risk would still be SMALL.

Table 4-1 Estimated Peak Annual Collective Population Transportation Impacts for the Proposed Expanded UUSA Facility (10 million SWU/yr)

		Cargo-Related[a] Radiological Impacts (LCFs)[b]						Vehicle-Related Impacts[b,c]
			Routine Public					
Shipment	Number of Shipments[d]	Routine Crew	Off-Link	On-Link	Stops	Total	Accident[e]	Physical Accident Fatalities
UF_6 feed coming from:								
Metropolis, IL	1,259	7×10^{-4}	2×10^{-4}	9×10^{-4}	9×10^{-4}	2×10^{-3}	0.1	0.2
Port Hope, Ontario	1,259	2×10^{-3}	4×10^{-4}	2×10^{-3}	2×10^{-3}	4×10^{-3}	0.4	0.4
UF_6 product going to:								
Columbia, SC	235	6×10^{-5}	2×10^{-5}	1×10^{-4}	1×10^{-4}	3×10^{-4}	0.2	0.04
Wilmington, NC	235	8×10^{-5}	2×10^{-5}	1×10^{-4}	1×10^{-4}	3×10^{-4}	0.2	0.06
Richland, WA	235	8×10^{-5}	2×10^{-5}	1×10^{-4}	2×10^{-4}	3×10^{-4}	0.1	0.08
Depleted UF_6 tails going to:								
Paducah, KY	1,390	9×10^{-4}	2×10^{-4}	9×10^{-4}	1×10^{-3}	2×10^{-3}	0.09	0.2
Portsmouth, KY	1,390	1×10^{-3}	2×10^{-4}	2×10^{-3}	2×10^{-3}	3×10^{-3}	0.1	0.2
Empty 48Y cylinder return to:								
Metropolis, IL	225	7×10^{-4}	1×10^{-4}	9×10^{-4}	1×10^{-3}	2×10^{-3}	0.02	0.04
Port Hope, Ontario	225	1×10^{-3}	5×10^{-4}	3×10^{-3}	3×10^{-3}	6×10^{-3}	0.06	0.06
LLRW going to:								
Clive, UT	104	4×10^{-5}	3×10^{-6}	1×10^{-5}	3×10^{-5}	4×10^{-5}	5×10^{-4}	0.03
Maximum Total[f]	3,213	4×10^{-3}	1×10^{-3}	6×10^{-3}	6×10^{-3}	0.01	0.7	0.7

[a] Cargo-related impacts are impacts attributable to the radioactive nature of the material being transported.

[b] All values have been rounded to one significant figure. Some totals may not equal sum of individual components because of independent rounding.

[c] Vehicle-related impacts are impacts independent of the cargo in the shipment.

[d] The total peak annual number of shipments is used with each option for a given shipment type. (Sources: UUSA, 2013f; LPES, 2014)

[e] Dose risk is a societal risk and is the product of accident probability and accident consequence.

[f] Assumes all feed cylinders from Port Hope, product cylinders to Wilmington, depleted UF_6 cylinders to Portsmouth, empty cylinders to Port Hope, and LLRW to Clive.

Source: Results scaled from impacts presented in NRC (2005a).

Table 4-2 Estimated Additional Peak Annual Collective Population Transportation Impacts Attributed to the Proposed UUSA Facility Expansion

Shipment	Additional Number of Shipments[d]	Cargo-Related[a] Radiological Impacts (LCFs)[b]						Vehicle-Related Impacts[b,c]
		Routine Crew	Routine Public				Accident[e]	Physical Accident Fatalities
			Off-Link	On-Link	Stops	Total		
UF_6 feed coming from								
Metropolis, IL	569	3×10^{-4}	7×10^{-5}	4×10^{-4}	4×10^{-4}	9×10^{-4}	7×10^{-2}	0.08
Port Hope, Ontario	569	7×10^{-4}	2×10^{-4}	8×10^{-4}	8×10^{-4}	2×10^{-3}	2×10^{-1}	0.2
UF_6 product going to								
Columbia, SC	118	3×10^{-5}	1×10^{-5}	6×10^{-5}	6×10^{-5}	1×10^{-4}	8×10^{-2}	0.02
Wilmington, NC	118	4×10^{-5}	1×10^{-5}	6×10^{-5}	7×10^{-5}	1×10^{-4}	8×10^{-2}	0.03
Richland, WA	118	4×10^{-5}	9×10^{-6}	6×10^{-5}	9×10^{-5}	2×10^{-4}	7×10^{-2}	0.04
Depleted UF_6 tails going to								
Paducah, KY	763	5×10^{-4}	1×10^{-4}	5×10^{-4}	7×10^{-4}	1×10^{-3}	5×10^{-2}	0.1
Portsmouth, OH	763	7×10^{-4}	1×10^{-4}	9 × 10-4	9×10^{-4}	2×10^{-3}	7×10^{-2}	0.1
Empty 48Y cylinder return to								
Metropolis, IL[f]	-120	2×10^{-4}	3×10^{-5}	2×10^{-4}	2×10^{-4}	5×10^{-4}	-0.01	-0.02
Port Hope, Ontario[e]	-120	3×10^{-4}	1×10^{-4}	6×10^{-4}	6×10^{-4}	1×10^{-3}	-0.03	-0.03
LLRW going to								
Clive, UT	96	4×10^{-5}	3×10^{-6}	1×10^{-5}	3×10^{-5}	4×10^{-5}	5×10^{-4}	0.02
Maximum Total[f,g]	1,426	2×10^{-3}	4×10^{-4}	2×10^{-3}	2×10^{-3}	5×10^{-3}	0.3	0.3

[a] Cargo-related impacts are impacts attributable to the radioactive nature of the material being transported.

[b] All values have been rounded to one significant figure. Some totals may not equal sum of individual components because of independent rounding.

[c] Vehicle-related impacts are impacts independent of the cargo in the shipment.

[d] The total peak annual number of shipments is used with each option for a given shipment type. (Sources: NRC, 2005a; UUSA, 2013f; LPES, 2014).

[e] Dose risk is a societal risk and is the product of accident probability and accident consequence.

[f] The actual operational rate of return of empty 48Y cylinders with heels has been found to be lower than originally forecast for the 3-million-SWU/yr facility, and thus the estimated rate of return of these cylinders for the 10-million-SWU/yr facility is now estimated to be less than that forecast for the 3-million-SWU/yr facility. While the number of shipments is less, the routine radiological risk from fewer shipments is larger because a higher external dose rate per shipment (2 mrem/h at 2 m [NRC, 2012a] vs. 1 mrem/h at 2 m [NRC, 2005a]) is now assumed for these shipments as discussed in the text.

[g] Assumes all feed cylinders from Port Hope, product cylinders to Wilmington, depleted UF_6 cylinders to Portsmouth, empty cylinders to Port Hope, and LLRW to Clive.

Table 4-3 Maximally Exposed Individual Routine Risk of Latent Cancer Fatality from Radioactive Material Shipments[a]

Material	Single Shipment Exposure (LCF risk)
UF_6 feed	7×10^{-12}
UF_6 product	3×10^{-12}
Depleted UF_6 tails	8×10^{-12}
Empty cylinders	5×10^{-11}
LLRW	1×10^{-12}

[a] Individual is located 30 m (98 ft) from the passing shipment. Shipment is traveling at 24 km/hr (15 mph).

Source: Based on NRC (2005a).

Accident Impacts

The total annual radiological collective population LCF risk from transportation accidents for all shipments from a 10-million-SWU/yr facility, for the most conservative case shown in Table 4-1 (all shipments to their most distant locations), was estimated to be 0.7, a value 0.3 higher than the fatality risk estimated for the 3-million-SWU/yr facility (Table 4-2). Since the additional 0.3 LCF risk would be spread out among all people along the transportation routes, the annual radiological transportation accident impacts from the facility expansion to the collective population during operations would be SMALL.

Chemical impacts from transportation accidents would be negligible, based on past analyses of depleted UF_6 shipments which have shown that the estimates of irreversible adverse effects are approximately 1 to 3 orders of magnitude lower than the estimates of public LCFs from radiological accident exposure (DOE, 2004a,b; NRC, 2005c).

Estimated annual fatalities from direct physical trauma as a result of accidents were estimated to be 0.7 for the peak year for the 10-million-SWU/yr facility, potentially 1 fatality per year. The impact of 0.7 annual fatalities is 0.4 fatalities higher than the high case value of annual fatalities estimated for the 3-million-SWU/yr facility (Table 4-2). The impact of 0.7 fatalities would be SMALL as compared to the more than 32,000 fatalities per year on the nation’s roads from all types of accident (BTS, 2013).

4.1.2.12 Public and Occupational Health

This section analyzes the potential impacts on public and occupational health from the operation of the proposed expanded UUSA facility. The analysis is divided into three main sections: non-radiological impacts, radiological impacts, and accidents. The section on non-radiological impacts analyzes occupational hazards to workers based on the recent injury rates from similar industries and from historical experience at URENCO’s European enrichment facilities. This section includes an analysis of occupational and public health hazards from exposure to uranium compounds and HF released into the workplace and from vent stacks during routine operations. The section on radiological impacts analyzes the effects of radiation exposure on workers and members of the public from routine operations. Impacts on workers are evaluated on the basis of radiation doses from airborne UF_6 releases and from direct radiation from handling UF_6 cylinders. Impacts on members of the public are evaluated on the basis of UF_6 emissions from vent stacks and direct radiation exposure from depleted UF_6 in UBCs on the UBC Storage Pad. Section 4.1.2.12.3, below, covers the potential health and environmental effects of postulated accidents considered to be representative of the range of accident types and accident consequences that could occur at the expanded UUSA facility.

4.1.2.12.1 Non-Radiological Impacts

Occupational Hazards

Occupational injuries and exposures during operation of the proposed expanded facility would be similar to those at other operating uranium enrichment facilities. As discussed in Section 3.12.1, yearly reportable lost-time accidents (OSHA Lost Work Day Case) for 2003–2007 for the similar URENCO Capenhurst Limited enrichment facility in Great Britain varied from 0 to 1.62 per 100 full-time equivalent workers (FTEs) per year, with an average of 0.55 per 100 FTEs (Table 3.11-5 of AES [2010]). This rate may be compared to the annual injury and illness incidence rates by industry compiled by the U.S. Department of Labor, Bureau of Labor Statistics (BLS, 2012). The national average incidence rate of nonfatal occupational injuries and illnesses resulting in days away from work, job transfer, or restriction for classification 325 "Chemical Manufacturing," for calendar year 2011 was 1.4 per 100 FTEs per year (BLS, 2012), which is within range of 0–1.62 and greater than the average of 0.55 per 100 FTEs reported for the Capenhurst enrichment facility.

Chemical exposures of potential concern to workers would be from UF_6 releases or leaks within the facility. Upon contact with moisture in air, UF_6 immediately reacts to form HF, a corrosive gas and strong respiratory irritant, and UO_2F_2, a uranium-containing particulate. As discussed in Section 3.12.3, the current facility and proposed expansion prevent worker exposures through the use of extensive GEVSs, which actively collect and trap HF and uranium compounds in process-line effluent and in workspace air (UUSA, 2013a). In addition, the negative operating pressure in process lines acts against process vapors entering the workspace and routes vapors through the GEVSs. Other URENCO enrichment facilities, as well as the current Lea County UUSA facility, have reported few exposure incidents, and none since 1984 (Section 3.12.3). Consequently, impacts from occupational injuries and chemical exposures from the proposed expanded operations would be SMALL.

Hazards to the Public

Facility emissions during normal operations that would cross the site boundary and result in possible exposures to members of the public would be limited to small quantities of uranium and HF that are not captured by the GEVSs, and are emitted from the rooftop ventilation stack. No other routine chemical emissions would be at levels of potential concern to the public. Estimated total site annual emissions for a 3-million-SWU/yr production level are no more than 10 g (0.022 lb) of uranium and no more than 1 kg (2.2 lb) of HF. These annual emissions are projected to rise to 12 g (0.027 lb) uranium and 1.2 kg (2.7 lb) HF when the facility is expanded to a production level of 10 million SWU/yr (UUSA, 2013a). Air dispersion modeling performed by UUSA with EPA's AERMOD model using these average emission rates as inputs produced an estimated maximum 8-hr average ambient air concentration of HF of 9.3×10^{-3} µg/m^3 and of uranium of 9.9×10^{-5} µg/m^3 (UUSA, 2013a).

The estimated HF concentration is three orders of magnitude below both the most stringent reference level available, the California inhalation REL of 14 µg/m^3 for chronic exposures (California Office of Environmental Health Hazard Assessment, 2003) and the New Mexico OEL/100 of 25 µg/m^3, which is used to evaluate dispersion modeling of toxic air pollutants (NMAQB, 2010). This analysis indicates that HF levels at offsite locations near the expanded UUSA facility would be far below levels of health concern. The modeled maximum 8-hr average ambient air concentration of uranium is more than five orders of magnitude below the NIOSH and OSHA occupational exposure limit of 50 µg/m^3 (soluble uranium forms, 8-hr time weighted average) (NIOSH, 2005) and more than four orders of magnitude below the OEL/100 for uranium of 2 µg/m^3 (20.2.72.502 NMAC). No ambient air quality standards are available, but comparison to the occupational standards indicates that uranium exposures to the public from normal operations would likewise be below levels of health concern. Therefore, non-radiological impacts on the public from chemical exposures associated with expanded operations would be SMALL.

