NUREG-1790

Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico

Draft Report for Comment

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555-0001

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Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
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ABSTRACT

Louisiana Energy Services (LES) has submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct, operate, and decommission a gas centrifuge uranium enrichment facility near Eunice, New Mexico, in Lea County. The proposed facility, referred to as the National Enrichment Facility (NEF), would produce enriched uranium-235 (^{235}U) up to 5 weight percent by the gas centrifuge process with a production of 3 million separative work units per year. The enriched uranium would be used in commercial nuclear power plants. The proposed NEF would be licensed in accordance with the provisions of the *Atomic Energy Act*. Specifically, an NRC license under Title 10, "Energy," of the *U.S. Code of Federal Regulations* (10 CFR) Parts 30, 40, and 70 would be required to authorize LES to possess and use special nuclear material, source material, and byproduct material at the proposed NEF site.

This Draft Environmental Impact Statement (Draft EIS) was prepared in compliance with the *National Environmental Policy Act* (NEPA) and the NRC regulations for implementing NEPA. This Draft EIS evaluates the potential environmental impacts of the proposed action and its reasonable alternatives. This Draft EIS also describes the environment potentially affected by LES's proposal, presents and compares the potential environmental impacts resulting from the proposed action and its alternatives, and describes LES's environmental monitoring program and mitigation measures.

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BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) is considering whether to issue a license, pursuant to Title 10, "Energy", of the *U.S. Code of Federal Regulations* (10 CFR) Parts 30, 40, and 70, that would allow the construction, operation, and decommissioning of a gas centrifuge uranium enrichment facility near Eunice in Lea County, New Mexico. This action would be taken in response to an application filed with the NRC by Louisiana Energy Services, Limited Partnership (LES) by letter dated December 12, 2003. To support its licensing decision on the proposed National Enrichment Facility (NEF), the NRC determined that an Environmental Impact Statement (EIS) is required by the NRC's *National Environmental Policy Act* (NEPA)-implementing regulations in 10 CFR Part 51.

The enriched uranium produced at the proposed NEF would be 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 (^{235}U) isotope. Uranium ore usually contains approximately 0.72 weight percent ^{235}U. In order to be useful in nuclear power plants as fuel for electricity generation, the uranium must be enriched up to 5 weight percent.

THE PROPOSED ACTION

The proposed action considered in this Draft Environmental Impact Statement (Draft EIS) is for LES to construct, operate, and decommission a uranium enrichment facility known as NEF at a site near Eunice in Lea County, New Mexico. By letter dated December 12, 2003, LES filed an application with the NRC for a license to possess and use special nuclear material, source material, and byproduct material at the site. The proposed NEF, if approved, would be situated on Section 32 located approximately 32 kilometers (20 miles) south of Hobbs, New Mexico, 8 kilometers (5 miles) east of Eunice, New Mexico, and about 0.8 kilometer (0.5 mile) from the New Mexico/Texas State line on New Mexico Highway 234. The proposed NEF would be built on land for which a 35-year easement has been granted by the State of New Mexico, which owns the property.

The proposed NEF would produce ^{235}U enriched up to 5 weight percent by a gas centrifuge process with a nominal production of 3 million separative work units (SWUs) per year. If the license is approved, facility construction would be scheduled to begin in 2006 and continued for 8 years through 2013. The proposed NEF operation would begin in 2008 with initial production beginning in 2008. Peak production would be achieved in 2013. Operations would continue at peak production until approximately 9 years before the license expires, at which time decommissioning activities would be phased in with completion by 2036.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The proposed NEF would provide an additional, reliable, and economical domestic source of enrichment services. This facility would contribute to the attainment of national energy security policy objectives by providing for additional source of low-enriched uranium. Nuclear power plants are currently supplying approximately 20 percent of the Nation's electricity requirements, but only about 15 and 14 percent of the enrichment services that were purchased by U.S. nuclear reactors in 2002 and 2003, respectively, were provided by enrichment plants located in the United States. Currently, the only uranium enrichment facility in operation in the United States is located in Paducah, Kentucky, imposing reliability risks for the supply of domestically generated enriched uranium. The Administration's energy policy, which was released in May 2001, recognized this need and stated the importance of having a reliable source of enriched uranium for national energy security purposes. The production of enriched uranium at the proposed NEF would be equivalent to about 25 percent of the current and projected demand for enrichment services within the U.S.

> ***Determination of the Significance of Potential Environmental Impacts***
>
> *A standard of significance has been established for assessing environmental impacts. Based on the Council on Environmental Quality's regulations, each impact is to be assigned one of the following three 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.*

ALTERNATIVES

The no-action alternative is considered in this Draft EIS. Under the no-action alternative, the proposed NEF would not be constructed, operated, and decommissioned in Lea County, New Mexico. The proposed NEF site uses and characteristics would remain unchanged. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.

Prior to submitting the license application in December 2003, LES considered alternative sites. Alternative sites proposed by LES included 44 sites throughout the United States. These sites were evaluated by LES based on various technical, safety, economic, and environmental factors. LES concluded that the site considered in the proposed action met all of these objectives and criteria. The NRC staff reviewed the site selection process and determined that none of the candidate sites were obviously superior to the LES preferred site in Lea County, New Mexico; therefore, no other site was selected for further analysis.

The NRC staff examined two reasonable alternatives to fulfill domestic enrichment needs: (1) reactivate the Portsmouth Gaseous Diffusion Facility near Piketon, Ohio; and (2) purchase low-enriched uranium from foreign sources. These alternatives were eliminated from further consideration based on costs, excessive energy consumption, and national energy security vulnerability.

Alternative technologies to the gas centrifuge process were also considered. These technologies included the Electromagnetic Isotope Separation Process, Liquid Thermal Diffusion, Atomic Vapor Laser Isotope Separation, and the Separation of Isotopes by Laser Excitation. These technologies, however, are not economically viable or remain at the research developmental scale and were therefore eliminated from further consideration.

POTENTIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Potential environmental impacts of the proposed action are evaluated in this Draft EIS and summarized below. The environmental impacts from the proposed action are generally SMALL to MODERATE and would be mitigated by methods described in Chapter 5. Environmental monitoring methods are described in Chapter 6.

Land Use

Small Impact. Construction activities would occur on about 81 hectares (200 acres) of a 220-hectare (543-acre) site that would be fenced. The land is currently undisturbed except for a gravel access road, cattle grazing, and the presence of a carbon dioxide pipeline. There are sufficient lands surrounding the proposed site for relocation of the pipeline and cattle grazing.

Historical and Cultural Resources

Small Impact. Seven archaeological sites were recorded on the proposed site. These sites are considered eligible for listing on the National Register of Historic Places. Two sites would be impacted by construction activities and a third is located along the access road. Based on the terms and conditions of a Memorandum of Agreement that is being prepared, a historic properties treatment plan would be fully implemented prior to construction of the proposed facility. A written plan for inadvertent discoveries would be developed prior to construction.

Visual and Scenic Resources

Small Impact. Impacts from construction activities would be limited to fugitive dust emissions that can be controlled using dust-suppression techniques. The cooling towers could contribute to the creation of fog 0.5 percent of the total number of hours per year. The proposed NEF site received the lowest scenic-quality rating using the U.S. Bureau of Land Management (BLM) visual resource inventory process.

Air Quality

Small Impact. Air concentrations of the criteria pollutants predicted for vehicle emissions and particulate matter of less than 10 microns (PM_{10}) emissions for fugitive dust during construction would all be below the National Ambient Air Quality Standards. Fugitive dust emissions would be temporary and localized. A National Emissions Standards for Hazardous Air Pollutants (NESHAP) Title V permit would not be required for operations due to the low levels of estimated emissions. All stack emissions would be monitored.

Geology and Soils

Small Impact. Construction-related impacts to the geology and soil would occur within the 81-hectare (200-acre) portion of the site that would contain the proposed NEF structures. Only onsite soils would be used during construction. No soil contamination would be expected during construction and operations. A plan would be in place to address any spills that may occur. No construction or operational impacts would occur on unique mineral deposits or geological resources.

Water Resources

Small Impact. There are no existing surface water resources. National Pollutant Discharge Elimination System (NPDES) general permits for construction and operations would be required to manage stormwater. Retention basins (i.e., the Treated Effluent Evaporative Basin and the Uranium Byproduct Cylinder (UBC) Storage Pad Stormwater Retention Basin) would be lined to minimize infiltration of water into the subsurface. Infiltration from the Site Stormwater Detention Basin and septic system leach fields could be expected to form a perched layer on top of the Chinle Formation, but there would be limited downgradient transport because of soil storage capacity and upward flux to the root zone. Impacts on water use would be SMALL because of the availability of excess capacity in the Hobbs and Eunice water supply systems. The proposed NEF's use of Ogallala Aquifer's waters indirectly through the Eunice and Hobbs water supply systems would constitute a small portion of the aquifer reserves in the New Mexico territory.

Ecological Resources

Small Impact. Construction, operation, and decommissioning of the proposed NEF would result in SMALL impacts to ecological resources. There are no wetlands or unique habitats for threatened or endangered plant or animal species on the proposed NEF site. A large portion of the site would remain undisturbed and in its natural status. Impacts from the use of water retention/detention basins would be SMALL because animal-friendly fencing and netting over the basins would be used to minimize animal intrusion. Revegetation using native plant species would be conducted in any areas impacted by construction activities.

Socioeconomics

Moderate Impact. During the 8-year construction period, there would be an average of 397 jobs per year created (about 19 percent of the Lea, Andrews, and Gaines Counties' construction labor force) with employment peaking at 800 jobs in the fourth year. Spending on goods and services and wages would create about 582 new jobs on average. Construction would cost $1.2 billion (2002 dollars). About 15 percent of the construction workforce would be expected to take up residency in the surrounding community, and about 15 percent of the local housing units are unoccupied. The impact to local schools would be minimal. Operations would employ a maximum of 210 people annually with an additional 173 indirect jobs being created. Increase in demand for public services would be SMALL. Decontamination and decommissioning would generally have SMALL impacts. Use of a U.S. Department of Energy (DOE) conversion facility in Paducah, Kentucky, or near Portsmouth, Ohio, for disposition of depleted uranium hexafluoride (DUF_6) could extend the operating life of the conversion facility, and therefore, the socioeconomic impacts associated with the operation. If a new private conversion facility is constructed, the resulting socioeconomic impacts would be similar to those expected for the construction and operation of the DOE conversion facility near Portsmouth, Ohio.

Environmental Justice

Small Impact. Examination of the various environmental pathways by which low-income and minority populations could be disproportionately affected reveals no disproportionately high and adverse impacts from either construction or normal operations over a 80-kilometer (50-mile) radius. Impacts would be SMALL, and no disproportionately high and adverse impacts would occur to minority or low-income populations living near the proposed NEF or along the transportation routes into and out of the proposed NEF.

Noise

Small Impact. Noise levels would be predominately from traffic. Construction activities could be limited to normal daytime working hours. The nearest residence is 4.3 kilometers (2.6 miles) away from the proposed site and noises at this distance from construction activities would be negligible. Noise levels during operations would be within the U.S. Department of Housing and Urban Development guidelines.

Transportation

Small to Moderate Impact during Construction. Traffic on New Mexico Highway 234 would almost double during construction, and three injuries and no fatalities could occur during the peak construction employment year due to workforce traffic and delivery of construction materials. Peak truck traffic during construction could cause less than one injury and less than one fatality.

Small Impact during Normal Operations; Small to Moderate during Accidents. Truck trips removing nonradioactive waste and delivering supplies would have a SMALL impact on the traffic on New Mexico Highway 234. Workforce traffic would also have a SMALL impact on New Mexico Highway 234 with less than one injury and less than one fatality annually expected due to traffic accidents. All truck shipments of feed, product, and waste materials (including the dispositioning of DUF_6) would be expected to result in 2 latent cancer fatalities (LCFs) to the general population over the life of the proposed NEF due to vehicle emissions and less than 1×10^{-2} LCF due to direct radiation. All rail shipments of feed, product, and waste materials would be expected to result in less than 7×10^{-2} LCF to the general population over the life of the proposed NEF due to vehicle emissions and 1×10^{-1} LCF from direct radiation. If a rail accident involving the shipment of DUF_6 occurs in an urban area, approximately 28,000 people could suffer adverse, but temporary, health effects with no fatalities due to chemical impacts. A truck accident involving the shipment of DUF_6 in an urban area could cause temporary adverse chemical impacts to approximately 1,700 people.

Small Impact during Decommissioning. SMALL impacts would occur if DUF_6 is temporarily stored at the proposed NEF for the duration of operations. Assuming that all of the material is shipped during the first 8 years (the final radiation survey and decontamination would occur during year 9), the proposed NEF would ship approximately 1,966 trucks per year. If the trucks are limited to weekday, non-holiday shipments, approximately 10 trucks per day or 2-1/2 railcars per day would leave the site for the DUF_6 conversion facility.

Public and Occupational Health and Safety

Small Impact during Construction and Normal Operations. During construction, fatality would not be likely to occur (probability of fatality is less than one fatality per year). Construction workers could receive radiation doses of up to 0.05 millisievert (5 millirem) per year once the operation of the proposed NEF begins. During normal operations, there would be approximately eight injuries per year and no fatalities based on statistical probabilities. A typical operations or maintenance technician could receive 1 millisievert (100 millirem) of radiation exposure annually. A typical cylinder yard worker could receive 3 millisievert (300 millirem) of radiation exposure annually. All public radiological exposures are significantly below the 10 CFR Part 20 regulatory limit of 1 millisievert (100 millirem) and 40 CFR Part 190 regulatory limit of 0.25 millisieverts (25 millirem) for uranium fuel-cycle facilities. Members of the public who are located at least a few miles from the UBC Storage Pad would have annual direct radiation exposures combined with exposure through inhalation result in SMALL impacts significantly less than 0.01 millisievert (1 millirem), resulting in SMALL impacts.

Small to Moderate Impact for Accidents. The most severe accident is estimated to be the release of UF_6 caused by rupturing an overfilled and/or overheated cylinder, which could incur a collective population dose of 120 person-sieverts (12,000 person-rem) and 7 latent cancer fatalities. The proposed NEF design would reduce the likelihood of this event by using redundant heater controller trips.

Waste Management

Small Impact. Solid wastes would be generated during construction and operations. Existing disposal facilities would have the capacity to dispose of the nonhazardous solid wastes. The proposed NEF would implement waste management programs to minimize waste generation and promote recycling where appropriate. In particular, impacts to the Lea County landfill would be SMALL. There would be enough existing national capacity to accept the low-level radioactive waste that would be generated at the proposed NEF.

Small to Moderate Impact for Temporary Storage of UBCs. Public and occupational exposures would be monitored and controlled. Shipment of the DUF_6 would extend operations of the DOE conversion facilities, thus extending their impacts as described in their NEPA documentation. Construction of a new privately owned conversion facility, whether adjacent to the proposed NEF or potentially near Metropolis, Illinois, would have comparable impacts to the DOE conversion facilities.

SUMMARY OF THE COSTS AND BENEFITS OF THE PROPOSED ACTION

Costs associated with construction activities would be approximately $1.2 billion (2002 dollars) excluding escalation, contingencies, and interest. About one-third of the cost to construct the facility would be spent locally for goods, services, and wages.

During operations, about $10.5 million in wages and benefits and $9.6 million in purchasing local goods and services would be spent annually. Construction and operation of the facility would have additional indirect economic impacts by creating additional employment and economic activity. Tax revenues would accrue primarily to the State of New Mexico and would total between $177 million and $212 million (2002 dollars) over the life of the proposed NEF.

Decontamination and decommissioning is estimated to cost approximately $837.5 million (2002 dollars). Locating a private conversion facility near the proposed NEF would have a greater economic impact on the local community, with the creation of approximately 180 jobs, than if the DUF_6 was shipped to another location for conversion.

COMPARISON OF ALTERNATIVES

For the no-action alternative, the proposed NEF would not be constructed, operated, and decommissioned in Lea County, New Mexico. The Paducah Gaseous Diffusion Plant in Paducah, Kentucky, and the down-blending of highly enriched uranium covered under the "Megatons to Megawatts" program (both are managed by USEC) would remain the sole source of domestically generated low-enriched uranium for U.S. commercial nuclear power plants. Foreign enrichment sources would continue supplying more than 85 percent of the U.S. nuclear power plants demand until other new domestic suppliers are constructed and operated. In the long term, this could lead to increase reliance on foreign suppliers for enrichment services.

The no-action alternative would have no local impact on current land use; visual/scenic resources; air, water, and ecological resources; geology and soils; transportation; environmental justice; and waste management. However, the failure to construct and operate the proposed NEF could have SMALL to MODERATE impacts to historical and cultural resources because it could expose the historical sites identified at the proposed NEF to the possibility of human intrusion unless requirements included in applicable Federal and State historic preservation laws and regulations are followed. On the other hand, for these reasons and for not providing additional jobs to the local community, the socioeconomic impacts would be MODERATE because all socioeconomic impacts related to employment, economic activity, population, housing, community resources, and financing would be avoided.

In comparison to the no-action alternative, the proposed action would also incur SMALL impacts to land use; historical and cultural resources; visual/scenic resources; air, water, and ecological resources; geology and soils; noise; and environmental justice. The most serious accident which could be expected to occur, the rupture of an overfilled and/or overheated cylinder, would potentially result in SMALL to MODERATE impacts. Waste management impacts could be as much as SMALL to MODERATE if it is conservatively assumed that the UBCs are temporarily stored on site until decommissioning begins even though this is not contemplated by LES. Transportation impacts are expected to be MODERATE during the two year construction period due to an increase in traffic on New Mexico Highway 234. Otherwise, transportation impacts are expected to be SMALL.

ACRONYMS AND ABBREVIATIONS

^{235}U	uranium-235
^{238}U	uranium-238
ALARA	as low as reasonably achievable
BLM	U.S. Bureau of Land Management
BMP	best management practice
CaF_2	calcium fluoride
CEDE	committed effective dose equivalent
CFR	*U.S. Code of Federal Regulations*
CO	carbon monoxide
CO_2	carbon dioxide
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DUF_4	depleted uranium tetrafluoride
DUF_6	depleted uranium hexafluoride
EDE	effective dose equivalent
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FWS	U.S. Fish and Wildlife Service
HEPA	high efficiency particulate air
HUD	U.S. Department of Housing and Urban Development
LCF	latent cancer fatality
LES	Louisiana Energy Services
MSL	mean sea level
NEF	National Enrichment Facility
NEPA	*National Environmental Policy Act*
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	*National Historic Preservation Act*
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
RCRA	*Resource Conservation and Recovery Act*

SER	Safety Evaluation Report
SWU	separative work unit
TEDE	total effective dose equivalent
U_3O_8	triuranium octaoxide
UO_2F_2	uranyl fluoride
UBC	uranium byproduct cylinder
UF_4	uranium tetrafluoride
UF_6	uranium hexafluoride
USEC	U.S. Enrichment Corporation
USGS	U.S. Geological Survey
WCS	Waste Control Specialists

1 INTRODUCTION

1.1 Background

The U.S. Nuclear Regulatory Commission (NRC) prepared this Draft Environmental Impact Statement (Draft EIS) in response to an application submitted by Louisiana Energy Services (LES), for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility near Eunice in Lea County, New Mexico (Figure 1-1). The proposed facility is referred to as the National Enrichment Facility (NEF).

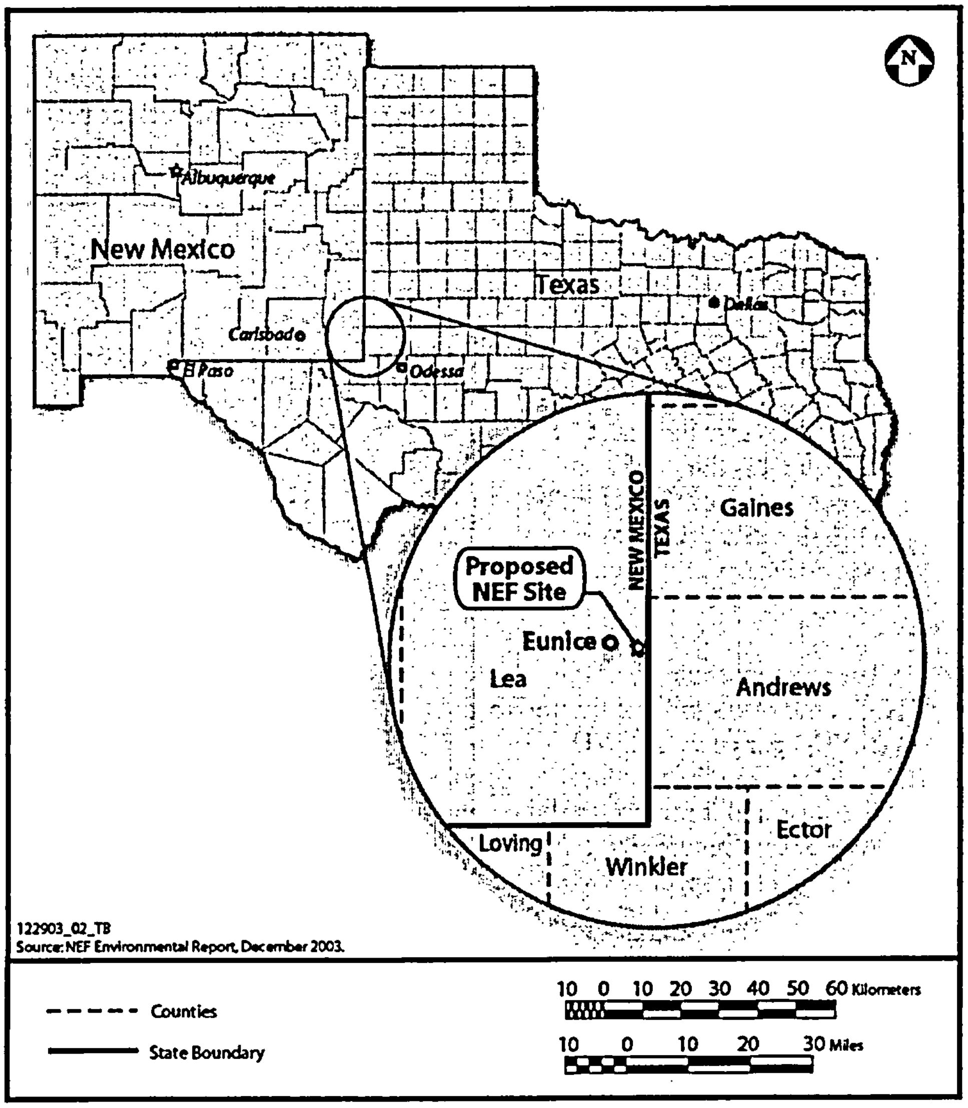

Figure 1-1 Location of the Proposed National Enrichment Facility (LES, 2004)

The NRC's Office of Nuclear Material Safety and Safeguards and its consultants Advanced Technologies and Laboratories International, Inc., and Pacific Northwest National Laboratory prepared this Draft EIS in accordance with Title 10, "Energy," of the *U.S. Code of Federal Regulations* (10 CFR) Part 51, which implements the requirements of the *National Environmental Policy Act of 1969* (NEPA), as amended (Public Law 91-190). This Draft EIS assesses the potential environmental impacts of the proposed action.

1.2 The Proposed Action

The LES proposed action considered in this Draft EIS is to construct, operate, and decommission a uranium enrichment facility referred to as NEF at a site near the city of Eunice, in Lea County, New Mexico. The proposed NEF would produce enriched uranium-235 (^{235}U) up to 5 weight percent by the gas centrifuge process. The enriched uranium would be used in commercial nuclear power plants. Uranium enrichment is a step in the nuclear fuel cycle (Figure 1-2) in which natural uranium is converted and fabricated so it can be used as nuclear fuel in commercial nuclear power plants. The proposed NEF would not alter the total amount of enriched uranium used in the U.S. nuclear fuel cycle because the amount of enriched uranium produced at the proposed NEF would only substitute for enriched uranium from other sources.

Uranium ore usually contains approximately 0.72 weight percent ^{235}U, and this percentage is significantly less than the 3 to 5 weight percent ^{235}U enrichment required by nuclear power plants as fuel for electricity generation. Therefore, uranium must be enriched. Enrichment is the process of increasing the percentage of the naturally occurring and fissionable ^{235}U isotope and decreasing the percentage of uranium-238 (^{238}U).

The nominal production capacity of the proposed NEF would be 3 million separative work units (SWUs) per year. A SWU is a measure of enrichment in the uranium enrichment industry, and it represents the level of effort or energy required to raise the concentration of ^{235}U to a specified level.

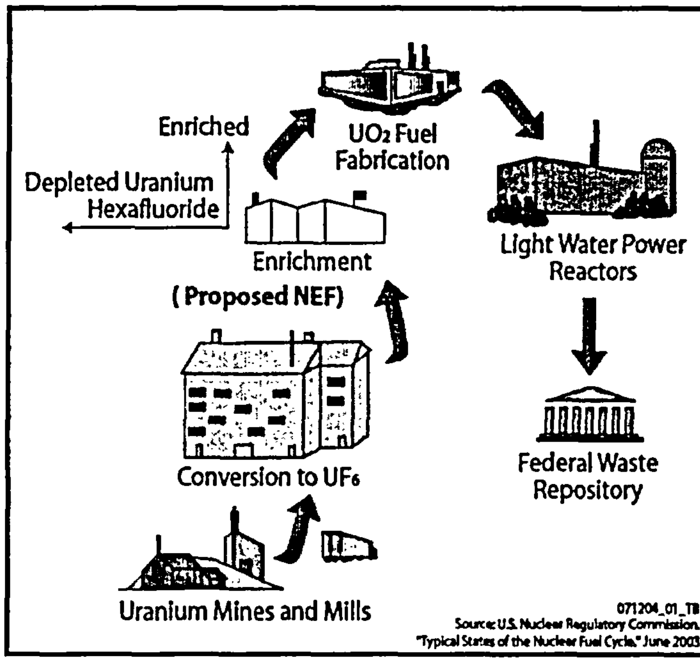

Figure 1-2 Nuclear Fuel Cycle (NRC, 2003c)

The proposed NEF would be licensed in accordance with the provisions of the *Atomic Energy Act*. Specifically, the proposed NEF would require an NRC license under 10 CFR Parts 30, 40, and 70 that would authorize the proposed NEF to possess and use special nuclear material, source material, and byproduct material.

1.3 Purpose and Need for the Proposed Action

The proposed action is intended to satisfy the need for an additional reliable and economical domestic source of enrichment services. The proposed NEF would contribute to the attainment of the national energy security policy objectives. The Administration's energy policy, which was released in May 2001, called the expansion of nuclear energy dependence "a major component of our national energy policy" (NEP, 2001).

Nuclear power plants are currently supplying approximately 20 percent of the Nation's electricity requirements (EIA, 2003a). Of the 11.5 million SWUs that were purchased by U.S. nuclear reactors in 2002, only about 1.7 million SWUs—or 15 percent—were provided by enrichment plants located in the United States (EIA, 2003b). In 2003, the domestic enrichment services provided 14 percent of the total 12 million SWUs purchased (EIA, 2004a).

Over the past 50 years, several uranium enrichment facilities have been used in the United States, including the gaseous diffusion plants near Portsmouth, Ohio (herein referred to as the Portsmouth Gaseous Diffusion Plant), and Paducah, Kentucky (herein referred to as the Paducah Gaseous Diffusion Plant). Both plants are operated by the United States Enrichment Corporation (USEC), only the Paducah Gaseous Diffusion Plant currently remains in operation (USEC, 2003). The end of enriched uranium production at the Portsmouth Gaseous Diffusion Plant in May 2001 has led to reliability risks of U.S. domestic enrichment supply capability. In addition, the Highly Enriched Uranium Agreement deliveries[1] provide for additional U.S. enrichment product. This Agreement is scheduled to expire in 2013. A supply disruption associated with the Paducah Gaseous Diffusion Plant production or the Highly Enriched Uranium Agreement deliveries could impact national energy security because domestic commercial reactors would be fully dependent on foreign sources for enrichment services.

In a 2002 letter to the NRC, the U.S. Department of Energy (DOE) indicated that domestic uranium enrichment had fallen from a capacity greater than domestic demand to a level that was less than half of domestic requirements (DOE, 2002). In this letter, DOE:

- Referenced those interagency discussions led by the National Security Council where there was a clear determination that the United States should maintain a viable and competitive domestic uranium enrichment industry for the foreseeable future.

- Estimated that 80 percent of projected demand for nuclear power in 2020 could be fueled from foreign sources.

- Noted the importance of promoting the development of additional domestic enrichment capacity to maintain a viable and competitive domestic uranium enrichment industry for the foreseeable future.

- Noted that there was sufficient domestic demand to support multiple uranium enrichment facilities and that competition is important to maintain a healthy industry, and encouraged the private sector to invest in new uranium enrichment capacity.

- Indicated its support for the deployment of Urenco gas centrifuge technology in the U.S. market by expressing its support for Urenco to partner with a U.S. company or companies, transferring Urenco's technology to new U.S. commercial uranium enrichment facilities.

Forecasts of installed nuclear-generating capacity suggest a continuing demand for uranium enrichment services both in the United States and abroad. Table 1-1 shows the uranium enrichment requirements in the United States for the next two decades as forecasted by LES (LES, 2004) and the Energy Information

[1] The United States Enrichment Corporation (USEC) implements the 1993 government-to-government agreement between the United States and Russia that calls for Russia to convert 500 metric tons (550 tons) of highly enriched uranium from dismantled nuclear warheads into low-enriched uranium. This is the equivalent of about 20,000 nuclear warheads. USEC purchases the enrichment portion of the blended-down material and sells it to its electric utility customers for fuel in their commercial nuclear power plants. This Agreement is also known as Megatons to Megawatts (USEC, 2004a).

Administration (EIA, 2003c). These two forecasts of uranium enrichment requirements were generally consistent. However, LES projections were adjusted for plutonium recycled in the mixed oxide fuel that would use plutonium oxide and uranium oxide mixture as fuel. DOE is planning to convert approximately 34 metric tons (37.5 tons) of surplus plutonium from nuclear weapons into a nuclear fuel comprised of a mixture of plutonium and uranium oxides, called MOX fuel, for use in selected commercial nuclear power plants (NRC, 2003d). Therefore, the LES projections tended to be slightly lower than the Energy Information Administration forecast. Annual enrichment services requirements in the United States are forecasted to be 11.4 to 14.2 million SWUs in 2025. The two forecasts indicate a need for additional uranium enrichment capability to ensure national energy security.

Table 1-1 Projected Uranium Enrichment Demand in the United States for 2002–2025 in Million SWUs

Year	LES Projections[a]	EIA Projections[b]
2002	11.5	11.5 (actual)[c]
2005	11.6	14.6
2010	11.8	12.9
2015	11.4	15.4
2020	11.4	13.5
2025	Not Provided	14.2

EIA - Energy Information Agency.
SWU - Separative Work Unit.
[a] LES, 2004.
[b] EIA, 2003c.
[c] EIA, 2003b.

The domestic enrichment services would be used in the production of nuclear fuel for commercial nuclear power reactors. By 2020, the United States would need about 393 gigawatts or 393,000 megawatts of new generating capacity (DOE, 2003). Installed nuclear-generating capacity in the United States is projected to increase from approximately 98 gigawatts (98,000 megawatts) in 2001 to about 103 gigawatts (103,000 megawatts) in 2025. This increase includes the uprating of existing plants equivalent to 3.9 gigawatts (3,900 megawatts) of new capacity (EIA, 2004b). This projection, including uprates, would increase U.S. nuclear capacity by more than 5 gigawatts (5,000 megawatts), the equivalent of adding about five large nuclear power reactors. As of March 2004, the NRC has granted 92 uprates and is reviewing 8 uprate applications (NRC, 2004b). In addition, domestic nuclear facilities reported a record high median 3-year design electrical rating capacity factor of 89.66 percent for the period 2001–2003 as compared to 70.78 percent for the period 1989–1991 (Blake, 2004).

USEC provides approximately 56 percent of the U.S. enrichment market needs (USEC, 2004c) with the remaining 44 percent supplied by foreign sources. These enrichment supplies encompass the enrichment products from its enrichment operation at the energy-intensive Paducah Gaseous Diffusion Plant (USEC, 2004a; NRC, 2004a) and the Highly Enriched Uranium Agreement deliveries from Russia, which expires in 2013 (USEC, 2002; USEC, 2004b). The current trend for domestic enrichment services is to develop more efficient, modern, and less costly means to operate enrichment facilities. The gas centrifuge technology for uranium enrichment is known to be more efficient and require less energy to operate than the gaseous diffusion technology currently in use in the United States (NRC, 2004a). On January 12, 2004, USEC announced plans to build and operate a uranium enrichment plant (known as the American Centrifuge Plant) in Piketon, Ohio. This plant

> ***How Much Is a Megawatt?***
>
> *One megawatt roughly provides enough electricity for the demand of 400–900 homes. The actual number is based on the season, time of day, region of the country, power plant capacity factors, and other factors.*
>
> *Source: Bellemare, 2003.*

would cost up to $1.5 billion, employ up to 500 people, and reach an initial annual production level of 3.5 million SWUs by 2010 (USEC, 2004b).

Purchasers of enrichment services view diversity and security of supply as vital from a commercial perspective (LES, 2004). The proposed NEF would supplement the domestic sources of enrichment services provided by USEC's Paducah Gaseous Diffusion Plant and the proposed American Centrifuge Plant. Beginning production in 2008 and achieving full production output by 2013, the proposed NEF would provide roughly 25 percent of the current and projected U.S. enrichment services demand (EIA, 2004a; EIA, 2003b).

The NRC Environmental and Safety Reviews

The focus of an Environmental Impact Statement (EIS) is a presentation of the environmental impacts of the proposed action.

In addition to meeting its responsibilities under the National Environmental Policy Act (NEPA), the NRC prepares a Safety Evaluation Report (SER) to analyze the safety of the proposed action and assess its compliance with applicable NRC regulations.

The safety and environmental reviews are conducted in parallel. Although there is some overlap between the content of a SER and an EIS, the intent of the documents is different.