4.1.2.12.2 Radiological Impacts

For members of the public, this EA considered the affected population within an 80-km (50-mi) radius of the UUSA facility, with the primary exposure pathways associated with gaseous effluents and direct and scatter (skyshine) radiation to the site boundary, and, to lesser extents, offsite locations. Workers at the expanded UUSA facility could similarly be exposed to airborne or gaseous releases in addition to the direct radiation exposure from handling UF_6 cylinders, working near enrichment process equipment, or decontaminating cylinders and equipment.

Uranium enrichment operations in the new SBMs 1005, 1007, and 1009 are expected to start in 2015, 2018, and 2020, respectively. Thus, as part of the proposed action, there would be 4 to 5 years of overlap between the start of SBM-1005 operations and the planned construction and operation of SBM-1007 and SBM-1009 (UUSA, 2013a).

As discussed in Section 3.12.2, there are three primary public exposure pathways associated with facility effluent releases: (1) direct radiation due to deposited radioactivity on the ground surface (ground plane exposure); (2) inhalation of airborne radioactivity in a passing effluent plume; and (3) ingestion of food that was contaminated by facility effluent radioactivity (LES, 2014).

As mentioned in Section 3.12.2, UUSA's effluent monitoring began in January 2009 and the results are routinely reported to the NRC in Semi-Annual Radioactive Effluent Release Reports. The effluent release reports were reviewed for the period from 2009 through June 2014, and the results are discussed in Section 3.12.2 to assess the current status of the site. The potential maximum TEDE for a member of the public from effluent releases was found to be much less than 1 mrem/yr.

Public Radiological Health Impacts

As described in Chapter 2 and Section 3.12, an effluent monitoring program is in place at the UUSA site to ensure releases of radioactive materials to the environment are within federal and state regulations and are maintained at levels that are ALARA. As stated in Section 3.12, all estimated annual doses to members of the public from facility operations to date are well below the NRC TEDE limit of 1 mSv/yr (100 mrem/yr), as established by 10 CFR 20.1301(a)(1). To estimate the offsite public radiological health impacts from the proposed expanded operations, both the expected total dose to the maximally exposed member of the public and the collective dose to the population within an 80-km (50-mi) radius of the UUSA facility were considered, as detailed in the following sections.

Gaseous Effluent Impacts

As with the existing operations, the proposed UUSA facility expansion would result in radiological gaseous effluent releases (UF_6) to the atmosphere. For bounding the health impacts from gaseous effluent releases during future operations, it was assumed that the gaseous effluent releases would be 29.7 million becquerel (MBq) (800 µCi) per year (UUSA, 2013a). This is considered to be a very conservative estimate obtained by scaling up from a 1.5-million-SWU/yr facility to a 10-million-SWU/yr facility, similar to what was done in estimating these impacts in the 2005 NEF EIS (NRC, 1994) (NRC, 2005a). Table 4-4 lists the estimated bounding gaseous effluent discharges from the 10-million-SWU/yr facility that were used as part of estimating the potential radiological impacts of the proposed action. The radiological health impacts on members of the public from gaseous effluent discharges were estimated in the 2005 NEF EIS (NRC, 2005a) based on gaseous effluent releases of 240 µCi/yr. The doses were estimated in the 2005 EIS for the hypothetical MEI at the site boundary and for members of the public who may be present or live near the site. There is no difference in the distances for the actual nearest worksite and for the nearest residence from the distances in the 2005 EIS (UUSA, 2013a).

Table 4-4 Estimated Bounding Isotopic Activity Annual Releases from TSB and SBM GEVSs

Isotope	Relative Isotopic Concentration, in Weight Fraction[a]	Isotopic Activity in Natural Uranium (µCi/g)	Isotopic Activity in Total Annual Release[b] (µCi/yr)	Isotopic Activity in TSB GEVS Annual Release[c] (µCi/yr)	Isotopic Activity in SBM GEVS Annual Release[c] (µCi/yr)
U-234	5.34×10^{-5}	0.3336	390.23	246.67	143.33
U-235	7.11×10^{-3}	0.0154	17.97	11.33	6.67
U-236	3.27×10^{-5}	0.0021	2.47	1.53	1.00
U-238	9.93×10^{-1}	0.3328	389.33	246.67	143.33

[a] Weight in 1 g of natural uranium.

[b] The annual release of natural uranium is estimated to be 800 µCi/yr.

[c] Scaled from bounding releases for TSB and SBM GEVS in NUREG-1790, Table 4-10.

Sources: NRC (2005a); UUSA (2013a).

Table 4-5 lists the estimated radiological impacts on the same receptors associated with the gaseous effluent discharges that the expanded operations would be expected to produce. The dose estimates are scaled using an 800-µCi/yr gaseous effluent release from the proposed expanded facility, and are based on the estimated 240-µCi/yr release for the existing facility, as presented in the 2005 EIS (NRC, 2005a). As shown in the Table 4-5 estimates, the highest annual dose for the hypothetical receptor at the north site boundary is 1.77×10^{-4} mSv/yr (0.0177 mrem/yr), which is a small fraction of the NRC's public dose limit of 1 mSv/yr (100 mrem/yr) stated in 10 CFR 20.1301(a)(1). Further, the dose estimates in the 2005 EIS included the contribution of the airborne particles from evaporation in the treated effluent evaporation basin. The evaporation basin is not used at the current UUSA facility, and would also not be used as part of the expanded operations. Therefore, the dose estimates presented in Table 4-5 are considered to be conservative.

Table 4-5 Radiological Impacts from Gaseous Effluent Releases to Members of the Public Associated with Expanded Operations

Receptor	Location	Distance, m (mi)	Estimated CEDE[a], mSv/yr (mrem/yr)
Highest site boundary	North boundary	1,010 (0.6)	1.77×10^{-4} (1.77×10^{-2})
Nearest residence	West	4,233 (2.6)	4.33×10^{-5} (4.33×10^{-3})
Worker at Lea County landfill	Southeast	917 (0.57)	6.33×10^{-5} (6.33×10^{-3})
Worker at Wallach Concrete, Inc.	North-northwest	1,867 (1.16)	7.33×10^{-5} (7.33×10^{-3})
Worker at Sundance Services, Inc.	North-northwest	1,706 (1.06)	8.67×10^{-5} (8.67×10^{-3})
Worker at WCS	East-northeast	1,513 (0.94)	3.10×10^{-5} (3.10×10^{-3})

[a] CEDE = committed effective dose equivalent.

Source: Table 4-11 in NUREG-1790 (scaled from dose estimates in NUREG-1790, assumed bounding natural uranium release of 800 µCi/yr instead of 240 µCi/yr assumed in NUREG-1790).

The general population within 80 km (50 mi) of the expanded UUSA facility would receive a collective annual dose of 0.00047 person-sieverts (0.047 person-rem), scaled from the 2005 EIS (NRC, 2005a) results for the 3-million-SWU/yr facility. The population dose impacts are based on the 2000 Census data and are not revised using the 2010 Census because there is no change in the location of the nearest residents (UUSA, 2013a) and the total estimated dose at the site boundary has not increased from the dose estimated for the existing facility in the 2005 EIS (NRC, 2005a). Based on the guidance from the ICRP and the National Council on Radiation Protection & Measurements (NCRP), since the collective dose (0.047 person-rem) is much smaller than the relevant risk detriment (<1,754 person-rem), the most likely number of excess health effects is zero (NCRP, 1995; ICRP, 2007). Thus, public health impacts from gaseous radiological releases from the proposed expanded facility would be SMALL.

Liquid Effluent Impacts

The UUSA facility expansion would result in liquid effluents including stormwater runoff, treated liquid effluents, and sanitary wastewater. The general site stormwater runoff will be collected and released untreated to existing or new stormwater detention basins. The stormwater runoff from the UBC Storage Pads associated with facility expansion will be collected in lined retention basins onsite and regulated by EPA and the State of New Mexico as discussed in Section 4.1.2.6. The operation of the UUSA facility includes liquid waste processing to collect and solidify the uranic materials that are collected as part of process operations. The remaining liquid effluent is solidified prior to offsite disposal. Sanitary wastewater would be discharged to the City of Eunice Wastewater Treatment Plant and managed as is done for the existing facility (Section 4.1.2.13). There is no direct liquid effluent discharge offsite except sanitary wastewater, which will not contain any radioactive material.

Direct Radiation Impacts

The proposed facility expansion would allow for storage of about 25,000 cylinders (primarily UBCs, up to approximately 1,400 product cylinders) at the UBC Storage Pad (UUSA, 2014b). Storage of feed, product, and UBC cylinders at the facility would have an impact due to direct and scatter (skyshine) radiation at the site boundary and at offsite locations. The UBC Storage Pad and CRDB are two sources of direct exposure. The MCNP5 computer code was used in estimating the direct radiation impacts. In estimating the direct dose equivalent, it was assumed that the UBC cylinders would be stored in a triple-stack configuration (UUSA, 2013a), a configuration different from what was assumed in the 2005 EIS (NRC, 2005a). In conjunction with the UBC cylinders, up to 1,430 30B product cylinders would be stored in a single-stack configuration (UUSA, 2014b). The NRC staff reviewed the radiological dose calculations and consider them to be representative of the proposed storage configuration and conservative in nature. UUSA proposed to expand the UBC Storage Pad capacity in multiple phases during facility expansion.

Table 4-6 lists the direct dose equivalent at different offsite locations from both sources (UBC Storage Pad and CRDB). The annual offsite dose equivalent was calculated at the UUSA fence line assuming 2,000 hr/yr occupancy. Table 4-6 also lists the annual dose for the actual nearest worksite and at the nearest residences from direct radiation exposure.

Radiation Impacts on Maximally Exposed Members of the Public

The LES ER (LES, 2014) indicated that for the present UUSA operation, the dominant source of offsite radiation exposure would be from direct (and scatter) radiation from the UBC Storage Pads (fixed source). The dominant source of offsite radiation exposure at the site boundary would remain the UBC Storage Pad for the proposed expanded UUSA facility. The estimated dose at the site boundary from gaseous effluent is a small fraction of the dose from direct exposure (see Table 4-5). Using more realistic assumptions in the analysis of direct exposure from the UBC Storage Pad, the maximum impact along the north site boundary has been modeled to have an estimated dose of 9.4×10^{-2} mSv/yr (9.4 mrem/yr) from direct exposure (Table 4-6), less than the estimated dose of 0.189 mSv/yr (18.9 mrem/yr) at the site boundary in

Table 4-6 Estimated Annual Direct Radiation Dose from Proposed UUSA Facility Expansion

Location	Distance, km (mi)	Exposure duration, hr/yr	Total Direct Dose from Storage Pad and CRDB, mSv/yr (mrem/yr)
Site fence, north	0.48 (0.30)[a]	2,000	0.094 (9.4)
Site fence, south	0.67 (0.42)[a]	2,000	0.050 (5.0)
Site fence, east	0.22 (0.14)[a]	2,000	0.085 (8.5)
Site fence, west	0.55 (0.34)[a]	2,000	0.00049 (0.049)
Nearest actual business, north	0.5 (0.3)[b]	2,000	0.093 (9.3)
Nearest actual residence, west	4.3 (2.63)[c]	8,760	$<4.0 \times 10^{-25}$ (4.0×10^{-23})

[a] Distance is from the closest edge of the pad.

[b] Distance is conservatively based on the business property closest to the site.

[c] Distance is from the center of the site.

Source: UUSA (2014f).

the 2005 EIS (NRC, 2005a). This estimated dose is well below the 1 mSv/yr (100 mrem/yr) TEDE limit established by 10 CFR 20.1301 and within the 0.25 mSv/yr (25 mrem/yr) dose equivalent to the whole body and any organ limit established by 40 CFR Part 190.

Conclusion

Based on the analysis of UUSA measurement data for the existing facility discussed above, radiological doses to members of the public from site operations at the UUSA site are presently below the 10 CFR Part 20 annual limits for doses to the public. Ongoing operational activities to date have not shown an incremental impact to the MEI or to the surrounding population, and the radiological impact of expanded operations is expected to be the same. Therefore, overall, the NRC staff finds that proposed expansion of the UUSA facility would be expected to have a SMALL radiological impact on public health.

Occupational Exposure Impacts

Under the proposed action, the most significant contributor to occupational radiation exposure would be direct radiation from the stored UF_6 cylinders. It is expected that the average occupational doses at the proposed expanded UUSA facility would be similar to occupational doses at existing fuel cycle facilities in the United States. As is the case for such fuel cycle facilities, the most substantial sources of direct radiation would likely include both full Type 48Y cylinders containing either feed material or depleted UF_6 and empty Type 48Y cylinders with residual material (NRC, 2005a). Table 4-7 presents occupational doses at fuel cycle facilities within the United States for 2008–2012 (Lewis et al., 2012; Lewis et al., 2013; Brock et al., 2014). The average measurable TEDE to the average worker dose during this time period varied from 0.0012 Sv/yr (0.12 rem/yr) to 0.0016 Sv/yr (0.16 rem/yr). The average measurable doses are well below the NRC limit of 0.05 Sv/yr (5 rem/yr) in 10 CFR 20.1201.

Table 4-7 Annual CEDE[a] and TEDE[b] for Fuel Cycle Facilities within the United States for 2008–2012

Year	Number of Monitored Individuals	Workers with Measured TEDE	Collective TEDE, person-Sv (person-rem[c,d])	Average Measured TEDE, Sv (rem)	Workers with Measured DDE	Collective DDE[e], person-Sv (person-rem)	Average Measured DDE, Sv (rem)	Workers with Measured CEDE	Collective CEDE, person-Sv (person-rem)	Average Measured CEDE, Sv (rem)
2008	7,867	3,424	5.38 (538)	0.0016 (0.16)	2,493	2.77 (277)	0.0011 (0.11)	2,260	2.62 (262)	0.0012 (0.12)
2009	8,918	3,738	5.34 (534)	0.0014 (0.14)	2,737	2.43 (243)	0.0009 (0.09)	2,598	2.91 (291)	0.0011 (0.11)
2010	9,362	4,212	5.42 (542)	0.0013 (0.13)	3,129	2.35 (235)	0.0008 (0.08)	2,966	3.07 (307)	0.0010 (0.10)
2011	9,535	4,361	6.07 (607)	0.0014 (0.14)	3,282	2.86 (286)	0.0009 (0.09)	3,022	3.21 (321)	0.0011 (0.11)
2012	7,388	3,541	4.39 (439)	0.0012 (0.12)	2,471	2.08 (208)	0.0008 (0.08)	2,709	2.30 (230)	0.0009 (0.09)

[a] Committed effective dose equivalent (CEDE) = total radiation dose received from ingestion or inhalation of radioactive material.

[b] Total effective dose equivalent (TEDE) = CEDE plus DDE (deep dose equivalent from external radiation).

[c] 1 rem = 1,000 mrem.

[d] To convert rem to Sv, divide by 100.

[e] Deep dose equivalent (DDE) = the dose equivalent at a tissue depth of 1 cm. It applies to external whole-body exposure.

Sources: Lewis et al. (2012, 2013) and Brock et al. (2014).

The existing nuclear and industrial safety program at the present UUSA facility would be extended to include the proposed expanded operations (UUSA, 2013b). The program would monitor the occupational workers at the facility for internal exposure from intake of uranium as well as doses from external exposure to radiation. UUSA would also apply an annual administrative limit of 10 mSv (1,000 mrem) (NRC, 2005b), which is below the 10 CFR 20.1201 limit of 50 mSv (5,000 mrem) for occupational exposure.

UUSA has implemented a comprehensive exposure control program to manage occupational radiation exposure and dose. The program maintains exposures that are ALARA through the use of radiation monitoring systems, personnel dosimetry, and mitigation systems to reduce environmental concentrations of uranium. The average TEDE to workers from existing UUSA operations for FY 2012 was 0.32 mSv (32 mrem), and the maximum TEDE was <2.5 mSv (250 mrem) (Brock et al., 2014). In addition, it is expected that the impacts from the performance of the gamma spectrometer and mass spectrometer examinations for the Items Relied on For Safety (IROFS)[13] of IROFS53a and IROFS53b related to the new re-feed configuration option in SBM-1005 would result in an average additional dose of 4 mrem/yr per person (UUSA, 2014b), a small fraction of current dose estimates. Therefore, it is expected that the estimated individual occupational exposures for typical occupational receptors from the expanded operations would be similar to the estimated exposure from the existing operations, as listed in Table 3-14.

The occupational exposure analysis and the historical exposure data from the United States Enrichment Corporation facilities and the existing UUSA Lea County operations demonstrate that a properly administered radiation protection program keeps radiological occupational exposures below the regulatory limits of 10 CFR 20.1201. The NRC staff therefore finds that the radiological impacts from occupational exposure at the proposed expanded UUSA facility would be SMALL.

<u>Construction Worker Impacts</u>

Under the proposed action, construction workers would also be exposed to radiological emissions from the existing facility's operations, combined with emissions from the expanded facility as it incrementally begins operation. The primary exposure pathways for construction workers would be (1) external exposure from onsite sources such as the UBC Storage Pad and CRDB; (2) inhalation of air effluent releases from existing UUSA operations; and (3) inhalation of air effluent releases from proposed UUSA expanded operations beginning in 2015. The construction workers were not assumed to consume food grown on the UUSA site.

For estimating the external dose from the UBC Storage Pad and the CRDB, the MCNP computer code was used. The maximum estimated dose for each of the exposure pathways was calculated for an annual exposure period. Table 4-8 lists the construction worker estimated radiological doses from applicable exposure pathways during different phases of construction (UUSA, 2013c). The estimated doses from the UBC Storage Pad, as discussed above regarding direct radiation impacts, are based on a triple-stack arrangement of Type 48Y feed cylinders. This arrangement results in a conservative dose estimate compared to other cylinder configurations on the pad (e.g., single- or double-stacked configurations), because it includes

[13] Items Relied on for Safety (IROFS) – Structures, systems, equipment, components, and activities of personnel that are relied on to prevent potential accidents at a facility that could exceed the performance requirements in 10 CFR 70.61 or to mitigate their potential consequences.

Table 4-8 Estimated Worker Doses during Different Phases of Construction of the Proposed UUSA Facility Expansion

Phase	Construction Activities	Maximum Individual Construction Worker Dose[a] (mrem)	Collective Dose[a] (person-rem)
Expansion 1 – 2016	UBC Storage Pad expansion to the east and SBM-1005	291.9	14.8
Expansion 2 – 2018/2019	UBC Storage Pad expansion to the west and SBM-1007	295.7	15
Expansion 3 – 2020	SBM-1009 and second CRDB	563.2	122.9
Expansion 4 – 2021–2029	UBC Storage Pad expansion, second west segment	295.1	15
	UBC Storage Pad expansion, northeast segment	280	14.2
	UBC Storage Pad expansion, north-center segment	571.9	29
	UBC Storage Pad expansion, northwest segment	573.4	29.1

[a] The contributions from SBMs are not included because a small number of UF_6 cylinders are present there. These maximally exposed individuals would be nearest the stored cylinders on the UBC Storage Pad and would be engaged in the construction of the UBC Storage Pad expansion as part of the facility expansion.

Source: UUSA (2013c).

the conservative assumption that the UBC Storage Pad and CRDB are packed with Type 48Y feed cylinders to full capacity (maximum source) before the start of construction (UUSA, 2013c). In fact, the construction will start well before the time when the UBC Storage Pad has reached its full storage capacity.

The actual construction worker dose in the worst cases will be lower than the estimates in Table 4-8 because of the posting requirements that would ensure worker doses are kept below 500 mrem/yr (UUSA, 2013d). The contributions from gaseous effluent releases are not included in the worker dose estimates because the site has not identified any detectable gaseous effluent discharges for the period January 2009–December 2012 (UUSA, 2010a,b; 2011a,b,c; 2012e,f,g; 2013b); therefore, the gaseous effluent exposures to site personnel are not appreciable. Currently, the presently licensed facility is running at full capacity and the gaseous effluent releases are below the minimum detectable activity. It is anticipated that the additional SBM effluent releases from the expanded facility will be similar.

Based on this assessment, the impact on construction workers from radiological exposure during operations could be SMALL to MODERATE. However, the reported estimates are for a conservative case involving MEIs exposed to a full, adjacent, storage pad. UUSA has committed to monitoring the external dose to construction workers from stored UF_6 cylinders to indicate if potential exposures would exceed 100 mrem/yr. If such a situation were encountered, UUSA would implement additional monitoring to ensure that individual doses remain below 500 mrem/yr (UUSA, 2013d). Thus, the impacts to construction workers would be expected to be SMALL.

4.1.2.12.3 Accidents

NRC staff assessed the potential health and environmental effects of postulated accidents for the original facility design based on information presented in the applicant's 2005 Safety Analysis Report (SAR) (LES, 2005). In its 2005 Safety Evaluation Report (SER) for the presently licensed facility (NRC, 2005b), the NRC staff analyzed in detail a subset of five accident sequences, which were intended to cover a representative range of possible accident types with consequence levels ranging from low to high. Sequences included accidents initiated by natural phenomena, operator error, and equipment failure.

Potential accident consequences are categorized in the 2005 SER as being low-, intermediate-, or high-consequence events. Threshold criteria values that define intermediate- and high-consequence events are shown in Table 4-9. These values are defined under the performance requirements in 10 CFR Part 70, Subpart H. Low-consequence events are those for which the potential consequence values remain below the intermediate criteria threshold values. The regulations in Subpart H that define acceptable levels of risk of accidents at nuclear fuel cycle facilities, such as at the UUSA facility, require that the licensee reduce the risks of credible high-consequence and intermediate-consequence events, and assure that under normal and credible abnormal conditions, all nuclear processes are subcritical.

To determine if the proposed action involves any new types of accident sequences, the NRC's 2015 SER (NRC, 2015) evaluates whether there are any new processes or changes in equipment that were not part of the facility's design considered in the 2005 SER. Although there were no new types of accident sequences, there was one new criticality accident sequence involving the use of re-feed tails in either assay unit of SBM-1005. In the 2015 SER, the staff has evaluated the effectiveness of two new IROFS (these administrative controls are designated as IROFS53a and IROFS53b) identified by UUSA to minimize the likelihood of this accident, as briefly summarized below. No other new accident sequences associated with the proposed action were identified.

UUSA postulated a new accident sequence that would be initiated by the use of a feed cylinder or a tails cylinder of higher than expected initial U-235 enrichment in either assay unit of SBM-1005 designated for use of tails re-feed. This accident sequence would result in over-enrichment and could present a criticality concern. The two new IROFS identified by UUSA would be introduced by UUSA to prevent this accident. The IROFSs require independent confirmation of feed cylinder contents through measurement and verification of the cascade setting against the cylinder analysis prior to connecting the cylinder to the assay.

The accident sequence summarized above, together with those evaluated in the 2005 SER, are considered to be representative of the range of accident types and accident consequences that could occur at the UUSA facility. The NRC staff concludes that the existing engineering and administrative controls in place and those that are being added to support operations in SBM-1005 will maintain an accident occurrence rate and consequences at acceptably low levels, and that the proposed facility expansion would not pose an undue risk to workers, or to

Table 4-9 Threshold Criteria that Define High- and Intermediate-Consequence Events[a]

Receptor	Intermediate Consequence	High Consequence
Worker – Radiological	>25 rem (0.25 Sv)	>100 rem (1 Sv)
Worker – Chemical (10-minute exposure)[b]	>19 mg U/m^3 >78 mg HF/m^3	>146 mg U/m^3 >139 mg HF/m^3
Environment at the Restricted Area Boundary	>5.4 mg U/m^3, or 24-hour release greater than 5,000 times the values in Table 2 of Appendix B of 10 CFR Part 20	Not applicable
Individual at the Controlled Area Boundary – Radiological	>5 rem (0.05 Sv)	>25 rem (0.25 Sv)
Individual at the Controlled Area Boundary – Chemical (30-minute exposure)	>2.4 mg U/m^3 >0.8 mg HF/m^3	>13 mg U/m^3 >28 mg HF/m^3

[a] Low-consequence events are those for which the potential consequence values remain below the intermediate criteria threshold values.

[b] Limits on uranium intake are also defined for workers in the immediate proximity of the release. These limits are 10 mg and 40 mg uranium for intermediate- and high-consequence events, respectively.

Source: NRC (2005b).

public health and safety and the environment. In particular, accidents with potentially high consequences to workers, the environment, or the offsite public would be kept highly unlikely though such controls. Thus, the impacts of facility accidents due to the facility expansion would be expected to be SMALL.

4.1.2.13 Waste Management

Waste streams generated during current UUSA facility operations are described in Section 3.13. Table 3-17 summarizes the major waste streams generated from current operations and describes waste type, collection, storage, transfer, treatment, handling, packaging, waste class, and volume generated. The proposed expanded facility would generate the same types of wastes but in larger quantities at the 10-million-SWU/yr capacity. Waste types include gaseous and aqueous effluents, solid wastes in several categories, and depleted UF_6 tails. Waste categorizations for disposition and disposal include sanitary wastewater, industrial solid wastes, hazardous wastes, LLRW, and mixed wastes. Some waste types would be treated prior to disposal. Waste disposal facilities currently used, or proposed to be used, include the City of Eunice Wastewater Treatment Plant, the Lea County municipal landfill, various hazardous waste disposal facilities, various licensed LLRW disposal facilities, and facilities licensed to accept processed mixed waste. Depleted UF_6 tails will be stored onsite in UBCs during the life of the facility. In New Mexico, there will be no long-term disposal or long-term storage of UBCs beyond the life of the UUSA facility. The depleted UF_6 tails will likely be shipped to a facility for conversion to uranium oxide with subsequent disposal as LLRW outside of New Mexico (UUSA, 2013a).

Sufficient capacity exists at identified or available treatment and disposal facilities for waste volumes generated at the currently permitted production level (NRC, 2005a). The proposed facility expansion would not affect the current waste management practices. It was originally planned that liquid radioactive wastes would be concentrated onsite in an evaporator/dryer (LES, 2014), but it is currently planned that radioactive liquids will be shipped offsite for disposal as either liquid or solidified wastes (UUSA, 2013a; LES, 2014). This change in processing of liquid radioactive wastes would occur for the currently licensed facility, whether or not the proposed expansion is approved.