To aid in the decision process, the EIS provides a summary of the more detailed analyses included in the SER. For example, the EIS does not address how accidents are prevented; rather, it addresses the environmental impacts that would result should an accident occur.

Much of the information describing the affected environment in the EIS also is applicable to the SER (e.g., demographics, geology, and meteorology).

Source: NRC, 2003b; NRC, 2002.

1.4 Scope of the Environmental Analysis

To fulfill its responsibilities under NEPA, the NRC has prepared this Draft EIS to analyze the environmental impacts of the LES proposal as well as reasonable alternatives to the proposed action. The scope of this Draft EIS includes consideration of both radiological and nonradiological (including chemical) impacts associated with the proposed action and the reasonable alternatives. The Draft EIS also addresses the potential environmental impacts relevant to transportation.

This Draft EIS addresses cumulative impacts to physical, biological, economic, and social parameters. In addition, this Draft EIS identifies resource uses, monitoring, potential mitigation measures, unavoidable adverse environmental impacts, the relationship between short-term uses of the environment and long-term productivity, and irreversible and irretrievable commitments of resources.

The development of this Draft EIS is the result of the NRC staff's review of the LES license application and the Environmental Report. This review has been closely coordinated with the development of the Safety Evaluation Report (SER) being prepared by the NRC to evaluate, among other aspects, the health and safety impacts of the proposed action. The SER is the outcome of the NRC safety review of the LES license application and Safety Analysis Report.

1.4.1 Scoping Process and Public Participation Activities

The NRC regulations in 10 CFR Part 51 contain requirements for conducting a scoping process prior to the preparation of an EIS. Scoping was used to help identify those issues to be discussed in detail and those issues that are either beyond the scope of this EIS or are not directly relevant to the assessment of potential impacts from the proposed action.

On February 4, 2004, the NRC published in the *Federal Register* (69 FR 5374) a Notice of Intent to prepare an EIS for the construction, operation, and decommissioning of the proposed NEF and to conduct the scoping process for the EIS. The Notice of Intent set forth in Appendix A summarized the NRC's plans to prepare the EIS and presented background information on the proposed NEF. For the scoping process, the Notice of Intent invited comments on the proposed action and announced a public scoping meeting to be held concerning the project.

On March 4, 2004, the NRC staff and its consultants, Advanced Technologies and Laboratories International, Inc., and Pacific Northwest National Laboratory toured the site and held a scoping meeting in Eunice, New Mexico. During the scoping meeting, a number of individuals offered oral and written comments and suggestions to the NRC concerning the proposed NEF and the development of the EIS. In addition, the NRC received written comments from various individuals during the public scoping period that ended on March 18, 2004. The NRC carefully reviewed and identified individual comments (both oral and written). These comments were then consolidated and categorized by topical areas.

After the scoping period, the NRC distributed the *Scoping Summary Report: Proposed Louisiana Energy Services National Enrichment Facility, Lea County, New Mexico* (Appendix A) in April 2004. The *Scoping Summary Report* identified categories of issues to be analyzed in detail and issues beyond the scope of the EIS.

1.4.2 Issues Studied in Detail

As stated in the Notice of Intent, the NRC identified issues to be studied in detail as they relate to implementation of the proposed action. The public identified additional issues during the subsequent public scoping process. All the issues that have identified by the NRC and the public could have short- or long-term impacts from the potential construction and operation of the proposed NEF. These issues are:

- Public and worker health.
- Need for the facility.
- Alternatives.
- Waste management.
- Depleted uranium disposition.
- Water resources.
- Geology and soils.
- Compliance with applicable regulations.
- Air quality.
- Transportation.
- Accidents.
- Land use.
- Socioeconomic impacts.
- Noise.
- Visual and scenic resources.
- Cost/benefits.
- Environmental justice.
- Cultural resources.
- Resource commitments.
- Ecological resources.
- Decommissioning.
- Cumulative impacts.

1.4.3 Issues Eliminated from Detailed Study

The NRC has determined that detailed analysis for mineral resources was not necessary because there are no known nonpetroleum mineral resources at the proposed site that would be affected by any of the alternatives being considered. In addition, detailed analysis of the impact of the proposed NEF on connected actions that include the overall nuclear fuel cycle activities were not considered. The proposed NEF would not measurably affect the mining and milling operations and the demand for enriched uranium. The amount of mining and milling is dependent upon the stability of market prices for uranium balanced with the concern of environmental impacts associated with such operations (NRC, 1980). The demand for enriched uranium in the United States is primarily driven by the number of commercial nuclear power plants and their operation. The proposed NEF will only result in the creation of new transportation routes within the fuel cycle to and from the enrichment facility. The existing transportation routes between the other facilities are not expected to be altered. Because the environmental impacts of all of the transportation routes other than those to and from the proposed NEF have been previously analyzed, they are eliminated from further study (NRC, 1980; NRC, 1977).

1.4.4 Issues Outside the Scope of the EIS

The following issues were identified during the scoping process to be outside the scope of the EIS:

- Nonproliferation.
- Public scoping process.
- Safety and security.

A summary of the scoping process is contained in Appendix A.

1.4.5 Related NEPA and Other Relevant Documents

The following NEPA documents were reviewed as part of the development of this Draft EIS to obtain information related to the issues raised.

- *Final Environmental Impact Statement for the Construction and Operation of Claiborne Enrichment Center, Homer, Louisiana. NUREG-1484, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, August 1994.* This EIS was developed to analyze the environmental consequences for the construction, operation, and decommissioning of a uranium enrichment facility in Claiborne, Louisiana, by LES. The proposed facility, which was never constructed, was based on a similar technology to that proposed for Lea County, New Mexico. Due to the similarities in technology and facilities, the impacts resulting from implementing the proposed action in Lea County could be compared to those estimated for the Claiborne facility.

- *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride. DOE/EIS-0269, Office of Nuclear Energy, Science and Technology, U.S. Department of Energy, April 1999.* This EIS analyzes strategies for the long-term management of the depleted uranium hexafluoride (DUF_6) inventory currently stored at three DOE sites near Paducah, Kentucky; Portsmouth, Ohio; and Oak Ridge, Tennessee. This EIS also analyzes the potential environmental consequences of implementing each alternative strategy for the period from 1999 through 2039. The results presented in this EIS are relevant to the management, use, and potential impacts associated with the DUF_6 that would be generated at the proposed NEF.

- *Final Environmental Impact Statement for the Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site. DOE/EIS-0359, Oak Ridge Operations, Office of Environmental Management, U.S. Department of Energy, June 2004.* This site-specific EIS considers the construction, operation, maintenance, and decommissioning of the proposed DUF_6 conversion facility at three locations within the Paducah, Kentucky, site, which is a DOE facility; transportation of DUF_6 conversion products and waste materials to a disposal facility; transportation and sale of the hydrogen fluoride produced as a conversion co-product; and neutralization of hydrogen fluoride to calcium fluoride and its sale or disposal in the event that the hydrogen fluoride product is not sold. The results presented in this EIS are relevant to the management, use, and potential impacts associated with the DUF_6 that would be generated at the proposed NEF.

- *Final Environmental Impact Statement for the Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site. DOE/EIS-0360, Oak Ridge Operations, Office of Environmental Management, U.S. Department of Energy, June 2004.* This site-specific EIS analyzes the construction, operation, maintenance, and decommissioning of the proposed DUF_6 conversion facility at three alternative locations within the Portsmouth, Ohio, site; transportation of all cylinders (DUF_6, enriched uranium, and empty) currently stored at the East Tennessee Technology Park near Oak Ridge, Tennessee, to Portsmouth; construction of a new cylinder storage yard at Portsmouth (if required) for cylinders from the East Tennessee Technology Park; transportation of DUF_6 conversion products and waste materials to a disposal facility; transportation and sale of the hydrogen fluoride produced as a conversion co-product; and neutralization of hydrogen fluoride to calcium fluoride and its sale or disposal in the event that the hydrogen fluoride product is not sold. The results presented in this EIS are relevant to the management, use, and potential impacts associated with the DUF_6 that would be generated at the proposed NEF.

- *Environmental Assessment: Disposition of Russian Federation Titled Natural Uranium. DOE/EA-1290, Office of Nuclear Energy, Science and Technology, U.S. Department of Energy, June 1999.* This Environmental Assessment analyzed the environmental impacts of transporting natural UF_6 from the gaseous diffusion plants to the Russian Federation. Transportation by rail and truck were considered. The Environmental Assessment addresses both incident-free transportation and transportation accidents. The results presented in this Environmental Assessment are relevant to the transportation of UF_6 for the proposed NEF.

1.5 Applicable Regulatory Requirements

This section provides a summary assessment of major environmental requirements, agreements, Executive Orders, and permits relevant to the construction, operation, and decommissioning of the proposed NEF.

1.5.1 Federal Laws and Regulations

1.5.1.1 *National Environmental Policy Act of 1969*, as amended (42 U.S.C. § 4321 et seq.)

NEPA establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment to ensure for all Americans a safe, healthful, productive, and aesthetically and culturally pleasing environment. NEPA provides a process for implementing these specific goals within the Federal agencies responsible for the action. This Draft EIS has been prepared in accordance with NEPA requirements and NRC regulations (10 CFR Part 51) for implementing NEPA.

1.5.1.2 *Atomic Energy Act of 1954,* as amended (42 U.S.C. § 2011 et seq.)

The *Atomic Energy Act*, as amended, and the *Energy Reorganization Act of 1974* (42 U.S.C. § 5801 et seq.) give the NRC the licensing and regulatory authority for nuclear energy uses within the commercial sector. If the license application for the proposed NEF is approved, the NRC would license and regulate the possession, use, storage, and transfer of byproduct, source, and special nuclear materials to protect public health and safety as stipulated in 10 CFR Parts 30, 40, and 70.

1.5.1.3 *Clean Air Act,* as amended (42 U.S.C. § 7401 et seq.)

The *Clean Air Act* establishes regulations to ensure air quality and authorizes individual States to manage permits. The *Clean Air Act*: (1) requires the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards as necessary to protect the public health, with an adequate margin of safety, from any known or anticipated adverse effects of a regulated pollutant (42 U.S.C. § 7409 et seq.); (2) requires establishment of national standards of performance for new or modified stationary sources of atmospheric pollutants (42 U.S.C. § 7411); (3) requires specific emission increases to be evaluated so as to prevent a significant deterioration in air quality (42 U.S.C. § 7470 et seq.); and (4) requires specific standards for releases of hazardous air pollutants (including radionuclides) (42 U.S.C. § 7412). These standards are implemented through plans developed by each State with EPA approval. The *Clean Air Act* requires sources to meet standards and obtain permits to satisfy those standards and to meet air-quality standards and obtain permits to satisfy those standards. The proposed NEF may be required to comply with the *Clean Air Act* Title V, Sections 501–507, for sources subject to new source performance standards or sources subject to National Emission Standards for Hazardous Air Pollutants.

1.5.1.4 *Clean Water Act,* as amended (33 U.S.C. § 1251 et seq.)

The *Clean Water Act* requires the EPA to set national effluent limitations and water-quality standards, and establishes a regulatory program for enforcement. Specifically, Section 402(a) of the Act establishes water-quality standards for contaminants in surface waters. The *Clean Water Act* requires a National Pollutant Discharge Elimination System (NPDES) permit before discharging any point source pollutant into U.S. waters. EPA Region 6 administers this program with an oversight review by the New Mexico Environment Department/Water Quality Bureau. The NPDES General Permit for Industrial Stormwater is required for point source discharge of stormwater runoff from industrial or commercial facilities to State waters. Construction of the proposed NEF would require an NPDES Construction Stormwater General Permit from EPA Region 6 and an oversight review by the New Mexico Environment Department/Water Quality Bureau. Section 401(a)(1) of the *Clean Water Act* requires States to certify that the permitted discharge would comply with all limitations necessary to meet established State water-quality standards, treatment standards, or schedule of compliance.

1.5.1.5 *Resource Conservation and Recovery Act,* as amended (42 U.S.C. § 6901 et seq.)

The *Resource Conservation and Recovery Act* (RCRA) requires the EPA to define and identify hazardous waste; establish standards for its transportation, treatment, storage, and disposal; and require permits for persons engaged in hazardous waste activities. Section 3006 of the RCRA (42 U.S.C. § 6926) allows States to establish and administer these permit programs with EPA approval. EPA Region 6 has delegated regulatory jurisdiction to the New Mexico Environment Department/Hazardous Waste Bureau for nearly all aspects of permitting as required by the *New Mexico Hazardous Waste Act*. The EPA regulations implementing the RCRA are found in 40 CFR Parts 260 through 283. Regulations imposed on a generator or on a treatment, storage, and/or disposal facility vary according to the type and quantity of material or waste generated, treated, stored, and/or disposed. The method of treatment, storage, and/or disposal also impacts the extent and complexity of the requirements. The proposed NEF would generate small quantities of hazardous waste that are expected to be not greater than 100 kilograms (220 pounds) per month. There would be no plans to store these wastes in excess of 90 days; thus, the proposed NEF would qualify as a small quantity hazardous waste generator in accordance with Section 20.4.1 of the *New Mexico Administrative Code* and would be in compliance with RCRA requirements.

1.5.1.6 *Low-Level Radioactive Waste Policy Act of 1980*, as amended (42 U.S.C. § 2021 et seq.)

The *Low-Level Radioactive Waste Policy Act of 1980* amended the *Atomic Energy Act* to specify that the Federal Government is responsible for disposal of low-level radioactive waste generated by its activities and that States are responsible for disposal of other low-level radioactive waste. The *Low-Level Radioactive Waste Policy Act of 1980* provides for and encourages interstate compacts to carry out the State responsibilities. Low-level radioactive waste would be generated from activities conducted from the proposed NEF. The State of New Mexico is a member of the Rocky Mountain compact.

1.5.1.7 *Emergency Planning and Community Right-to-Know Act of 1986* (42 U.S.C. § 11001 et seq.) (also known as SARA Title III)

The *Emergency Planning and Community Right-to-Know Act of 1986*, which is the major amendment to the *Comprehensive Environmental Response, Compensation, and Liability Act* (42 U.S.C. § 9601), establishes the requirements for Federal, State, and local governments; Indian tribes; and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals. The "Community Right-to-Know" provisions increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities working with facilities can use the information to improve chemical safety and protect public health and the environment. This Act requires emergency planning and notice to communities and government agencies concerning the presence and release of specific chemicals. The EPA implements this Act under regulations found in 40 CFR Parts 355, 370, and 372. This Act would require the proposed NEF to report on hazardous and toxic chemicals used and produced at the facility, and to establish emergency planning procedures in coordination with the local communities and government agencies.

1.5.1.8 *Safe Drinking Water Act*, as amended (42 U.S.C. § 300f et seq.)

The *Safe Drinking Water Act* was enacted to protect the quality of public water supplies and sources of drinking water. The New Mexico Environment Department/Water Quality Bureau, under 42 U.S.C. § 300g-2 of the Act, established standards applicable to public water systems. These regulations include maximum contaminant levels (including those for radioactivity) in public water systems. Other programs established by the *Safe Drinking Water Act* include the Sole Source Aquifer Program, the Wellhead Protection Program, and the Underground Injection Control Program. In addition, the Act provides underground sources of drinking water with protection from contaminated releases and spills (for example, implementing a Spill Prevention Control and Countermeasures Plan). The proposed NEF would not use onsite ground-water or surface-water supplies and would obtain potable water from nearby municipal water supply systems (i.e., the cities of Eunice and Hobbs, New Mexico). The proposed NEF is required to obtain a Ground Water Discharge Permit/Plan for the septic systems from the New Mexico Environment Department/Water Quality Bureau to comply with this Act.

1.5.1.9 *Noise Control Act of 1972,* as amended (42 U.S.C. § 4901 et seq.)

The *Noise Control Act* delegates the responsibility of noise control to State and local governments. Commercial facilities are required to comply with Federal, State, interstate, and local requirements regarding noise control. The proposed NEF is located in Lea County, which does not have a noise control ordinance.

1.5.1.10 *National Historic Preservation Act of 1966,* as amended (16 U.S.C. § 470 et seq.)

The *National Historic Preservation Act* (NHPA) was enacted to create a national historic preservation program, including the National Register of Historic Places and the Advisory Council on Historic Preservation. Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties. The Advisory Council on Historic Preservation regulations implementing Section 106, found in 30 CFR Part 800, were revised on December 12, 2000 (65 FR 77697), and became effective on January 11, 2001. These regulations call for public involvement in the Section 106 consultation process, including Indian tribes and other interested members of the public, as applicable. The NRC has initiated the Section 106 consultation process to address the potential archaeological sites that have been identified on the proposed NEF site (see Section 1.5.6 and Appendix B).

1.5.1.11 *Endangered Species Act of 1973,* as amended (16 U.S.C. § 1531 et seq.)

The *Endangered Species Act* was enacted to prevent the further decline of endangered and threatened species and to restore those species and their critical habitats. Section 7 of the Act requires consultation with the U.S. Fish and Wildlife Service (FWS) of the U.S. Department of the Interior or the National Marine Fisheries Service of the U.S. Department of Commerce to determine whether endangered and threatened species or their critical habitats are known to be in the vicinity of the proposed action. The NRC has initiated the consultation process with the FWS for the proposed NEF (see Section 1.5.6 and Appendix B).

1.5.1.12 *Occupational Safety and Health Act of 1970,* as amended (29 U.S.C. § 651 et seq.)

The *Occupational Safety and Health Act* establishes standards to enhance safe and healthy working conditions in places of employment throughout the United States. The Act is administered and enforced by the Occupational Safety and Health Administration (OSHA), a U.S. Department of Labor agency. The identification, classification, and regulation of potential occupational carcinogens are found in 29 CFR § 1910.101, while the standards pertaining to hazardous materials are listed in 29 CFR § 1910.120. The OSHA regulates mitigation requirements and mandates proper training and equipment for workers. The proposed NEF would be required to comply with the requirements of these regulations.

1.5.1.13 *Hazardous Materials Transportation Act* (49 U.S.C. § 1801 et seq.)

The *Hazardous Materials Transportation Act* regulates transportation of hazardous material (including radioactive material) in and between States. According to the Act, states may regulate the transport of hazardous material as long as they are consistent with the Act or the U.S. Department of Transportation regulations provided in 49 CFR Parts 171-177. Title 49 CFR Part 173, Subpart I contains other regulations regarding packaging for transportation of radionuclides. Transportation of the depleted uranium cylinders from the proposed NEF would require compliance with the U.S. Department of Transportation regulations.

1.5.1.14 *Environmental Standards for Uranium Fuel Cycle* (40 CFR Part 190, Subpart B)

These regulations establish the maximum doses to the body or organs resulting from operational normal releases received by members of the public. These regulations were promulgated under the authority of the *Atomic Energy Act* of 1954, as amended. The proposed NEF would be required to comply with these regulations for its releases due to normal operations.

1.5.2 Applicable Executive Orders

- *Executive Order 11988* (Floodplain Management) directs Federal agencies to establish procedures to ensure that the potential effects of flood hazards and floodplain management are considered for any action undertaken in a floodplain and that floodplain impacts be avoided to the extent practicable.

- *Executive Order 12898* (Environmental Justice) requires Federal agencies to address environmental justice in minority populations and low-income populations (59 FR 7629), and directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

1.5.3 Applicable State of New Mexico Laws and Regulations

Certain environmental requirements, including some discussed earlier, have been delegated to State authorities for implementation, enforcement, or oversight. Table 1-2 provides a list of applicable State of New Mexico laws, regulations, and agreements.

Table 1-2 Applicable State of New Mexico Laws, Regulations, and Agreements

Law/Regulation/Agreement	Citation	Requirements
New Mexico Air Quality Control Act	NMSA, Chapter 74, "Environmental Improvement", Article 2, "Air Pollution", and implementing regulations in NMAC Title 20, Environmental Protection, Chapter 2, "Air Quality"	Establishes air-quality standards and requires a permit prior to construction or modification of an air-contaminant source. Also, requires an operating permit for major producers of air pollutants and imposes emission standards for hazardous air pollutants.
New Mexico Radiation Protection Act	NMSA, Chapter 74, Article 3, "Radiation Control"	Establishes State requirements for worker protection.
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 requires a permit prior to the construction or modification of a water-discharge source.

Law/Regulation/Agreement	Citation	Requirements
New Mexico Ground-Water Protection Act	NMSA, Chapter 74, Article 6B, "Ground-Water Protection"	Establishes State standards for protection of ground water from leaking underground storage tanks.
New Mexico Solid Waste Act	NMSA, Chapter 74, Article 9, *Solid Waste Act*, and implementing regulations found in NMAC Title 20, Environmental Protection, Chapter 9, "Solid Waste"	Requires a permit prior to construction or modification of a solid waste disposal facility.
New Mexico Hazardous Waste Act	NMSA, Chapter 74, Article 4, Hazardous Waste, and implementing regulations found in NMAC Title 20, Environmental Protection, Chapter 4, "Hazardous Waste"	Requires a permit prior to construction or modification of a hazardous waste disposal facility.
New Mexico Hazardous Chemicals Information Act	NMSA, Chapter 4, 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 Wildlife Conservation Act	NMSA, Chapter 17, Game and Fish, Article 2, Hunting and Fishing Regulations, Part 3, *Wildlife Conservation Act*	Requires a permit and coordination if a project may disturb habitat or otherwise affect threatened or endangered species.
New Mexico Raptor Protection Act	NMSA, Chapter 17, Articles 2–14	Makes it unlawful to take, attempt to take, possess, trap, ensnare, injure, maim, or destroy any species of hawks, owls, and vultures.
New Mexico Endangered Plant Species Act	NMSA, Chapter 75, Miscellaneous Natural Resource Matters, Article 6, Endangered Plants	Requires coordination with the State if a proposed project affects an endangered plant species.
Threatened and Endangered Species of New Mexico	NMSA Title 19, Natural Resources and Wildlife, Chapter 33, Endangered and Threatened Species 19.33.6.8	Establishes the list of threatened and endangered wildlife species.

Law/Regulation/Agreement	Citation	Requirements
Endangered Plant Species	NMAC Title 19, Chapter 21, Endangered Plants	Establishes endangered plant species list and rules for collection.
State Trust Lands Land Exchanges	NMAC Title 19, Chapter 21, Natural Resources and Wildlife	Establishes State standards and procedures for exchanges of lands held in trust, including consideration of cultural and natural resources and wildlife.
New Mexico Cultural Properties Act	NMSA, Chapter 18, Libraries and Museums, Article 6, Cultural Properties	Establishes State Historic Preservation Office and requirements to prepare an archaeological and historic survey and consult with the State Historic Preservation Office

NMSA - *New Mexico Statutes Annotated*
NMAC - *New Mexico Administrative Code.*
Source: LES, 2004; NMCPR, 2004; Conway, 2003.

1.5.4 Permit and Approval Status

Several construction and operating permit applications would be prepared and submitted, and regulator approval and/or permits would be received prior to construction or facility operation. Table 1-3 lists the required Federal, State, and local permits and their status.

Table 1-3 Required Federal, State, and Local Permits

Requirement	Agency	Comments/Status
Federal		
10 CFR Part 70, 10 CFR Part 40, 10 CFR Part 30	NRC	The proposed NEF license application is being reviewed.
NPDES General Permit for Industrial Stormwater	EPA Region 6	LES has the option of claiming "No Exposure" exclusion or filing for coverage under the Multi-Sector General Permit. A decision on the option to pursue is pending.
NPDES Construction Stormwater General Permit	EPA Region 6	LES may be required to develop a Stormwater Pollution Prevention Plan. This permit would not be required to be submitted until prior to the construction of the proposed NEF.
State		
Air Construction Permit	NMED/AQB	LES has filed a Notice of Intent with the AQB.

Requirement	Agency	Comments/Status
Air Operation Permit	NMED/AQB	An application is required 60 days before operations. LES has filed a Notice of Intent with the AQB.
NESHAP Permit	NMED/AQB	A NESHAP permit is not required because proposed NEF emissions would be below Federal and state regulatory limits.
Ground-Water Discharge Permit/Plan	NMED/WQB	This permit is required for industrial and septic discharges to evaporative retention/detention ponds/leach fields. The application has been submitted by LES to the WQB.
NPDES Industrial Stormwater	NMED/WQB	LES has the option of claiming "No Exposure" exclusion or filing for coverage under the Multi-Sector General Permit. A decision on the option to pursue is pending.
NPDES Construction Stormwater Permit	NMED/WQB	This permit requires the development of a Stormwater Pollution Prevention Plan. This permit would not be required to be submitted until prior to construction.
Hazardous Waste Permit	NMED/HWB	This permit is required to file a U.S. EPA Form 8700-12, Notification of Regulated Waste Activity. LES would be classified as a small quantity generator; therefore, no hazardous waste permit would be required.
EPA Waste Activity EPA ID Number	NMED/HWB	This number would be required for the DUF_6. This would be received after filing U.S. EPA Form 8700-12 in the hazardous waste permitting process.
Machine-Produced Radiation Registration (X-Ray Inspection)	NMED/RCB	Registration is required for security nondestructive inspection (x-ray) machines. The RCB has been notified that equipment will be registered, but registration would occur later in the regulatory process.
Rare, Threatened, & Endangered Species Survey Permit	NMDFG	This permit would only be required for conducting surveys of Bureau of Land Management lands. Surveys have been completed.
Right-of-Entry Permit	NMSLO	LES has obtained this permit for entry onto Section 32.

Requirement	Agency	Comments/Status
State Land Swap Arrangement	NMSLO	This arrangement requires that an environmental assessment and a cultural resources survey be conducted on lands offered for exchange. LES is evaluating different candidate properties. Once LES identifies properties to be offered for exchange, LES would purchase these properties and convey them to Lea County for reconveyance to the NMSLO.
Class III Cultural Survey Permit	NMSHPO	LES has obtained this permit to conduct surveys on Section 32.

NPDES - National Pollutant Discharge Elimination System; EPA - U.S. Environmental Protection Agency; NESHAP - National Emission Standards for Hazardous Air Pollutants; NMED/AQB - New Mexico Environment Department/Air Quality Bureau NMED/HWB - New Mexico Environment Department/Hazardous Waste Bureau; NMED/RCB - New Mexico Environment Department/Radiological Control Bureau; NMED/WQB - New Mexico Environment Department/ Water Quality Bureau; NMDGF - New Mexico Department of Game and Fish; NMSLO - New Mexico State Land Office; NMSHPO - New Mexico State Historic Preservation Office.
Source: LES, 2004.

1.5.5 Cooperating Agencies

During the scoping process, no Federal, State, or local agencies were identified as potential cooperating agencies in the preparation of this Draft EIS.

1.5.6 Consultations

As a Federal agency, the NRC is required to comply with the consultations requirements in the *Endangered Species Act of 1973*, as amended, and the *National Historic Preservation Act of 1966*, as amended.

1.5.6.1 *Endangered Species Act of 1973* Consultation

The NRC staff has initiated consultation with the FWS to comply with the requirements of Section 7 of the *Endangered Species Act of 1973* (Appendix B). On March 2, 2004, the NRC staff sent a letter to the FWS New Mexico Ecological Services Field Office describing the proposed action and requesting a list of threatened and endangered species and critical habitats that could potentially be affected by the proposed action. By letter dated March 26, 2004, the FWS New Mexico Ecological Services Field Office provided a list of threatened and endangered species, candidate species, and species of concern. Additional consultation with the FWS would be completed prior to issuance of the Final EIS to ensure that threatened or endangered species would be protected.

Additionally, by letter dated February 23, 2004, the State of New Mexico Department of Game and Fish, submitted scoping comments regarding the sand dune lizard and lesser prairie chicken, both of which are candidate species under the *Endangered Species Act*. The potential impacts of the proposed NEF on these species are addressed in Section 4.2.7 of Chapter 4 of this Draft EIS.

1.5.6.2 *National Historic Preservation Act of 1966* Section 106 Consultation

The NRC staff has offered State agencies, Federally recognized Indian tribes, and other organizations that may be concerned with the possible effects of the proposed action on historic properties an opportunity to participate in the consultation process required by Section 106 (see Appendix B). The following is a list of agencies, tribes, and organizations contacted during the ongoing consultation process:

New Mexico State Historic Preservation Office

By letter dated February 17, 2004, the NRC staff initiated the Section 106 consultation process with the State of New Mexico Department of Cultural Affairs, Historic Preservation Division, State Historic Preservation Office. This letter described the potentially affected area and requested the views of the State Historic Preservation Office on further actions required to identify historic properties that may be affected. The NRC staff submitted a copy of the Cultural Resource Inventory for the proposed NEF to the State Historic Preservation Office, by letter dated March 29, 2004. The Cultural Resource Inventory is required by the NHPA and 36 CFR Part 800 to locate and identify all potential prehistoric and historic properties that could be adversely affected by an undertaking. On April 7, 2004, the NRC staff met with representatives from the State Historic Preservation Office and New Mexico State Land Office to discuss the proposed NEF and the Section 106 consultation process. The State Historic Preservation Office responded by letter dated April 26, 2004, summarizing the meeting and providing the following suggestions:

- Enter into a Memorandum of Agreement (Agreement) that outlines agreed-upon measures that LES would undertake to mitigate the potential adverse effects of the proposed action on the historic properties located in the potentially affected area.

- Notify the Advisory Council on Historic Preservation that there would be adverse effects to cultural resources and notify and invite the Council to be a signatory to the Agreement.

- Contact Indian tribes and forward them a copy of the Cultural Resource Inventory.

- Consider several options for mitigating the adverse effects of the proposed action (see Appendix B).

Federally Recognized Indian Tribes

By letter dated February 17, 2004, the NRC staff initiated the Section 106 process with regional Federally recognized Indian tribes, soliciting their interest in being consulting parties in the Section 106 consultation process for the proposed project. In response to the State Historic Preservation Office's letter dated April 26, 2004, the NRC staff provided the Indian tribes with copies of the Cultural Resource Inventory and requested information regarding historic properties in the area of potential effects that could have cultural or religious significance to them. In addition, during the month of June, the NRC staff contacted the Indian tribes via telephone to discuss the requested information and to invite the Indian tribes to be concurring parties to the Agreement. The Mescalero Apache Tribe, by letter dated June 10, 2004, indicated the proposed NEF would not affect any sites or locations important to the tribe culture or religion. The Kiowa Tribe of Oklahoma, Comanche Tribe of Oklahoma, Mescalero Apache Tribe, and Yseleta del Sur Pueblo indicated they would like to be concurring parties to the Agreement. Subsequently, by letters dated July 6, 2004, the NRC staff provided a followup letter confirming the information provided in the above-mentioned telephone conversation or documenting attempts to contact the Mescalero Apache Tribe and the Apache Tribe of Oklahoma. As recommended by the State Historic Preservation Office, the NRC staff contacted Sam Cata, a Governor-appointed tribal liaison to discuss the project and determine which tribes should be contacted to comment on a treatment/mitigation plan. Project information was provided to Mr. Cata on June 4, 2004.

Other Organizations

Additionally, in accordance with 36 CFR § 800.3(f), the NRC staff contacted local organizations, by letter dated March 18, 2004, to solicit information on the proposed project.

Advisory Council on Historic Preservation

By letter dated June 24, 2004, the NRC staff notified the Council that the proposed action would result in an adverse effect on cultural resources and that an Agreement would be prepared.

1.6 Organizations Involved in the Proposed Action

Two organizations have specific roles in the implementation of the proposed action:

- LES is the NRC license applicant. If the license is granted, LES would be the holder of an NRC license for the construction, operation, and decommissioning of the proposed NEF. LES would be responsible for operating the proposed facility in compliance with applicable NRC regulations. LES is a Delaware limited partnership that was formed solely to provide uranium enrichment services for commercial nuclear power plants. LES has one, 100-percent-owned subsidiary operating as a limited liability company (LLC) that was formed for the purpose of purchasing industrial revenue bonds and has no organizational divisions. The LES general partners are Urenco Investments, Inc.[2], and Westinghouse Enrichment Company LLC[3]. The limited partners[4] are Urenco Deelnemingen B.V.; Westinghouse Enrichment Company LLC; Entergy Louisiana, Inc.; Claiborne Energy Services, Inc.; Cenesco Company LLC; and Penesco Company LLC. Urenco owns 70.5 percent of the partnership,

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[2] Urenco Investments, Inc., is a Delaware corporation and wholly owned subsidiary of Urenco Limited (Urenco), a corporation formed under the laws of the United Kingdom. Urenco is owned in equal shares by BNFL Enrichment Limited (BNFL-EL), Ultra-Centrifuge Nederland NV (UCN), and Uranit GmbH (Uranit) companies formed under English, Dutch, and German law, respectively. BNFL-EL is wholly owned by British Nuclear Fuels plc (BNFL), which is wholly owned by the Government of the United Kingdom. UCN is 99-percent owned by the Government of the Netherlands with the remaining 1 percent owned collectively by the Royal Dutch Shell Group, Koninklijke Philips Electronics N.V., and Stork N.V. Uranit is owned by Eon Kernkraft GmbH (50 percent) and RWE Power AG (50 percent), which are corporations formed under laws of the Federal Republic of Germany.

[3] Westinghouse Enrichment Company LLC is a Delaware limited liability company and wholly owned subsidiary of Westinghouse Electric Company (Westinghouse) LLC, a Delaware limited liability company whose ultimate parent (through two intermediary Delaware corporations and one corporation formed under the laws of the United Kingdom) is BNFL.

[4] Urenco Deelnemingen B.V. is a Netherlands corporation and wholly owned subsidiary of Urenco Nederlands B.V. (UNL); Westinghouse Enrichment Company LLC is a Delaware limited liability company, wholly owned by Westinghouse, that also is acting as a General Partner; Entergy Louisiana, Inc., is a Louisiana corporation and wholly owned subsidiary of Entergy Corporation, a publicly held Delaware corporation and a public utility holding company; Claiborne Energy Services, Inc., is a Louisiana corporation and wholly owned subsidiary of Duke Energy Corporation, a publicly held North Carolina corporation; Cenesco Company LLC is a Delaware limited liability company and wholly owned subsidiary of Exelon Generation Company LLC, which is a Pennsylvania LLC; Penesco Company LLC is a Delaware LLC and wholly owned subsidiary of Exelon Generation Company LLC.

while Westinghouse owns 19.5 percent of LES. The remaining 10 percent is owned by companies representing three U.S. electric utilities: Entergy Corporation, Duke Energy Corporation, and Exelon Generation Company LLC (LES, 2004).

LES has indicated that the principal business location is in Albuquerque, New Mexico. Furthermore, LES has stated that no other companies would be present or operating on the proposed NEF site other than services specifically contracted by LES (LES, 2004). The NRC intends to examine any foreign relationship to determine whether it is inimical to the common defense and security of the United States. The foreign ownership, control, and influence issue will be addressed as part of the NRC SER, and this issue is beyond the scope of this Draft EIS.

- The NRC is the licensing agency. The NRC has the responsibility to evaluate the license application for compliance with the NRC regulations associated with uranium enrichment facilities. These include standards for protection against radiation in 10 CFR Part 20 and requirements in 10 CFR Parts 30, 40, and 70 that would authorize LES to possess and use special nuclear material, source material, and byproduct material at the proposed NEF. The NRC is responsible for regulating activities performed within the proposed NEF through its licensing review process and subsequent inspection program. To fulfill the NRC responsibilities under NEPA, the environmental impacts of the proposed action are evaluated in accordance with the requirements of 10 CFR Part 51 and documented in this Draft EIS.

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2 ALTERNATIVES

This chapter describes the Louisiana Energy Services (LES) proposed action and reasonable alternatives including the no-action alternative. Related to the proposed action, the U.S. Nuclear Regulatory Commission (NRC) staff also examines alternatives for the disposition of the depleted uranium hexafluoride (DUF_6) material resulting from the enrichment operation over the lifetime of the proposed National Enrichment Facility (NEF). Under the no-action alternative, LES would not construct, operate, or decommission the proposed NEF. This alternative is included to comply with National Environmental Policy Act (NEPA) requirements. The no-action alternative provides a basis for comparing and evaluating the potential impacts of constructing, operating, and decommissioning the proposed NEF.

This chapter also addresses the site-selection process and reviews alternative enrichment technologies (other than the proposed centrifuge technology) and alternative sources for enriched product.

2.1 Proposed Action

The LES proposed action is the construction, operation, and decommissioning of the proposed NEF in southeastern New Mexico. Figure 2-1 shows the location of the proposed NEF.

The proposed action can be divided into three major activities: (1) site preparation and construction, (2) operation, and (3) decontamination and decommissioning.

The NRC license, if granted, would be for 30 years from the start of construction until completion of decommissioning.

Table 2-1 presents the current schedule for the proposed NEF project.

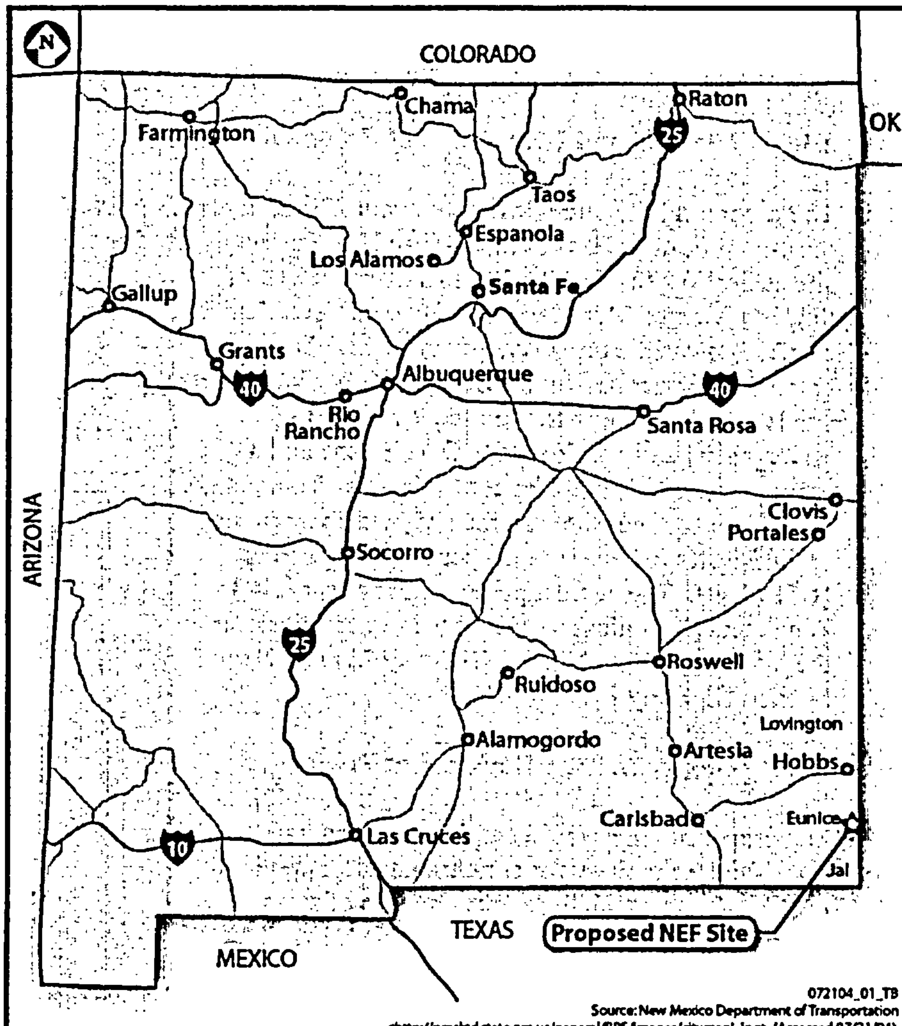

Figure 2-1 Location of Proposed NEF Site (NMDOT, 2004a)

Table 2-1 Proposed National Enrichment Facility Operation Schedule

Task	Start Date
Submit License Application to NRC	December 2003
Begin Construction of Facility	April 2006
Begin Operations of First Cascade	June 2008
Achieve Full Production Output	June 2013
Operate Facility at Full Capacity	June 2013 to June 2027
Submit Decommissioning Plan to NRC	April 2025
Begin Decommissioning of NEF	June 2027
Cease All Operations of Cascades	April 2033
Complete Decommissioning of Facility	April 2036

Source: LES, 2004a.

2.1.1 Location and Description of Proposed Site

The proposed NEF site consists of about 220 hectares (543 acres) located 8 kilometers (5 miles) east of the city of Eunice, New Mexico. The U.S. Bureau of Land Management (BLM) identifies the proposed site as Section 32 of range 38E in Township 21S of the New Mexico Meridian. The State of New Mexico currently owns the property; however, LES has been granted a 35-year easement (LES, 2004a). The entire site is undeveloped, with the exception of an underground carbon dioxide (CO_2) pipeline and a gravel road, and is used for cattle grazing. There is no permanent surface water on the site, and appreciable ground-water reserves are deeper than 340 meters (1,115 feet). The nearest permanent resident is 4.3 kilometers (2.6 miles) west of the proposed site near the junction of New Mexico Highway 234 and New Mexico Highway 18.

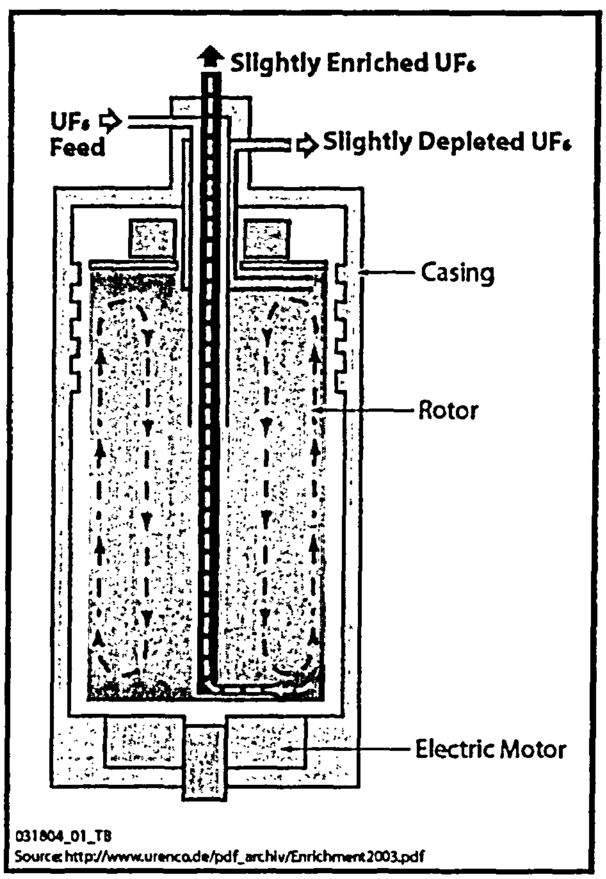

Figure 2-2 Schematic of a Gas Centrifuge (Urenco, 2003)

2.1.2 Gas Centrifuge Enrichment Process

The proposed NEF would employ a proven gas centrifuge technology for enriching natural uranium. Figure 2-2 shows the basic construction of a gas centrifuge. The technology uses a rotating cylinder (rotor) spinning at a high circumferential rate of speed inside a protective casing. The casing maintains a vacuum around the rotor and provides physical containment of the rotor in the event of a catastrophic rotor failure.

The uranium hexafluoride (UF_6) gas is fed through a fixed pipe into the middle of the rotor, where it is accelerated and spins at almost the same speed as the rotor. The centrifugal force produced by the spinning rotor causes the heavier uranium-238 hexafluoride ($^{238}UF_6$) molecules to concentrate close to the rotor wall and the lighter uranium-235 hexafluoride ($^{235}UF_6$) molecules collect closer to the axis of the rotor. This separation effect, which initially occurs only in a radial direction, increases when the rotation is supplemented by a convection current produced by a temperature difference along the rotor axis (thermoconvection). A centrifuge with this kind of gas circulation (i.e., from top to bottom near to the rotor axis and from bottom to top by the rotor wall) is called a counter-current centrifuge.

The inner and outer streams become more enriched/depleted in ^{235}U in their respective directions of movement. The biggest difference in concentration in a counter-current centrifuge does not occur between the axis and the wall of the rotor, but rather between the two ends of the centrifuge rotor. In the flow pattern shown in Figure 2-2, the enriched UF_6 is removed from the lower end and the DUF_6 at the upper end through take-off pipes that run from the axis close to the wall of the rotor.

The enrichment level achieved by a single centrifuge is not sufficient to obtain the desired concentration of 3 to 5 percent by weight of ^{235}U in a single step; therefore, a number of centrifuges are connected in series to increase the concentration of the ^{235}U isotope. Additionally, a single centrifuge cannot process a sufficient volume for commercial production, which makes it necessary to connect multiple centrifuges in parallel to increase the volume flow rate. The arrangement of centrifuges connected in series to achieve higher enrichment and parallel for increased volume is called a "cascade." A full cascade contains hundreds of centrifuges connected in series and parallel. Figure 2-3 is a diagram of a segment of a uranium enrichment cascade showing the flow path of the UF_6 feed, enriched UF_6 product, and depleted uranium hexafluoride (DUF_6) gas. In the proposed NEF, eight cascades would be grouped in a Cascade Hall, and each separation building would house two cascade halls.

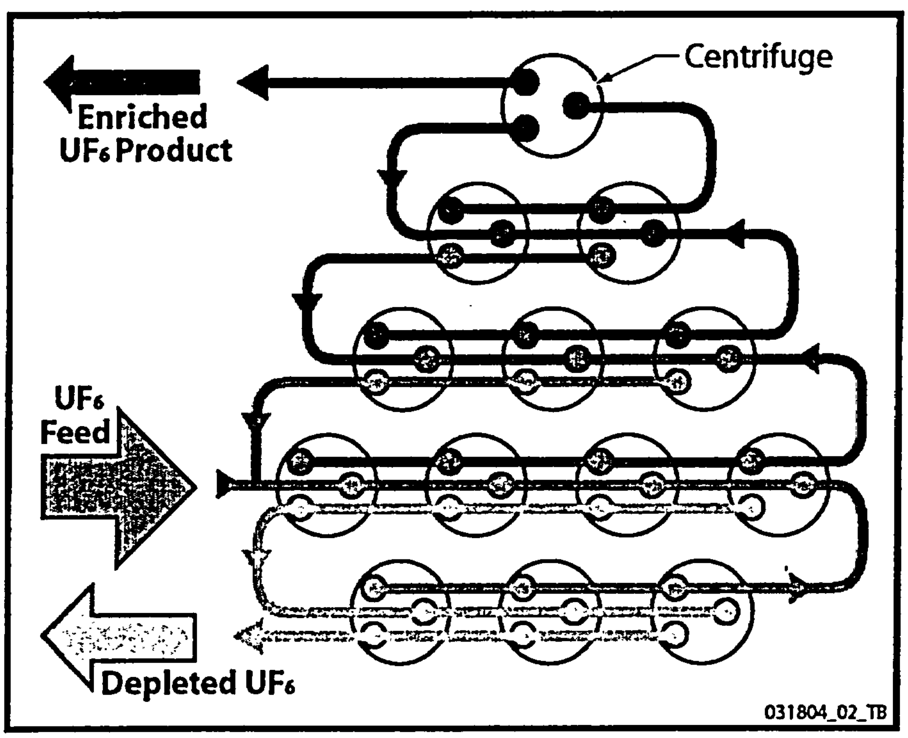

Figure 2-3 Diagram of Enrichment Cascade for Proposed NEF (Urenco, 2003)

What is enriched uranium?

Uranium is a naturally occurring radioactive element. In its natural state, uranium contains approximately 0.72 percent by weight of the uranium-235 isotope (^{235}U), which is the fissile isotope of uranium. There is a very small (0.0055 percent) quantity of the uranium-234 (^{234}U) isotope, and most of the remaining mass (99.27 percent) is the uranium-238 (^{238}U) isotope. All three isotopes are chemically identical and only differ slightly in their physical properties. The most important difference between the isotopes is their mass. This small mass difference allows the isotopes to be separated and makes it possible to increase (i.e., "enrich") the percentage of ^{235}U in the uranium to levels suitable for nuclear power plants or, at very high enrichment, nuclear weapons.

Most civilian nuclear power reactors use low-enriched uranium fuel containing 3 to 5 percent by weight of ^{235}U. Uranium for most nuclear weapons is enriched to greater than 90 percent.

Uranium would arrive at the proposed NEF as natural UF_6 in solid form in a Type 48X or 48Y transport cylinder from existing conversion facilities in Port Hope, Ontario, Canada or Metropolis, Illinois. To start the enrichment process, the cylinder of UF_6 is heated, which causes the material to sublime (change directly from a solid to a gas). The UF_6 gas is fed into the enrichment cascade where it is processed to increase the concentration of the ^{235}U isotope. The UF_6 gas with an increased concentration of ^{235}U is known as "enriched" or "product." Gas with a reduced concentration of ^{235}U is referred to as "depleted" UF_6 (DUF_6) or "tails."

Source: WNA, 2003.

2.1.3 Description of Proposed National Enrichment Facility

Principal structures within the proposed NEF are shown in Figure 2-4. These include the following structures:

- Uranium Byproduct Cylinder (UBC) Storage Pad.
- Centrifuge Assembly Building.
- Cascade Halls.
- Cylinder Receipt and Dispatch Building.
- Blending and Liquid Sampling Area.
- Technical Services Building.
- Administration Building.
- Visitor Center.
- Security Building.
- Central Utilities Building.

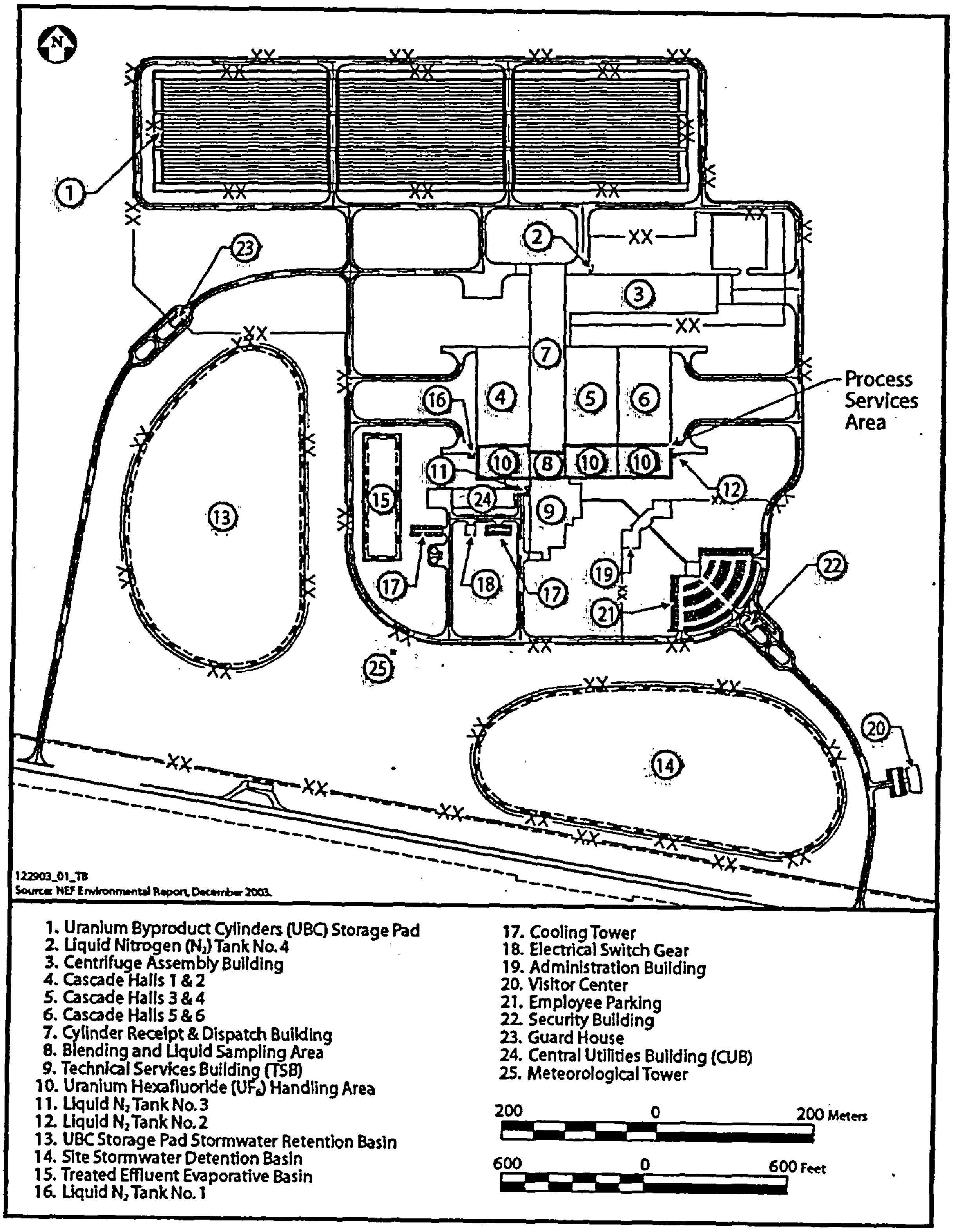

Figure 2-4 Proposed NEF Site Layout (LES, 2004a)

Uranium Byproduct Cylinders (UBC) Storage Pad

The UBC Storage Pad (Item 1 in Figure 2-4) would be constructed on the north side of the controlled area to store transportation cylinders and UBCs. The UBCs are Type 48Y cylinders. The large concrete pad would initially be sized to store the first 5 years' worth of cylinders (about 1,600 cylinders) stacked 2 high in concrete saddles that would elevate them approximately 20 centimeters (8 inches) above ground level. The pad would be expanded as additional storage is required. The maximum size of the UBC storage pad would be 9 hectares (23 acres), and it would be able to store 15,727 cylinders (LES, 2004a).

Centrifuge Assembly Building

The Centrifuge Assembly Building (Item 3 in Figure 2-4) would be used for the assembly, inspection, and mechanical testing of the centrifuges prior to installation in the Cascade Halls. This building would also contain the Centrifuge Test and Postmortem Facilities that would be used to test the functional performance and operational problems of production centrifuges and ensure compliance with design parameters.

Cascade Halls

The six proposed Cascade Halls would be contained in three Separations Buildings (Items 4, 5, and 6 in Figure 2-4) near the center of the proposed NEF. Figure 2-5 is a photograph of centrifuges inside a cascade hall at Urenco. Each of the six proposed Cascade Halls would house eight cascades, and each cascade would consist of hundreds of centrifuges connected in series and parallel to produce enriched UF_6. Each Cascade Hall would be capable of producing a maximum of 545,000 SWU per year.

The centrifuges would be mounted on precast concrete-floor-mounted stands (flomels). Each Cascade Hall would be enclosed by a structural steel frame supporting insulated sandwich panels (metal skins with a core of insulation) to maintain a constant temperature within the cascade enclosure.

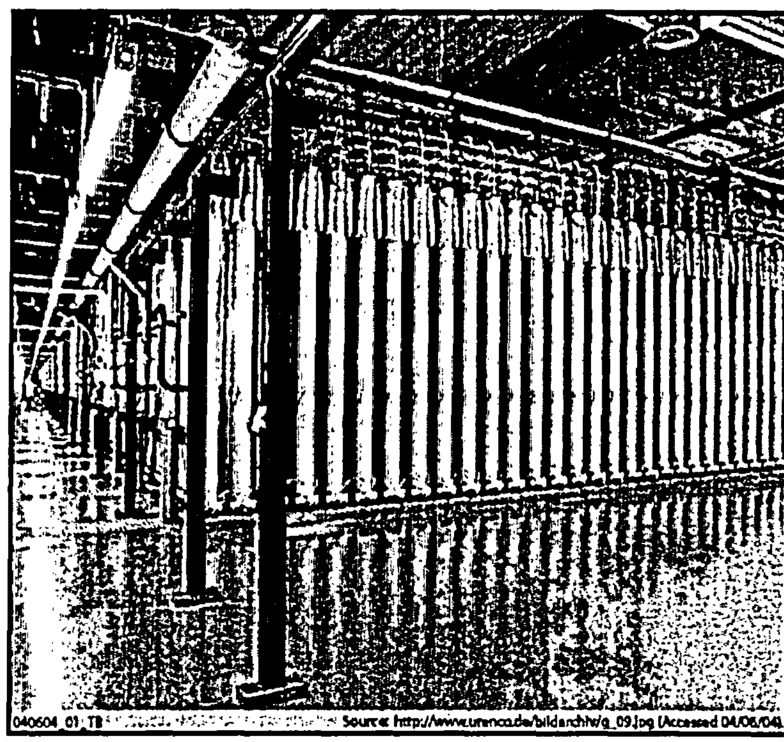

Figure 2-5 Inside a Cascade Hall (Urenco, 2003)

In addition to the Cascade Halls, each Separations Building module would house a UF_6 Handling Area and a Process Services Area. The UF_6 Handling Area would contain the UF_6 feed input system as well as the enriched UF_6 product, and DUF_6 takeoff systems. The Process Services Area would contain the gas transport piping and equipment, which would connect the cascades with each other and with the product and depleted materials takeoff systems. The Process Services Area would also contain key electrical and cooling water systems.

Cylinder Receipt and Dispatch Building

All UF_6 cylinders (feed, product, and UBCs) would enter and leave the proposed NEF through the Cylinder Receipt and Dispatch Building (Item 7 in Figure 2-4).

Blending and Liquid Sampling Area

The primary function of the Blending and Liquid Sampling Area (Item 8 in Figure 2-4) would be filling and sampling the Type 30B product cylinders with UF_6 enriched to the customer specifications and verifying the purity of the enriched product.

Technical Services Building

The Technical Services Building (Item 9 in Figure 2-4) would contain support areas for the facility and acts as the secure point of entry to the Separations Building Modules and the Cylinder Receipt and Dispatch Building. This building would contain the following functional areas:

- The *Control Room* would be the main monitoring point for the entire plant and provide all of the facilities for the control of the plant.

- The *Security Alarm Center* would be the primary security monitoring station for the facility. All electronic security systems would be controlled and monitored from this center.

- The *Cylinder Preparation Room* would provide a set-aside area for testing and inspecting new or cleaned Type 30B, 48X, and 48Y cylinders for use in the proposed NEF. It would be maintained under negative pressure and would require entry and exit through an airlock.

- The *Radiation Monitoring Control Room* would separate the non-contaminated areas from the potentially contaminated areas of the proposed plant. It would include personnel radiation monitoring equipment, hand-washing facilities and safety showers.

- The *Decontamination Workshop* would provide a facility for the removal of radioactive contamination from contaminated materials and equipment.

- The *Solid Waste Collection Room* would be used for processing wet and dry low-level solid waste.

- The *Liquid Effluent Collection and Treatment Room* would be used to collect, monitor, and treat potentially contaminated liquid effluents produced onsite.

- The *Gaseous Effluent Vent System Room* would be used to remove uranium and other radioactive particles and hydrogen fluoride from the potentially contaminated process gas streams.

- The *Laboratory Area* would provide space for laboratories where the purity and enrichment percentage of the enriched UF_6 would be measured and the impact of the proposed NEF on the environment would be monitored.

Administration Building

The Administration Building (Item 19 in Figure 2-4) would contain office areas and a security station. All personnel access to the proposed NEF would occur through the Administration Building.

Visitor Center

The Visitor Center (Item 20 in Figure 2-4) would be located outside the security fence close to New Mexico State Highway 234.

Security Building

The main Security Building (Item 22 in Figure 2-4) would be located on the main access road at the entrance to the proposed NEF. All traffic entering or leaving the proposed NEF would proceed past the Security Building.

Central Utilities Building

The Central Utilities Building (Item 24 in Figure 2-4) would house two diesel generators, which would provide standby and emergency power for the proposed facility as well as the electrical switchgear and heating, ventilation, and air-conditioning systems for the proposed facility.

2.1.4 Site Preparation and Construction

Site preparation for the construction of the proposed NEF would require the clearing of approximately 81 hectares (200 acres) of undisturbed pasture land within the 220-hectares (543-acre) site. The permanent plant structures, support buildings, and the UBC Storage Pad would occupy about 73 hectares (180 acres) of the 81 hectares (200 acres) if the UBC Storage Pad is expanded to its fullest capacity. Contractor parking and a lay-down area would occupy the remaining 8 hectares (20 acres). The contractor parking and lay-down area and areas around the building exteriors would be graded and restored after completion of the proposed construction (LES, 2004a).

Most of the disturbed area would be graded and would form the owner-controlled area. The disturbed area would comprise about one-third of the total site area. The undisturbed onsite areas (147 hectares [343 acres]) would be left in a natural state with no designated use for the life of the proposed NEF. Figure 2-6 shows the areas that would be cleared for construction activities.

Site Preparation

Groundbreaking at the proposed NEF site would begin in 2006, with construction continuing for eight years until 2013. The proposed site terrain currently ranges in elevation from +1,033 to +1,045 meters (+3,390 to +3,430 feet) above mean sea level. Because the proposed NEF requires an area of flat terrain, about 36 hectares (90 acres) would be graded to bring the site to a proposed final grade of +1,041 meters (+3,415 feet) above mean sea level. All material excavated onsite would be used for onsite fill, and no new material would be brought onto the proposed NEF site.

Site preparation would include the cutting and filling of approximately 611,000 cubic meters (797,000 cubic yards) of soil and caliche with the deepest cut being 4 meters (13 feet) and the deepest fill being 3.3 meters (11 feet) (LES, 2004a). In this phase, conventional earthmoving and grading equipment would be used. The removal of very dense soil or caliche could require the use of heavy equipment with ripping tools. Control of soil-removal work for foundations would follow to reduce over excavation and minimize construction costs. In addition, loose soil and/or damaged caliche would be removed prior to installation of foundations for seismically designed structures.

Subsurface geologic materials at the proposed NEF site generally consist of red clay beds, a part of the Chinle Formation of the Triassic-aged Dockum Group. Bedrock is covered with up to 17 meters (55 feet) of silty sand, sand, sand and gravel, and an alluvium that is part of the Antlers and/or Gatuña Formations. Foundation conditions at the site are generally good, and no potential for mineral development has been found at the site.

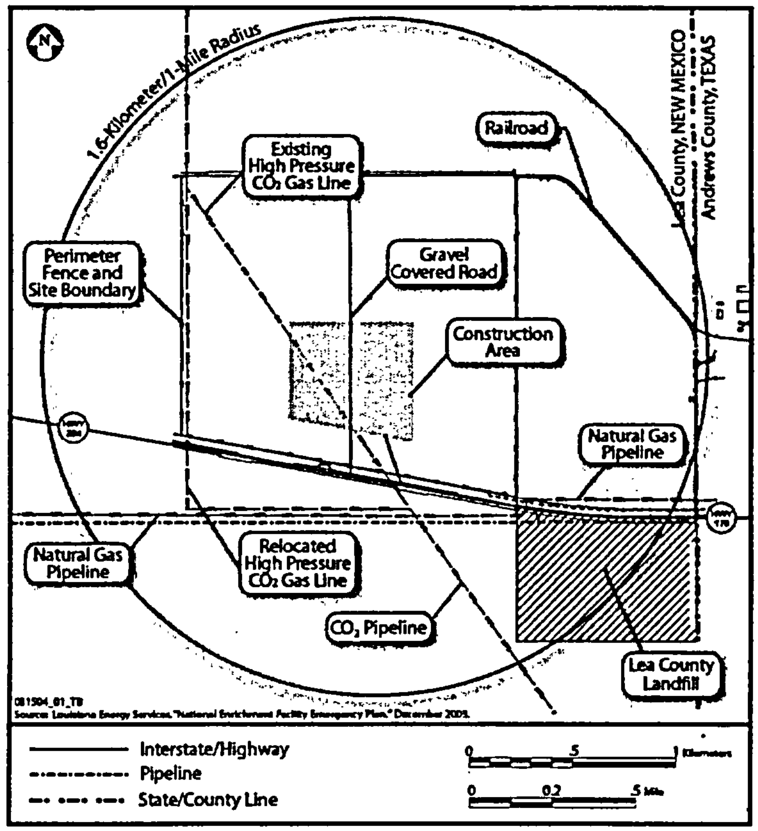

Figure 2-6 Construction Area for the Proposed NEF Site (LES, 2004a)

A 13.8 newtons per square millimeter (2,000 pounds-force per square inch) high-pressure CO_2 pipeline crosses the site diagonally from the southeast to the northwest. It would be relocated during the site preparation for safety considerations. The relocation would be performed in accordance with applicable regulations to minimize any direct or indirect impacts on the environment.

Soil Stabilization

An engineered system would control surface stormwater runoff for the proposed NEF. Construction and erosion control management practices would mitigate erosional impacts due to site clearing and grading. Part of construction work would involve stabilizing disturbed soils. Earth berms, dikes, and sediment fences would be used as necessary during all phases of construction to limit runoff. Much of the excavated areas would be covered by structures or paved, limiting the creation of new dust sources. Additionally, two stormwater detention basins would be constructed prior to land clearing to be used as sedimentation collection basins during construction, and they would be converted to stormwater detention or retention basins once the site is re-vegetated and stabilized.

One of the construction stormwater detention basins would be converted to the Site Stormwater Detention Basin (Item 14 in Figure 2-4) at the south side of the proposed site. The Site Stormwater Detention Basin would collect runoff from various developed parts of the site including roads, parking areas, and building roofs. It would be unlined and would have an outlet structure to control discharges above the design level. The normal discharge would be through evaporation to the air or infiltration into the ground. The basin's design would enable it to contain runoff for a rainfall of 15.2 centimeter (6.0

inch) in 24 hours, which is equal to the 100-year return frequency storm. In addition, the basin would have 60 centimeters (2 feet) of freeboard beyond design capacity.

The site is currently unimproved ground. Rainfall percolates into the soil or runs off into the roadside drainage ditch. After construction is completed part of the site would be covered with buildings and paved areas that would prevent rainfall from percolating into the soil. Runoff from the buildings and paved areas would be diverted to the Site Stormwater Detention Basin. The Basin would be equipped with an outfall that would be designed to limit the discharge flow rate to the same or less than the site's current runoff rate.

The Site Stormwater Detention Basin would have approximately 123,350 cubic meters (100 acre-feet) of storage capacity. The drainage area served would include about 39 hectares (96 acres), the majority of which would be the developed portion of the proposed NEF site. The water quality of the discharge would be typical of runoff from building roofs and paved areas from any industrial facility. Except for small amounts of oil and grease typically found in runoff from paved roadways and parking areas, the discharge would not be expected to contain contaminants.

The second stormwater detention basin built during construction would be converted to the UBC Storage Pad Stormwater Retention Basin (Item 13 in Figure 2-4) for the operation phase. The UBC Storage Pad Stormwater Retention Basin would collect and contain water discharges from two sources: (1) stormwater runoff from the UBC Storage Pad and (2) cooling tower blowdown discharges. This basin would be designed with a membrane lining to minimize ground infiltration of the water. Evaporation would be the primary method to eliminate the water from the UBC Stormwater Retention Basin. The basin would be designed to contain a volume equal to 30.4 centimeters (12 inches) of rainfall, which is double the 24-hour, 100-year return frequency storm plus an allowance for cooling tower blowdown water. The UBC Storage Pad Stormwater Retention Basin would be designed to contain a volume of approximately 77,700 cubic meters (63 acre-feet), which serves 9 hectares (23 acres), the maximum area of the proposed UBC Storage Pad.

Additional mitigation measures would be taken to minimize soil erosion and impacts during the construction phase. Mitigation measures proposed by LES during construction include:

- Watering the onsite construction roads periodically to control fugitive dust emissions, taking into account water conservation.

- Using adequate containment methods during excavation and other similar operations.

- Covering open-bodied trucks transporting materials likely to disperse when in motion.

- Promptly removing earthen materials dispensed on paved roads.

- Stabilizing or covering bare areas once earth-moving activities are completed.

After construction was complete, natural, low-water maintenance landscaping and pavement would be used to stabilize the site.