Increases in waste volumes as a result of expanded operations would be roughly a factor of two to three, for various waste types, over levels for the currently licensed facility (UUSA, 2013a). For example, spent ventilation filters used in the GEVSs are projected to increase to 99,790 kg/yr (220,000 lb/yr) at an annual production level of 10 million SWU, as compared to 36,741 kg/yr (81,000 lb/yr) at 3 million SWU. Solidified radioactive liquid waste is expected to increase to about 861,825 kg/yr (1,900,000 lb/yr) at an annual production level of 10 million SWU, as compared to 312,978 kg/yr (690,000 lb/yr) at 3 million SWU (UUSA, 2013a).

For nonhazardous solid wastes, the increase in disposal at the Lea County landfill from the proposed expansion would be within the 10 percent rate increase estimate for the original UUSA facility, and would be less than 0.1 percent of total capacity (UUSA, 2013a). Increased demand on the City of Eunice Wastewater Treatment Facility for the treatment of sanitary wastewater would likewise be incremental and minor, since only a minor increase in workforce is anticipated for the expanded facility.

The impacts of the proposed expansion on the volume of liquid LLRW for offsite disposal noted above already reflects a change in the mode of treatment; onsite evaporation was originally planned for the facility to achieve solidification, but offsite disposal of such wastes has been adopted for the existing facility. The effects this change in mode of disposal will have on the capacity of receiving facilities would be minor, however, due to sufficient existing offsite capacity (UUSA, 2013a).

The currently permitted facility produces low volumes of RCRA hazardous wastes. Because the facility now ships hazardous wastes offsite to a licensed disposal facility within 90 days of generation, the facility does not require a New Mexico Hazardous Waste Permit to store, treat, or dispose of the wastes onsite (UUSA, 2013a). Under the proposed expansion to 10 million SWU/yr, the facility would continue to be considered a small quantity generator of RCRA hazardous wastes under 40 CFR 260.10, because it would produce less than 1,000 kg (2,200 lb) of RCRA hazardous wastes per month. Note that under the EPA's regulations (40 CFR 261.5), exempt small quantity generators are those who generate less than 100 kg (220 lb) of RCRA hazardous wastes per month. Since the proposed expanded facility is expected to generate more than 100 kg (220 lb) of hazardous waste per month, UUSA's facility would remain a non-exempt small quantity generator. The expanded facility would be expected to produce incrementally more than the estimated quantity of hazardous wastes for the original facility of 1,770 kg/yr (3,930 lb/yr) (Table 3-17). Sufficient capacity would continue to be available for the disposal of such wastes. Similarly, minor additional quantities of mixed wastes would be generated at the expanded facility, which would have a negligible effect on disposal capacity (UUSA, 2013a).

Waste minimization practices are in place at the existing facility and would continue under the proposed expansion. These practices involve waste reduction, reuse, and recycling. A decontamination workshop at the facility allows some equipment to be reused rather than disposed as waste. Efforts would be made to avoid contamination of disposable materials in order to reduce the quantity of radioactive waste. Uncontaminated solid wastes would be volume reduced prior to disposal. Fomblin oil would be recovered and reused to the extent practical.

Thus, since the expansion would not require changes in waste management practices and sufficient capacity exists offsite for waste disposal of solid, hazardous, and low-level radioactive waste, expanded operations would have only SMALL impacts on the affected waste management facilities.

Depleted UF_6 tails produced from the enrichment process would continue to be stored onsite in UBCs located on the UBC Storage Pad. For the proposed expansion, the storage pad will be expanded as needed to store up to 25,000 cylinders in a stacked arrangement on cradles, up from an original estimate of 15,727 cylinders. Depleted UF_6 tails production is projected to increase to 1,250 UBCs/yr (15,700 MT/yr [17,300 tons/yr]) under the proposed expansion from about 627 UBCs/yr (7,800 MT/yr [8,600 tons/yr]) for the currently licensed facility. UUSA would run an active cylinder management program to protect, inspect, maintain, and repair cylinders. UUSA is committed to removing all UBCs prior to facility closure. The preferred option for their disposition is conversion of their contained depleted UF_6 to a uranium oxide and fluorine by a private entity, with disposal of the uranium oxide at a licensed LLRW facility. UUSA also considers an option for conversion at DOE facilities in Paducah, Kentucky, or Portsmouth, Ohio. Other options for disposition are not currently considered plausible. With respect to UUSA's preferred option, the company has signed an agreement with IIFP, to accept and convert UUSA's depleted UF_6. IIFP has received a license from the NRC for the construction and operation of a conversion facility west of Hobbs, New Mexico, about 32 km (20 mi) from the UUSA facility, but construction has not yet started.

The IIFP conversion process would produce uranium dioxide (UO_2) and fluoride products. The fluoride products would be sold commercially, while the UO_2 would be shipped in drums to an approved LLRW disposal facility. Potential disposal facilities include EnergySolutions in Clive, Utah, and WCS in Andrews, Texas (UUSA, 2013a). At the disposal facility, the UO_2 may be mixed with cement and repackaged in drums to form a grout, which would improve structural integrity and reduce solubility in water. The grouting of the waste would increase its volume.

UUSA estimates that the expanded facility producing 1,250 UBCs per year would generate 11,900 MT (13,100 tons), or 5,500 m^3 (190,000 ft^3), of depleted UO_2 annually (UUSA, 2013a), half of which would be attributable to the proposed expansion. Assuming a total of 25,000 UBCs, a total volume of 110,000 m^3 (3,900,000 ft^3) of depleted UO_2 would have to be disposed of. Based on a total capacity of 3.1 million m^3 (109 million ft^3) for the Clive, Utah, facility, this total volume would represent 3.5 percent of the capacity for that facility, not accounting for potential changes in volume from grouting UO_2 prior to disposal. Such a production level, roughly half of which would be attributable to the proposed facility expansion, would have a SMALL impact on a single facility such as the one in Clive, Utah. The projected

25,000 UBCs produced over the operating life of the expanded UUSA facility, roughly half of which is attributable to the proposed expansion, would contain a total of about 300,000 MT (330,000 tons) of depleted UF_6 that would have to be converted for disposal, assuming nominally 12.5 MT (13.7 tons) per UBC. At a design rate of 3,400 MT/yr (3,740 tons/yr) (UUSA, 2013a), conversion of all UUSA depleted UF_6 would take an estimated 88 years at IIFP. The expanded IIFP (Phase II, not currently licensed) would convert nearly 800 depleted UF_6 cylinders per year (about 9.8 million kg/yr, or 21.7 million lb/yr, or 10,850 tons/yr). Conversion of all UUSA depleted UF_6 with Phase II of IIFP would take approximately 31 years. Since UUSA has committed to the Governor of New Mexico that there will be no long-term disposal or long-term storage of UBCs in the State of New Mexico beyond the life of the facility (LES, 2014), additional conversion sites outside New Mexico would likely be required.

The other conversion facilities considered are operated for DOE in Paducah, Kentucky, and Portsmouth, Ohio (LES, 2014). The Paducah facility would operate 25 years to process the 436,400 MT (481,000 tons) of depleted UF_6 that was stored at that facility prior to the start of conversion, while the Portsmouth facility would operate for 18 years to process the 243,000 MT (268,000 tons) of depleted UF_6 stored at that facility (NRC, 2011a). Thus, the proposed UUSA expansion representing about 150,000 MT (165,000 tons) of depleted UF_6, or half of the projected total of 300,000 MT (330,000 tons), would represent about 34 percent and 62 percent, respectively, of the initial Paducah and Portsmouth inventories. Given the large quantities of depleted UF_6 that would need to be processed at potentially available conversion facilities relative to the total capacity of the facilities and pending inventories, the impacts of managing the depleted UF_6 produced from the proposed expansion of the UUSA facility on the capacity of existing and planned waste management facilities would be SMALL to MODERATE. The combined effects of the original and expanded designs, 25,000 UBCs in total, along with those from other enrichment facilities are discussed under cumulative impacts in Section 4.1.5.2.

Impacts on waste conversion and disposal capacity would be SMALL to MODERATE for various waste streams produced in the expanded facility, with impacts for conversion of depleted UF_6 near the MODERATE end of the range.

4.1.3 Environmental Impacts of Decommissioning

When operations at the UUSA site permanently cease, UUSA will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. The plan would be submitted for NRC review, and the NRC staff would evaluate specific impacts at that time. Decommissioning, as described in Section 7.2.16 of UUSA (2013a), involves decontaminating or removing all materials from the site to allow for release of the facility for unrestricted use. Only the building shells and the site infrastructure will remain. All remaining facilities, including site basins, will be decontaminated where needed to acceptable levels for unrestricted use. Excavations and berms will be leveled to restore the land to a natural contour. Decommissioning is expected to take approximately 10 years. The potential environmental impacts of decommissioning based on UUSA's preliminary decommissioning information are evaluated for each resource area in the sections below.

4.1.3.1 Land Use

In the short term, it is anticipated that facility decommissioning activities and any associated land use impacts would largely be confined to the existing UUSA leased property. After the site has been decommissioned and the NRC license terminated, the land, building shells, and site infrastructure would become available for other uses either with or without institutional controls on future land use options, depending on NRC conditions for license termination. UUSA currently intends that the decommissioned facility would be released for unrestricted use (UUSA, 2013a). Long-term impacts on land use would depend on the new tenants or owners of the site. Anticipated impacts on land use from decommissioning would be SMALL, given that much of the infrastructure would remain for a future indeterminate use.

4.1.3.2 Historic and Cultural Resources

Because no known historic or cultural resources are present on the property and the NRC staff does not expect that site decommissioning activities would require disturbance of any previously undisturbed areas, the NRC staff has determined that the impact on historical and cultural resources from site decommissioning would be SMALL.

4.1.3.3 Visual and Scenic Resources

The visual character of the site would remain roughly similar to that of the existing facility, since the building shells and site infrastructure would remain in place following decommissioning (UUSA, 2013a). Planting native species on disturbed areas of the site would contribute to reducing contrasts with the surrounding landscape. Therefore, impacts of decommissioning on visual and scenic resources would be SMALL.

4.1.3.4 Climatology, Meteorology, and Air Quality

During the decommissioning phase, primary air emission sources include fugitive dust from heavy construction equipment (e.g., bulldozers, graders, front-end loaders), vehicle exhaust, portable generators, air compressors, cutting torches, and solvent fumes. Activities for decommissioning at the site would be similar to those used for construction, but on a more limited scale. Potential impacts on climatology, meteorology, and ambient air quality would be correspondingly less than those for construction activities, as described in Section 4.1.1.4.
In addition, around the time when the decommissioning activities would occur, more energy-efficient, less polluting, and green-energy vehicles and equipment would likely be widely available. Thus, potential impacts would be expected to be much lower than those analyzed based on current emission factors. Accordingly, it is concluded that the potential impacts on climatology, meteorology, and ambient air quality associated with decommissioning activities at the UUSA site would be SMALL.

4.1.3.5 Geology, Minerals, and Soil

Decommissioning activities could increase the potential for short-term erosional impacts (similar to those during construction), but these impacts would be mitigated by the use of BMPs (as described in Section 3.1.2 of UUSA's Supplemental ER [2013a], and as listed in Table 4-10 of this EA). These include using a sedimentation detention basin, erosion control structures (e.g., earth berms, dikes, and sediment fences), fugitive dust suppression (by watering), and stabilization of disturbed and stockpiled soil (e.g., by covering), as needed. In addition, UUSA would continue to implement its stormwater monitoring program (to retain sediments within property boundaries) and comply with the requirements of its NPDES General Permit and SWPPP (UUSA, 2013a). Soil contamination as a result of accidental fluid releases related to trucks and mechanical equipment use (e.g., fuels, lubricating oils, hydraulic fluids, coolants, and battery acid) and use of potentially hazardous materials (e.g., cleaning fluids and chemicals) would be localized; such impacts would be minimized by adherence to the BMPs detailed in Section 5.2 of UUSA's Supplemental ER (2013a) and listed in Table 4-10 of this EA. Therefore, the NRC staff concludes that the impact of decommissioning on soils would be SMALL. Geology and mineral resources would not be affected because there are no unique geologic features, Quaternary faults, or mineral resources within the site boundaries.

4.1.3.6 Water Resources

4.1.3.6.1 Surface Water

There are no permanent or jurisdictional surface waters or drainage features within the UUSA site (see Section 3.6.1), and there are no receiving waters for site runoff derived from the facility other than the detention/retention basins that control stormwater discharges (under Ground Water Discharge Permit 1481). Therefore, the NRC staff concludes that decommissioning activities would not affect surface water.

4.1.3.6.2 Ground Water

Ground-Water Quality

The presence of vehicles and equipment and the use of potentially hazardous materials during decommissioning (e.g., cleaning fluids and chemicals) could increase the potential for ground-water contamination as a result of accidental spills or releases of hazardous materials or fuels. These impacts, however, would be mitigated through implementation of UUSA's stormwater monitoring program (to prevent the contamination of stormwater) and compliance with the requirements of its NPDES General Permit, SWPPP, and Ground Water Discharge Permit/Plan (UUSA, 2013a). Furthermore, the depth at which ground water occurs below the site (greater than 61 m [200 ft]) and factors such as low precipitation and high evaporation rates that reduce recharge rates in the area (see Section 3.6.2.1) serve to protect ground water from contamination via surface infiltration. Therefore, the NRC staff concludes that the impact of decommissioning on ground water would be SMALL.

Ground-Water Use

Ground water from below the site would not be used during decommissioning; therefore, no impacts on local ground-water users would be expected. The UUSA site obtains its water supply from the City of Eunice, New Mexico (Section 3.6.2). The current capacity of the Eunice municipal water supply is 11,125 m^3/d (2.94 million gpd); its current usage is 4,680 m^3/d (1.23 million gpd) (as reported by the New Mexico Office of the State Engineer for 2010 [Longworth et al., 2013]). Water use during decommissioning would not exceed its peak consumption rate of 4,149 m^3/d (761.2 gpm), which is well within the capacity of the Eunice municipal water system. Therefore, the NRC staff concludes that the impact of decommissioning on ground-water availability would be SMALL.

4.1.3.7 Ecological Resources

During decommissioning, vegetation in equipment laydown and disassembly areas and vegetation that became established on the site during operations, such as in the site stormwater detention basin, would be removed. Disturbed areas would be replanted with native species. Noise levels would likely be similar to those during facility construction. Wildlife in the vicinity would be disturbed by noise, and many species would be displaced to adjacent habitats. Wildlife use of the site would depend on the future activities at the site. Impacts on ecological resources from decommissioning would be SMALL.

4.1.3.8 Socioeconomics

The magnitude of the socioeconomic effects would vary, depending on the amount of contamination requiring cleanup, the length of time needed to complete decommissioning activities, and, therefore, the length of service needed for decommissioning workers. During the 10-year decommissioning phase, a construction labor pool would be needed, together with a small number of professional, scientific, management, and administrative staff positions to provide oversight of site decommissioning activities and ensure that the conduct of such activities would be protective of public health and safety and the environment.

During decommissioning, UUSA would continue to be expected to pay applicable gross receipts, corporate income, franchise, state and federal income, and property taxes in addition to unemployment insurance to the appropriate local, county, state, and federal taxing authorities. UUSA anticipates only modest changes in employment during the transition from operations to decommissioning; a small increase in the ROI unemployment rate could occur in the short term as UUSA operations workers found other jobs. Since operations workers represent only a relatively small percentage of the total ROI labor force, it is likely that some of the 258 operations employees would leave communities within the ROI during and immediately following decommissioning to seek employment elsewhere in the United States. The NRC staff therefore expects impacts on available housing, education, and health and social services to be moderate for the 10-million-SWU/yr facility decommissioning phase overall. However, because the proposed action is for the proposed facility expansion to only involve the addition of approximately eight operations staff members, the subsequent unemployment and outmigration of these few workers would not affect housing, education, and health and social services in the

ROI. Therefore, the NRC staff concludes that the socioeconomic impact from decommissioning associated with the proposed action would be SMALL.

4.1.3.9 Environmental Justice

As described in Section 3.9, for the purposes of this review, the NRC staff used low-income and minority data for a 6.4-km (4-mi) area around the UUSA site. As described elsewhere in Section 4.1.3, the impacts of decommissioning the UUSA facility would be expected to be SMALL for all of the resource areas evaluated. In addition, because there are no minority or low-income populations in the 6.4-km (4-mi) area defined by U.S. Census Bureau data and NRC guidelines, the impacts in each of these resource areas would not affect minority or low-income populations; therefore, no detailed EJ review is warranted.

Even where environmental impacts are generally SMALL, the behaviors of some subpopulations may lead to disproportionate exposure through inhalation or ingestion (e.g., higher participation in outdoor recreation, home gardening, subsistence fishing).

The analysis assessed the potential for indirect exposure to radiological material due to releases and subsequent uptake by fish. Neither census block group is located downstream of the UUSA facility. If radiation was released, there would be no increased risk of exposure due to their fish-consumption patterns. The releases of total uranium and UF_6 are projected to be extremely low, and any indirect exposure, even if it were to occur through fish consumption, would be even lower.

As discussed in Section 4.1.3.12 (Public and Occupational Health) regarding the radiological doses to the public resulting from decommissioning of the UUSA facility, it is not expected that the exposures would be greater than annual public dose limits or permitted levels.

Therefore, overall, decommissioning of the UUSA facility is not expected to result in disproportionately high or adverse impacts on minority or low-income populations.

4.1.3.10 Noise

Activities for decommissioning at the site would be similar to those used for construction, but on a far more limited scale. Decommissioning would require many of the same procedures and equipment used in traditional construction. Associated with the proposed facility capacity expansion, noise levels at the nearest residences would be correspondingly less than those for construction activities, which are discussed in Section 4.1.1.10. Therefore, potential noise impacts of decommissioning activities on the nearest residences associated with the proposed facility capacity expansion would be SMALL, and no mitigation measures would be warranted.

4.1.3.11 Transportation

Traffic during decommissioning activities, consisting of commuting workers, a few materials supply shipments, and waste and debris shipments, may be expected to be greater than traffic during normal operations, but not as great as during the construction phase of the proposed expanded facility. Therefore, the surrounding roads would be able to readily handle the decommissioning-related traffic because the current traffic levels of the roads during construction are well within their capacities, as discussed in Section 3.11. The relative number of heavy trucks hauling waste material could noticeably increase for short periods of time; however, this number is not expected to be more significant than during construction and is in character with the high percentage of truck traffic in the region due to the mining and oil industries, as reflected in Table 3-9. Thus, any traffic-related impacts associated with decommissioning would be SMALL.

If the depleted UF_6 has not already been removed at the time of decommissioning, it would be shipped offsite for conversion and disposal. The maximum number of cylinders that could be stored would be 25,000, which is the capacity of the expanded facility UBC Storage Pad (see Section 2.1.3.2). Should that many depleted UF_6 cylinders remain at the time of decommissioning, they would necessarily be required to be shipped offsite during the first 9 years of decommissioning to allow for decommissioning of the UBC Storage Pad itself. With one cylinder per truck, an average of 2,778 shipments per year would be needed, which translates to about 11 to 12 shipments per day, assuming a normal 250-day work year. Based on the peak number of tails cylinder shipments per year (1,390) evaluated in Section 4.1.2.11.2, the annual impacts could be approximately 2.0 times larger. These impacts would still be SMALL.

4.1.3.12 Public and Occupational Health

4.1.3.12.1 Non-Radiological Hazards

During decommissioning of the facility, physical hazards to workers would be similar to those during construction. Exposure hazards would include the additional possibility of worker exposure to uranium compounds and HF from residual UF_6 in process lines and equipment. Such exposures, if they occur at all, would be controlled and of short duration. Workers would use personal protective equipment to minimize and maintain exposures below occupational exposure limits. Any chemical releases resulting from decommissioning activities would not be expected to reach members of the public. Non-radiological occupational and public health impacts from facility decommissioning would therefore be SMALL.

4.1.3.12.2 Radiological Health Impacts

The decommissioning plan would account for any contamination that has occurred as a result of operations. Remediation of such contamination would be addressed during decommissioning. At the time of decommissioning, no further generation of operational process wastes and effluents would occur. However, decommissioning activities would be expected to generate emissions of radioactive and hazardous constituents to both water and air as the buildings, equipment, and ancillary facilities are decontaminated, and facility equipment and materials and decontamination wastes are removed from the site.

Decommissioning activities would be expected to slightly increase public and worker exposures to these hazards over operational levels for the short term, but such exposures would be expected to remain well below the annual public and occupational dose limits. Exposure to the depleted UF_6 cylinders on the UBC Storage Pad would be expected to diminish with the removal of any remaining cylinders as decommissioning progresses. Long-term impacts to public health would be limited because the NRC-approved site decommissioning standards would be protective of public health and safety. Therefore, the NRC staff concludes that the radiological impacts on public and occupational health for site decommissioning would be SMALL.

4.1.3.13 Waste Management

Facility decommissioning would generate a one-time demand on waste disposal capacity. The decommissioning plan would be to decontaminate the facility sufficiently to allow unrestricted reuse, leaving only building shells and site infrastructure. All recoverable items would be decontaminated with any remaining contaminated material disposed of as LLRW. Decontamination processes will produce solid and liquid LLRW. Liquids would be treated in a liquid waste disposal system as during operations (NRC, 2005a). LLRW produced during the decontamination and decommissioning process would consist of the remains of crushed centrifuge rotors, trash, citric cake, sludge from the liquid effluent treatment system, and contaminated soils from affected site basins. The total volume of radioactive waste generated during the decontamination and decommissioning period estimated for the original facility design was 5,000 m^3 (6,600 cubic yards) (NRC, 2005a). This volume would increase proportionately with the proposed expanded operations. This waste would be disposed of in a licensed LLRW disposal facility. A significant amount of aluminum, steel, and copper would be recovered from disassembly of the enrichment equipment. Uncontaminated metals would be shredded or smelted, as appropriate for security purposes before being sold on the metals market. Contaminated metal would be disposed as LLRW (NRC, 2005a). Site basins would be decontaminated to unrestricted use levels. Any remaining, depleted UF_6 would be shipped offsite for conversion and then disposed as LLRW in accordance with regulations and current agreements as discussed in Section 4.1.2.13. Hazardous wastes would be sent to a licensed hazardous waste facility for treatment and/or disposal (UUSA, 2013a). The decommissioning impacts associated with waste management are expected to be SMALL because the volumes of potential non-hazardous, hazardous, and radioactive wastes generated by decommissioning are expected to be well within the available capacity of licensed disposal facilities.

4.1.4 Proposed Mitigation Measures

In addition to adhering to the mitigation measures proposed for the construction and operation of the presently licensed facility, as described in Section 2.1.2.6, UUSA has committed to additional or updated mitigation measures applied to the construction and operation of the expanded facility (UUSA, 2013a). These additional mitigation measures are summarized in Table 4-10. The NRC staff has reviewed these proposed mitigation measures and concluded that any further measures would likely produce little additional benefit.

4.1.5 Cumulative Impacts

The Council on Environmental Quality regulations implementing NEPA define cumulative effects as “the impact on the environment which results from 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” (40 CFR 1508.7). The past, present, and

Table 4-10 Summary of Additional Mitigation Measures Proposed by UUSA for Proposed Facility Expansion Activities

Resource Area	Proposed Mitigation Measures
Land Use	No additional or updated mitigation measures were proposed.
Historic and Cultural Resources	No additional or updated mitigation measures were proposed.
Visual and Scenic Resources	No additional or updated mitigation measures were proposed.
Air Quality	No additional or updated mitigation measures were proposed.
Geology, Minerals, and Soil	• Construction equipment will be in good repair without visible leaks of oil, greases, or hydraulic fluids. • Stone construction pads will be placed at entrance/exits, if unpaved construction access adjoins a state road. • Use of BMPs during construction and operations to prevent fuel oil spills and/or releases. • BMPs will also be used for dust control associated with excavation and fill operations during construction. • BMPs will be implemented for the facility to identify potential spill substances, sources, and responsibilities. • All above-ground diesel storage tanks will be bermed.
Water Resources	The mitigation measures above for geology, minerals, and soil also act to minimize impacts to surface and ground water from contaminated soil. The following measures were also proposed to minimize impacts to surface- and ground-water resources: • Use of the BMPs will assure stormwater runoff related to these activities will not release runoff into nearby sensitive areas. • Silt fencing and/or sediment traps. • Stabilization of stockpiled soil, and, following construction, site soils will be stabilized with landscaping and pavement. • External vehicle washing (water only and controlled to minimize use). • Use of BMPs will reduce the potential for accidental spills or releases of hazardous materials or fuels. • All basins are arranged to provide for the prompt, systematic sampling of runoff in the event of any special needs. • Water quality impacts will be controlled during construction by compliance with the NPDES Construction General Permit requirements and by applying BMPs as detailed in the site SWPPP. • Any hazardous materials will be handled by approved methods and shipped offsite to approved disposal sites. Sanitary wastes generated during site construction will be sent to the City of Eunice Wastewater Treatment Plant for processing via a system of lift stations and 8-in. sewage lines. • The facility's Liquid Effluent Collection and Treatment System provides a means to control liquid waste within the facility including the collection, analysis, and processing of liquid wastes for disposal. • Liquid effluent will be solidified onsite by a vendor and then disposed of offsite. • Control of surface water runoff will be required for activities regulated by the New Mexico Environment Department. As a result, no impacts are expected to surface- or ground-water bodies.

Table 4-10 Summary of Additional Mitigation Measures Proposed by UUSA for Proposed Facility Expansion Activities (Cont.)

Resource Area	Proposed Mitigation Measures
	The following measures are designed to minimize depletion of water resources. • The installation of low-flow toilets, sinks, and showers reduces water usage when compared to standard-flow fixtures. • Localized floor washing using mops and self-contained cleaning machines reduces water usage compared to conventional washing with a hose twice per week. The use of high-efficiency closed-cell cooling towers (water/air cooling) versus the open-cell design reduces water usage.
Ecological Resources	• Minimize the amount of open trenches at any given time and keep trenching and backfilling crews close together. • Trench during the cooler months (when possible). • Avoid leaving trenches open overnight. Escape ramps will be constructed at least every 90 m (295 ft). The slope of the ramps will be less than 45 degrees. Trenches that are left open overnight will be inspected and animals removed prior to backfilling. • Consider all recommendations of appropriate state and federal agencies, including the United States Fish and Wildlife Service and the New Mexico Department of Game and Fish.
Noise	No additional or updated mitigation measures were proposed.
Waste Management	No additional or updated mitigation measures were proposed.