Spill Prevention

All construction activities would comply with the National Pollutant Discharge Elimination System (NPDES) general construction permit obtained from EPA Region 6. A Spill Prevention, Control, and Countermeasure plan would also be implemented during construction to minimize environmental impacts from potential spills and to ensure prompt and appropriate remediation. Potential spills during construction would likely occur around vehicle maintenance and fueling locations, storage tanks, and painting operations. The Spill Prevention, Control, and Countermeasure plan would identify sources, locations, and quantities of potential spills and response measures. The plan would also identify individuals and their responsibilities for implementation of the plan and provide for prompt notifications of State and local authorities, as required. Implementing best management practices for waste management would minimize solid waste and hazardous material generation during construction. These practices would include the placement of waste receptacles and trash dumpsters at convenient locations and the designation of vehicle and equipment maintenance areas for the collection of oil, grease, and hydraulic fluids. If external washing of construction vehicles would be necessary, no detergents would be used, and the runoff would be diverted to an onsite basin. Adequately maintained sanitary facilities would be available for construction crews.

Air Emissions

Construction activity would generate some degree of dust during the various stages of construction activity. The amount of dust emissions would vary according to the types of activity. The first five months of construction would likely be the period of highest emissions because approximately one-third of the 220-hectare (543-acre) proposed NEF site would be involved along with the greatest number of construction vehicles operating on an unprepared surface. However, it would be expected that no more than 18 hectares (45 acres) would be involved in this type of work at any one time.

Table 2-2 lists the estimated peak emission rates during construction of the proposed NEF. Emission rates for fugitive dust were estimated for a 10-hour workday assuming peak construction activity levels were maintained throughout the year. The calculated total work-day average emissions result for fugitive emission particulate would be 8.6 kilograms per hour (19.1 pounds per hour). Fugitive dust would most likely be caused by vehicular traffic on unpaved surfaces, earth moving, excavating and bulldozing, and to a lesser extent wind erosion.

Table 2-2 Estimated Peak Emission Rates During Construction (Based on 10 hours per day, 5 days per week, and 50 weeks per year)

Pollutant	Average Emissions, kilograms per hour (pounds per hour)
Vehicle Emissions	
Hydrocarbons	2.1 (4.6)
Carbon Monoxide	13.3 (29.4)
Nitrogen Oxides	7.53 (59.8)
Sulfur Oxides	2.7 (6.0)
Particulate	1.9 (4.3)
Fugitive Emissions	
Particulate	8.6 (19.1)

Source: LES, 2004b.

Sanitary Waste

In lieu of connecting to the local sewer system, six onsite underground septic systems would be installed for the treatment of sanitary wastes. Each septic system would consist of a septic tank with one or more leachfields. Together, the 6 septic systems would be sized to process 40,125 liters per day (10,600 gallons per day), which is sufficient flow capacity for approximately 420 people. Assuming an average water use of 95 liters per day (25 gallons per day) per person, the planned staff of 210 full-time employees would use approximately 20,000 liters per day (5,283 gallons per day) which, if evenly distributed, means the planned septic systems would operate at about 50 percent of design capacity (LES, 2004a).

Construction Work Force

Table 2-3 presents the estimated average annual number of construction employees who would work on the proposed NEF site during construction and their annual pay. The construction force is anticipated to peak at about 800 workers from 2008 to 2009. During early construction stages of the project, the work force would be expected to consist primarily of structural crafts workers, most of whom would be recruited from the local area. As construction progresses, there would be a transition to predominantly mechanical and electrical crafts. The bulk of this labor force would come from the surrounding 120-kilometer (75-mile) region, which is known as the region of influence.

Table 2-3 Estimated Number of Construction Workers by Annual Pay

	Number of Workers by Salary Range				Total Number of Workers
Year	$0 - 16,000	$17,000 - 33,000	$34,000 - 49,000	$50,000 - 82,000	Average Number per Year
2006	100	100	50	5	255
2007	50	75	350	45	520
2008	50	100	500	50	700
2009	50	100	600	50	800
2010	50	25	300	50	425
2011	10	25	100	60	195
2012	10	15	75	40	140
2013	10	15	75	40	140

Source: LES, 2004b.

Construction Materials

Construction of the proposed NEF would require many different commodities. Table 2-4 lists materials that would be used during the construction phase, and most of these materials would be obtained locally.

Table 2-4 Selected Commodities and Resources to be Used During Construction of Proposed NEF

Description	Quantity
Water	7,570 cubic meters (2 million gallons) [a] annually
Asphalt Paving	72,940 cubic meters (95,400 cubic yards)
Chain link Fencing	15.1 kilometers (9.3 miles)
Concrete	59,196 cubic meters (77,425 cubic yards)
Concrete Paving	1,614 cubic meters (2,111 cubic yards)
Copper & Aluminum Wiring	362 kilometers (225 miles)
Crushed Stone	287,544 square meters (343,900 square yards)
Electrical Conduit	121 kilometers (75 miles)
Piping (Carbon & Stainless Steel)	56 kilometers (34.6 miles)
Roofing Materials	52,074 square meters (560,500 square feet)
Stainless & Carbon Steel Ductwork	515 metric tons (568 tons)

[a] Escalated from the formerly proposed Claiborne Enrichment Facility. The value from the Claiborne Enrichment Facility was doubled since the proposed NEF would have double the production capacity, and the total was then increased by 65 percent to account for the semi-arid climate of the proposed site (NRC, 1994).
Source: LES, 2004a.

2.1.5 Local Road Network

New Mexico Highway 234 is a 2-lane highway located on the southern border of the proposed NEF site with 3.6-meter (12-foot) wide driving lanes, 2.4-meter (8-foot) wide shoulders, and a 61-meter (200-foot) right-of-way easement on either side. The highway provides direct access to the site. A gravel-covered road currently runs north from the highway through the center of the site to the sand and gravel quarry to the north. Two access roads would be built from the highway to support construction. The materials delivery construction access road would run north from the highway along the west side of the proposed NEF. The personnel construction access road would run north from the highway along the east side of the proposed NEF. Both roadways would eventually be paved and converted to permanent access roads upon completion of construction.

Over-the-road trucks of various sizes and weights would deliver construction material to the proposed NEF. Delivery vehicles would range from heavy-duty 18-wheeled tractor trailers to commercial box and light-duty pick-up trucks. Delivery vehicles from the north and south would travel New Mexico Highway 18 or New Mexico Highway 207 to New Mexico Highway 234. The intersection of New Mexico Highway 18 and New Mexico Highway 234 is approximately 6.4 kilometers (4 miles) west of the site. While the intersection of New Mexico Highway 207 and New Mexico Highway 234 is further west, construction material would also travel from the east by way of Texas Highway 176, which becomes New Mexico Highway 234 at the New Mexico/Texas State line. Construction material from the west would come by way of New Mexico Highway 8, which becomes New Mexico Highway 234 near the city of Eunice west of the site. Due to the presence of a quarry directly north of the site, bulk aggregate trucks might also use the onsite gravel road that currently leads to the quarry.

Planned maintenance to New Mexico Highway 234 include the resurfacing, restoration, and rehabilitation of existing lanes to improve roadway quality, enhance safety, and further economic development. However, no time frame has been established for the maintenance activities (NMDOT, 2004b).

2.1.6 Proposed Facility Utilities and Other Services

The proposed NEF would require the installation of water, natural gas, and electrical utility lines.

Water Supply

The proposed NEF water supply would be obtained from the municipalities of Eunice and Hobbs, New Mexico. This would be performed by running new potable water pipelines from the municipal water supply systems for Eunice and Hobbs to the proposed NEF site. The pipeline from Eunice would be about 8 kilometers (5 miles) long, and the pipeline from Hobbs would be about 32 kilometers (20 miles) long. Both pipelines would run inside the Lea County right-of-way easements along New Mexico Highways 18 and 234.

Current capacities for the Eunice and Hobbs municipal water supply systems are 16,350 cubic meters per day (4.32 million gallons per day) and 75,700 cubic meters per day (20 million gallons per day), respectively. Current Eunice and Hobbs usages are about 5,600 cubic meters per day (1.48 million gallons per day) and 23,450 cubic meters per day (6.2 million gallons per day), respectively. The average and peak potable water requirements for operation of the proposed NEF would be approximately 240 cubic meters per day (63,423 gallons per day) and 2,040 cubic meters per day (539,000 gallons per day), respectively (Abousleman, 2004; Woomer, 2004).

Natural Gas

A 406-millimeter (16-inch) diameter underground natural gas pipeline owned by the Sid Richardson Energy Services Company is located along the south property line paralleling New Mexico Highway 234. This pipeline would supply natural gas for the proposed NEF.

Electrical Power

The proposed NEF would require approximately 30 megawatts of electricity. This power would be supplied by two new synchronized 115-kilovolt overhead transmission lines on a large loop system. These lines would tie into a trunk line about 13 kilometers (8 miles) west of the proposed site. Currently, there are several power poles along the highway in front of the adjacent vacant parcel east of the proposed site, and a 61-meter (200-foot) right-of-way easement along both sides of New Mexico Highway 234 would allow installation of utility lines within the highway easement. In conjunction with the new electrical lines serving the site, Xcel Energy, the local electrical service company, would install two independent substations to ensure redundant service. Associated power-support structures would be installed along New Mexico Highway 234. An application for highway easement modification would be submitted to the State. The average power requirement and the peak power requirement of the facility are approximately 30.3 million volt-amps and 32 million volt-amps, respectively (LES, 2004b).

2.1.7 Proposed Facility Operation

At full production, the proposed NEF would receive 8,600 metric tons (9,480 tons) per year of UF_6 containing a concentration of 0.72 percent by weight of the ^{235}U isotope. The proposed NEF would enrich natural UF_6 feed material to between 3 and 5 percent by weight of the ^{235}U isotope. DUF_6 gas would be transferred to a Type 48Y cylinder where the gas would cool to a solid. LES would store the cylinder on the UBC Storage Pad until final dispositioning.

<u>Receiving UF_6 Feed Material</u>

Figure 2-7 shows the unloading of a Type 48Y cylinder. The proposed 8,600 metric tons (9,480 tons) of natural UF_6 feed material would be processed by the cascades to generate up to 800 metric tons (882 tons) of enriched UF_6 product and 7,800 metric tons (8,600 tons) of DUF_6 material each year. The feed material would be shipped to the proposed NEF in standard Type 48X or 48Y cylinders. Both of these cylinders are U.S. Department of Transportation (DOT) approved containers for transporting Type A radioactive material (DOE, 1999a) from the UF_6 generation facilities in Port Hope, Ontario, Canada or Metropolis, Illinois. A fully loaded Type 48Y cylinder weighs 14.9 metric tons (16.4 tons) and is shipped one per truck (WNTI, 2004). Therefore, the site would receive an average of three shipments of natural UF_6 feed material every day (assuming only weekday shipments). After receipt and inspection, the cylinder could be stored until needed or connected to the gas centrifuge cascade at one of several feed stations. Once installed in the feed station, the transport cylinders would be heated to sublime the solid UF_6 into a gas that would be fed to the gas centrifuge enrichment cascade.

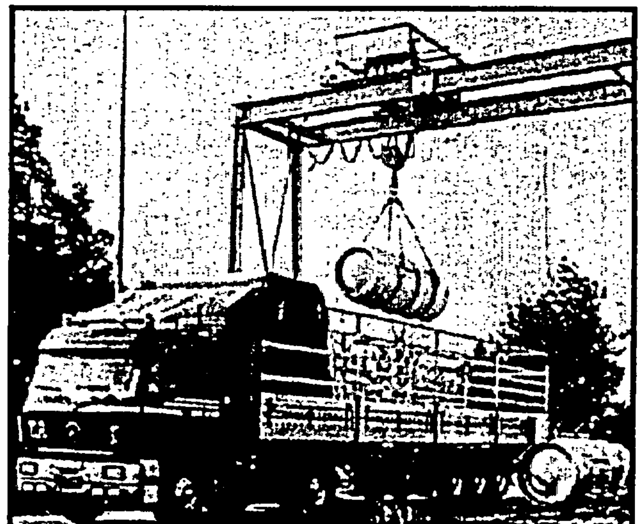

Figure 2-7 Cylinder of UF_6 Being Unloaded (Urenco, 2004b)

After the cylinder has been emptied, it would be inspected and processed for reuse. The proposed NEF currently has no plans for internal cleaning or decontamination of the cylinders. The Type 48X cylinders are smaller than the Type 48Y cylinders and would not be used for onsite storage of the DUF_6 material. They would be returned to the supplier for reuse or disposed of at a licensed facility. The Type 48Y cylinders would be used to store DUF_6 material on the UBC Storage Pad or returned to the supplier. A Type 48Y cylinder filled with DUF_6 would be designated as a UBC.

<u>Producing Enriched UF_6 Product</u>

The proposed NEF would be constructed in stages to allow enrichment operations to begin while additional cascade halls are still under construction. The first set of enrichment cascades would begin operating as soon as practical. This ramped production schedule would allow the proposed facility to begin operation only two years after initial groundbreaking. Production of enriched UF_6 product would increase from approximately 77 metric tons (85 tons) in 2008 to a maximum of 800 metric tons (882 tons) by 2013 (LES, 2004a).

Shipping Enriched Product

Enriched UF_6 product would be shipped in a Type 30B cylinder, which is 76 centimeters (30 inches) in diameter and 206 centimeters (81 inches) long and holds a maximum of 2.3 metric tons (2.5 tons) of 5-percent enriched $^{235}UF_6$. Figure 2-8 shows Type 30B enriched product cylinders and overpacks being loaded for transport. At full production, the proposed NEF would produce 800 metric tons (882 tons) of enriched product which, at 2.3 metric tons (2.5 tons) per cylinder and 3 cylinders per truck, would require approximately 2 trucks per week to be shipped to the fuel fabricators in Richland, Washington; Wilmington, North Carolina; or Columbia, South Carolina.

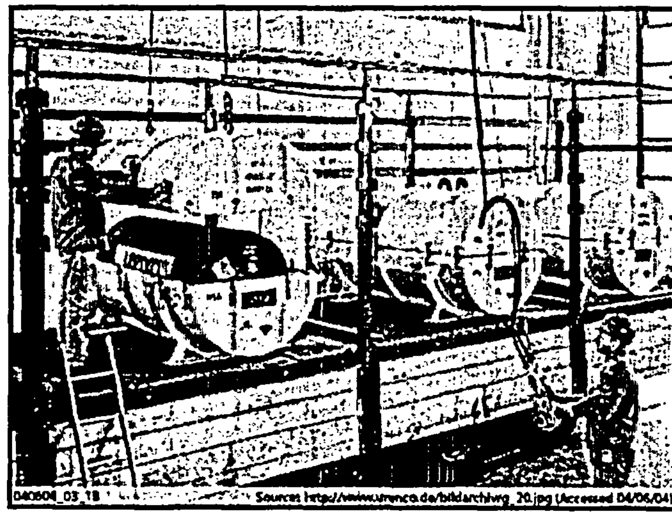

Figure 2-8 Shipment of Enriched Product (Urenco, 2004b)

Storing DUF_6 Material

During operation of the proposed NEF, the production of DUF_6 material would increase from 748 metric tons (825 tons) to 7,800 metric tons (8,600 tons) per year. This material would fill between 66 and 627 cylinders per year. Table 2-5 shows the potential maximum and anticipated quantity of Type 48Y cylinders that would be filled with DUF_6 material each year during the anticipated life of the proposed NEF.

The "Maximum" production column shown in Table 2-5 provides a upper limit bounding guide for the operation of the proposed NEF. It does not consider a sequential shutdown or progressive decommissioning of the proposed NEF. The proposed NEF would undergo sequential decommissioning which would reduce the production capability of the proposed facility as the cascades are shut down in sequence and the proposed NEF undergoes sequential decommissioning. The "Anticipated" production column incorporates this sequential shutdown into the estimated production of DUF_6 material during the operational life of the proposed NEF.

The DUF_6 material would be stored in Type 48Y cylinders on the UBC Storage Pad until a final disposition option is identified. The UBC Storage Pad would be able to hold up to 15,727 cylinders, which is the maximum projected production of the DUF_6 material cylinders.

Figure 2-9 shows the material flow of feed, enriched, and DUF_6 material and cylinders during full operation of the proposed NEF.

Table 2-5 Maximum and Anticipated Yearly Production of Cylinders of DUF_6 over 30-Year License

Year	Maximum		Anticipated	
	Yearly UBCs Filled	Cumulative UBCs Filled	Yearly UBCs Filled	Cumulative UBCs Filled
2008	66	66	66	66
2009	196	262	196	262
2010	313	575	313	575
2011	431	1,006	431	1,006
2012	548	1,554	548	1,554
2013	623	2,177	623	2,177
2014 to 2027	627	2,804 to 10,955	627	2,804 to 10,955
2028	627	11,582	561	11,516
2029	627	12,209	444	11,960
2030	627	12,836	326	12,286
2031	627	13,463	209	12,495
2032	627	14,090	92	12,587
2033	561	14,651	5	12,592
2034	444	15,095	0	12,592
2035	326	15,421	0	12,592
2036	209	15,630	0	12,592
2037	92	15,722	0	12,592
2038	5	15,727	0	12,592
2039	0	15,727	0	12,592

Source: LES, 2004c.

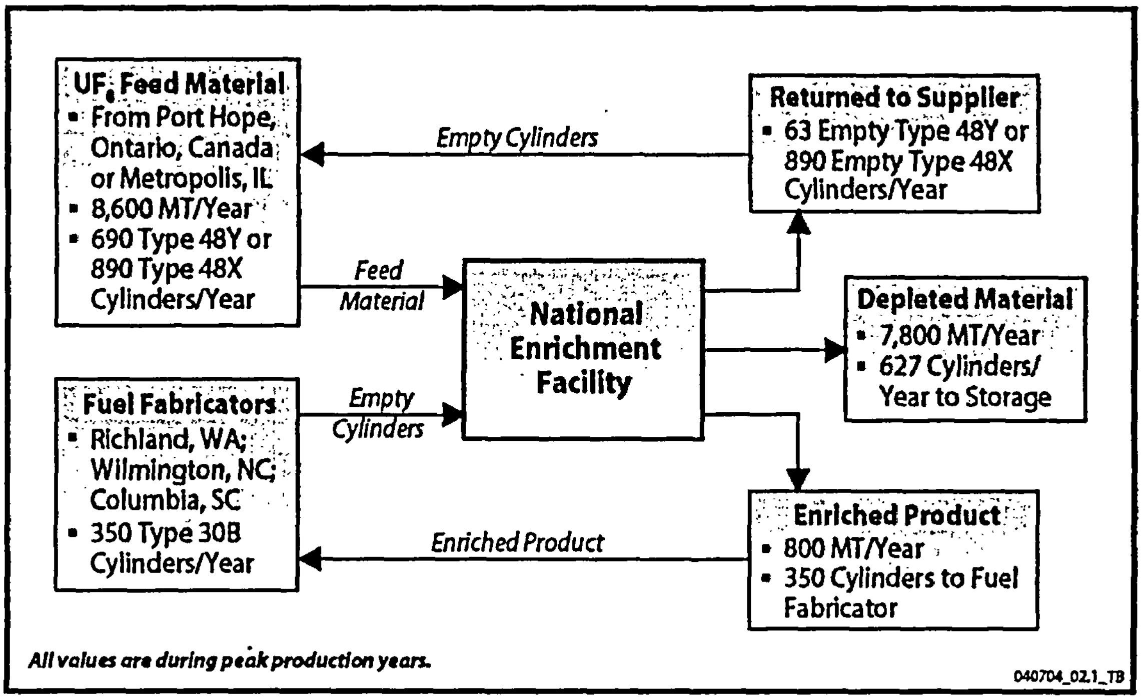

Figure 2-9 Flow from Feed, Enriched, and DUF_6 Material

Operations Work Force

An estimated 210 full-time workers would be required during full operation of the proposed NEF, providing an average of 150 jobs per year over the life of the facility. The average total annual wages and benefits paid to these workers would be $10.5 million per year. The annual number of production workers would increase as construction activities tapered off and, correspondingly, the production work force would reduce as decommissioning activities began.

Production Process Systems

The primary product of the proposed NEF would be enriched UF_6 product. Production of enriched UF_6 would require the safe operation of multiple plant support systems to ensure the safe operation of the facility. The principal process systems required for the safe and efficient production of enriched UF_6 product would include the following:

- Decontamination System.
- Fomblin® Oil Recovery System.
- Liquid Effluent Collection and Treatment System.
- Stormwater Retention and Detention Basins
- Solid Waste Collection System.
- Gaseous Effluent Vent Systems.
- Centrifuge Test and Postmortem Exhaust Filtration System.

Containers Used for Transportation and Storage of UF_6

Type 48X or Type 48Y cylinders would be used to transport feed material (natural UF_6) to the proposed NEF site. Only 48Y cylinders would be used for temporary storage of DUF_6 on the UBC Storage Pad. The difference between the Type 48X and 48Y cylinders is their capacity. Both containers are constructed of American Society for Testing and Materials (ASTM) type A-516 steel, and both can be used to transport UF_6 enriched up to 4.5 percent ^{235}U.

Type 30B containers would be used to transport enriched UF_6 to fuel fabrication facilities. Type 30B containers have additional design requirements as specified in 10 CFR § 71.51 to permit the safe transportation of higher enriched UF_6 than the Type 48X or 48Y containers.

	Type 48X	Type 48Y	Type 30B
Diameter	1.2 meters (48 inches)	1.2 meters (48 inches)	0.76 meter (30 inches)
Length	3.0 meters (119 inches)	3.8 meters (150 inches)	2.06 meters (81 inches)
Wall Thickness	16 millimeters (0.625 inch)	16 millimeters (0.625 inch)	12.7 millimeters (0.5 inch)
Empty Weight	2,041 kilograms (4,500 pounds)	2,359 kilograms (5,200 pounds)	635 kilograms (1,400 pounds)
UF_6 Capacity	9,540 kilograms (21,000 pounds)	12,500 kilograms (27,560 pounds)	2,277 kilograms (5,020 pounds)

Source: DOE, 1999a; LES, 2004a; USEC, 1995.

Decontamination System

The Decontamination System would be designed to remove radioactive contamination from centrifuges, pipes, instruments, and other potentially contaminated equipment. The system would contain equipment and processes to disassemble, clean and degrease, decontaminate, and inspect plant equipment. Scrap and waste material from the decontamination process would be sent to the solid or liquid waste processing system for segregation and treatment prior to offsite disposal at a licensed facility. Exhaust air from the decontamination system area would pass through the gaseous effluent vent system before discharge to the atmosphere.

Fomblin® Oil Recovery System

Vacuum pumps would maintain the vacuum between the rotor and casing of the centrifuge. The pumps would use a perfluorinated polyether oil, such as Fomblin® oil, which is a highly fluorinated, nonflammable, chemically inert, thermally stable oil for vacuum pump lubrication and seal maintenance. The Fomblin® oil would provide long service life and would not react with UF_6 gas. Disposal and replacement of the oil is very expensive, which makes recovery and reuse the preferred practice. The Fomblin® Oil Recovery System would reclaim spent oil from the UF_6 processing system, and filter and recondition it for reuse by the proposed NEF. The recovery would employ anhydrous sodium carbonate (soda ash) in a laboratory-scale precipitation process to remove the primary impurities and activated carbon to remove trace amounts of hydrocarbons.

Liquid Effluent Collection and Treatment System

The Liquid Effluent Collection and Treatment System would collect potentially contaminated liquid effluents generated in a variety of plant operations and processes. These liquid effluents would be collected in holding tanks and then transferred to bulk storage tanks prior to disposal. Significant and slightly contaminated liquids would be processed for uranium recovery while noncontaminated liquids would be rerouted to the Treated Effluent Evaporative Basin. Figure 2-10 shows the annual effluent input streams, which include hydrolyzed UF_6, degreaser water, citric acid, laundry water, floor-wash water, hand-wash/shower water, and miscellaneous effluent.

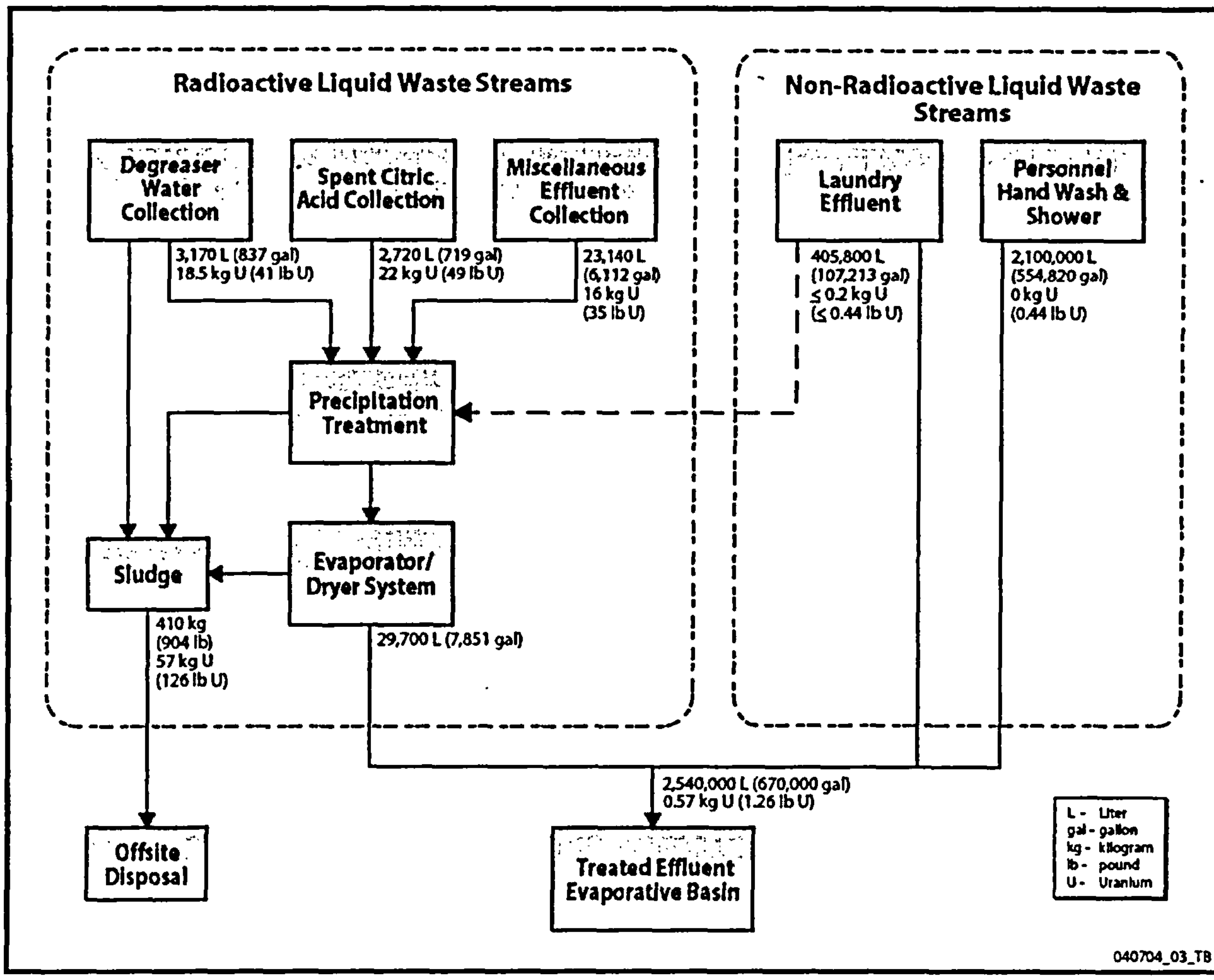

Figure 2-10 Liquid Effluent Collection and Treatment

The Treated Effluent Evaporative Basin (Item 15 on Figure 2-4) would receive liquid discharged from the Liquid Effluent Collection and Treatment System. This liquid could contain low concentrations of uranium compounds and uranium decay products. This uranium-bearing material would settle to the bottom of the Treated Effluent Evaporative Basin and collect in the sludge on the bottom of the basin during the operation of the proposed NEF. The sludge would be disposed of as low-level radioactive waste during the decommissioning of the facility.

The Treated Effluent Evaporative Basin would be a double-lined basin built in accordance with New Mexico Environment Department Guidelines for Liner Material and Site Preparation for Synthetically-Lined Lagoons. The basin foundation would be about 60-centimeter (2-foot) thick clay layer, compacted in place and covered with a high-strength geosynthetic liner. A leak-collection piping system and drainage mat would be installed on top of the liner. A sump system would collect any liquid from the collection piping and pump it back into the Treated Effluent Evaporative Basin. A second geosynthetic liner would cover the collection piping, mat, and sump system. The top liner would be covered with a 30-centimeter (1-foot) thick layer of compacted clay.

Animal-friendly fencing would surround the Treated Effluent Evaporative Basin to prevent access to animals and unauthorized personnel. The surface of the basin would be covered with surface netting or similar material to exclude waterfowl.

Stormwater Retention and Detention Basins

All normal stormwater and runoff waters would be routed from the buildings, parking lot, and roadways to a Site Stormwater Detention Basin (Item 14 on Figure 2-4) and allowed to infiltrate the soil or evaporate. Runoff and stormwaters from the UBC Storage Pad would be routed to a lined basin for evaporation. This would allow the water from the UBC Storage Pad to be monitored and minimize the potential for contaminants entering the soil. Six separate septic systems throughout the proposed NEF would collect and process all sanitary waste from the facility in accordance with applicable regulations.

Neither the Treated Effluent Evaporative Basin nor the two stormwater basins would meet the definition of "surface water" in the State of New Mexico Standards for Interstate and Intrastate Surface Waters. According to these standards, "Waste treatment systems, including treatment ponds or lagoons designed to meet requirements of the Clean Water Act (other than cooling ponds as defined in 40 CFR § 423.11(m) which also meet the criteria of this definition), are not surface waters of the State, unless they were originally created in surface waters of the State or resulted in the impoundment of surface waters of the State" (NMWQCC, 2002).

Solid Waste Collection System

In addition to the DUF_6, operation of the proposed NEF would generate other radioactive and nonradioactive solid wastes. Solid waste would be segregated and processed based on its classification as wet solid or dry solid wastes and segregated into radioactive, hazardous, or mixed-waste categories. Wet solid waste would include wet trash (waste paper, packing material, rags, wipes, etc.), oil-recovery sludge, oil filters, miscellaneous oils (such as cutting machine oils), solvent recovery sludge, and uranic waste precipitate. Dry solid waste would include trash (combustible and non-metallic items), activated carbon, activated alumina, activated sodium fluoride, high efficiency particulate air (HEPA) filters, scrap metal, laboratory waste, and dryer concentrate. All solid waste would be segregated, compacted, packaged, and sent to a licensed low-level waste disposal facility such as Hanford or Envirocare.

Material that would be classified as mixed waste or *Resource Conservation and Recovery Act* (RCRA) material would be segregated and disposed of in accordance with the State of New Mexico regulations (EPA, 2003).

Nonradioactive wastes—including office and warehouse trash such as wood, paper, and packing materials; scrap metal and cutting oil containers; and building ventilation filters—would be collected, compacted, and packaged and sent to a commercial landfill for disposal.

Figure 2-11 shows the disposal pathways and anticipated volumes for the miscellaneous solid waste that would be generated by the proposed NEF.

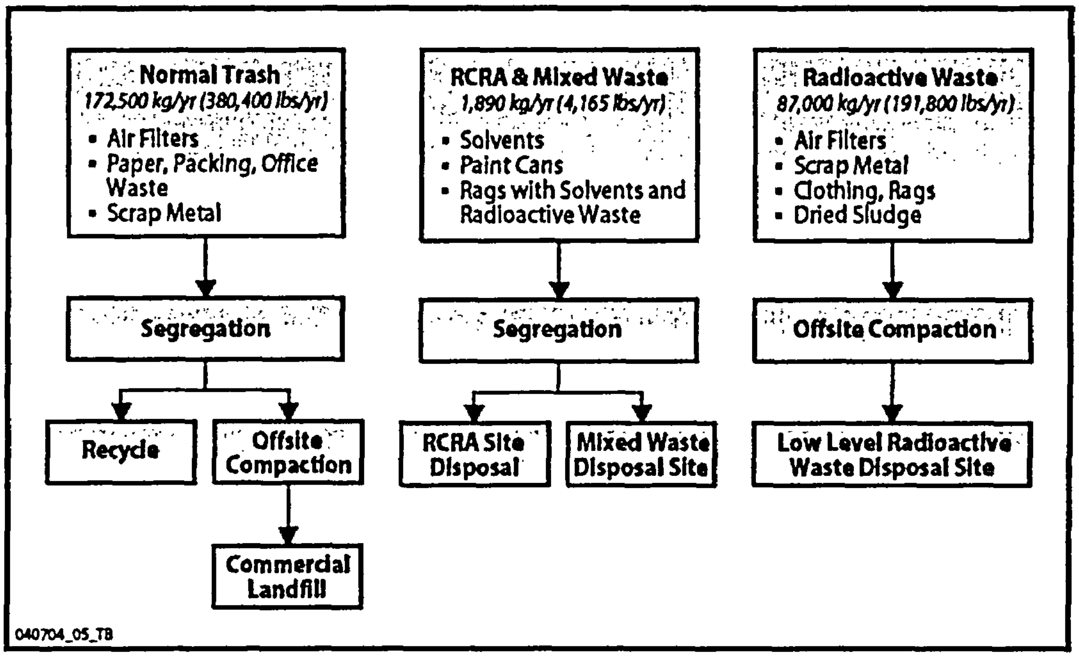

Figure 2-11 Disposal Pathways and Anticipated Volumes for Solid Waste

Gaseous Effluent Vent Systems

The Gaseous Effluent Vent Systems would be designed to collect the potentially contaminated gaseous streams in the Technical Services Building (Item 9 in Figure 2-4) and treat them before discharge to the atmosphere. The system would route these streams through a filter system prior to exhausting out a vent stack. The vent stack would contain a continuous monitor to measure radioactivity levels. Potentially contaminated gaseous streams in the Technical Services Building would include ventilation air from the Ventilation Room, Decontamination Workshop, Laundry, Fomblin® Oil Recovery System, Decontamination System, Chemical Laboratory, and Vacuum Pump Rebuild Workshop. The total airflow would be handled by a central gaseous effluent distribution system that would maintain the areas under negative pressure. The treatment system would include a single train of three air filters (a pre-filter, a HEPA filter, and an activated carbon filter impregnated with potassium carbonate), centrifugal fan, automatically operated inlet-outlet isolation dampers, monitoring system, and differential pressure transducers.