Source: Section 5 in the Supplemental ER (UUSA, 2013a).

reasonably foreseeable future actions considered in assessing the cumulative impacts of the proposed action are discussed in Section 4.1.5.1. The anticipated potential cumulative impacts are then presented in Section 4.1.5.2 for resource areas in which there are anticipated changes related to other activities that may arise from single or multiple actions and may result in additive or interactive effects.

4.1.5.1 Past, Present, and Reasonably Foreseeable Future Actions

The potential environmental impacts of the proposed action (i.e., the impacts associated with the construction and operation of the expanded facility and the decommissioning impacts) are presented in Sections 4.1.1 through 4.1.3. The impacts that would be considered cumulative to the impacts from the proposed action would be (1) impacts of the existing UUSA facility before the proposed facility expansion; (2) impacts resulting from the preconstruction activities for the proposed expansion; and (3) impacts of other past, present, and reasonably foreseeable future projects outside of the UUSA site. These three categories of past, present, and reasonably foreseeable future actions are discussed below.

4.1.5.1.1 Existing UUSA Facility

The potential environmental impacts of construction, operation, and decommissioning of the existing UUSA facility are presented in NUREG-1790, the NRC's NEF EIS (NRC, 2005a). The impacts are summarized in Section 2.3, Table 2-9, of that EIS.

4.1.5.1.2 Preconstruction Activities for the Proposed Facility Expansion

As discussed previously in Section 2.1.3.1, preconstruction activities for the proposed UUSA facility expansion are not considered part of the proposed action, and are instead considered past actions in this cumulative impacts assessment. Preconstruction activities would include site preparation and civil construction activities and initiating procurement of certain rebar, structural steel, and equipment (see Section 1.4.5 of UUSA [2013a]). For this EA, the preconstruction activities are assumed to have been completed prior to initiation of construction activities that are considered to be part of the proposed action.

Site preparation activities relevant to the proposed facility expansion, such as extensive land clearing and major grading, are not necessary because the bulk of the site preparation activities were performed prior to construction of the presently licensed facility (NRC, 2005a). Minimal land disturbance would result from preconstruction activities for the facility expansion. No new access roads, water lines, or electric utility lines to the site will be required for the proposed expansion (UUSA, 2013a).

For preconstruction activities, impacts would come from excavation and preparation of the building footprints for the new CRDB and for SBM-1005, SBM-1007, and SBM-1009. In addition, there would be clearing of vegetation in a 1.2-ha (3-ac) area for the new UBC Storage Pad Stormwater Retention Basins (see Figure 4-1). This area is adjacent to ongoing construction-related activities, and is currently indirectly impacted by factors such as construction noise.

The preconstruction activities would be of short duration and would involve a small number of the construction workforce, thus having a small impact on non-radiological public and occupational health. It would not change the current land use; and would have no impact on historic and cultural resources, as any known historic properties on the UUSA site have been removed. Most of the activities would take place in previously disturbed areas and are in character with the construction activities for the presently licensed facility; therefore, they would have a minimal impact on visual and scenic resources; geology, minerals, and soil; water resources; noise; environmental justice; and waste management. Some backfill would be required, but its transportation to the site would be over non-public roadways from the adjacent Wallach Concrete operation (UUSA, 2013a). The impacts of preconstruction activities on ecological resources, air quality, socioeconomics, and radiological public and occupational health from planned preconstruction activities are discussed below.

Regarding potential impacts to ecological resources, any necessary clearing and grading would result in the mortality of less-mobile species and nesting or burrowing species. Other species would likely be displaced to nearby suitable habitat. Species present on the site occur throughout the region, and extensive areas of similar habitat occur in the vicinity of the site. The types of impacts on vegetation and wildlife from preconstruction would be similar to those evaluated for the currently licensed facility (see Section 4.2.7.1 in NRC [2005a]), although at a greatly reduced scale. Land disturbance has already occurred for construction of the present facility, the impacts of which included disturbance of about 159 ha (394 ac) of sand scrub habitat. Preconstruction activities associated with the proposed action include clearing only about 1.2-ha (3 ac). Because extensive areas of similar habitat occur outside the area to be disturbed, the impacts on populations of federal special status species, including the threatened lesser prairie chicken, from the 1.2-ha (3-ac) of habitat loss associated with land clearing for the facility capacity expansion would be negligible.

Migratory birds have been observed on the UUSA site during nesting season (NRC, 2005a). Migratory birds that may nest in areas to be cleared could be disturbed. Nests could potentially be destroyed if clearing occurs during the nesting season (April 1–August 31); however, impacts could be avoided if the areas to be cleared are surveyed for active nests prior to clearing, as recommended by the New Mexico Department of Game and Fish (NMDGF, 2013). Impacts on special status species and migratory birds from preconstruction would therefore be expected to be small.

As discussed earlier in Chapter 4 of this EA, estimated air emissions associated with the construction, operation, and decommissioning activities to expand the UUSA facility would contribute to up to 0.4 percent of the Lea County total emissions, resulting in small impacts on ambient air quality and climate change. By comparison, preconstruction activities would be short-lived and therefore would have even smaller impacts on air quality and climate change.

During the preconstruction phase, UUSA anticipates modest employment impacts. Preconstruction employment would correspond to continued employment of a small portion of the existing construction workforce for the presently licensed facility. Additional, indirect economic effects would occur as a result of the spending of wages and salaries and the expenditures associated with procurement of equipment, supplies, and services in the ROI economy.

UUSA would be expected to pay applicable gross receipts, corporate income, franchise, state, and federal income, and property taxes, as well as unemployment insurance to the appropriate local, county, state, and federal taxing authorities. Also, since all construction employees for the currently licensed facility are expected to continue employment as members of the preconstruction/construction workforce for the proposed facility expansion, meaning no in-migrating population, the NRC staff expects impacts on available housing, education, and health and social services would be SMALL.

Any radiological impacts associated with preconstruction activities would be received primarily by the onsite workers, but any such impacts would be SMALL, as discussed below. Exposure to the offsite public would not be expected. Preconstruction which involves site preparation activities would not generate any radiological contamination. Preconstruction workers would be exposed to radiological emissions from existing UUSA facility operations during the overlap period of preconstruction and operation. The primary exposure pathways for preconstruction workers would be (1) external exposure from onsite sources such as the UBC Storage Pad and CRDB and (2) inhalation of air effluent releases from existing UUSA operations. The 2011 REMP results did not detect any onsite soil contamination from existing UUSA operations (UUSA, 2012e); thus, there would not be radiological doses from inhalation of dust resuspended by preconstruction activities or from external exposure to dust deposited on the ground surface. The doses to construction workers during the preconstruction phase would be significantly smaller than those for the workers in the construction phase because most of the preconstruction work will be farther from the UBC pad and will last for a short period of time.

4.1.5.1.3 Other Past, Present, and Reasonably Foreseeable Future Actions

In its 2013 Supplemental ER, UUSA provided a list of past, present, and reasonably foreseeable future actions in the vicinity of the UUSA facility that could affect the same resources as the proposed UUSA facility expansion (see Section 2.2 of UUSA, 2013a). The NRC staff reviewed this list; considered the information gathered during the staff's visit to the UUSA facility site on April 16–18, 2013; and consulted with local development boards and agencies with which proposed new projects are filed to verify the information provided by UUSA, and to find out if there would be other past, present, and reasonably foreseeable actions or activities in the area that need to be discussed in this EA. The NRC staff did not identify any such actions or activities other than those listed in UUSA's Supplemental ER.

Table 4-11 provides the list of other projects and facilities (other than the existing UUSA facility and the preconstruction activities) that have been considered by the staff in evaluating cumulative impacts. For the purposes of this analysis, past actions are those that occurred prior to the NRC's receipt of LAR 12-10 in November 2012 requesting authorization to expand the UUSA facility. Present actions are those taken between November 2012 until the anticipated start of NRC-authorized construction of the expanded UUSA facility. Future actions are those that are reasonably foreseeable during the construction, operation, and decommissioning of the expanded UUSA facility. The geographic area over which the past, present, and future actions could contribute to cumulative impacts depends on the type of resource considered and is described individually for each resource area as appropriate.

Table 4-11 Other Past, Present, and Reasonably Foreseeable Future Projects and Actions Considered in the Cumulative Impact Analysis

Project Name	Summary of Project	Location	Status
WCS	LLRW storage and disposal facility	1.6 km (1.0 mi) due east of the UUSA site	Operating
Wallach Concrete, Inc.	Produces ready-mix concrete mixture; also has a sand/aggregate quarry	Just north of the UUSA site	Operating
Sundance Industries “produced water” treatment facility	Treats produced water from oil and gas facilities	Just north of the UUSA site, collocated with the Wallach Concrete, Inc.	Operating
Lea County landfill	Sanitary landfill	Approximately 1.6 km (1.0 mi) south of UUSA site	Operating
Oil and gas facilities, various	Various oil and gas production facilities	Spread across area around the UUSA site	Operating
IIFP Fluorine Extraction Process and Depleted Uranium Conversion Plant	Conversion of depleted UF_6 to depleted uranium oxide for storage onsite and eventual transportation to a disposal facility offsite; also production of commercial fluoride products	About 32 km (20 mi) north of UUSA site, west of Hobbs, NM	Proposed (licensed by the NRC but not yet under construction)
DOE Waste Isolation Pilot Plant (WIPP)	Disposal of transuranic waste	About 80 km (50 mi) west of UUSA facility	Operating

4.1.5.2 Cumulative Impacts on Environmental Resources

The anticipated potential cumulative impacts for each resource area are discussed in the subsections that follow.

4.1.5.2.1 Land Use

Past impacts on land use include those from construction and early operation of the existing UUSA facility, preconstruction activities associated with the future construction of the expanded facility, and the “at risk” construction of SBM-1005 which, with one of the two cascades installed, is nearing completion. While industrial developments have increased in Lea County, farming/grazing is still the primary land use in the region. Because the preconstruction activities for the facility expansion and the construction and operation of the expanded facility would be consistent with those that occurred during initial construction, and would be confined to the existing footprint of the current facility, only on a larger scale, the proposed action would not be expected to significantly change land use in the area. Therefore, the NRC staff concludes that the cumulative land use impacts would be SMALL and no mitigation would be warranted. As described in Section 4.1.3.1, expected impacts on land use on the UUSA property as a result of decommissioning the UUSA facility would be SMALL, given that the site's building shells and infrastructure would remain intact for a future indeterminate use after decommissioning. The cumulative land use impacts for the region after the decommissioning of the UUSA facility would also be considered SMALL because the expected condition of the property after decommissioning (i.e., a few building shells would remain) would be consistent with the industrial character of the surrounding land use to the north, east, and west as described in Section 3.1.

4.1.5.2.2 Historic and Cultural Resources

No prehistoric or historic archaeological sites remain on the UUSA site (Ensey, 2013). The sites that were excavated on the property as part of the original licensing for the UUSA facility were all typical for the region and are well represented in the archaeological record of Lea County (Proper, 2007). The Native American Tribes consulted as part of the proposed facility expansion project did not identify any historic or cultural properties of concern in the area being affected by the proposed facility. In Sections 4.1.1.2, 4.1.2.2, and 4.1.2.3, the NRC staff concluded that the proposed action would have a SMALL impact on historic and cultural resources because no known resources remain on the UUSA property. As a result, the NRC staff concludes that the cumulative impacts on historic and cultural resources as a result of the proposed action would be SMALL. All effects on historic and cultural resources on the UUSA property were addressed in the original licensing action for the presently licensed facility.

4.1.5.2.3 Visual and Scenic Resources

The currently licensed UUSA facility and other nearby industrial facilities constitute an industrial visual presence at and in the vicinity of the UUSA site. The proposed UUSA facility expansion would result in little change in the visual character of the general area. Therefore, cumulative impacts on visual and scenic resources would be SMALL.

4.1.5.2.4 Climatology, Meteorology, and Air Quality

Despite the presence of widespread oil and gas development and other industries in the area, Lea County, which encompasses the UUSA site, along with neighboring counties in New Mexico and Texas, are in attainment for all criteria pollutants (EPA, 2013b). Currently, air emissions from industrial facilities in the immediate vicinity of the UUSA site are relatively minor (EPA, 2013d). Other considered projects such as the existing Waste Isolation Pilot Plant (WIPP) and the proposed IIFP facility are located far from the UUSA site and are not anticipated to affect local air quality.