Urenco's experience in Europe shows uranium discharges from Gaseous Effluent Vent Systems are less than 10 grams (0.35 ounces) per year (LES, 2004a; LES, 2004b).

Nonradioactive gaseous effluents include argon, helium, nitrogen, hydrogen fluoride, and methylene chloride (LES, 2004a). Approximately 440 cubic meters (15,540 cubic feet) of helium, 190 cubic meters (6,709 cubic feet) of argon and 53 cubic meters (1,872 cubic feet) of nitrogen would be released each year. In addition, 610 liters (161 gallons) of methylene chloride and 40 liters (11 gallons) of ethanol would be vented each year. Two natural gas-fired boilers (one in operation and one spare) would be used to provide hot water for the plant heating system. At 100-percent power, each boiler would emit approximately 0.8 metric tons (0.88 tons) per year of volatile organic compounds; 0.5 metric tons (0.55 tons) per year of carbon monoxide; and 5.0 metric tons (5.5 tons) per year of nitrogen dioxide (LES, 2004a). The boilers would be permitted for operation as non-Title V sources under 40 CFR Part 61 "National Emission Standards for Hazardous Air Pollutants" (NESHAP) (LES, 2004a).

In addition, there would be two diesel generators onsite for use as emergency electrical power sources. Because the diesel generators would have the potential to emit more than 90,700 kilograms (100 tons) per year of a regulated air pollutant, they would only run a limited number of hours per year to avoid being classified as Title V sources.

Centrifuge Test and Postmortem Facilities Exhaust Filtration System

The Centrifuge Test and Postmortem Facilities Exhaust Filtration System would exhaust potentially hazardous contaminants from the Centrifuge Test and Postmortem Facilities. The system would also ensures the Centrifuge Postmortem Facility is maintained at a negative pressure with respect to adjacent areas.

The ductwork would be connected to a single-filter station and exhaust through either of two 100-percent fans. The filter station and either of the two fans would be able to handle 100 percent of the effluent exhaust. One of the fans would normally be on standby status. Activities that require the Centrifuge Test and Postmortem Facilities Exhaust Filtration System to be operational would be manually stopped if the system fails or shuts down. After filtration, the clean gases would be discharged through the monitored exhaust stack on the Centrifuge Assembly Building. The Centrifuge Assembly Building exhaust stack would be monitored for hydrogen fluoride and alpha radiation.

2.1.8 Proposed Facility Decontamination and Decommissioning

The proposed NEF would be licensed for 30 years. Before license termination, the proposed NEF would be decontaminated and decommissioned to levels suitable for unrestricted use. All proprietary equipment and radiologically contaminated components would be removed, decontaminated, and shipped to a licensed disposal facility. The buildings, structures, and selected support systems would be cleaned and released for unrestricted use. Before the start of the decontamination and decommissioning activities, a Decommissioning Plan would be prepared in accordance with the requirements of 10 CFR § 70.38 and submitted to the NRC for approval.

Decontamination and dismantling of the equipment would be conducted in the three Separations Building modules sequentially (in three phases) over a nine-year time frame. Decommissioning of the remaining plant systems and buildings would begin after operations in the final Separations Building module were terminated. The sequential construction of the three Cascade Halls would allow each hall to be isolated during the decommissioning activities. This isolation would help prevent re-contamination of an area once it has been fully decontaminated.

At the end of the useful life of each Separations Building module, the enrichment-process equipment would be shut down and UF_6 removed to the fullest extent possible by normal process operation. This would be followed by evacuation and purging with nitrogen. The shutdown and purging portion of the decommissioning process would take approximately three months for each cascade.

Prompt decontamination or removal of all materials from the site that would prevent release of the facility for unrestricted use would be performed. This approach would avoid long-term storage and monitoring of radiological and hazardous wastes onsite. All of the enrichment equipment would be removed, and only the building shells and site infrastructure would remain. All remaining facilities would be decontaminated to levels that would allow for unrestricted use. DUF_6, if not already sold or otherwise disposed of prior to decommissioning, would be disposed of in accordance with regulatory requirements. Other miscellaneous radioactive and hazardous wastes would be packaged and shipped to a licensed facility for disposal.

Following decommissioning, the entire site would be available for unrestricted use. Decommissioning would generally include the following activities:

- *Installation of decontamination facilities.*
- Purging of process systems.
- Dismantling and removal of equipment.
- Decontamination and destruction of confidential and secret, restricted-data material.
- Sales of salvaged materials.
- Disposal of wastes.
- Completion of a final radiation survey and spot decontamination.

Decommissioning would require residual radioactivity to be reduced below regulatory limits so the facilities could be released for unrestricted use. The intent of decommissioning would be to release the site for unrestricted use.

Dismantling the Facility

Dismantling would require cutting and disconnecting all components requiring removal. The activities would be simple but very labor-intensive and generally require the use of protective clothing. The work process would be optimized through consideration of the following measures:

- Minimizing the spread of contamination and the need for protective clothing.

- Balancing the number of cutting and removal operations with the resultant decontamination and disposal requirements.

- Optimizing the rate of dismantling with the rate of decontamination facility throughput.

- Providing storage and laydown space as required for effective workflow, criticality, safety, security, etc.

The decontamination and decommissioning effort would start in 2027 and end by 2036. Specific details of the planned decommissioning of the proposed NEF would be formally proposed in the Decommissioning Plan submitted to the NRC in 2025. Optimization of the decontamination and decommissioning process would occur near the end of the proposed facility's life to take advantage of advances in technology that are likely to occur in between now and the start of the decontamination and decommissioning activities. To avoid laydown space and contamination problems, dismantling would proceed generally no faster than the downstream decontamination process. The timeframe to accomplish both dismantling and decontamination is estimated to be approximately three years for each Separations Building module.

Items to be removed from the facilities would be categorized as potentially re-usable equipment, recoverable scrap, and wastes. However, operating equipment would not be assumed to have reuse value. Wastes would also have no salvage value.

A significant amount of scrap aluminum, steel, copper, and other metals would be recovered during the disassembly of the enrichment equipment. For security and convenience, the uncontaminated materials would likely be shred or smelt to standard ingots and, if possible, sold at market price. The contaminated materials would be disposed of as low-level radioactive waste.

Disposal

All wastes produced during decommissioning would be collected, handled, and disposed of in a manner similar to that described for those wastes produced during normal operation. Wastes would consist of normal industrial trash, nonhazardous chemicals and fluids, small amounts of hazardous materials, and radioactive wastes. Radioactive wastes would consist primarily of crushed centrifuge rotors, trash, and citric cake. Citric cake consists of uranium and metallic compounds precipitated from citric acid decontamination solutions. Approximately 5,000 cubic meters (6,600 cubic yards) of radioactive waste would be generated over the 9-year decommissioning period. This waste would be subject to further volume-reduction processes prior to disposal. Table 2-6 provides estimates for the amounts and types of radioactive wastes expected to be disposed.

Table 2-6 Radioactive Waste Disposal Volume from Dismantling Activities

Low-Level Radioactive Waste Type	Disposal Volume cubic meters (cubic yards)	Maximum Number of Drums[a]
Solidified Liquid Wastes	432 (565)	2,159
Centrifuge Components, Piping, and Other Parts	1,036 (1,355)	5,180
Aluminum	3,602 (4,711)	Not Supplied
Total	**5,070 (6,631)**	**7,339**

[a] 55-gallon (208-liter) drums.
Source: LES, 2004b.

Radioactive wastes would ultimately be disposed of in licensed low-level radioactive waste disposal facilities. Hazardous wastes would be disposed of in licensed hazardous waste disposal facilities. Nonhazardous and nonradioactive wastes would be disposed of in a manner consistent with good industrial practice and in accordance with applicable regulations. A complete estimate of the wastes and effluent to be produced during decommissioning would be provided in the Decommissioning Plan that LES would submit prior to the start of the decommissioning.

Final Radiation Survey

A final radiation survey would verify complete decontamination of the proposed NEF prior to allowing the site to be released for unrestricted use. The evaluation of the final radiation survey would be based in part on an initial radiation survey performed prior to initial operation. The initial survey would determine the natural background radiation levels in the area of the proposed NEF, thereby providing a benchmark for identifying any increase in radioactivity levels in the area. The final survey would measure radioactivity over the entire site and compare it to the original benchmark survey. The intensity of the survey would vary depending on the location (i.e., the buildings, the immediate area around the buildings, and the remainder of the site). A report would document the survey procedures and results, and would include, among other things, a map of the survey of the proposed site, measurement results, and a comparison of the proposed NEF site's radiation levels to the surrounding area. The results would be analyzed to show that they were below allowable residual radioactivity limits; otherwise, further decontamination would be performed.

Decontamination of Facilities

Decontamination would deal primarily with radiological contamination from ^{238}U, ^{235}U, uranium-234, and their daughter products. The primary contaminant throughout the plant would be in the form of small amounts of uranium oxide and uranium fluoride compounds.

At the end of the plant's life, some of the equipment, most of the buildings, and all of the outdoor areas should already be acceptable for release for unrestricted use. If accidentally contaminated during normal operation, they would be cleaned and decontaminated when the contamination was discovered. This would limit the scope of decontamination necessary at the time of decommissioning.

Contaminated plant components would be cut up or dismantled, and then processed through the decontamination facilities. Contamination of site structures would be limited to areas in the Separations Building modules and Technical Services Building, and would be maintained at low levels throughout plant operation by regular surveys and cleaning. The use of special sealing and protective coatings on porous and other surfaces that might become radioactively contaminated during operation would simplify the decontamination process and the use of standard good-housekeeping practices during operation of the proposed facility would ensure that final decontamination of these areas would require minimal removal of surface concrete or other structural material.

Decontamination of Centrifuges

The centrifuges would be processed through a specialized decontamination facility. The following operations would be performed:

- Removal of external fittings.
- Removal of bottom flange, motor and bearings, and collection of contaminated oil.
- Removal of top flange, and withdrawal and disassembly of internals.
- Degreasing of items as required.
- Decontamination of all recoverable items for smelting.
- Destruction of other classified portions by shredding, crushing, smelting, etc.

2.1.9 DUF_6 Disposition Options

At full production, the proposed NEF would generate 7,800 metric tons per year (8,600 tons per year) of DUF_6. Initially, the DUF_6 would be stored in Type 48Y cylinders (UBC) on the UBC Storage Pad (LES, 2004a). Each Type 48Y cylinder would hold approximately 12.5 metric tons (13.8 tons), which means that the site, at full production, would generate approximately 627 cylinders of DUF_6 every year. During the operation of the facility, the plant could generate and store up to 15,727 cylinders of DUF_6. The facility would maintain the UBCs while they are in storage. Maintenance activities would include periodic inspections for corrosion, valve leakage, or distortion of the cylinder shape, and touch-up painting as required. Problem cylinders would be removed from storage and the material transferred to another storage cylinder. The proposed storage area would be kept neat and free of debris, and all stormwater or other runoff would be routed to the UBC Storage Pad Stormwater Retention Basin for monitoring and evaporation.

Classification of DUF_6

The U.S. Department of Energy (DOE) has evaluated a number of alternative and potential beneficial uses for DUF_6 (DOE, 1999b; Brown et al, 1997). However, the current DUF_6 consumption rate is low compared to the existing DUF_6 inventory (DOE, 1999b), and the potential for a significant commercial market for the DUF_6 to be generated by the proposed NEF is considered to be low. The NRC has assumed that the excess DOE and commercial inventory of DUF_6 would be disposed of as waste (NRC, 1995).

For the purpose of this Draft EIS, the NRC considers the DUF_6 generated by the proposed NEF to be a Class A low-level radioactive waste as defined in 10 CFR § 61.55(a)(6).

What is Class A Low-level Radioactive Waste?

Low-level radioactive waste is defined by what it is not; that is, material classified as low-level radioactive waste does not meet the criteria of high-level radioactive waste, transuranic waste, or mill tailings. Low-level radioactive waste represents about 90 percent of all radioactive wastes, by volume. It includes ordinary items such as cloth, bottles, plastic, wipes, etc. that become contaminated with some radioactive material. These wastes can be generated anywhere radioisotopes are produced or used -- in nuclear power stations, local hospitals, university research laboratories, etc.

For regulatory purposes, there are 3 classes of low-level radioactive wastes. The NRC classifies low-level radioactive waste as Class A, Class B, or Class C based on the concentration of certain long-lived radionuclides as shown in Tables 1 and 2 of 10 CFR § 61.55 and the physical form and stability requirements set forth in 10 CFR § 61.56. Waste that contains the smallest concentration of the identified radionuclides and meets the stability requirement is considered Class A waste and could be considered for near-surface disposal. Classes B and C wastes contain greater concentrations of radionuclides with longer half-lives, and have stricter disposal requirements than Class A.

Sources: 10 CFR § 61.55 and 61.56

All DUF_6 would be disposed of before the site is decommissioned (LES, 2004a). This Draft EIS evaluates in detail two DUF_6 disposition options. These options are described in the following subsections, and Chapter 4 discusses their potential environmental impacts. Section 2.2 discusses additional DUF_6 disposition options but, for the reasons discussed in that section, these options are not evaluated in detail.

The Defense Nuclear Facilities Safety Board has reported that long-term storage of DUF_6 in the UF_6 form represents a potential chemical hazard if not properly managed (DNFSB, 1995). For this reason, alternatives for the strategic management of depleted uranium include the conversion of DUF_6 stock to a more stable uranium oxide (e.g., triuranium octaoxide [U_3O_8]) form for long-term management (OECD, 2001). DOE also evaluated multiple disposition options for DUF_6 and agreed that conversion to U_3O_8 was preferable for long-term storage and disposal of the depleted uranium due to its chemical stability (DOE, 2000b). Therefore, all the options evaluated in the Draft EIS include conversion of the DUF_6 to U_3O_8.

Two plausible options are proposed for disposition of DUF_6. The first option would be to ship the material to a private conversion facility prior to disposal (Option 1). An alternative available under the provisions of the USEC Privatization Act of 1996 would be to ship the material to the DOE's conversion facility at Portsmouth, Ohio, or Paducah, Kentucky, for temporary storage and eventual processing by the DOE conversion facility prior to disposal by DOE (Option 2). DOE has issued two final environmental impact statements to construct and operate a conversion facility at Paducah, Kentucky, and Portsmouth, Ohio (DOE, 2004a; DOE, 2004b). Additionally, DOE has issued two Records of Decision and construction of the conversion facilities began in July 2004 (DOE, 2004c; DOE, 2004d). Figure 2-12 shows the disposal flow paths for DUF_6 evaluated in this Draft EIS.

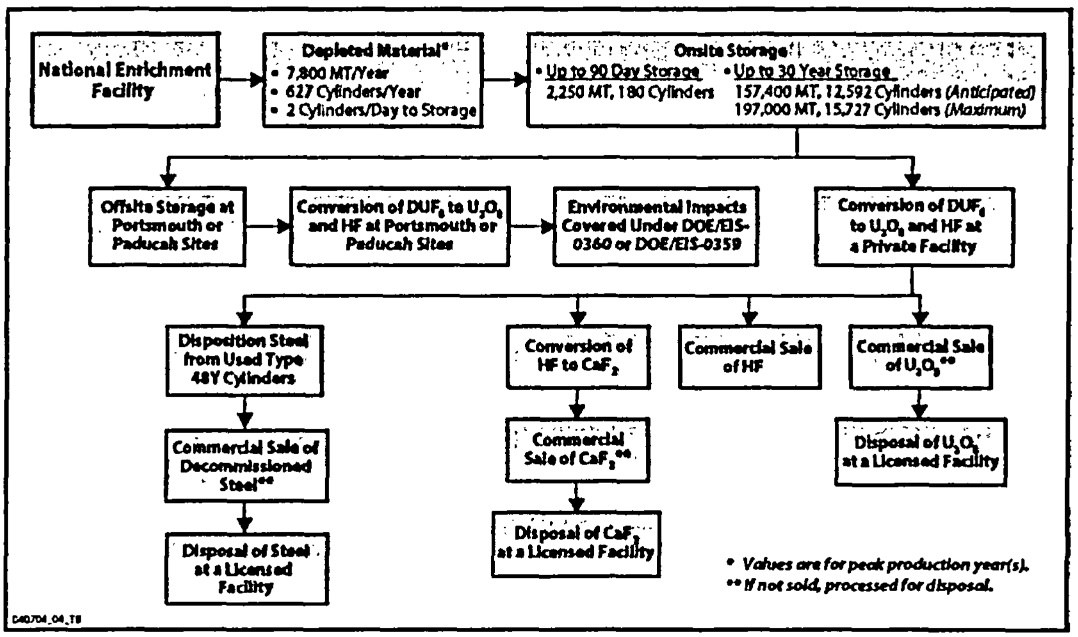

Figure 2-12 Disposal Flow Paths for DUF_6

In this Draft EIS, it is assumed that the proposed conversion facility would be using the same technology adapted for use by DOE in its conversion facilities. This technology would apply a continuous dry-conversion process based on the commercial process used by Framatome Advanced Nuclear Power, Inc., fuel fabrication facility in Richland, Washington (DOE, 2004a; DOE, 2004b; LES, 2004a).

Waste Classification of Depleted Uranium

Depleted uranium is different from most low-level radioactive waste in that it consists mostly of long-lived isotopes of uranium, with small quantities of thorium-234 and protactinium-234. Additionally, in accordance with 10 CFR Parts 40 and 61, depleted uranium is a source material and, if treated as a waste, it would fall under the definition of a low-level radioactive waste per 10 CFR § 61.55(a). This means that it could be disposed of in a licensed low-level radioactive waste facility if it is in a suitably stable form and meets the performance requirements of 10 CFR Part 61. Therefore, under 10 CFR § 61.55(a), depleted uranium is a Class A low-level radioactive waste.

Source: NRC, 1991.

Conversion of UF_6 to U_3O_8 generates hydrogen fluoride gas. This gas is dissolved in water to form hydrofluoric acid which is easier to store and handle than the hydrogen fluoride gas. The hydrofluoric acid could be sold to a commercial hydrofluoric acid supplier for reuse if the radioactive content is below free release limits, or it could be converted to calcium fluoride (CaF_2) for sale or disposal. Because conversion of the large quantities of DUF_6 at the DOE Portsmouth and Paducah Gaseous Diffusion Plant sites would be occurring at the same time the proposed NEF would be in operation, it is not certain that the market for hydrofluoric acid and calcium fluoride would allow for the economic reuse of the material generated by the proposed NEF (DOE, 2000a; DOE, 2000b). Therefore, only immediate neutralization of the hydrofluoric acid by conversion to calcium fluoride with disposal at a licensed low-level radioactive waste disposal facility is considered in this analysis. Descriptions of the options are set forth below.

<u>Option 1: Private Sector Conversion and Disposal</u>

This disposition option is private sector conversion of the DUF_6 into U_3O_8 and hydrogen fluoride, disposal of the depleted U_3O_8, and possible commercial sale of the hydrofluoric acid. The conversion could occur within the region of influence of the proposed NEF or at some other site within the United States. Since no company has agreed to construct or operate a conversion facility within the region of influence of the proposed NEF, this Draft EIS considers that the private conversion facility could be located beyond the region of influence of the proposed NEF site (this is known as Option 1a). One potential location for a private conversion facility would be near the ConverDyn UF_6 generation facility in Metropolis, Illinois (LES, 2004a; LES, 2004b).

No private company has yet agreed to construct or operate a DUF_6 to U_3O_8 conversion facility anywhere in the United States. LES suggested the construction of a DUF_6 to U_3O_8 conversion facility near Metropolis, Illinois. The existing ConverDyn plant at Metropolis, Illinois, converts natural uranium dioxide (UO_2) (yellow cake) from mining and milling operations into UF_4 and UF_6 for feed to enrichment facilities such as the proposed NEF (Converdyn, 2004). Construction of a private DUF_6 to U_3O_8 conversion facility near the ConverDyn plant in Metropolis, Illinois, would allow the hydrogen fluoride produced during the DUF_6 to U_3O_8 conversion process to be reused to generate more UF_6 feed material while the U_3O_8 would be shipped for final dispositioning.

The NRC staff has determined that construction of a private DUF_6 to U_3O_8 conversion plant near Metropolis, Illinois, would have similar environmental impacts as construction of an equivalent facility anywhere in the United States. The advantage of selecting the Metropolis, Illinois, location is the proximity of the ConverDyn uranium dioxide to UF_6 conversion facility and, for the purposes of assessing impacts, the DOE conversion facility in nearby Paducah, Kentucky, for converting DOE-owned DUF_6 to U_3O_8. Because the proposed private plant would be similar in size and the effective area would be the same as the Paducah conversion plant, the environmental impacts would be similar. DOE has completed an EIS for the Paducah conversion facility which defines the impacts of the proposed DOE conversion facility (DOE, 2004a).

DUF_6 Conversion Process

DUF_6 conversion is a continuous process in which DUF_6 is vaporized and converted to U_3O_8 by reaction with steam and hydrogen in a fluidized-bed conversion unit. The hydrogen is generated using anhydrous ammonia, although an option of using natural gas is being investigated. Nitrogen is also used as an inert purging gas and is released to the atmosphere through the building stack as part of the clean off-gas stream. The depleted U_3O_8 powder is collected and packaged for disposition. The process equipment would be arranged in parallel lines. Each line would consist of two autoclaves, two conversion units, a hydrofluoric acid recovery system, and process off-gas scrubbers. The Paducah facility would have four parallel conversion lines. Equipment would also be installed to collect the hydrofluoric acid co-product and process it into any combination of several marketable products. A backup hydrofluoric acid neutralization system would be provided to convert up to 100 percent of the hydrofluoric acid to calcium fluoride for storage and/or sale in the future, if necessary.

Source: (DOE, 2004a; DOE 2004b).

The DUF_6 would be shipped from the proposed NEF site to the new conversion facility. The hydrofluoric acid produced by the conversion process could be re-used by ConverDyn in its existing hydrofluorination process to convert uranium dioxide ("yellowcake") to UF_6 (Converdyn, 2004). These assumptions bound the potential impacts of DUF_6 disposition. Once converted, U_3O_8 and the associated waste streams would be transported to a licensed low-level radioactive waste disposal facility for final disposition, as discussed below.

This Draft EIS also considers that the private conversion facility could be located close to the proposed NEF (this is known as Option 1b). This would involve a private sector company constructing and operating a new conversion facility close (within 6.4 kilometers [4 miles]) to the proposed NEF. By constructing and operating a private conversion facility in close proximity to the proposed NEF, the environmental impacts from the private conversion facility would affect the same area as the proposed NEF. Additionally, shipping and conversion of the depleted uranium could be accomplished within days of the filling of the Type 48Y cylinders, which would minimize the amount of DUF_6 stored onsite. The nearby conversion facility would be proportionally sized to meet the annual generation of 7,800 metric tons (8,600 tons) of DUF_6 per year. It is further assumed that the hydrofluoric acid generated at the adjacent conversion facility would not be marketable for reuse due to the large amount that would be available from the DOE conversion plants. The hydrofluoric acid would be converted to calcium fluoride for disposal at a licensed low-level radioactive waste disposal site.

Option 2: DOE Conversion and Disposal

DOE is constructing two conversion plants to convert the DUF_6 now in storage at Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee, to U_3O_8 and hydrofluoric acid. LES proposes to transport the DUF_6 generated by the proposed NEF to either of these new facilities and paying DOE to convert and dispose of the material. This plan is based on Section 3113 of the 1996 *United States Enrichment Corporation Privatization Act* that states the DOE "shall accept for disposal low-level radioactive waste, including depleted uranium if it were ultimately determined to be low-level radioactive waste, generated by [...] any person licensed by the Nuclear Regulatory Commission to operate a uranium enrichment facility under Sections 53, 63, and 193 of the *Atomic Energy Act of 1954* (42 U.S.C. 2073, 2093, and 2243)."

Disposal Options

Converted DUF_6 in the form of U_3O_8 can be considered a Class A low-level radioactive waste (NRC, 1991). Following conversion, the only currently available viable disposal option would be disposal of the depleted U_3O_8, based on its waste classification and site-specific evaluation, in a near-surface emplacement at a licensed low-level radioactive waste disposal facility within the borders of the United States. LES proposed disposal of the U_3O_8 in an abandoned mine as their preferred option but no existing mine is currently licensed to receive or dispose of low-level radioactive waste nor has any application been made to license such a facility. During its evaluation of disposal of the depleted uranium in a licensed low-level radioactive waste disposal facility, the NRC staff determined that, depending on the quantity of material to be deposited, additional environmental impact evaluations of the proposed disposal site may be required.

DOE recognizes that there could be commercial applications for the U_3O_8, and the possibility exists that other disposal options could become available in the future (after the satisfactory completion of appropriate NEPA or environmental review and licensing processes). If the U_3O_8 could be applied in a commercial application (e.g., as radiation shielding), then it would reduce the disposition impacts in proportion to the amount of U_3O_8 diverted to commercial applications. At this time, no viable commercial application for the material generated by the proposed NEF has been identified.

There are currently three active, licensed commercial low-level radioactive waste disposal facilities, all of which are located in Agreement States (licensing of the use and disposal of radioactive material is regulated by the State in accordance with agreements established with the NRC [NRC, 2003]). Additionally, DOE operates its own low-level radioactive waste disposal facility within the Nevada Test Site which is restricted to DOE-generated waste. Another company, Waste Control Specialists (WCS) is a commercial RCRA waste disposal facility located less than 3.2 kilometers (2 miles) east of the proposed NEF. WCS recently submitted an application to the State of Texas to allow the company to dispose of low-level radioactive waste (WCS, 2004). The following summarizes the disposal sites and the regions of the United States that can ship low-level radioactive waste to each site (NRC, 2003):

- Barnwell, located in Barnwell, South Carolina. Currently, Barnwell accepts waste from all U.S. generators except those in the Rocky Mountain and Northwest compacts. Beginning in 2008, Barnwell would only accept waste from the Atlantic Compact States (Connecticut, New Jersey, and South Carolina). Barnwell is licensed by the State of South Carolina to receive Class A, B, and C wastes. Because New Mexico is a member of the Rocky Mountain compact, the proposed NEF, at this time, would not be able to send low-level radioactive waste directly to Barnwell.

- Hanford, located in Hanford, Washington. Hanford accepts waste from the Northwest and Rocky Mountain compacts. Hanford is licensed by the State of Washington to receive Class A, B, and C wastes. New Mexico is a member of the Rocky Mountain compact, therefore, the proposed NEF would be able to ship low-level radioactive waste to Hanford for disposal.

- Envirocare, located in Clive, Utah. Envirocare accepts waste from all regions of the United States. Envirocare is licensed by the State of Utah for Class A waste only. Therefore, Envirocare is a disposal option for radioactive wastes generated at the proposed NEF.

- Nevada Test Site, located in southern Nye County, Nevada. The Nevada Test Site is a DOE disposal site for low-level radioactive waste from the various DOE sites and facilities across the United States. The Nevada Test Site was selected as the secondary disposal site for converted DUF_6 material generated at the Paducah, Kentucky, and Portsmouth, Ohio, DUF_6 conversion facilities (DOE, 2004a; DOE, 2004b). Because the Nevada Test Site is a DOE disposal site, it can not receive low-level radioactive wastes directly from private facilities such as the proposed NEF.

- Waste Control Specialists (WCS) disposal facility, located in Andrews County, Texas. The WCS disposal facility is less than 3.2 kilometers (2 miles) east of the proposed NEF site. This facility is currently licensed to dispose of RCRA hazardous waste and to temporarily store, but not dispose of, radioactive material under its current State of Texas Bureau of Radiation Control license L04971 (BRC, 2003). WCS recently submitted an application to the State of Texas to allow them to dispose of low-level radioactive waste (WCS, 2004). The application is for two separate facilities, a low-level radioactive waste disposal facility for the Texas Compact and a low-level radioactive waste and mixed low-level radioactive and hazardous waste Federal Waste Disposal Facility. Both the Compact Facility and Federal Waste Disposal Facility would be located within the boundaries of the WCS site in Andrews County, Texas.

  In 1980, Congress passed the "Low-Level Radioactive Waste Policy Act" which requires States to provide for disposal of low-level radioactive waste generated within their own borders. The States of Texas, Maine, and Vermont joined together to form the Texas Compact for disposal of low-level radioactive waste generated by the member States. If the August 2, 2004 application is approved, WCS would become the low-level radioactive waste disposal site for the Texas Compact. As previously stated for the Barnwell site, a disposal site within the Texas Compact can only accept waste generated by the compact member States. Thus, any radioactive wastes generated at the proposed NEF could not be shipped directly to WCS for disposal.

  The Low-Level Radioactive Waste Policy Act also allows for a Federal disposal facility to be co-located. The WCS application includes a request for a Federal Waste Disposal Facility to dispose of both low-level radioactive waste and mixed low-level radioactive and hazardous wastes from federal facilities such as the DOE. If the license application is approved, the WCS facility would be able to dispose of Class A, B, and C low-level radioactive and mixed wastes (WCS, 2004). Thus, the WCS waste disposal facility would be able to accept wastes similar to the waste currently accepted by Hanford, Envirocare, and Nevada Test Site. A Federal Waste Disposal Facility can only accept waste from Federal facilities, thus, the proposed NEF would not be able to ship depleted uranium directly to the proposed WCS facility.

The disposition of the U_3O_8 generated from the DOE conversion facilities would be at either the Envirocare site near Clive, Utah (the proposed disposition site), or the Nevada Test Site (optional disposal site) (DOE, 2004a; DOE, 2004b). Due to the need for separate regulatory actions to accomplish disposal at WCS, it is assumed that the U_3O_8 from the adjacent or offsite private conversion process would be disposed of at the Envirocare or Hanford disposal facilities.

2.2 Alternatives to the Proposed Action

This section examines the alternatives considered for the proposed action described in Section 2.1. The range of alternatives was determined by considering the underlying need and purpose for the proposed action. From this analysis, a set of reasonable alternatives was developed and the impacts of the proposed action were compared with the impacts that would result if a given alternative was implemented. These alternatives include:

- A no-action alternative under which the proposed NEF would not be constructed.
- An evaluation of alternative sites for the proposed NEF.
- A discussion of alternative conversion and disposition methods for DUF_6.
- A review of alternative technologies available for uranium enrichment.
- An evaluation of potential alternative sources of low-enriched uranium.

2.2.1 No-Action Alternative

The no-action alternative would be to not construct, operate, or decommission the proposed NEF in Lea County, New Mexico. The NRC would not approve the license application for the proposed NEF. Under the no-action alternative, the fuel-fabrication facilities in the United States would continue to obtain low-enriched uranium from the currently available sources. Currently, the only domestic source of low-enriched uranium available to fuel fabricators is from production of the Paducah Gaseous Diffusion Plant, the only operating uranium enrichment facility in the United States, and the downblending of highly enriched uranium under the "Megatons to Megawatts" program (USEC, 2003a). Foreign enrichment sources are currently supplying more than 85 percent of the U.S. nuclear power plants demand (EIA, 2004).

Currently, the "Megatons to Megawatts" program will expire by 2013, potentially eliminating downblending as a source of low-enriched uranium. Opened in 1952, the Paducah Gaseous Diffusion Plant utilizes gaseous diffusion technology (as described in Section 2.2.2.3) which is more energy intensive and requires higher energy consumption. These issues and factors such as new and more efficient enrichment technology (e.g., gas centrifuge) could lead to the eventual closure of the Paducah Gaseous Diffusion Plant. On the other hand, USEC could continue operation of the Paducah Gaseous Diffusion Plant to supply the needed low-enriched uranium.

Additional domestic enrichment facilities utilizing these more efficient technology in the future could be constructed. In this regard, USEC has announced its intention to construct and operate a uranium enrichment facility (i.e., proposed American Centrifuge Plant to be located near the Portsmouth Gaseous Diffusion Plant) which could supplement domestic and international demands (USEC, 2004a). The proposed American Centrifuge plant would have an initial annual production level of 3.5 million SWU by 2010. If the proposed American Centrifuge Plant begins operations, this would represent a more efficient and less costly means of producing low-enriched uranium.

At the same time, nuclear-generating capacity within the United States is expected to increase, causing an increase in demand for low-enriched uranium. Given the expected increase in demand and the possible elimination of low-enriched uranium from downblending, along with the uncertainty that any additional domestic supplies will be available, the no-action alternative could generate uncertainty regarding the availability of adequate, reliable domestic supplies of low-enriched uranium in the future.

2.2.2 Alternatives Considered but Eliminated

As required by NRC regulations, the NRC staff has considered other alternatives to the construction, operation, and decommissioning of the proposed NEF. These alternatives were considered but eliminated from further analysis due to economical, environmental, national security, or maturity reasons. This section discusses these alternatives and the reasons the NRC staff eliminated them from further consideration. These alternatives can be categorized as (1) an evaluation of alternative sites for the proposed NEF, (2) a discussion of alternative conversion and disposition methods for DUF_6, (3) a review of alternative technologies available for uranium enrichment, and (4) a review of potential alternative sources of low-enriched uranium.

2.2.2.1 Alternative Sites

The alternative sites considered in this Draft EIS are the result of the LES site-selection process. This section discusses the site-selection process and identifies the candidates sites for the proposed NEF and the criteria used in the selection process. The LES undertook a site-selection process to identify viable locations for the proposed NEF (LES, 2004a). This evaluation process yielded six finalist sites which are reviewed below. Figure 2-13 shows the six finalist sites for the proposed NEF.

Because many environmental impacts can be avoided or significantly reduced through proper site selection, the NRC staff evaluated the LES site-selection process to determine if a site considered by LES was obviously superior to the proposed NEF.

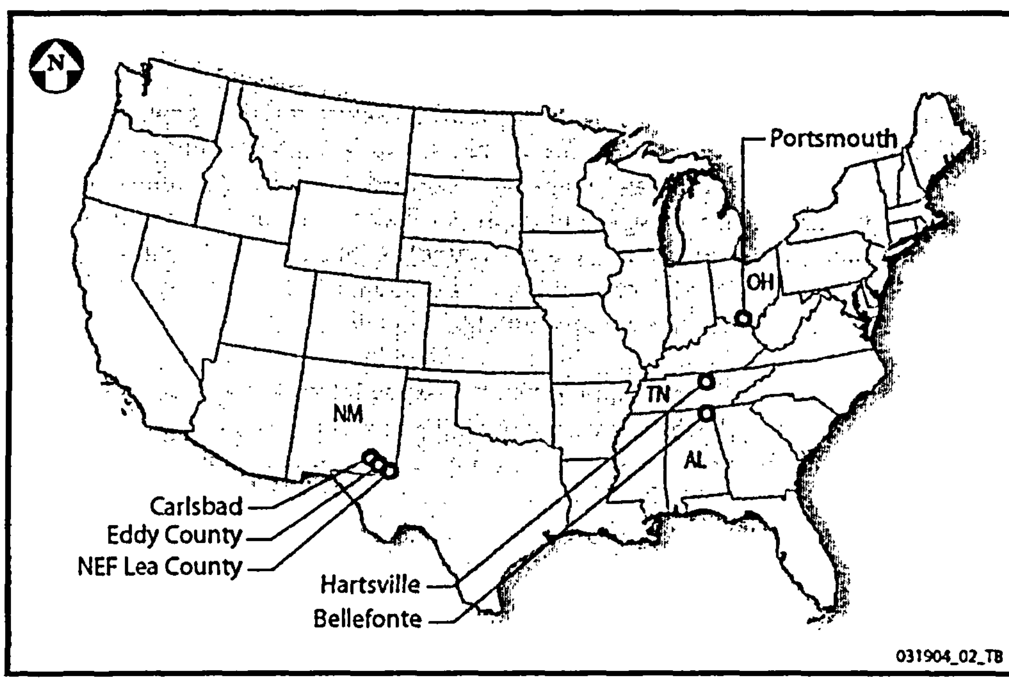

Figure 2-13 Six Final Potential NEF Sites

LES Site-Selection Process

LES evaluated 44 sites throughout the United States. The site-selection process used to locate a suitable site for construction and operation of the proposed NEF was based on various technical, safety, economic, and environmental factors. A multi-attribute-utility-analysis methodology was used for site selection that incorporated all of these factors to assess the relative benefits of a site with multiple, often competing, objectives or criteria. Figure 2-14 is a schematic of the LES site-selection process.

Forty-four potential sites were reviewed for possible analysis in the initial screening phase of the process. Twenty-nine sites were eliminated due to a lack of available environmental information or because they were located next to an operating commercial nuclear power plant. Sites in proximity to operating nuclear power plants would require enhanced security measures (LES, 2004a). The initial screening included the following criteria:

- Availability of adequate site information.
- Location of proposed site for ease of access and security.
- Acceptability of regional climate.

The outcome of the initial screening yielded 15 sites that met the first screening criteria. A second screening program was used to evaluate each of these 15 sites. This second screening program consisted of a "Go/No Go" analysis approach that compared the 15 semifinalist sites using the following criteria:

- Seismology/geology.
- Site characterization surveys.
- Size of plot.
- Land not contaminated.
- Moderate climate.
- Redundant electrical power.

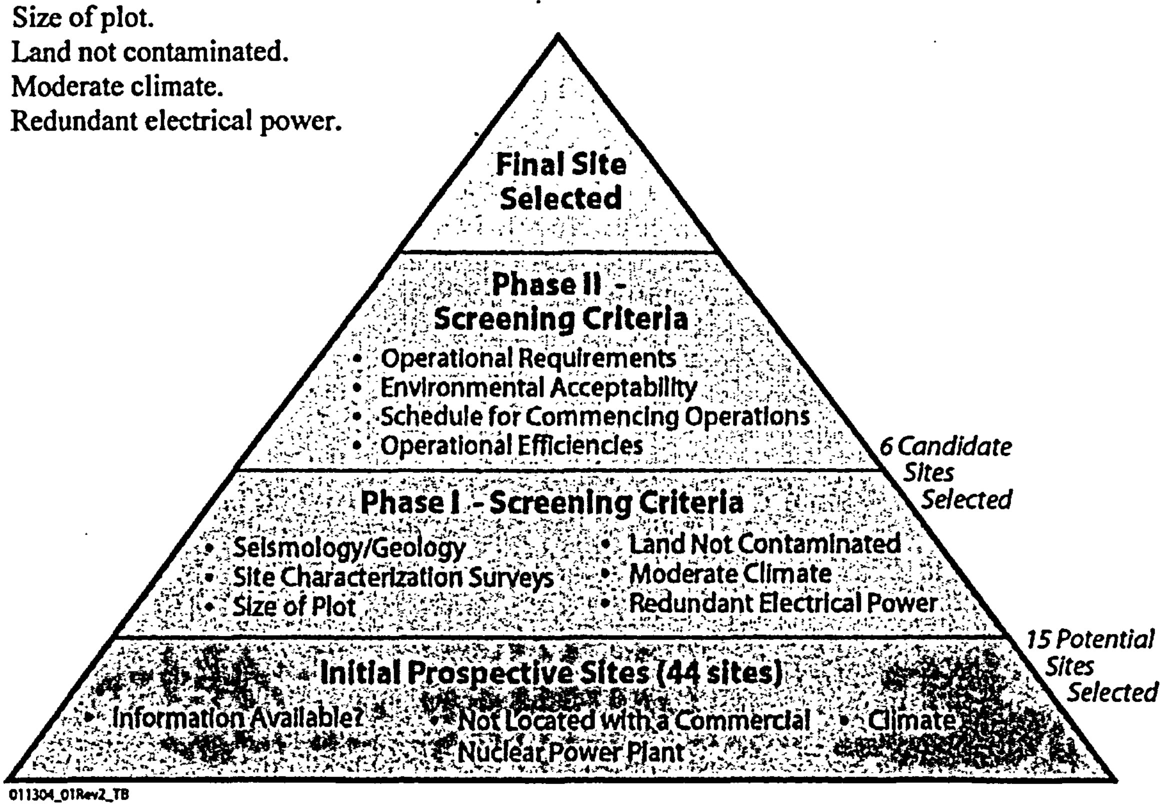

Figure 2-14 LES Site Selection Process (LES, 2004a)

The sites that met all these first-phase screening criteria were further evaluated in the second-phase screening. The second-phase approach in the LES site-selection process involved more detailed analysis using weighted criteria as well as more specific subcriteria for the first-phase criteria. The second-phase screening criteria were placed into the following four site-evaluation categories or objectives:

1. Operational Requirements weighting factor = 

2. Environmental Acceptability weighting factor = 

3. Schedule for Commencing Operations weighting factor = 

4. Operational Efficiencies weighting factor = 

Table 2-7 presents the 15 potential sites formally evaluated against the first-phase screening criteria and the results of the evaluation for each site.

Six of the sites met all of the first-phase criteria and were considered in the second-phase screening. These six candidate sites, shown in Figure 2-13, were Bellefonte, Alabama; Carlsbad, New Mexico; Eddy County, New Mexico; Hartsville, Tennessee; Lea County, New Mexico; and Portsmouth, Ohio.

Each of the final six locations underwent a detailed evaluation to identify the best location for the proposed NEF. The results of this evaluation are summarized below.

A sensitivity analysis was conducted after the initial analysis to ensure that the site selection was not sensitive to small changes in the relative weights of objectives or criteria. The sensitivity analysis also helped demonstrate how sites compare to each other. In the sensitivity analysis, the weighting factor for each criterion was adjusted to the minimum and maximum extreme of the weighting scale while the raw score was kept the same. The final score of the site was then reviewed to determine how much it changed (LES, 2004a).

Table 2-7 Summary of First-Phase Evaluation

Potential Site	Reasons for Elimination	Results of Screening
Ambrosia Lake, New Mexico	Earthquake risk.	✖
Barnwell, South Carolina	Earthquake risk.	✖
Bellefonte, Alabama	Met all phase I screening criteria.	✔
Carlsbad, New Mexico	Met all phase I screening criteria.	✔
Clinch River Industrial Site, Tennessee	Earthquake risk. Site not large enough.	✖
Columbia, South Carolina	Earthquake risk. Site impacted by a 500-year flood plain.	✖
Eddy County, New Mexico	Met all phase I screening criteria.	✔
Erwin, Tennessee	Site not large enough.	✖
Hartsville, Tennessee	Met all phase I screening criteria.	✔
Lea County, New Mexico	Met all phase I screening criteria.	✔
Metropolis, Illinois	Earthquake risk. Site not large enough.	✖
Paducah, Kentucky	Earthquake risk.	✖
Portsmouth, Ohio	Met all phase I screening criteria.	✔
Richland, Washington	Earthquake risk.	✖
Wilmington, North Carolina	Site not large enough.	✖

✔ Denotes candidate site status.
Source: LES, 2004a.

<u>Description of Alternative Sites</u>

Eddy County, New Mexico, Site

The Eddy County site scored highest in the multi-attribute-utility-analysis ranking but, due to potential problems with transferring ownership of the site from the BLM to LES, the site is not the preferred location for the proposed NEF. Federal regulations (43 CFR § 2711.1.3) require that any BLM land currently leased or permitted cannot be sold until the lease or permit holder is given two years' prior notification (Sorensen, 2004). Because the Eddy County site is currently leased for cattle grazing, it cannot be transferred to LES for at least two years. This two-year period can be waived by the leaseholder or it may run concurrently with preparation of the EIS. However, this could delay the start of construction of the facility and lowered the multi-attribute-utility-analysis ranking of the site (LES, 2004a).

Lea County, New Mexico, Site

Lea County ranked second in the multi-attribute-utility-analysis assessment. It is the preferred LES site for the proposed NEF. Two adjacent sites in Lea County were considered, and the evaluation is applicable to both. The preferred Lea County site consists of 220 hectares (543 acres) in Section 32 of range 38E in Township 21S of the New Mexico Meridian. The alternative Lea County site is 182 hectares (452 acres) in Section 33 of range 38E in Township 21S, which is east of and adjacent to Section 32. The area is in an air-quality attainment zone, and no air-permitting constraints are identified. Because the Lea County site is the preferred site for construction of the proposed NEF, Chapter 3 presents a complete description of the site (LES, 2004a).

Bellefonte, Alabama, Site

The Bellefonte site scored third in the multi-attribute-utility-analysis assessment and is considered an acceptable location for installation of the proposed NEF. However, part of the site is within the historic boundaries of a Cherokee Indian Reservation which may necessitate a historical preservation assessment. Additionally, high-voltage transmission lines cross the site and would have to be relocated before beginning construction. The historical preservation assessment and costly relocation of transmission lines lowered Bellefonte's ranking (LES, 2004a).

Hartsville, Tennessee, Site

The Hartsville site ranked fourth in the multi-attribute-utility-analysis assessment. The major drawback was the business climate in the State of Tennessee and the requirement to rezone the site. The site scored well in environment, labor, and transportation issues. On September 9, 2002, LES identified the Hartsville, Tennessee, site as a location for a uranium enrichment plant. However, because LES was unable to obtain local approval to rezone the site (LES, 2004a), the overall site score was reduced.

Portsmouth, Ohio, Site

The Portsmouth site ranked fifth of the six sites in the multi-attribute-utility-analysis assessment. Contamination on an existing firing range would have to be remediated, and existing waterways and ponds would have to be filled or relocated to make the site useable. Due to the proposed construction of the American Centrifuge Plant by USEC in the same immediate area, the finalization of an agreement between DOE, USEC, and LES would be difficult and would delay construction of the facility, thus lowering the overall score.

Carlsbad, New Mexico, Site

The Carlsbad site ranked sixth in the evaluation. The area around the proposed Carlsbad site contains both active and abandoned facilities including potash mining and oil-field welding services. This creates the possibility that the site soil is contaminated with oils, solvents, and industrial waste products. This potential contamination requires further investigations and surveys prior to selecting the Carlsbad site for the facility. No detailed geological surveys have been completed for the site. However, the general area is geologically and seismically stable and acceptable for construction of the proposed NEF. While no wetlands exist on the site, a dry arroyo, Lone Tree Draw, runs through the site which could require obtaining additional environmental approvals.

An Xcel Energy transmission line passes near the northwest corner of the proposed site. LES would have to pay for a new substation on the main line and new secondary feeder lines from alternate transmission lines to provide a redundant power supply for the site. The potential for soil contamination would make site decommissioning and decontamination more difficult, and the potential for environmental justice issues lowered Carlsbad's overall score.

Conclusion

Based on the above assessment, the NRC staff has determined that the LES site selection process has a rational, objective structure and appears reasonable. None of the candidate sites were obviously superior to the LES preferred site in Lea County, New Mexico; therefore no other site was selected for further analysis.

2.2.2.2 Alternative Sources of Low-Enriched Uranium

The NRC staff examined two alternatives to fulfill the domestic enrichment needs. These alternatives, as shown below, were eliminated from further consideration.

Re-Activate Portsmouth Gaseous Diffusion Facility

USEC closed the Portsmouth Gaseous Diffusion Plant in May 2001 to reduce operating costs (DOE, 2003). USEC cited long-term financial benefits, more attractive power price arrangements, operational flexibility for power adjustments and a history of reliable operations as reasons for choosing to continue operations at the Paducah Gaseous Diffusion Plant. In its June 2000 press release, USEC explained that they "...clearly could not continue to operate two production facilities." Key business factors in USEC's decision to reduce operations to a single production plant included long-term and short-term power costs, operational performance and reliability, design and material condition of the plants, risks associated with meeting customer orders on time, and other factors relating to assay levels, financial results, and new technology issues (USEC, 2000).

The NRC staff does not believe that there has been any significant change in the factors that were considered by USEC in its decision to cease uranium enrichment at Portsmouth. In addition, the gaseous diffusion technology (as described in Section 2.2.2.3) is more energy intensive than gas centrifuge. The higher energy consumption results in larger indirect impacts, especially those impacts which are attributable to significantly higher electricity usage (e.g., air emissions from coal-fired electricity generation plants) (DOE, 1995). Therefore, this proposed alternative was eliminated from further consideration.

Purchase Low-Enriched Uranium From Foreign Sources

There are several potential sources of enrichment services worldwide. However, U.S. reliance on foreign sources of enrichment services, as an alternative to the proposed action, would not meet the U.S. national energy policy objective of a "...viable, competitive, domestic uranium enrichment industry for the foreseeable future" (DOE, 2000a). For this reason, the NRC staff does not consider this alternative action to meet the purpose and need for the proposed action, and this alternative was eliminated from further studies.

2.2.2.3 Alternative Technologies for Enrichment

A number of different processes have been invented for enriching uranium but only two have been proven suitable for commercial and economic use. Only the gaseous diffusion process and the gas centrifuge technology have reached the maturity needed for industrial use. Other technologies—namely the Electromagnetic Isotope Separation Process, Liquid Thermal Diffusion, and a laser enrichment process—have proven too costly to operate or remain at the research and laboratory developmental scale and have yet to prove themselves to be economically viable.

Electromagnetic Isotope Separation Process

Figure 2-15 shows a sketch of the electromagnetic isotopic separation process. In the Electromagnetic Isotope Separation Process, or calutron, a monoenergetic beam of ions of normal uranium travels between the poles of a magnet. The magnetic field causes the beam to split into several streams according to the mass of the isotope. Each isotope has a different radius of curvature and follows a slightly different path. Collection cups at the ends of the semicircular trajectories catch the homogenous streams. Because the energy requirements for the calutrons proved very high—in excess of 3,000 kilowatt hour per SWU—and the production was very slow (Heilbron et al., 1981), this process was removed from further consideration.

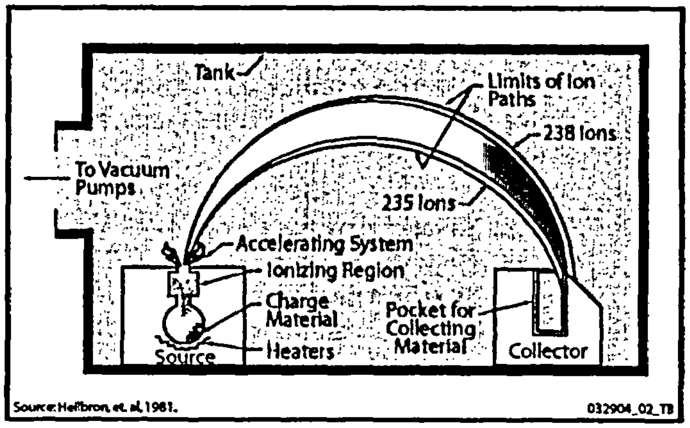

Figure 2-15 Sketch of Electromagnetic Isotopic Separation Process (Heilbron et al., 1981)

Liquid Thermal Diffusion

Liquid thermal diffusion process was investigated in the 1940's. Figure 2-16 is a diagram of the liquid thermal diffusion process. It is based on the concept that a temperature gradient across a thin layer of liquid or gas causes thermal diffusion that separates isotopes of differing masses. When a thin, vertical column is cooled on one side and heated on the other, thermal convection currents are generated and the material flows upward along the heated side and downward along the cooled side. Under these conditions, the lighter $^{235}UF_6$ molecules diffuse toward the warmer surface, and heavier $^{238}UF_6$ molecules concentrate near the cooler side. The combination of this thermal diffusion and the thermal convection currents causes the lighter ^{235}U molecules to concentrate on top of the thin column while the heavier ^{238}U goes to the bottom. Taller columns produce better separation. Eventually, a facility was designed and constructed at Oak Ridge, Tennessee, but it was closed after about a year of operation due to cost and maintenance (Settle, 2004). Based on high operating costs

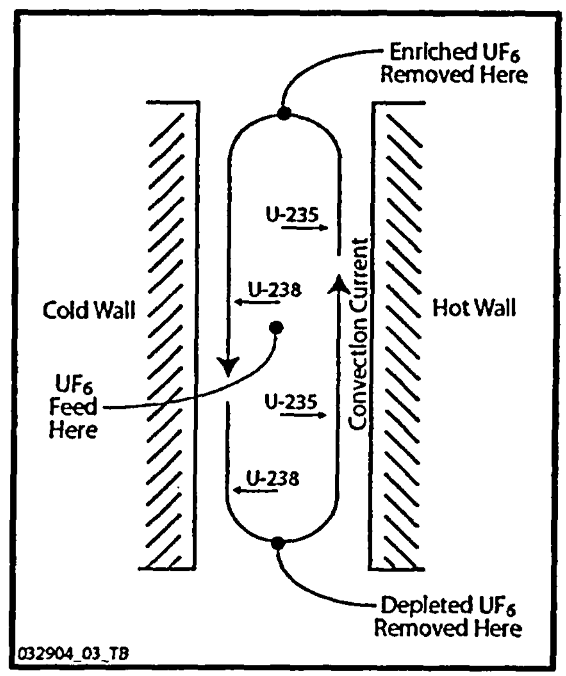

Figure 2-16 Liquid Thermal Diffusion Process

and high maintenance requirements, the liquid thermal diffusion process has been eliminated from further consideration.

Gaseous Diffusion Process

The gaseous diffusion process is based on molecular effusion, a process that occurs whenever a gas is separated from a vacuum by a porous barrier. The gas passes through the holes because there are more "collisions" with holes on the high-pressure side than on the low-pressure side (i.e., the gas flows from the high-pressure side to the low-pressure side). The rate of effusion of a gas through a porous barrier is inversely proportional to the square root of its mass. Thus, lighter molecules pass through the barrier faster than heavier ones. Figure 2-17 is a diagram of a single gas diffusion stage.

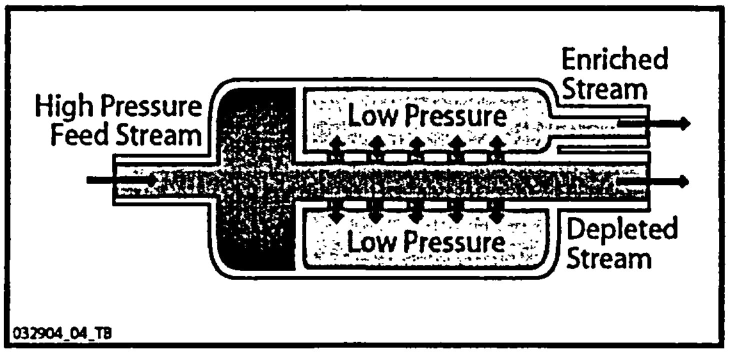

Figure 2-17 Gaseous Diffusion Stage (Urenco, 2003)

The gaseous diffusion process consists of thousands of individual stages connected in series to multiply the separation factor. The gaseous diffusion plant in Paducah, Kentucky, contains 1,760 enrichment stages and is designed to produce UF_6 enriched up to 5.5 percent ^{235}U. The design capacity of the Paducah Gaseous Diffusion Plant is approximately 8 million SWU per year, but it has never operated at greater than 5.5 million SWU. Paducah consumes approximately 2,200 kilowatt hours per kilogram of separative work unit, which is less than the electromagnetic isotopic separation process or liquid thermal diffusion process but still higher than the 40 kilowatt hours per kilogram of separative work unit possible in modern gas centrifuge plants (DOE, 2000a; Urenco, 2004a). The gaseous diffusion process is 50-year-old technology that is energy intensive and has been eliminated from further consideration.

Laser Separation Technology

Laser separation technology encompasses two known developmental technologies that have yet to reach the maturity stage for industrial use. These are the Atomic Vapor Laser Isotope Separation and the Separation of Isotopes by Laser Excitation processes.

The Atomic Vapor Isotope Separation process is based on different isotopes of the same element, while chemically identical, having different electronic energies and therefore absorbing different colors of laser light. The isotopes of most elements can be separated by a laser-based process if they can be efficiently vaporized into individual atoms. In Atomic Vapor Isotope Separation enrichment, uranium metal is vaporized and the vapor stream is illuminated with a laser light of a specific wavelength that is absorbed only by ^{235}U. The laser selectively adds enough energy to ionize or remove an electron from ^{235}U atoms while leaving the other isotopes unaffected. The ionized ^{235}U atoms are then collected on negatively charged surfaces inside the separator unit. The collected material (enriched product) is condensed as liquid on the charged surfaces and then drains to a caster where it solidifies as metal nuggets. Figure 2-18 is a diagram of the Atomic Vapor Isotope Separation process (LLNL, 2004). In June 1999, citing budget constraints, USEC stopped further development of the Atomic Vapor Isotope Separation program (USEC, 1999).

The Separation of Isotopes by Laser Excitation technology, developed by the Australian Silex Systems Ltd., uses a similar process to the Atomic Vapor Isotope Separation process. The Separation of Isotopes by Laser Excitation process uses UF_6 vapor that passes through a tuned laser and an electromagnetic field to separate the $^{235}UF_6$ from the $^{238}UF_6$. The process is still under development and will not be ready for field trials for several years. USEC ended its support of the Separation of Isotopes by Laser Excitation program on April 30, 2003, in favor of the proposed American Centrifuge Plant (USEC, 2003b).

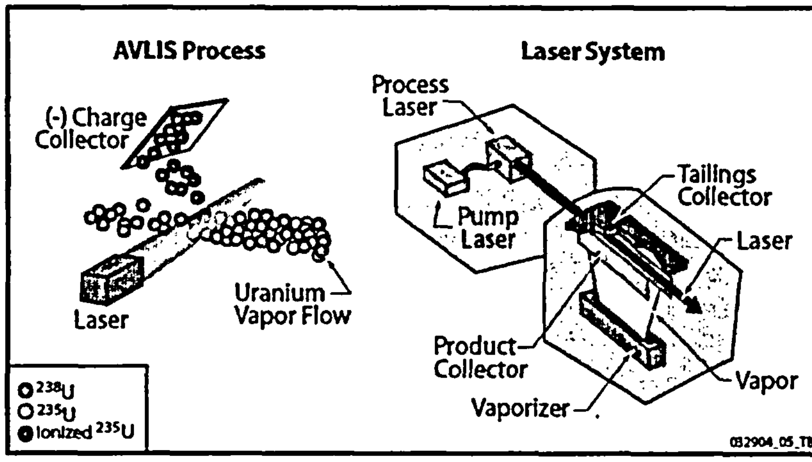

Figure 2-18 AVLIS Process (LLNL, 2004)

Because neither the Atomic Vapor Isotope Separation process nor the Separation of Isotopes by Laser Excitation process is ready for commercial production of low-enriched uranium, these processes have been eliminated from further consideration.

<u>Conclusion</u>

The NRC considered the feasibility of utilizing alternative methods for producing low-enriched uranium. Gas centrifuge and liquid thermal diffusion technology would be far more costly then the centrifuge technology proposed. The other technologies reviewed–electromagnetic isotope separation process and laser separation technology–have not been sufficiently developed for commercial application. Accordingly, these technologies were not considered reasonable alternatives.

2.2.2.4 Alternatives for DUF_6 Disposition

In addition to the DUF_6 disposition options discussed in Section 2.1.9, other alternatives for dispositioning the DUF_6 include (1) storage of the DUF_6 onsite in anticipation of future use as a resource and (2) continuous conversion of the DUF_6 to U_3O_8 and storage of the oxide as a potential resource. In addition, DOE has evaluated the potential impacts of various disposition options in its "Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride" (DOE, 1999b). These include (1) storage as DUF_6 for up to 40 years, (2) long-term storage as depleted U_3O_8, (3) use of depleted U_3O_8, and (4) use of uranium metal.

The Programmatic EIS evaluated the potential environmental impacts of disposal in shallow earthen structures, below-grade vaults and underground mines. LES also proposed three additional alternatives for DUF_6 disposition that include Russian re-enrichment, French conversion or re-enrichment, and Kazakhstan conversion. Due to costs, the NRC staff does not consider these alternatives to be viable; therefore, they are not discussed further in this Draft EIS. Figure 2-12 shows the disposition flow paths considered by the NRC staff in this Draft EIS.

The following subsections discuss the other DUF_6 disposition alternatives in two broad categories—use of DUF_6 and conversion at existing fuel fabrication facilities—and the reasons these alternatives are not evaluated in detail in this Draft EIS.

Use of DUF_6

As discussed above, the NRC staff views DUF_6 as a potential resource with very limited use. If storage of DUF_6 beyond 30 years occurs, then the impacts described in Chapter 4 of this Draft EIS would be extended for that storage period. If a viable use for DUF_6 is found, it could reduce the environmental impacts associated with its disposition. However, the likelihood of a significant commercial market for the DUF_6 generated by the proposed NEF site is considered to be low.

DOE has evaluated a number of alternatives and potentially beneficial uses for DUF_6, and some of these applications have the potential to use a portion of the existing DUF_6 inventory (DOE, 1999b; Brown et al., 1997). However, the current DUF_6 consumption rate is low compared to the DUF_6 inventory (DOE, 1999b), and the NRC has assumed that excess DOE and commercial inventory of DUF_6 would be disposed of as a waste product (NRC, 1995).

The NRC staff has determined that unless LES can demonstrate a viable use, the DUF_6 generated by the proposed NEF should be considered a waste product. Because the current available inventory of depleted uranium in the form of metal (UF_6 and U_3O_8) is in excess of the current and projected future demand for the material, this Draft EIS will not further evaluate DUF_6 disposition alternatives involving its use as a resource, including continued storage at the proposed NEF site for more than 30 years in order to be used in the future.

Beneficial Uses of Depleted Uranium

Some historical beneficial uses for depleted uranium:

- *Further enrichment – DOE originally undertook the long-term storage of* DUF_6 *because it can be used in the future as feed for further enrichment. The low cost of uranium ore and postponed deployment of advanced enrichment technology have indefinitely delayed this application.*
- *Nuclear reactor fuel – depleted uranium oxide can be mixed with plutonium oxide from nuclear weapons to make mixed oxide fuel (typically about 6 percent plutonium oxide and 94 percent depleted uranium oxide) for commercial power reactors.*
- *Down-blending high-enriched uranium – Nuclear disarmament allows the down-blending of some weapons-grade highly enriched uranium with depleted uranium to make commercial reactor fuel.*
- *Munitions – depleted uranium metal can be used for tank armor and armor-piercing projectiles. This demand is decreasing as environmental regulations become more complex.*
- *Biological shielding – depleted uranium metal has a high density, which makes it suitable for shielding from x-rays or gamma rays for radiation protection.*
- *Counterweights – Because of its high density, depleted uranium has been used to make small but heavy counterweights such as in the aircraft industry.*

Source: DOE 1999b; Brown et al., 1997.

Conversion at Existing Fuel Fabrication Facilities

Another potential alternative disposition strategy would be to perform the conversion of DUF_6 to U_3O_8 at an existing fuel-fabrication facility. The existing fuel-fabrication facilities are Global Nuclear Fuel-Americas, LLC, in Wilmington, North Carolina; Westinghouse Electric Company, LLC, in Columbia, South Carolina; and Framatome ANP, Inc., in Richland, Washington. These facilities have existing processes and conversion capacities. They also use Type 30B cylinders. Therefore, the existing fuel-fabrication facilities would need to install new equipment to handle the larger Type 48Y cylinders. The facilities would probably need to install separate capacity to process the DUF_6 to avoid quality control issues related to processing enriched UF_6. The facilities would also need to manage and dispose of the hydrofluoric acid that would be generated from the conversion process. Furthermore, these existing facilities have not expressed an interest in performing these services, and the cost for the services would be difficult to estimate. For these reasons, this alternative is eliminated from further consideration in this Draft EIS.

Conclusion

Although DUF_6 does have alternative and beneficial uses, the current U.S. inventory is estimated to be approximately 480,000 metric tons of uranium (OECD, 2001), which far exceeds the existing and projected demand for the material. Consequently, the NRC staff has assumed that all of the DUF_6 to be generated by the proposed NEF would be converted to U_3O_8 and disposed of in a licensed disposal facility.

2.3 Comparison of Predicted Environmental Impacts

Chapter 4 of this Draft EIS presents a more detailed evaluation of the environmental impacts of the proposed action and the no-action alternative. Table 2-8 summarizes the environmental impacts for the proposed NEF and the no-action alternative.

2.4 Staff Preliminary Recommendation Regarding the Proposed Action

After weighing the impacts of the proposed action and comparing alternatives, the NRC staff, in accordance with 10 CFR § 51.71(e), sets forth its preliminary NEPA recommendation regarding the proposed action. The NRC staff recommends that, unless safety issues mandate otherwise, the proposed license be issued to LES. In this regard, the NRC staff has preliminarily concluded that the applicable environmental monitoring program described in Chapter 6 and the proposed mitigation measures discussed in Chapter 5 would eliminate or substantially lessen any potential adverse environmental impacts associated with the proposed action.

The NRC staff has preliminarily concluded the overall benefits of the proposed NEF outweigh the environmental disadvantages and costs based on consideration of the following:

- The need for an additional, reliable, economical, domestic source of enrichment services.

- The beneficial economic impacts of the proposed NEF on the local communities which have determined will be MODERATE.

- The remaining impacts on the physical environment and human communities would be small with the exception of short-term impacts associated with construction traffic, accidents, and waste management, which would be SMALL to MODERATE.

Table 2-8 Summary of Environmental Impacts for the Proposed NEF and the No-Action Alternative

Affected Environment	Proposed Action: *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	No-Action Alternative: *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Land Use	SMALL. Construction activities would occur on about 81 hectares (200 acres) of a 220-hectare (543-acre) site that would be fenced. While the land is currently undisturbed except for an access road, CO_2 pipeline, and cattle grazing, there are sufficient lands surrounding the proposed NEF for relocation of the cattle grazing and the CO_2 pipeline.	SMALL. Under the no-action alternative, no local impact would occur because the proposed NEF would not be constructed or operated. The land use of cattle-grazing would continue and the property would be available for alternative use. There would also be no land disturbances. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on land use similar to the proposed action.

Affected Environment	**Proposed Action:** ***LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.***	**No-Action Alternative:** ***The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.***
Historical and Cultural Resources	SMALL. Seven archaeological sites were recorded on the proposed site. All of these sites are considered potentially eligible for listing on the National Register of Historic Places. Two sites would be impacted by construction activities, and a third is located along the access road. Based on the terms and conditions of a Memorandum of Agreement that is being prepared, a historic properties treatment plan would be fully implemented prior to construction of the proposed NEF. Once measures from the treatment plan are implemented, adverse impacts would be mitigated.	SMALL to MODERATE. Under the no-action alternative, the land would continue to be used for cattle-grazing and historical and cultural resources would remain in place unaffected by the proposed action. Without the treatment plan and its mitigation measures proposed by LES, historical sites identified at the proposed NEF could be exposed to the possibility of human intrusion. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed at other sites and could have potential impacts to cultural resources. Impacts to historical and cultural resources would be expected to be SMALL to MODERATE, providing that requirements included in applicable Federal and State historic preservation laws and regulations are followed.

Affected Environment	**Proposed Action:** *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	**No-Action Alternative:** *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Visual and Scenic Resources	SMALL. Impacts from construction activities would be limited to fugitive dust emissions that can be controlled using dust-suppression techniques. The proposed NEF cooling towers could contribute to the formation of local fog less than 0.5 percent of the total number hours per year. The proposed NEF site received the lowest scenic-quality rating using the BLM visual resource inventory process.	SMALL. Under the no-action alternative, the visual and scenic resources would remain the same as described in the affected environment section. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on visual and scenic resources similar to the proposed action.

Affected Environment	**Proposed Action:** *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	**No-Action Alternative:** *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Air Quality	SMALL. Air concentrations of the criteria pollutants predicted for vehicle emissions and PM_{10} emissions for fugitive dust during construction would all be below the National Ambient Air Quality Standards, temporary, and highly localized. A NESHAP Title V permit would not be required for operations due to the low levels of estimated emissions.	SMALL. Under the no-action alternative, air quality in the general area would remain at its current levels described in the affected environment section. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely impact on air quality would be similar to the proposed action.

Affected Environment	Proposed Action: *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	No-Action Alternative: *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Geology and Soils	SMALL. Construction-related impacts to soil would occur within the 81-hectare (200-acre) portion of the site that would contain the proposed NEF structures. Only onsite soils would be used during construction. No soil contamination would be expected during construction and operations although soil contamination could occur. A plan would be in place to address any spills that may occur during operations and any contaminated soil in excess of regulatory limits would be properly disposed of.	SMALL. Under the no-action alternative, the land would continue to be used for cattle-grazing. The geology and soils on the proposed site would remain unaffected because no land disturbance would be occur. Natural events such as wind and water erosion would remain as the most significant variable associated with the geology and soils of the site. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on geology and soils similar to the proposed action.