As discussed in Sections 4.1.1.4, 4.1.2.4, and 4.1.3.4, estimated emissions associated with construction, operation, and decommissioning activities at the UUSA facility would contribute up to 0.4 percent of Lea County's total emissions. The potential impacts these activities would have on ambient air quality would be SMALL, and impacts on climate change would be minimal. Construction of waste disposal cells at the WCS waste facility, just across the New Mexico–Texas border, would add some engine exhaust and fugitive dust emissions, which would be controlled to well below the NAAQS levels (UUSA, 2013a). Thus, expected cumulative impacts on the surrounding area from both construction and operation of the WCS facility and the proposed UUSA facility expansion would be SMALL. In addition, there would be ongoing criteria pollutant and greenhouse gas emissions associated with local oil and gas development and recovery operations, such as compressor stations, gas plants, and many scattered pump jacks. Compared with emissions from local oil and gas operations, those from the proposed UUSA facility expansion project would be minor. Therefore, the UUSA facility emissions are not considered a significant contributor to cumulative air emission impacts from the local oil and gas industry.

Given the magnitude of cumulative air emissions and the relatively low contribution of the proposed UUSA facility expansion to cumulative air emissions, potential impacts from cumulative emissions on climatology, meteorology, and ambient air quality are expected to be SMALL.

4.1.5.2.5 Geology, Minerals, and Soil

The proposed action would not contribute to cumulative impacts on soils in the region because soil-related impacts are expected to be SMALL and limited to the area of the proposed facility expansion within the UUSA site boundary. The proposed action would have no effect on geology and mineral resources; therefore, no contribution to cumulative impacts on these resources would be expected.

4.1.5.2.6 Water Resources

<u>Surface Water</u>

The proposed action would not contribute to cumulative impacts on surface water in the region because there are no permanent or jurisdictional surface waters or drainage features within the UUSA site and there are no receiving waters for site runoff derived from the facility other than the detention/retention basins that control stormwater discharges.

<u>Ground Water</u>

The UUSA facility obtains its water supply from the Eunice Municipal Water Supply System, which withdraws water from highly productive ground-water sources in the High Plains (Ogallala) Aquifer (Section 3.6.2). There are four other energy production facilities in the region that rely on water from the High Plains Aquifer. The Lea County 40-year plan estimates that in 2005 total withdrawals from the aquifer, including those from these facilities, were 185,952 ac-ft/yr (60,593 million gallons per year [gpy]) (Sublett and Peery, 2009). The plan provides an assessment of impacts from existing and future beneficial uses of ground water from the High Plains Aquifer. In the plan, the UUSA facility (including the expansion) is allocated 360.5 ac-ft/yr (117 million gpy) for a total of 10,815 ac-ft (3,524 million gal) over the 30-year operational life of the facility. In 2013, UUSA estimated that water consumption at the facility (including water used in the proposed expansion) would be about 60,600 m^3/yr (16 million gpy) (UUSA, 2013a), representing about 20 percent of its annual allocation, as reported in the 40-year plan. The facility water demand is a small fraction (less than 0.03 percent) of the total aquifer demand on the High Plains Aquifer. Therefore, the NRC staff concludes that the contribution of the proposed action to cumulative water use impacts on the aquifer would be SMALL.

The proposed action would not contribute to cumulative impacts on ground water quality in the region because UUSA would continue to implement its stormwater monitoring program (to prevent the contamination of stormwater) and comply with the requirements of its NPDES General Permit and SWPPP. It would also follow the requirements of its Groundwater Discharge Permit/Plan, as required by New Mexico Water Quality Control Commission regulations (for the direct or indirect discharge of effluents and/or leachate to ground water). The potential for ground-water contamination as a result of accidental spills or releases of hazardous materials or fuels would be mitigated by the use of appropriate BMPs, as listed in Table 4-10 of this EA. In addition, the depth at which ground water occurs below the site (greater than 61 m [200 ft]) and the configuration of the retention basin (lined and designed to prevent overflow) protect ground water from contamination via surface infiltration. Furthermore, factors such as low precipitation and high evaporation rates that reduce recharge rates in the area (see Section 3.6.2.1) also serve to protect ground water from contamination via surface infiltration.

4.1.5.2.7 Ecological Resources

The Plains Sand Scrub habitat in the region of the UUSA site has been affected by domestic livestock grazing, construction of the present UUSA facility, preconstruction activities for the proposed facility expansion, and adjacent facilities, roadways, pipeline rights-of-way, and oil and gas production facilities. Impacts on habitats and wildlife from the proposed facility expansion would constitute a negligible contribution to the impacts of other local and regional activities. The small area of habitat loss associated with the proposed expansion would be a negligible percentage of the habitat surrounding the site. Thus, the cumulative impact on ecological resources would be SMALL.

4.1.5.2.8 Socioeconomics

Cumulative socioeconomic impacts could result from future expansion or contraction of the local economy and population in response to the development of industrial and commercial facilities in the ROI in addition to the proposed UUSA facility expansion, particularly if multiple facilities begin construction or operation within similar timeframes, creating potential issues with the provision of sufficient infrastructure, housing, and educational and public services.

The WCS disposal facility was projected to have a peak construction force of about 40 full-time workers and approximately 40 permanent operations workers (UUSA, 2013a). Residing in the two-county ROI, WCS construction and operations workers would likely have small impacts on the housing and community services in the ROI.

Preconstruction associated with the proposed IIFP facility is projected to take approximately 1 year, with between 35 and 70 workers involved, primarily heavy equipment operators and structural crafts workers, most of whom would be expected to come from the ROI. Phase 1 construction of the proposed IIFP facility would employ 140 workers, and between 150 and 180 workers employed during Phase 2; of these, 15 percent are expected to move into the ROI from elsewhere in the United States (NRC, 2012c). Operations would require a maximum of 40 workers (NRC, 2012c), with 20 percent of this workforce in-migrating into the ROI. Given the relatively small size of the construction and operations workforce, the NRC staff concludes that socioeconomic impacts from IIFP construction and operations would be small. It is possible, given the location and the required construction skills and trades, that any IIFP construction activities and UUSA continuing construction would draw from the same labor force.

No other large-scale projects are anticipated in the near future that would significantly impact the socioeconomics of Lea County, New Mexico, or Andrews County, Texas. Because the proposed UUSA facility expansion is expected to make only a small incremental contribution to socioeconomic impacts in the ROI, the NRC staff concludes that the cumulative socioeconomic impacts of the proposed action would be SMALL.

4.1.5.2.9 Environmental Justice

If multiple facilities, in addition to the UUSA facility, begin construction or operation within similar timeframes, cumulative environmental justice impacts in the 6.4-km (4-mi) area around the UUSA facility could create potential environmental and health and safety issues for low-income and minority population groups.

Two industrial facilities, the WCS disposal facility and the proposed IIFP facility, would be under construction and in operation during a similar timeframe in the vicinity of the UUSA facility. No other large-scale projects are anticipated in the near future that would potentially affect the 6.4-km (4-mi) area around the UUSA facility.

However, because there are no minority or low-income populations in the 6.4-km (4-mi) area defined by U.S. Census Bureau data and NRC guidelines, as described in Section 3.9, any impacts caused by the proposed UUSA facility expansion would not disproportionately affect minority or low-income populations; therefore, the NRC staff concludes that there are no EJ concerns in the context of this cumulative impacts analysis.

4.1.5.2.10 Noise

In general, about 3.2–4.8 km (2–3 mi) is the farthest distance at which noise would be discernible, other than extremely loud noise (e.g., a large explosion), and expected noise levels will mostly affect a 1.6-km (1-mi) radius. Thus, noise is a localized issue. In general, if another identical stationary noise source is added over an existing stationary noise source, the combined noise level would increase by 3 dBA, which is barely noticeable by the human ear (NWCC, 2002). Likewise, doubling traffic volume would increase the noise level by about 3 dBA.

Noise levels from facility operations are significantly lower than those from construction because most noisy equipment is placed inside the buildings. Therefore, noise from facility operations would add little to ambient noise levels. Currently, noise levels at the nearest residences and neighboring communities are primarily from highway traffic, and contributions from ongoing operations at the UUSA site along with its surrounding facilities are minor (see Section 3.10). Construction at the nearby WCS site is the only relatively high noise-generating project near the UUSA site now occurring, and such noise is expected to continue into the foreseeable future. Construction noise associated with the proposed UUSA facility expansion would be added to the construction noise from the nearby WCS site. As discussed in Section 4.1.1.10, potential noise impacts on the nearest residences associated with construction of the proposed facility expansion would be SMALL. If construction at the WCS site occurs simultaneously with the construction of the proposed UUSA facility expansion, the NRC staff estimates that noise levels would increase by about 3 dBA at the nearest residences, which is a barely noticeable difference. This increase is indiscernible or rarely audible due to higher background levels along NM 18 and 176. Associated with these projects, commuter, delivery, and support vehicular traffic on the two highways would somewhat increase the noise level at the nearest residences; however, individuals in these residences would not recognize a noise level change caused by increasing traffic volume. The potential impacts of expanded operation and decommissioning of the UUSA facility on the nearest residences would be lower than those of construction, as discussed in Sections 4.1.2.10 and 4.1.3.10. Therefore, the cumulative noise impacts from the construction, operation, and decommissioning of the proposed UUSA facility expansion and WCS projects, combined with operation of other nearby facilities around the UUSA site, would be SMALL.

4.1.5.2.11 Transportation

The construction, operation, and decommissioning activities associated with the proposed UUSA facility expansion would have a SMALL impact on traffic, as discussed in Sections 4.1.1.11, 4.1.2.11, and 4.1.3.11. Current operations at and in the vicinity of the UUSA site that contribute to local traffic include the presently licensed UUSA facility, preconstruction activities for the proposed UUSA facility expansion, the Wallach Concrete and Sundance Industries facilities to the north, the Lea County landfill to the southeast, the WCS disposal facility to the east, and regional oil and gas activities. Currently foreseeable actions include the continuation of these actions in addition to those from the proposed IIFP conversion facility in Hobbs. The WCS disposal facility is expected to receive about 4,600 shipments per year (WCS, 2007), which translates to about 40 trucks per day, including return trips, coming and going on NM 176 adjacent to the UUSA site. The IIFP facility is expected to add approximately 180 commuting workers during construction and up to about 160 workers during full operation. Operations at IIFP would also add about 16 roundtrip shipments of non-radiological and radiological material per day (NRC, 2012c). The IIFP facility would be west of Hobbs, and most of its traffic impacts would be on NM 483 and US 62/180. Most of the IIFP workers are expected to come from the Hobbs area. Thus, the impact of additional traffic in the vicinity of the UUSA site on NM 176 is expected to remain SMALL, including the additional WCS shipment traffic.

The radiological transportation risk associated with the proposed UUSA facility expansion would be SMALL, as discussed in Section 4.1.2.11. Other regional radiological transportation risks would be those associated with the WIPP, any future IIFP facility, and the WCS disposal site. On an annual basis, radiological transportation risks to the general public from WIPP and IIFP transportation are anticipated to be much less than 1 LCF and 0.1 LCF, respectively (NRC, 2012c). Annual radiological transportation risks for LLRW shipments to the WCS disposal facility are estimated to be approximately 0.1 LCF (WCS, 2007). The cumulative annual radiological transportation risk for the UUSA facility (existing facility and proposed expansion), the WCS disposal facility, WIPP, and any future IIFP would be SMALL, as less than 1 LCF would be expected.

4.1.5.2.12 Public and Occupational Health

<u>Non-Radiological Public and Occupational Hazards</u>

With regard to potential occupational injuries and occupational chemical exposures to workers, the proposed UUSA facility expansion would not result in cumulative effects on construction or operational workers because UUSA workers would not be subject to occupational injury or chemical exposure generated by employment at any offsite facilities. With regard to potential non-occupational chemical exposures to both facility workers and members of the public, there are a number of other facilities and activities in proximity to the UUSA site that might produce chemical or particulate emissions and resulting exposures, including the nearby WCS facility, Wallach Concrete, Lea County landfill, and numerous oil and gas well operations. In this context, exposures to members of the public from the expanded facility's chemical emissions during operation would be cumulatively minor. HF is the chemical emission of greatest concern from the UUSA facility. Emissions of HF and uranium from expanded operations are estimated to increase only on the order of 20 percent over what are already very low levels for the existing facility (as discussed above in Section 4.1.2.12.1, emissions of HF and uranium are several orders of magnitude or more below levels of health concern). Similarly, chemical exposures to UUSA workers from both occupational and offsite exposures would be cumulatively minor because occupational exposures would be very low and would make a small contribution to cumulative exposure. Offsite chemical exposures to both UUSA workers and members of the public would be limited by environmental regulations that protect the public. Cumulative non-radiological effects would thus be SMALL.

<u>Radiological Public and Occupational Hazards</u>

In addition to the existing UUSA facility, one proposed and two operating nuclear facilities are located within 80 km (50 mi) of the proposed UUSA facility expansion site: (1) LLRW storage and disposal facility (WCS) operating 1.6 km (1.0 mi) east of the UUSA site; (2) a proposed depleted UF_6 conversion facility (IIFP) that would be located approximately 32 km (20 mi) north of the UUSA site; and (3) transuranic waste disposal site (WIPP) operating approximately 80 km (50 mi) west of the UUSA site.