Affected Environment	**Proposed Action:** ***LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.***	**No-Action Alternative:** ***The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.***
Water Resources	SMALL. There are no existing surface water resources, and ground-water resources under the proposed NEF site are not considered potable or near the surface. NPDES general permits for construction and operations would be required to manage stormwater runoff. Construction-related impacts would be SMALL to both surface water and ground water. Retention basins (i.e., the Treated Effluent Evaporative Basin and the UBC Storage Pad Stormwater Retention Basin) would be lined to minimize infiltration of water into the subsurface. Infiltration from the Site Stormwater Detention Basin and septic systems' leach fields would be expected to form a perched layer on top of the Chinle Formation, but there would be limited downgradient transport due to soil-storage capacity and upward flux to the root zone. Operations impacts would be SMALL. Impacts on water use would be SMALL due to the availability of excess capacity in the Hobbs and Eunice water systems. The proposed NEF's use of Ogallala waters indirectly through the Eunice and Hobbs water-supply systems would constitute a small portion of the aquifer reserves in the New Mexico territory.	SMALL. Under the no-action alternative, water resources would remain the same as described in the affected environment section. Water supply demand would continue at current rate. The natural surface flow of stormwaters on the site would continue, and potential ground-water contamination could occur due to surrounding operations related to the oil industry. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed. Depending on these facilities, the likely impact on water resources including water usage would be similar to the proposed action.

Affected Environment	**Proposed Action:** *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	**No-Action Alternative:** *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Ecological Resources	SMALL. There are no wetlands or unique habitats for threatened or endangered plant or animal species on the proposed NEF site. There are no unique habitats on the site. Impacts from use of stormwater retention/detention basins would be SMALL. Animal-friendly fencing and netting over the basins (where appropriate) would be used to minimize animal intrusion. Revegetation using native plant species would be conducted in any areas impacted by construction, operation, and decommissioning activities.	SMALL. Under the no-action alternative, the land would continue to be used for cattle grazing and the ecological resources would remain the same as described in the affected environmental section. Land disturbances would also be avoided. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed. Potential impacts on ecological resources from these facilities could arise from activities associated with land disturbances of existing habitats.

Affected Environment	**Proposed Action:** *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	**No-Action Alternative:** *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Socio-economic	MODERATE. During the 8-year construction period, there would be an average of 397 jobs per year created (about 19 percent of the Lea, Andrews, and Gaines counties' construction labor force) with employment peaking at 800 jobs in the fourth year. Construction would cost $1.2 billion (2002 dollars). Spending on goods and services and wages would create 582 new jobs on average. About 15 percent of the construction work force would take up residency in the surrounding community, and about 15 percent of the local housing units are unoccupied. The impact to local schools would be SMALL. Gross receipts taxes paid by LES and local businesses could approach $3 million during the 8-year construction period. Income taxes during construction are estimated to be about $4 million annually. LES would employ 210 people annually during peak operations with an additional 173 indirect jobs with about $20 million in annual operations spending. Increase in demand for public services would be SMALL. Decommissioning would have a SMALL impact. Approximately 300 direct and indirect jobs at Paducah, Kentucky, or Portsmouth, Ohio, would be extended for 11 to 15 years, respectively, if DUF_6 conversion takes place at either site. If a private conversion facility is constructed, approximately 180 total jobs would be created.	MODERATE. Under the no-action alternative, socioeconomics in the local area would continue as described in the affected environmental section. Approximately 800 construction jobs during the peak construction years and 210 operational jobs would not be created. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely socioeconomic impact would be similar to the proposed action. Long-term uncertainty in future supplies of low-enriched uranium could be affect without replacement enrichment capacity for the existing U.S. enrichment facility or from the potential ending of the "Megaton to Megawatts" program in 2013.

Affected Environment	**Proposed Action:** *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	**No-Action Alternative:** *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Environmental Justice	SMALL. The environmental justice study was chosen to encompass an 80-kilometer (50-mile) radius around the proposed NEF site. All population data, including information on minorities and low-income population, were obtained from the 2000 census data. Impacts would be SMALL and no disproportionately high adverse impacts would occur to minority and low-income populations living near the proposed NEF or along the transportation routes into and out of the proposed NEF.	SMALL. Under the no-action alternative, no changes to environmental justice issues other than those that may already exist in the community would occur. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on environmental justice concerns similar to the proposed action. No disproportionately high or adverse impacts would be expected.

Affected Environment	**Proposed Action:** ***LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.***	**No-Action Alternative:** ***The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.***
Noise	SMALL. Noise levels would be predominately due to traffic noise. Construction and decommissioning activities could be limited to normal daytime working hours. The nearest residence would be 4.3 kilometers (2.6 miles) away from the proposed site, and noises at this distance from construction activities would be SMALL. Noise levels during operations would primarily be confined to inside buildings and would be within the U.S. Department of Housing and Urban Development guidelines.	SMALL. Under the no-action alternative, there would be no construction or operational activities or processes that would generate noise. Noise levels would remain as is currently observed at the site. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely noise impact would be similar to the proposed action.

Affected Environment	**Proposed Action:** *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	**No-Action Alternative:** *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Transportation	SMALL to MODERATE during construction. Traffic on New Mexico Highway 234 would almost double during construction for a period of approximately two years, and three injuries and less than one fatality could occur during the peak construction employment year due to work force traffic. Peak truck traffic during construction could cause less than one injury and less than one fatality. SMALL during operations. Truck trips removing nonradioactive waste and delivering supplies would have a small impact on the traffic on New Mexico Highway 234. Work force traffic would also have a SMALL impact on New Mexico Highway 234 with less than one injury and less than one fatality annually due to traffic accidents. All truck shipments of feed, product, and waste materials would result in less than 1×10^{-2} latent cancer fatalities to the public and workers from direct radiation and two or less from vehicle emissions. All rail shipments of feed, product, and waste materials would result in less than 1×10^{-1} latent cancer fatalities to the public and workers from direct radiation and less than 7×10^{-2} from vehicle emissions during the life of the facility. SMALL to MODERATE during accidents. If a rail accident involving the shipment of DUF_6 occurs in an urban area, approximately 28,000 people could suffer	SMALL. Under no-action alternative, traffic volumes and patterns would remain the same as described in the affected environment section. The current volume of radioactive material and chemical shipments would not increase. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on transportation similar to the proposed action.

Affected Environment	Proposed Action: *LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.*	No-Action Alternative: *The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.*
Public and Occupational Health	SMALL during construction and normal operations. During construction, there could be less than one fatality per year based on State statistics from the year 2002. Construction workers could receive up to 0.05 millisieverts (5 millirem) per year once proposed NEF operations are initiated. Precautions would be taken to prevent injuries and fatalities. During operations, there would be approximately eight injuries per year and no fatalities due to nonradiological occurrences based on statistical probabilities. A typical operations or maintenance technician could receive 1 millisievert (100 mrem) of radiation exposure annually. A typical cylinder yard worker could receive 3 millisievert (300 mrem) of radiation exposure annually. All public radiological exposures are significantly below the 10 CFR Part 20 regulatory limit of 1 millisieverts (100 millirem) and 40 CFR Part 190 regulatory limit of 0.25 millisieverts (25 millirem) for uranium fuel-cycle facilities. Members of the public who are located at least a few miles from the UBC Storage Pad would have annual direct radiation exposures combined with exposure through inhalation result in SMALL impacts significantly less than 0.01 millisieverts (1 millirem). SMALL to MODERATE for accidents. Although highly unlikely, the most severe accident is estimated to be the release of UF_6 caused by rupturing an over-filled and/or over-heated cylinder, which could incur a collective	SMALL. Under the no-action alternative, the public health would remain as described in the affected environment. No radiological exposure are estimated to the general public other than background levels. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely public and occupation health impacts would be similar to the proposed action.

Affected Environment	**Proposed Action:** ***LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico.***	**No-Action Alternative:** ***The proposed NEF would not be constructed, operated and decommissioned. Enrichment services would continue to be met with existing domestic and foreign uranium enrichment suppliers.***
Waste Management	SMALL. Solid wastes would be generated during construction and operations. Existing disposal facilities would have the capacity to dispose of the nonhazardous solid wastes. The proposed NEF would implement waste management programs to minimize waste generation and promote recycling where appropriate. In particular, impacts to the Lea County landfill would be SMALL. There would be enough existing national capacity to accept the low-level radioactive waste that could be generated at the proposed NEF. SMALL to MODERATE for temporary storage of the UBCs. Public and occupational exposures would be monitored and controlled. Shipment of the DUF_6 would extend operations of the DOE conversion facilities, thus extending their impacts as described in their NEPA documentation. Construction of a new privately owned conversion facility, whether adjacent to the proposed NEF or potentially near Metropolis, Illinois, would have comparable impacts to the DOE conversion facilities and proposed NEF.	SMALL. Under the no-action alternative, new wastes including sanitary, hazardous, low-level radioactive wastes, or mixed wastes would not be generated that would require disposition. The existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources, and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely waste management impacts would be similar to the proposed action.

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3 AFFECTED ENVIRONMENT

This chapter describes the regional and local environmental characteristics at the proposed National Enrichment Facility (NEF) site. These data and information provide a starting point from which to assess impacts (Chapter 4) of the proposed action (Chapter 2) of this Draft Environmental Impact Statement (Draft EIS). This chapter presents information on land use; water resources; historic and cultural resources; visual and scenic resources; climatology, meteorology, and air quality; geology, minerals and soils; ecology; noise; socioeconomic; public health; transportation; and waste disposal.

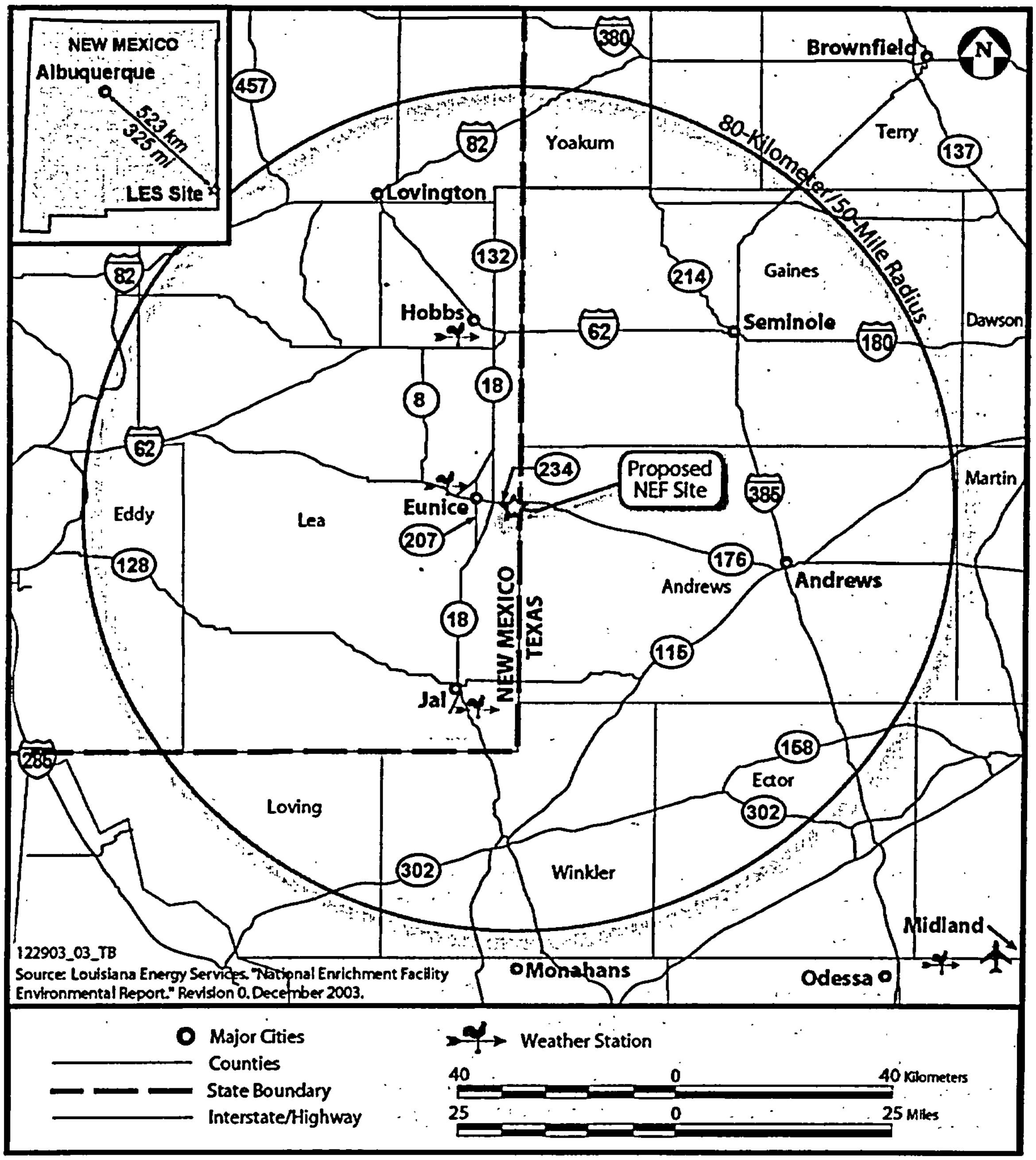

Figure 3-1 Proposed NEF Site and Surrounding Areas (LES, 2004a)

3.1 Site Location and Description

The proposed NEF site is located in southeastern New Mexico in Lea County, approximately 32 kilometers (20 miles) south of Hobbs, New Mexico; 8 kilometers (5 miles) east of Eunice, New Mexico; and about 0.8 kilometers (0.5 miles) from the New Mexico/Texas State line (Figure 3-1). Eunice, the closest population center, is located at the cross-junction of New Mexico Highways 207 and 234. The site is about 51 kilometers (32 miles) northwest of Andrews, Texas, and 523 kilometers (325 miles) southeast of Albuquerque, New Mexico. The largest population center with an international airport is Midland-Odessa, located 103 kilometers (64 miles) southeast of the proposed site.

The State of New Mexico currently owns the proposed site property; however, Louisiana Energy Services (LES) has been granted a 35-year easement (LES, 2004a; LES, 2004b). The land-exchange process for the 220-hectare (543-acre) proposed site would eventually culminate in the land being deeded to LES (LES, 2004a; LES, 2004b; LES, 2004c).

The site consists of mostly undeveloped land that is used for cattle grazing. A gravel-covered road bisects the east and west halves of the site. The site is traversed by an underground carbon dioxide pipeline, running southeast-northwest. An underground natural gas pipeline is located along the southern property line (Figure 3-2). A barbed-wire fence runs along the eastern, southern, and western property lines. The north fence has been dismantled.

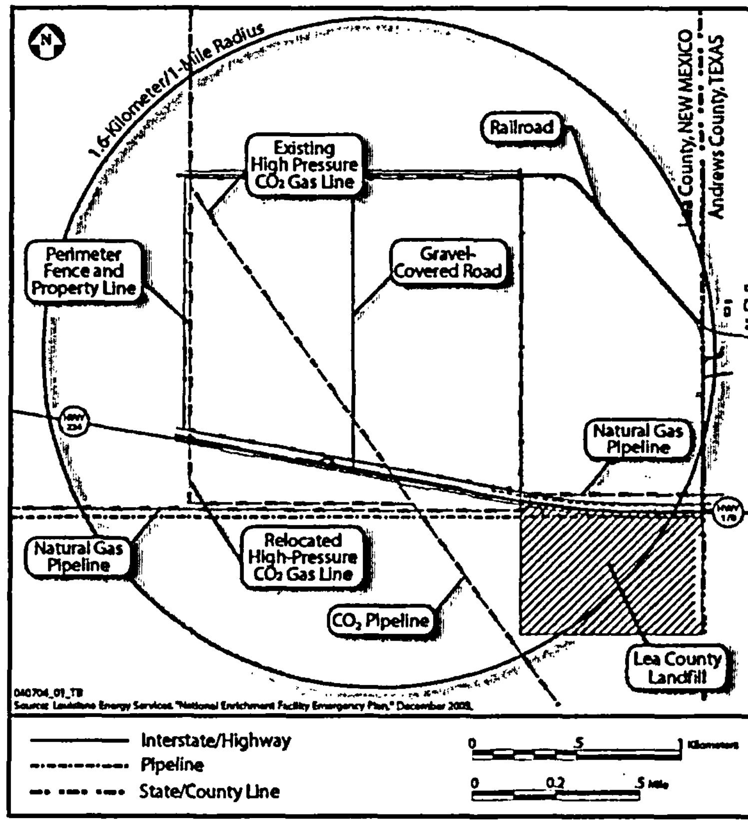

Figure 3-2 Proposed NEF Site Area (LES, 2004b)

3.2 Land Use

This section includes a description of the land uses on and near the proposed NEF site as well as a discussion of offsite areas and the regional setting. Figure 3-3 shows a general land use map for the proposed site vicinity.

The area surrounding the proposed site consists of vacant land and industrial developments. The northern side of the site is bordered by a railroad spur, beyond which is a sand/aggregate quarry operated by Wallach Concrete, Inc. (Wallach, 2004) and an oil- reclamation operation owned by Sundance Services, Inc. The Sundance facility disposes of oil industry solid wastes in a disposal facility and treats soils contaminated with hydrocarbons via landfarming (NMCDE, 2004a; Sundance, 2004a; BLM, 1992).

Further east of the proposed site, a hazardous waste treatment facility operated by Waste Control Specialists (WCS) is situated within the State of Texas. The WCS facility owns buffer areas that border the immediate eastern boundary of the proposed NEF site. The WCS facility holds a renewable seven-year license to temporarily store low-level radioactive and mixed wastes. In addition, WCS holds:

- A *Resource Conservation and Recovery Act* (RCRA) Part B permit (Texas Natural Resources and Conservation Commission Permit No. HW-50358).

- A *Toxic Substances Control Act* Land Disposal Authorization (Environmental Protection Agency [EPA] Identification No. TXD988088464).

- A Texas Natural Resources and Conservation Commission Naturally Occurring Radioactive Material Disposal Authorization, and a Texas Department of Health, Bureau of Radiation Control, Radioactive Material License (Texas Department of Health License No. L04971) (WCS, 2004a; TDH, 2000).

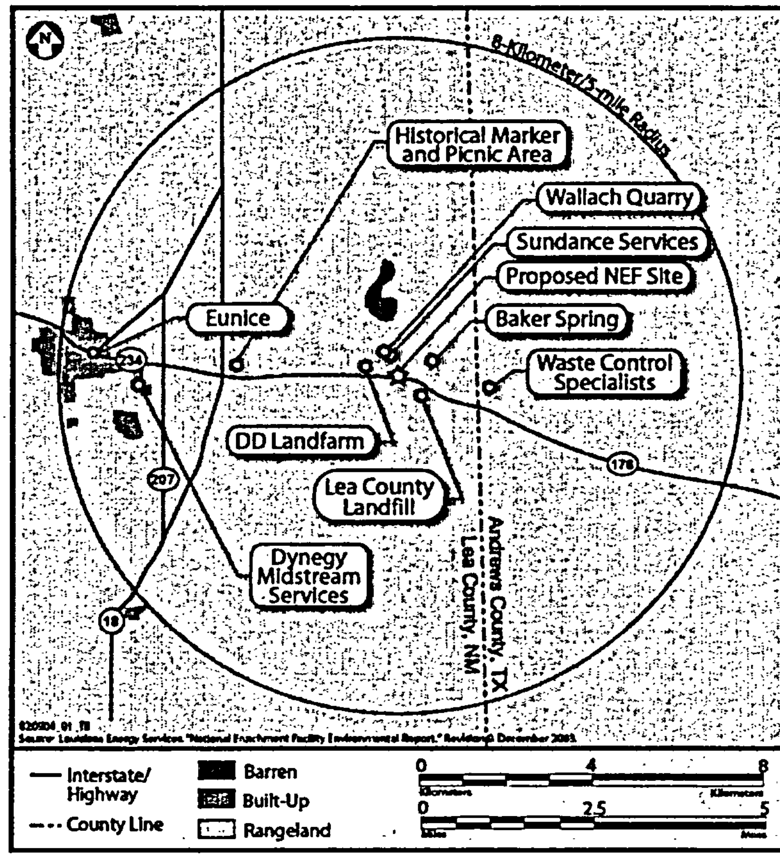

Figure 3-3 Land Use Within 8 Kilometers (5 Miles) of the Proposed NEF Site (LES, 2004a)

Under these licenses, permits, and authorizations, WCS treats, processes, and/or temporarily stores low-level radioactive wastes (including greater-than-class-C, sealed sources, solids, and liquids), 11e(2) material, and mixed wastes (i.e., hazardous waste with radioactive contamination) in addition to the disposal of RCRA/*Toxic Substances Control Act* hazardous materials (WCS, 2004b). WCS is an Agreement State licensee with the State of Texas and has a U.S. Nuclear Regulatory (NRC) Order for exemption from 10 CFR Part 70 (NRC, 2001).

The Lea County landfill is located to the southeast and across New Mexico Highway 234 from the proposed NEF. This landfill disposes of municipal solid waste for the Lea County Solid Waste Authority under New Mexico Environment Department Permit Number SWM-130302. The landfill services Lea County and its municipalities, and other communities within a 160-kilometer (100-mile) radius (LCSWA, 2004).

Bordering the proposed site from the west is privately held land, beyond which is the DD Landfarm, a petroleum-contaminated-soil treatment facility (NMEMNRD, 2000). A historical marker and picnic area are also situated approximately 3.2 kilometers (2 miles) west of the proposed NEF at the intersection of New Mexico Highway 18 and Highway 234. Also, Dynegy Midstream Services, a gathering and processing plant of natural gas, is located 6 kilometers (4 miles) west of the proposed NEF site. The nearest residences are situated approximately 4.3 kilometers (2.6 miles) west of the site (LES, 2004a).

The oil and gas industry has developed the land further to the north, south, and west of the proposed site with hundreds of operating oil pump jacks and associated rigs (Figure 3-4). The more than 33,700 oil wells in the southeastern region of New Mexico produced approximately 63.4 million barrels of oil and more than 16 million cubic meters (570 million cubic feet) of gas in 2003 (NMCDE, 2004b; NMEMNRD, 2004).

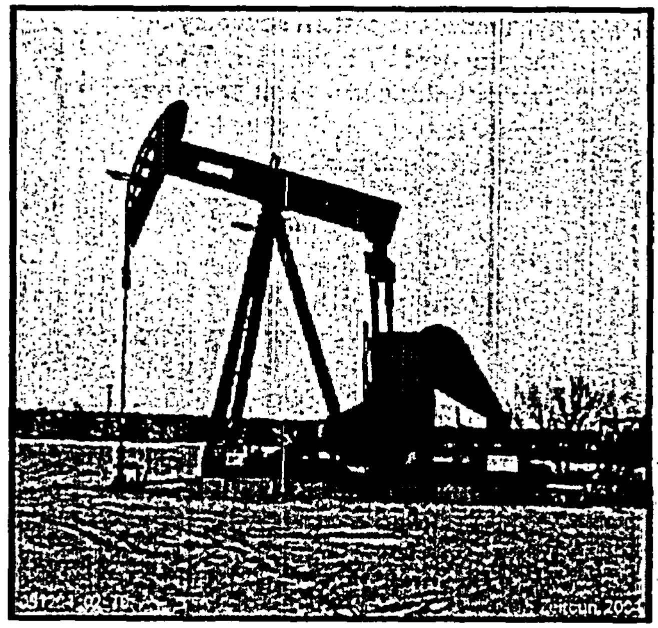

Figure 3-4 Oil Pump Jack

As shown in Figure 3-3, the area surrounding the proposed NEF is extensively dominated by open rangeland used for cattle grazing. Over 98 percent of the land within the 8-kilometer (5-mile) radius of the proposed NEF site is comprised of herbaceous rangeland, shrub and brush rangeland, and mixed rangeland. Rangeland encompasses 12,714 hectares (31,415 acres) within Lea County, New Mexico, and 7,213 hectares (17,823 acres) within Andrews County, Texas (USGS, 1986). Throughout the year, cattle grazing occurs on adjacent local lands including those owned by Wallach Concrete, Inc., and WCS (Wallach, 2004; Berry, 2004).

Built-up land and barren land constitute the other two land use classifications in the proposed site vicinity, but at considerably smaller percentages. Built-up land (i.e., land with residential and industrial developments) comprises approximately 243 hectares (601 acres) of Lea and Andrews Counties and makes up 1.2 percent of the land use. Barren land, consisting of bare exposed rock and transitional and sandy areas, make up the remaining 0.3 percent of land area. There are no special land use classifications (i.e., Indian tribe reservations, national parks, or prime farmland) within the proposed site vicinity. Also, there are no known public recreational areas located within 8 kilometers (5 miles) of the site. With the exception of cattle grazing, no agricultural activities have been identified in the proposed site vicinity (LES, 2004a). Cattle are the primary livestock for both Lea and Andrew Counties (USDA, 1998; USDA, 1999). The nearest dairy farms in Lea County (where milk cows make up a significant number of cattle) are located near the city of Hobbs (Wallach, 2004). There are no milk cows in Andrews County (LES, 2004a).

The following nonindustrial water resources are located in the proposed NEF site vicinity:

- A manmade pond on the adjacent quarry property to the north that is stocked with fish for private catch-and-release use (Wallach, 2004).

- Baker Spring, an intermittent surface-water feature situated about 1.6 kilometers (1 miles) northeast of the site that contains water seasonally.

- Several cattle-watering holes where ground water is pumped by windmill and stored in aboveground tanks.

- A well by an abandoned home about 4 kilometers (2.5 miles) to the west.

- Monument Draw, a natural shallow drainageway situated several kilometers (miles) southwest of the site. Local residents indicated that Monument Draw only contains water for a short period of time following a significant rainstorm (LES, 2004a).

Industrial water uses include "produced water" lagoons, a freshwater pond, evaporation ponds, and a settlement basin. The freshwater pond, a settlement basin, and several evaporation ponds are located on the adjacent quarry property to the north (Wallach, 2004). Five produced-water lagoons and an oil-reclamation pit are located on the Sundance Services, Inc., property (Sundance, 2004b). Produced water is salty wastewater that is brought to the surface during production of natural gas and is also a byproduct of the cleaning process of raw crude oil from a well head (ANL, 2004; Emerson, 2003).

In addition, three Superfund/*Comprehensive Environmental Response, Compensation, and Liability Act* sites are located in Lea County, and six are located in Eddy County, New Mexico (EPA, 2003c). These sites are not in close proximity to the proposed NEF site. There are no sites in Andrews County (EPA, 2003c).

Currently, other than the construction of the proposed NEF and the potential siting of a low-level radioactive waste disposal site at WCS, there are no other known future or proposed land use plans in the area. In addition, the proposed site is not subject to local or county zoning, land use planning, or associated review process requirements, and there are no known potential conflicts of land use plans, policies, or controls (LES, 2004a). However, the city of Eunice is working on a new zoning plan for expansion of the city limits (Consensus Planning, 2004). The city plan includes an eastward commercial and heavy industrial zoning area that follows New Mexico Highway 234 towards the proposed NEF site. Figure 3-5 presents details of the preferred land use for the city of Eunice.

3.3 Historic and Cultural Resources

The region surrounding the proposed NEF site in southeastern New Mexico and western Texas is rich in prehistoric and historic American Indian and Euro-American history. However, the environmental setting in the immediate vicinity of the proposed site has greatly affected both prehistoric and historic occupation and use of the area. This local setting, which occurs well onto the Llano Estacado (see Section 3.6, "Geology, Minerals, and Soils"), is a flat, treeless plain lacking nearby permanent or semipermanent surface water. As a result, it has not been conducive to extensive human use of the area over the centuries. In contrast, both prehistoric and historic occupation and use were extensive in all directions from the proposed site. Shelter and resources were more readily available in the site area at selected locales on the Llano Estacado where temporary and some permanent springs and lakes were found.

The cultural sequence in the region extends back approximately 11,000 years, and several chronological prehistoric and historic periods can be defined (Sebastian and Larralde, 1989). These periods include the Paleo-Indian period (9000 B.C.-7000 B.C.); the Archaic period (5000-6000 B.C.–A.D. 900-1000); the Ceramic period (A.D. 900-1500); the Protohistoric Native American and Spanish Colonial period (A.D. 1541-1800); and the Historic Hispanic, American Indian, and American period (A.D. 1800-present). The following subsections present brief background summaries of these eras.

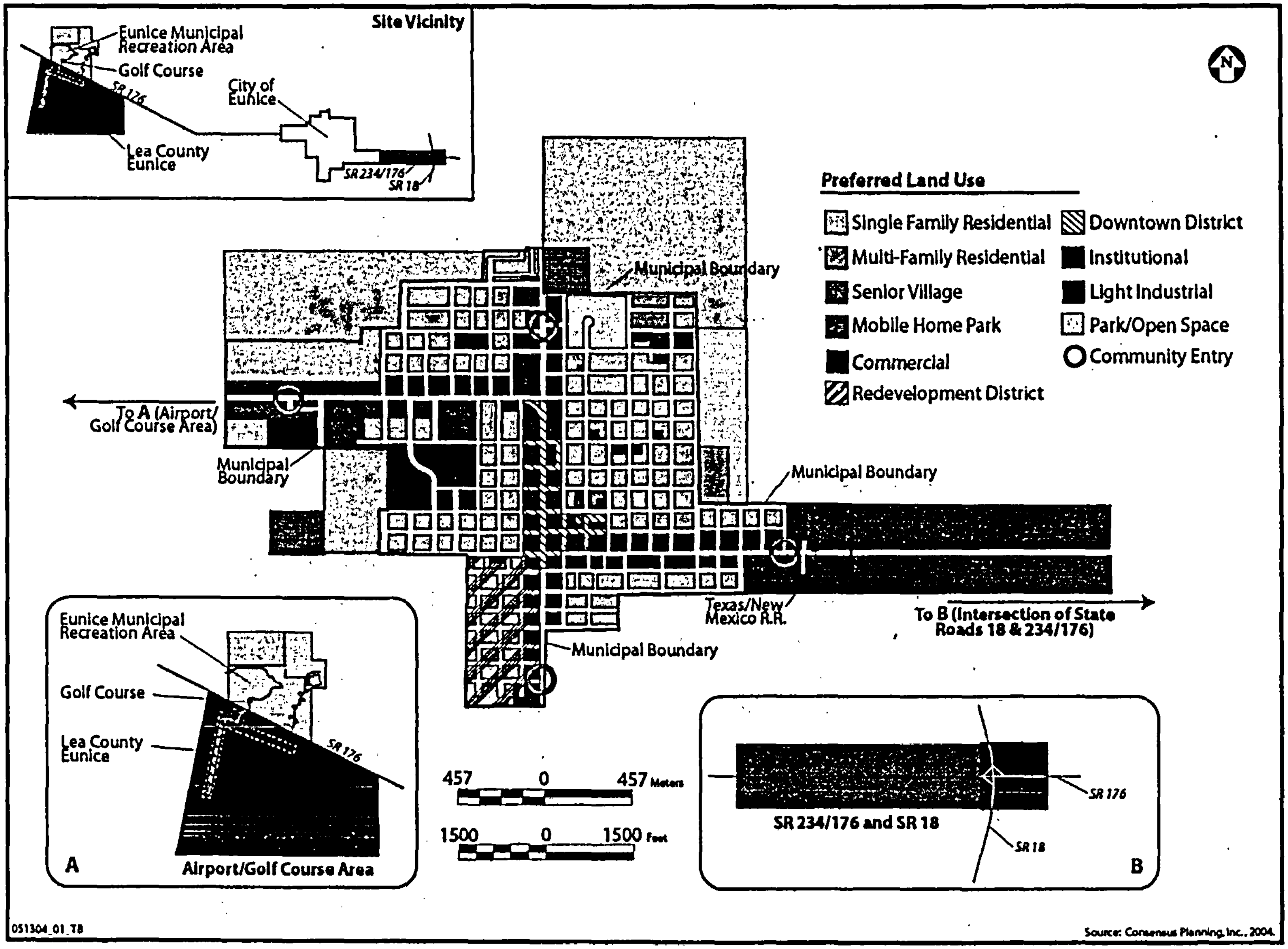

Figure 3-5 Preferred Land Use for the City of Eunice, New Mexico (Consensus Planning, 2004)

3.3.1 Prehistoric

According to the cultural resource overview for southeastern New Mexico (Sebastian and Larralde, 1989), the initial prehistoric period in the region was characterized by a big-game-hunting subsistence pattern with small groups of nomadic humans preying on now extinct animal species such as mammoths and large bison. Some of the classic Paleo-Indian archaeological hunting sites were discovered on the Llano Estacado and nearby areas, although none are located in close proximity to the project area. The subsequent Archaic period was also marked by nomadic groups relying on increased use of smaller game animals and plant foods. In general, the Ceramic period was characterized by a trend towards more sedentary villages and reliance on cultivated crops. However, the environment in the vicinity of the project area was not conducive to this lifestyle, and the presence of Ceramic period sites reflects more limited occupations than other areas such as the Pecos River Valley to the west. Reviews of existing archaeological site files (Sebastian and Larralde, 1989) and area overviews (Leslie, 1979; Runyon, 2000) reveal that archaeological materials associated with each of these prehistoric periods have been found in the vicinity of the project area. All previously recorded archaeological sites close to the proposed NEF site are designated as seasonally used temporary prehistoric campsites.

3.3.2 Protohistoric and Historic Indian Tribes

Similar to the prehistoric era, protohistoric and historic period exploitation of the immediate vicinity of the NEF project area by Indian tribes was also sparse, although occupation and use of the larger region was intensive. At the time of contact by Spanish expeditions, the area was occupied by groups that are nearly nonexistent today. These groups include the Suma and Tigua (Gerald, 1974) and the Jumano (Kelley, 1986; Hickerson, 1994), who were centered to the south in western present-day Texas and to the west along the Pecos River drainage. These groups were replaced in historic times by Plains immigrants from the north and east, including the Kiowa (Mayhall, 1971), Comanche (Fehrenbach, 1974; Kavanagh, 1996; Wallace and Hoebel, 1952), and the Mescalero Apaches who occupied the mountainous areas of south-central New Mexico (Opler, 1983; Sonnichsen, 1973). Each of these protohistoric- and historic-period groups frequented the vicinity of the project area over time, but their primary occupations and activities took place elsewhere in areas with better resources.