The WCS LLRW disposal site in the State of Texas is located adjacent to the UUSA site. Therefore, there would be a cumulative radiological dose impact to the public from the expanded operations at the UUSA facility and the ongoing operations at the WCS disposal site. The maximum estimated TEDE for a full-year exposure received by a resident at the WCS fence line is 9.5 mrem/yr (UUSA, 2013b). This dose will be cumulative with the UUSA predicted dose equivalent if the resident is located at the WCS fence line. UUSA modeled the maximum potential fence line exposure to be 9.4 mrem for 2,000 hours of exposure. For a full-year (8,760 hours) occupancy at the fence line, the impact would be approximately 41 mrem/yr. The cumulative dose (<0.51 mSv/yr [<51 mrem/yr]) from both of these sources (UUSA facility expansion and WCS operations) to a receptor for a full-year occupancy at the fence line would be less than the 100 mrem/yr public dose limit in 10 CFR 20.1301.

The IIFP facility would be located approximately 32 km (20 mi) away from the UUSA facility, and the WIPP facility is located approximately 80 km (50 mi) away from the UUSA facility. Therefore, these facilities would not contribute significantly to the MEI dose and, therefore, will not contribute to the cumulative radiological impact on public and occupational health.

As indicated by the above analysis, the cumulative collective radiological impacts on the offsite population from all sources would be below the 1 mSv/yr (100 mrem/yr) dose limit (10 CFR Part 20) to the offsite MEI. In addition, under Gaseous Effluent Impacts in Section 4.1.2.12.2, the general population within 80 km (50 mi) of the UUSA facility would receive a collective dose of 0.00047 person-Sv (0.047 person-rem), a dose that does not contribute appreciably to present or future collective exposures. Therefore, the proposed action's cumulative impact on public radiological health would be SMALL.

4.1.5.2.13 Waste Management

Waste management activities at the presently licensed UUSA facility and proposed expansion are analyzed in Sections 4.1.1.13, 4.1.2.13, and 4.1.3.13 largely in terms of the relative demands of various waste streams on the total capacity of affected offsite waste treatment and disposal facilities, including facilities for non-hazardous, hazardous, LLRW, and mixed wastes. Cumulative impacts of the proposed facility expansion on the capacity of licensed disposal facilities are estimated to be SMALL for all waste types, including LLRW from the conversion of depleted UF_6 to uranium oxide, based on the small contribution of these wastes to the overall capacity of available disposal facilities as analyzed in Section 4.1.2.13. In addition, the newly opened and adjacent WCS LLRW disposal facility may provide additional capacity for LLRW from the UUSA facility. In any case, the availability of this facility for the disposal of LLRW from the UUSA facility would mitigate the cumulative effects of the current facility and proposed expansion on the overall radioactive waste management system by increasing overall capacity, even if it is not currently available to UUSA.

The current analysis also considers the effects of expanded UUSA operations on the capacity of the foreseeable IIFP and existing Paducah and Portsmouth depleted UF_6 conversion facilities. With respect to the conversion of depleted UF_6 to uranium oxide, other proposed enrichment facilities that could also place demands on the available depleted UF_6 conversion (and LLRW disposal) facilities of a magnitude similar to that from the UUSA facility include the ACP in Piketon, Ohio (NRC, 2006); the EREF near Idaho Falls, Idaho (NRC, 2011a); and the GLE Facility in Wilmington, North Carolina (NRC, 2012a). The EREF alone is projected to produce depleted UF_6 tails equal to 74 percent and 132 percent, respectively, of the current inventories at the Paducah and Portsmouth conversion facilities (NRC, 2011a), while the proposed UUSA facility expansion is estimated to represent 34 percent and 62 percent of the current Paducah and Portsmouth inventories, respectively (Section 4.1.2.13). Clearly, available and foreseeable conversion capacity would be strained by the demands of all of the depleted UF_6 produced by these proposed facilities, if they later start uranium enrichment operations. Thus, the cumulative waste management impacts from the depleted UF_6 from the proposed expansion, in conjunction with the depleted UF_6 from any future operation of the other three licensed enrichment facilities, would be MODERATE.

4.2 No-Action Alternative

Under the no-action alternative, described in Section 2.2.1 of this EA, the proposed UUSA facility expansion described in Sections 1.2 and 2.1 would not be constructed and the facility capacity would remain as presently licensed for 3 million SWU/yr along with the associated impacts as addressed in the NEF EIS (NRC, 2005a). Potential impacts associated with uranium enrichment capacity supplied by construction and operation of other licensed or future proposed uranium enrichment facilities have been or would be evaluated, respectively, under separate NEPA evaluations. As discussed in Section 2.1.3.1, UUSA has carried out, and expects to carry out, preconstruction activities, i.e., certain site preparation activities and other activities that have no reasonable nexus to radiological health and safety or the common defense and security. UUSA has already engaged in some “at risk” construction of SBM-1005 which, with one of the two cascades installed, is nearing completion. If the NRC does not ultimately grant UUSA a license amendment for the proposed facility expansion, the preconstruction activities and the “at risk” construction of SBM-1005 would be activities associated with the no-action alternative. The conclusions presented in this section for the no-action alternative address the impacts of the NRC denying the license amendment, but do not include the impacts of the preconstruction activities, which have been addressed in Section 4.1.5, Cumulative Impacts.

As discussed in Section 2.2.2, other alternatives, including alternative sites and alternative technologies, have been eliminated from detailed consideration in this EA. The environmental impacts of alternatives involving other sites and technologies would have impacts similar to or greater than the impacts from the proposed action. Therefore, the no-action alternative is limited to the proposed action and its associated positive or adverse environmental effects not occurring. Potential environmental impacts of the no-action alternative to each resource area are discussed below.

4.2.1 Land Use

Under the no-action alternative, construction and operation of the proposed facility expansion would not take place and, thus, there would be no additional alterations to current land use. Therefore, land use impacts would be SMALL.

4.2.2 Historic and Cultural Resources

Because all historic and cultural resource issues on the UUSA property were addressed during the original licensing action for the presently licensed UUSA facility and construction and operation of the proposed facility expansion would not occur, the no-action alternative would have no effect on historic and cultural resources and the impact would be SMALL.

4.2.3 Visual and Scenic Resources

Under the no-action alternative, the proposed facility capacity expansion would not occur. Visual impacts would be the same as those evaluated for the currently licensed facility (NRC, 2005a) and would remain SMALL.

4.2.4 Climatology, Meteorology, and Air Quality

Under the no-action alternative, no facility expansion at the UUSA site would occur. Thus potential impacts on climatology, meteorology, and ambient air quality under this alternative would be the same as those evaluated for the currently licensed facility and would remain SMALL.

4.2.5 Geology, Minerals, and Soil

Under the no-action alternative, there would be no facility expansion at the UUSA site. Therefore, there would be no soil-related impacts and no impact on geology and minerals.

4.2.6 Water Resources

Under the no-action alternative, there would be no facility expansion at the UUSA site. Therefore, there would be no associated ground-water quality impacts or ground water use; thus, ground-water-related impacts under this alternative would be SMALL. There would be no impacts on surface water because there are no surface water bodies on the site.

4.2.7 Ecological Resources

Under the no-action alternative, the proposed facility expansion would not occur, and there would be none of the associated impacts on ecological resources. Impacts on vegetation and wildlife from facility operations would be the same as those evaluated for the currently licensed UUSA facility and would remain SMALL.

4.2.8 Socioeconomics

Under the no-action alternative, the proposed facility expansion would not occur and employment and taxation of UUSA would remain at current levels. Therefore, the impacts would be SMALL.

4.2.9 Environmental Justice

Under the no-action alternative, the proposed facility expansion would not occur. Because there are no minority or low-income populations in the 6.4-km (4-mi) area around the site, there would be no disproportionate impacts on low-income or minority residents, and EJ impacts would remain SMALL (NRC, 2005a).

4.2.10 Noise

Under the no-action alternative, no facility expansion at the UUSA site would occur. Thus, potential noise-related impacts under this alternative would be the same as those evaluated for the currently licensed facility and would remain SMALL (NRC, 2005a).

4.2.11 Transportation

Under the no-action alternative, the proposed facility expansion would not occur and construction activities, including construction-related traffic, would cease with the completion of the facility as currently licensed. Impacts on transportation from facility operations would be the same as those evaluated for the currently licensed facility (NRC, 2005a). Therefore, transportation impacts would remain SMALL.

4.2.12 Public and Occupational Health

Under the no-action alternative, construction for the facility expansion would not occur. Radiological and non-radiological impacts on workers during operation of the presently licensed facility would be the same as those evaluated in the NEF EIS (NRC, 2005a). Therefore, the impacts of the no-action alternative would be SMALL.

4.2.13 Waste Management

Under the no-action alternative, the proposed facility expansion would not occur and waste management impacts would be the same as those evaluated for the currently licensed facility (NRC, 2005a). Environmental impacts from waste management and disposal activities would thus remain SMALL.

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5 Agencies and Persons Consulted

The following sections list the agencies/organizations and persons contacted by the NRC staff to discuss the proposed UUSA facility expansion project and/or obtain comments, information, and data for use in preparing this EA. Position titles/functions of agency/organization personnel are included where known.

The draft EA was sent to NMED for review on December 16, 2014. NMED responded with comments on January 16, 2015 (NMED, 2015). A number of these comments related to a UUSA request to modify a New Mexico ground water discharge permit that NMED was reviewing, and the potential effects such a modification would have on the UBC Storage Pad and stormwater retention basins. The UUSA request to modify the New Mexico ground water discharge permit was not part of the proposed action addressed in the draft EA. UUSA has now withdrawn its permit modification request (UUSA, 2015), and the NRC staff views this withdrawal as having mooted the related NMED comments. In response to the remaining NMED comments on the draft EA, this final EA has been revised where applicable.

5.1 Federal Agencies

Advisory Council on Historic Preservation, Office of Federal Agency Programs, Washington, DC

- Reid Nelson, Director

U.S. Department of the Interior, Fish and Wildlife Service, New Mexico Ecological Service Field Office, Albuquerque, New Mexico

- Wally Murphy, Field Supervisor
- Eric W. Hein, Chief, Terrestrial Ecosystems Branch

5.2 Federally Recognized Native American Tribes

Apache Tribe of Oklahoma, Anadarko, Oklahoma

- Donnie Cabniss, Chairman

Comanche Nation Tribe, Lawton, Oklahoma

- Wallace Coffey, Chairman

Kiowa Indian Tribe of Oklahoma, Carnegie, Oklahoma

- Amber Poppah, Chairwoman

Mescalero Apache Tribe, Mescalero, New Mexico

- Mark R. Chino, President

Ysleta del Sur Pueblo, El Paso, Texas

- Frank Paiz, Governor
- Javier Loera, War Captain/Tribal Historic and Preservation Officer

5.3 State Agencies

New Mexico Department of Game and Fish, Conservation Services Division, Santa Fe, New Mexico

- Matthew Wunder, Chief

New Mexico State Historic Preservation Office, Historic Preservation Division, Santa Fe, New Mexico

- Dr. Jeff Pappas, State Historic Preservation Officer
- Michelle M. Ensey, Archaeologist

5.4 Local Governments and Agencies

Lea County, Hobbs, New Mexico

- Michael Gallagher, Lea County Manager
- Ron Black, Lea County Commissioner
- Corey Needham, Lea County Public Works Director

City of Hobbs, New Mexico

- Kris Allen, Fire Chief
- Tim Kent, Battalion Chief
- Sam Cobb, Mayor
- Garry Buie, City Commissioner
- Todd Randall, City Engineer
- Toby Spears, Finance Director

City of Eunice, New Mexico

- Matt White, Mayor
- Martin Moore, City Manager
- Tyerone Hardy, Public Works Director
- Richard Cummins, Fire Chief
- Casey Arcidez, Police Department representative
- Jesse Davis, Emergency Medical Services Division Chief
- Eddy Fabela, Fire Division Chief
- Jacob Haynes, Emergency Medical Services Lieutenant
- Derek Cox, Emergency Medical Technician/Firefighter
- Martin Moore, City Manager

6 Conclusion

Based on its review of the proposed action relative to the requirements set forth in 10 CFR Part 51, the NRC staff has determined that the amendment to NRC License SNM-2010, authorizing expansion of UUSA's presently licensed uranium enrichment facility near Eunice, New Mexico, and operation at an annual production capacity of 10 million SWU, would not significantly affect the quality of the human environment. In its license amendment request, UUSA is proposing to increase production using similar technology to that already employed at its existing facility at the site. In its 2014 supplement to LAR 12-10, UUSA is proposing the incorporation of an additional modified enrichment process for re-feed of tails material. For the new process, UUSA identified two new IROFS required to mitigate a new potential accident sequence. This potential accident sequence is considered in the NRC staff's safety review. In addition, in the supplement to its license amendment request, UUSA is proposing increases of mass possession limits for natural, depleted, and enriched uranium that are consistent with the operation of a 10-million-SWU/yr facility. Gaseous emissions would continue to be treated prior to discharge and monitored in accordance with applicable license and permit requirements and would be expected to remain within regulatory limits for non-radiological and radiological components. There would be no liquid effluents discharged from the facility except for sanitary wastewater piped to the Eunice wastewater treatment plant. Public and occupational radiological dose exposures would be expected to remain below the 10 CFR Part 20 regulatory limits. Therefore, based on this assessment, in accordance with 10 CFR 51.31, preparation of an EIS is not required for the proposed action, and pursuant to 10 CFR 51.32, a finding of no significant impact is appropriate.

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