Based on various testimonies before the U.S. Indian Claims Commission (ICC), the area proximal to the project area was found to have been used and/or occupied by Federally recognized present-day tribes known as the Plains Apache, Comanche, and Kiowa. Today, these tribes occupy a reservation in southwestern Oklahoma (ICC, 1979). The ICC also noted that the historically occupied area of the Mescalero Apache tribe lies just to the west of the project area, although Mescalero did at times extend over an area that includes the proposed NEF site. Today, the Mescalero Reservation is located about 125 miles northwest of the project area. A remnant group of the Tigua (Ysleta del Sur Pueblo near El Paso, Texas) also has a traditional use presence in the area. Based on these data, the NRC staff consulted the following modern-day tribes:

- Apache tribe of Oklahoma.
- Comanche tribe of Oklahoma.
- Kiowa tribe of Oklahoma.
- Mescalero Apache tribe.
- Ysleta del Sur Pueblo.

Review of the extant literature has not identified any known individual tribal properties and resources or traditional cultural places of significance within or near the proposed NEF site.

3.3.3 Historic Euro-American

The historic Euro-American period in the region began with Spanish exploration expeditions, beginning in 1541 with the Coronado expedition. However, no information was available that indicates any of the Spanish expeditions approached the project area (Morris, 1997). The first Anglo presence in the vicinity of the proposed NEF site was associated with U.S. military activities involved in conflicts with and the subjugation of the Indian tribes. Treaties in the 1860's and 1870's essentially ended the American Indian presence in the area as the various tribes were relocated to reservations. Following these events, American settlers slowly but steadily occupied the area in the vicinity of the proposed NEF site. This era leading to the present day was characterized by several phases of occupation and use. These phases included the open-cattle-ranching era (from the 1860's to about 1910), homesteading and settlement (beginning about 1905), and the development of the oil and gas industry (beginning in the 1920's). These events are summarized in the following county histories: Andrews County, Texas (organized in 1910) (ACHC, 1978); Gaines County, Texas (organized in 1905) (Coward, 1974); and Lea County, New Mexico (organized in 1917) (Brooks, 1993; Hinshaw, 1976; Mauldin, 1997; Mosely, 1973), on which sources the following discussion is based as it pertains to the proposed NEF site.

The 84 Ranch (also known as the Half Circle 84) was one of the earliest ranches in the area. The 84 Ranch was established in 1884 or 1885 with the digging of a well and the emplacement of a windmill (Hinshaw, 1976; Price, 1967). The well and ranch headquarters were located east of the present-day town of Eunice, about 4.8 kilometers (3 miles) northwest of the project area. The proposed NEF site was originally included in the ranch's grazing lands. The 84 Ranch was eventually purchased by the larger JAL Ranch, which raised about 40,000 head of cattle on an expansive tract of land that occupied the southeast quarter of Lea County until about 1910.

After 1900, changes in the *Homestead Act* allowed larger acreages that permitted settlers to take up tracts of the former open range. In 1908, John Carson homesteaded 129 hectares (320 acres) of former 84 Ranch land, a tract that would eventually become the city of Eunice. The Carson homestead was located about 8 kilometers (5 miles) west of the proposed NEF site. In 1909, Carson established a post office and general store at the locale named for his eldest daughter, Eunice. Other settlers were attracted to the location, and Eunice reached its pinnacle as a pioneer settlement in the years 1914-1915. However, drought and other larger events—including recession, World War I, and the influenza epidemic of 1918—led to a decline in the area's population. A regional oil boom reached Eunice in 1929, and the town began to again grow. In 1937, Eunice was incorporated as a city with a population of 2,188.

3.3.4 Historic and Archaeological Resources at the Proposed NEF Site

The State of New Mexico currently owns the proposed NEF site, which comprises 220 hectares (543 acres) of land lying north of U.S. Highway 176 in Section 32 of range 38E in Township 21S. Information obtained from the Historic Preservation Division of the New Mexico Office of Cultural Affairs, Archaeological Resource Management Records Section, reveals that prior to the current project, no cultural resources surveys have been conducted within the proposed project area nor were there any previously recorded archaeological sites. A review of the current listings for the New Mexico State Register of Cultural Resource Properties and the National Register of Historic Places indicate no listed properties within 8 kilometers (5 miles) of the project area.

In September 2003, an intensive cultural resources inventory was completed for the 220-hectare (543-acre) tract, resulting in the identification and recording of 7 new archaeological sites and 35 instances of isolated artifacts (Graves, 2004). The latter included isolated occurrences of prehistoric artifacts, except for two U.S. General Land Office bench markers dated 1911 located at the northeast and northwest corners of the section, and parts of an historic barbed-wire fence enclosure.

Each of the seven archaeological sites recorded within the proposed project area is designated as a prehistoric campsite of indeterminate age. In the New Mexico site file system, the archaeological sites are listed as Laboratory of Anthropology 140701-140707. All of the sites are similar in configuration, with a presence of one or more thermal features (concentrations of fire-cracked rocks), scattered fire-cracked rocks, and a scatter of stone tools and/or flakes. Field analysis of the artifacts indicates that these campsites and artifact scatters may have been associated with procurement of stone tool materials from nearby gravel cobbles.

Applying the significance criteria for possible listing in the National Register of Historic Places, the field investigators recommended to the New Mexico State Historic Preservation Office that each of the recorded archaeological sites falls into one of the following categories:

- **Not eligible** for listing in the National Register of Historic Places based on lack of buried cultural materials (field recording has exhausted the research potential) (Laboratory of Anthropology 140701, 140702, and 140703).

- **Potentially eligible** for listing in the National Register of Historic Places based on an observed potential for buried cultural deposits (Laboratory of Anthropology 140707).

- **Eligible** for listing in the National Register of Historic Places based on the expectation that buried cultural deposits exist and/or the surface data indicate a definite research potential (Laboratory of Anthropology 140404, 140705, and 140706).

Each of the recommendations for potential eligibility or eligible status for the NEF archaeological sites falls under the National Register of Historic Places criterion (d), which identifies sites that have either yielded, or may likely yield, information important in prehistory or history. By designation, cultural items recorded as isolated artifacts are not considered as potentially eligible for listing in the National Register of Historic Places. All seven sites have been determined to be eligible for listing in the National Register of Historic Places.

3.4 Visual and Scenic Resources

The proposed NEF site consists of open, vacant land. Nearby landscapes are similar in appearance, except for manmade structures associated with the neighboring industrial properties and the local oil and gas well heads. Figures 3-6 and 3-7 show that no existing structures are located on the site. The only agricultural activity in the site vicinity is cattle grazing.

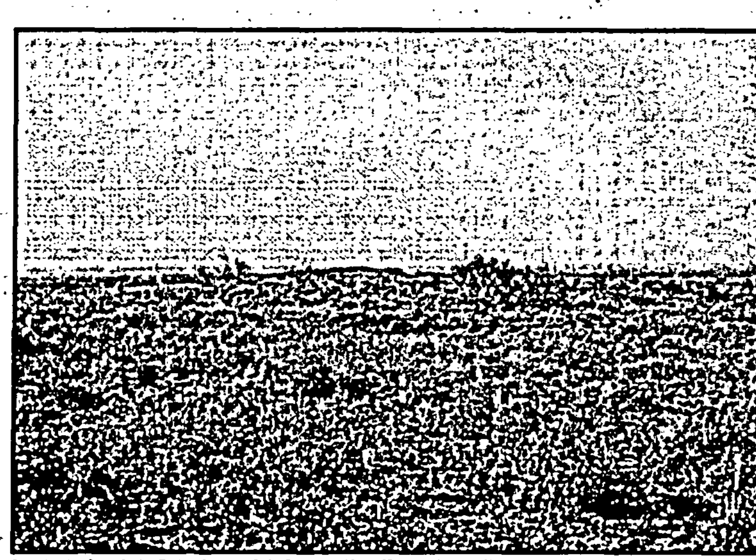

Figure 3-6 View of the Proposed NEF Site Looking from the Northwest to the Southeast (LES, 2004a)

The proposed NEF site is considered indistinguishable in terms of scenic attractiveness when compared to surrounding land. No recreational resources are identified in the immediate area of the site.

The proposed NEF site received the lowest scenic-quality rating using the Bureau of Land Management (BLM) visual resource inventory process (LES, 2004a). This rating allows for the greatest level of landscape modification, which is defined as "extensive change to the landscape characteristics which may dominate the view and be the major focus of viewer attention" (BLM, 2003a; BLM, 2003b).

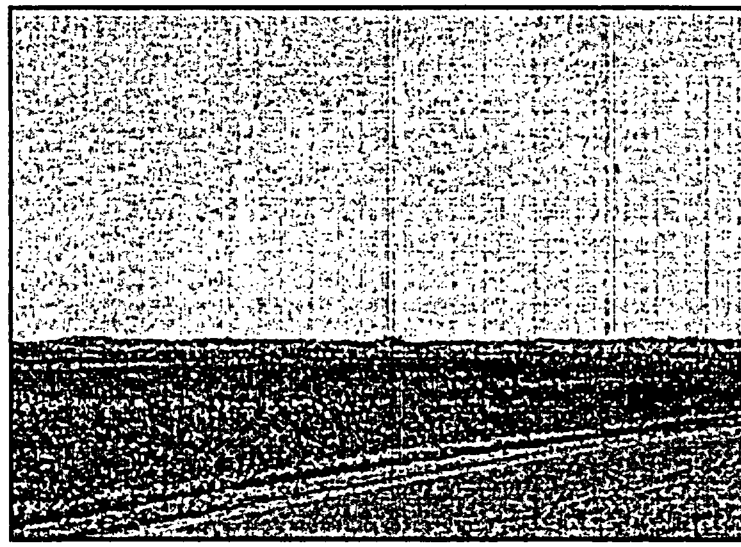

Figure 3-7 View of the West Half of the Proposed NEF Site (LES, 2004a)

The proposed NEF site is not visible from the city of Eunice, which is located 8 kilometers (5 miles) to the west. However, the site is bordered to the south by New Mexico Highway 234 and is visible to westbound traffic approaching from the New Mexico/Texas State line, approximately 0.8 kilometers (0.5 miles) to the east. Eastbound highway traffic is partially shielded by a naturally occurring series of small sand dunes on the western portion of the site. Once traffic passes the sand dune buffer, the site becomes visible. The view from the nearest residences situated approximately 4.3 kilometers (2.6 miles) away is also limited by onsite sand dunes.

Properties adjacent to the site include Wallach Concrete, Inc., and Sundance Services, Inc., to the north and WCS to the east. The site is visible from these properties and slightly visible from the Lea County landfill, located to the southeast, and from DD Landfarm, located to the west.

3.5 Climatology, Meteorology, and Air Quality

3.5.1 Regional Climatology

The climate in the region of the proposed NEF site is semi-arid with mild temperatures, low precipitation and humidity, and a high evaporation rate. The weather is often dominated in the winter by a high-pressure system in the central part of the western United States and a low-pressure system in north-central Mexico. The region is affected by a low-pressure system located over Arizona in the summer.

3.5.2 Site and Regional Meteorology

There are no site-specific meteorological data available at the proposed NEF site. Data is available from WCS, 1.6 kilometers (1 mile) from the proposed NEF site, but these data are not fully verified. Climatological averages for atmospheric variables such as temperature, pressure, winds, and precipitation presented in this Draft EIS are based on data collected from four weather stations. These stations are located in Eunice, New Mexico; Hobbs, New Mexico; Roswell, New Mexico; and Midland-Odessa, Texas (Figure 3-1). Table 3-1 presents the distances and directions of these stations from the site and the length of the records for the reported data.

Table 3-1 Weather Stations Located near the Proposed NEF Site

Station	Distance and Direction from Proposed Site	Length of Record*	Station Elevation (meters)
Eunice, New Mexico	8 kilometers (5 miles) west of site	1 (1993)	1,050
Hobbs, New Mexico	32 kilometers (20 miles) north of site	16 (1982-1997)	1,115
Midland-Odessa, Texas	103 kilometers (64 miles) southeast of site	16 (1982-1997)	872
Roswell, New Mexico	161 kilometers (100 miles) northwest of site	16 (1982-1997)	1,118

* Years of compiled data for climatological analysis.
Source: WRCC, 2004

The Midland-Odessa monitoring station is the closest first-order National Weather Service station to the proposed NEF site. First-order weather stations record a complete range of meteorological parameters for 24-hour periods, and they are usually fully instrumental (NCDC, 2003). The National Oceanic and Atmospheric Administration (NOAA) compiles and certifies the hourly meteorological data for Midland-Odessa, Roswell, and Hobbs (NCDC, 1998). In addition to hourly data, the Western Regional Climate Center compiles and certifies the climatological summaries for Hobbs (WRCC, 2004). The State of New Mexico Environment Department Air Quality Bureau collects the only available data from Eunice (NMAQB, 2003).

3.5.2.1 Temperature

Local climate data are available from a monitoring station in Hobbs, New Mexico. The Hobbs station is a part of the National Climatic Data Center Cooperative Network. The Hobbs, New Mexico, station shows a mean annual temperature of 16.6°C (61.9°F) with the mean monthly temperature ranging from 5.7°C (42.2°F) in January to 26.8°C (80.2°F) in July. The highest daily maximum temperature on record is 45.6°C (114°F) (June 27, 1998) and the lowest daily minimum temperature is -21.7°C (-7°F) (January 11, 1962). Table 3-2 presents a summary of temperatures in the Hobbs area from 1914 to 2003.

3.5.2.2 Precipitation

The normal annual total rainfall as measured in Hobbs is 40 centimeters (16 inches). Precipitation amounts range from an average of 1.14 centimeter (0.45 inch) in January to 6.68 centimeters (2.63 inches) in September.

Maximum and minimum monthly totals are 35 centimeters (13.8 inches) and zero. Table 3-3 presents a summary of precipitation in the Hobbs area for monthly and annual means.

Summer rains fall almost entirely during brief, but frequently intense thunderstorms. The general southeasterly circulation from the Gulf of Mexico brings moisture from these storms into the State of New Mexico, and strong surface heating combined with orographic lifting as the air moves over higher terrain causes air currents and condensations. Orographic lifting occurs when air is intercepted by a mountain and is forcefully raised up over the mountain, cooling as it rises. If the air cools to its saturation point, the water vapor condenses and a cloud forms. August and September are the rainiest months with 30 to 40 percent of the year's total moisture falling at that time.

Table 3-2 Summary of Monthly Temperatures at Hobbs, New Mexico, from 1914 to 2003*

Month	Monthly Averages			Daily Extremes			
	Maximum	Minimum	Mean	High	Date	Low	Date
January	13.6°C (56.5°F)	-2.3°C (27.9°F)	5.7°C (42.2°F)	28.3°C (83°F)	01/11/1953	-21.7°C (-7°F)	01/11/1962
February	16.7°C (62.0°F)	0.0°C (32.0°F)	8.3°C (47.0°F)	30.6°C (87°F)	02/12/1962	-18.9°C (-2°F)	02/02/1985
March	20.5°C (68.9°F)	2.9°C (37.3°F)	11.7°C (53.1°F)	35.0°C (95°F)	03/27/1971	-17.2°C (1°F)	03/02/1922
April	25.5°C (77.8°F)	7.9°C (46.2°F)	16.7°C (62.0°F)	36.7°C (98°F)	04/30/1928	-7.8°C (18°F)	04/04/1920
May	29.7°C (85.5°F)	13.0°C (55.3°F)	21.3°C (70.4°F)	41.7°C (107°F)	05/30/1951	1.1°C (34°F)	05/02/1916
June	33.8°C (92.9°F)	17.5°C (63.4°F)	25.6°C (78.1°F)	45.6°C (114°F)	06/27/1998	4.4°C (40°F)	06/03/1919
July	34.3°C (93.8°F)	19.2°C (66.6°F)	26.8°C (80.2°F)	43.3°C (110°F)	07/15/1958	10.0°C (50°F)	07/01/1927
August	33.4°C (92.1°F)	18.7°C (65.6°F)	26.0°C (78.8°F)	41.7°C (107°F)	08/09/1952	8.3°C (47°)	08/29/1916
September	30.0°C (85.9°F)	15.2°C (59.4°F)	22.6°C (72.6°F)	40.6°C (105°F)	09/05/1948	1.1°C (34°F)	09/23/1948
October	25.1°C (77.1°F)	9.2°C (48.5°F)	17.1°C (62.8°F)	36.7°C (98°F)	10/03/2000	-11.1°C (12°F)	10/29/1917
November	18.5°C (65.2°F)	2.6°C (36.7°F)	10.5°C (50.9°F)	31.1°C (88°F)	11/01/1952	-15.6°C (4°F)	11/29/1976
December	14.5°C (58.1°F)	-1.3°C (29.6°F)	6.7°C (44.0°F)	28.9°C (84°F)	12/09/1922	-17.2°C (-1°F)	12/24/1983

*For monthly and annual means, thresholds, and sums: months with five or more missing days are not considered, years with one or more missing months are not considered.
Source: WRCC, 2004.

As these storms move inland, much of the moisture is precipitated over the coastal and inland mountain ranges of California, Nevada, Arizona, and Utah. Much of the remaining moisture falls on the western slope of the Continental Divide and over northern and high-central mountain ranges. Winter is the driest season in New Mexico except for the portion west of the Continental Divide. This dryness is most noticeable in the Central Valley and on eastern slopes of the mountains. In New Mexico, much of the winter precipitation falls as snow in the mountain areas, but it may occur as either rain or snow in the valleys.

Table 3-3 Summary of Monthly Precipitation at Hobbs, New Mexico, from 1914 To 2003

	Precipitation							Total Snowfall		
Month	**Mean**	**High**	**Year**	**Low**	**Year**	**1-Day Maximum**		**Mean**	**High**	**Year**
January	1.14 cm (0.45 in)	7.52 cm (2.96 in)	1949	0.00	1924	3.07 cm (1.21 in)	01/11/1949	3.56 cm (1.4 in)	31.75 cm (12.5 in)	1983
February	1.14 cm (0.45 in)	6.20 cm (2.44 in)	1923	0.00	1917	3.53 cm (1.39 in)	02/05/1988	3.05 cm (1.2 in)	36.32 cm (14.3 in)	1973
March	1.35 cm (0.53 in)	7.57 cm (2.98 in)	2000	0.00	1918	5.08 cm (2.00 in)	03/20/2002	1.52 cm (0.6 in)	25.40 cm (10.0 in)	1958
April	2.03 cm (0.80 in)	13.13 cm (5.17 in)	1922	0.00	1917	4.75 cm (1.87 in)	04/20/1926	0.51 cm (0.2 in)	22.86 cm (9.0 in)	1983
May	5.23 cm (2.06 in)	35.13 cm (13.83 in)	1992	0.00	1938	13.21 cm (5.20 in)	05/22/1992	0.0	0.0	1948
June	4.78 cm (1.88 in)	23.62 cm (9.30 in)	1921	0.00	1924	11.23 cm (4.42 in)	06/07/1918	0.0	0.0	1948
July	5.36 cm (2.11 in)	23.90 cm (9.41 in)	1988	0.00	1954	11.35 cm (4.47 in)	07/19/1988	0.0	0.0	1948
August	6.02 cm (2.37 in)	23.29 cm (9.17 in)	1920	0.10 cm (0.04 in)	1938	11.30 cm (4.45 in)	08/09/1984	0.0	0.0	1948
September	6.68 cm (2.63 in)	32.99 cm (12.99 in)	1995	0.00	1939	19.05 cm (7.50 in)	09/15/1995	0.0	0.0	1948
October	3.99 cm (1.57 in)	20.70 cm (8.15 in)	1985	0.00	1917	14.22 cm (5.60 in)	10/09/1985	0.25 cm (0.1 in)	11.43 cm (4.5 in)	1976
November	1.45 cm (0.57 in)	11.00 cm (4.33 in)	1978	0.00	1915	9.65 cm (3.80 in)	11/04/1978	1.52 cm (0.6 in)	41.91 cm (16.5 in)	1980
December	1.42 cm (0.56 in)	12.90 cm (5.08 in)	1986	0.00	1917	4.72 cm (1.86 in)	12/21/1942	2.54 cm (1.0 in)	24.13 cm (9.5 in)	1986
Annual	40.59 cm (15.98 in)	81.76 cm (32.19 in)	1941	13.41 cm (5.28 in)	1917	19.05 cm (7.50 in)	09/15/1995	12.95 cm (5.1 in)	68.83 cm (27.1 in)	1980

cm - centimeter.
in - inch.
Source: WRCC, 2004.

Climatological data collected from the Midland-Odessa station indicate the relative humidity throughout the year ranges from 45 to 61 percent, with the highest humidity occurring during the early morning hours (LES, 2004a).

> ***Atmospheric Stability Classes***
>
> *Stability classes are used to assess the dispersion behavior of materials released into the atmosphere. Dispersion is affected by ambient air temperature changes with height above ground and is categorized by Pasquill. Seven stability classes for use in dispersion calculations are established. Many times, the EPA and NRC will use only six stability classes by merging the sixth and seven (F and G) classes into one class.*

Stability Classification	***Pasquill Category***	***Temperature Change with Height (°C/100 meters)***
Extremely Unstable	*A*	*<-1.9*
Moderately Unstable	*B*	*-1.9 to -1.7*
Slightly Unstable	*C*	*-1.7 to-1.5*
Neutral	*D*	*-1.5 to -0.5*
Slightly Stable	*E*	*-0.5 to 1.5*
Moderately Stable	*F*	*1.5 to 4.0*
Extremely Stable	*G*	*<4.0*

Source: NRC, 1972.

3.5.2.3 Meteorological Data Analyses

The NRC staff examined the data from the four meteorological stations in Table 3-1 (NCDC, 1998; NMAQB, 2003). Because the Eunice meteorological data are limited to 1993, annual wind roses for Midland-Odessa, Roswell, Hobbs, and Eunice for 1993 were compared (Figure 3-8). From this one-year comparison, the general wind patterns for Midland-Odessa, Hobbs, and Eunice were somewhat similar. Roswell data, on the other hand, appeared to be different with a stronger northerly and westerly component. To illustrate such comparison further, Figure 3-9 presents the frequency distributions of atmospheric stability classes that were plotted for the 1993 data.

Histograms of atmospheric stability at Midland-Odessa, Roswell, Hobbs, and Eunice for the same year show that the stability-class frequency distribution for Midland-Odessa and Hobbs are similar. Distributions for Eunice and Roswell are different from Midland-Odessa and Hobbs. Stability class was determined using the solar radiation/cloud cover method for Midland-Odessa, Roswell, and Hobbs. The New Mexico Air Quality Bureau provided stability categories for Eunice, which is limited to one year of data (NMAQB, 2003). Also, no information was available on the methods used to calculate the stability categories at this location.

Table 3-4 presents a statistical summary of the data completeness for Hobbs and Midland-Odessa that was performed to comply with Environmental Protection Agency (EPA) data completeness guidance for air quality modeling. The EPA requires that meteorological data be at least 75-percent complete (with less than 25 percent missing data) to be reliably usable as inputs for dispersion models (EPA, 2003b). Despite the fact that Hobbs is the closest station to the proposed NEF site, the Hobbs data did not meet the 75-percent completeness criteria. Therefore, these data were not used for dispersion modeling. However, Hobbs observations can be used for a general description of the meteorological conditions at the proposed NEF site as they are all located within the same region and have similar climates.

Midland-Odessa and Hobbs had comparable climate data based on a comparative analysis of meteorological data at the four locations surrounding the proposed NEF site. Roswell climate data were different, and Eunice data had too many severe shortcomings to be used reliably. Since Midland-Odessa was a first-order weather station with data completeness exceeding EPA guidance, it was used as the representative meteorological station for the dispersion modeling needs in this Draft EIS.

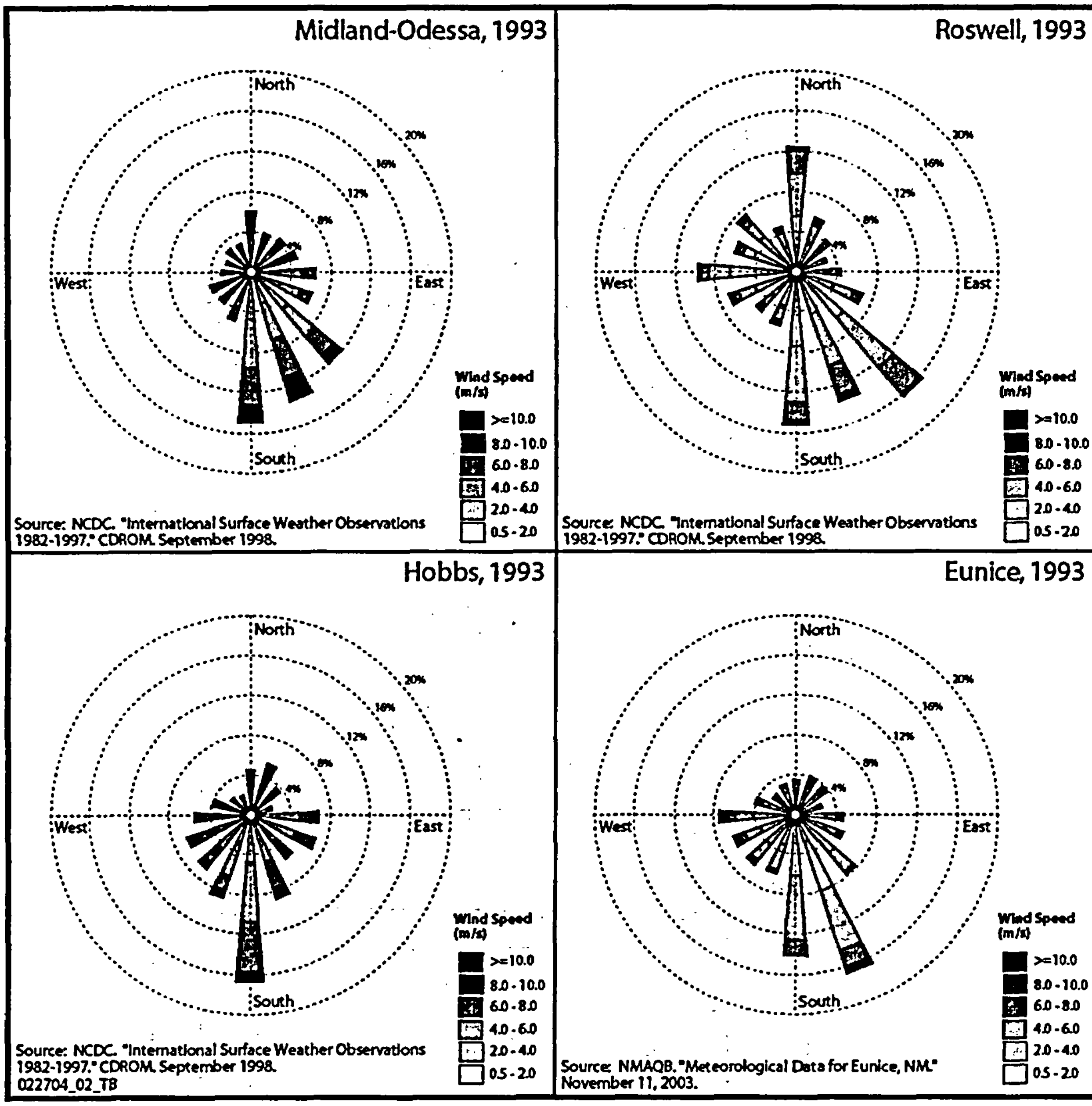

Figure 3-8 Wind Roses for Midland-Odessa, Roswell, Hobbs, and Eunice for 1993 (NCDC, 1998; NMAQB, 2003)

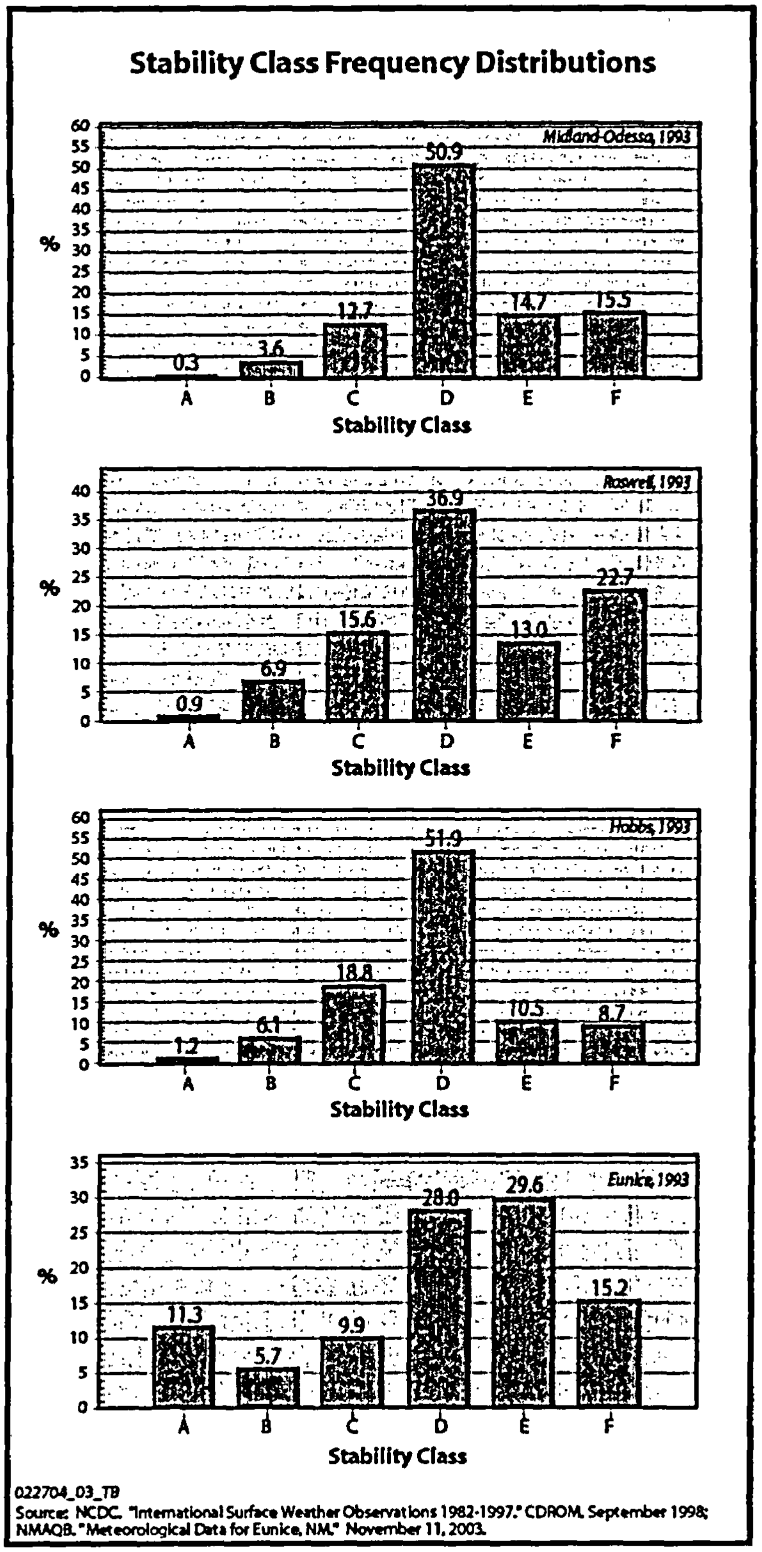

Figure 3-9 Histograms of Stability Categories for Midland-Odessa, Roswell, Hobbs, and Eunice, 1993 (NCDC, 1998; NMAQB, 2003)

Table 3-4 Statistical Summary of the Data Completeness for Midland-Odessa and Hobbs

Hobbs, NM			Midland-Odessa, NM		
Year	Number of Observations	% Complete	Year	Number of Observations	% Complete
1990	5,670	64.7	1990	8,168	93.2
1991	5,768	65.8	1991	8,251	94.2
1992	5,985	68.1	1992	8,431	96.0
1993	5,767	65.8	1993	8,368	95.5
1994	5,770	65.9	1994	8,325	95.0
1995	5,399	61.6	1995	7,863	89.8
1996	5,627	64.1	1996	6,621	75.4
1997	5,640	64.4	1997	8,208	93.7

Source: NCDC, 1998.

3.5.2.4 Winds and Atmospheric Stability

Wind speeds over the State of New Mexico are usually moderate, although relatively strong winds often accompany occasional frontal activity during late winter and spring months and sometimes occur just in advance of thunderstorms. Frontal winds may exceed 13 meters per second (30 miles per hour) for several hours and reach peak speeds of more than 22 meters per second (50 miles per hour).

Spring is the windy season. Blowing dust and serious soil erosion of unprotected fields may be a problem during dry spells. Winds are generally stronger in the eastern plains than in other parts of the State. Winds generally predominate from the southeast in summer and from the west in winter, but local surface wind directions will vary greatly because of local topography and mountain and valley breezes.

The hourly meteorological observations at Midland-Odessa were used to generate wind rose plots. Figure 3-10 shows wind speed and direction frequency for the years 1987 to 1991. Calculated annual mean wind speed was 5.1 meters per second (11.4 miles per hour), with prevailing winds from the south and a maximum 5-second wind speed of 31.2 meters per second (70 miles per hour). Figure 3-11 presents frequency distributions of wind speed and direction as a function of Pasquill stability class (A-F). The most stable classes—E and F—occur 18.9 and 13 percent of the time, respectively. The least stable classes, A and B, occur 0.3 and 3.5 percent of the time, respectively. Figure 3-12 presents frequency distribution data analyzed for a five-year period (1987-1991) at the Midland-Odessa National Weather Service.

The use of recent data generated at WCS from October 1999 through August 2002 (LES, 2004a) shows a similarity in wind patterns and distribution of wind speed between the Midland-Odessa and WCS locations. Although the meteorological data are from different time periods and the two sites are separated in distance, the data from both sites show a predominance of southerly winds, and both data sets shows similar distributions of wind speed.

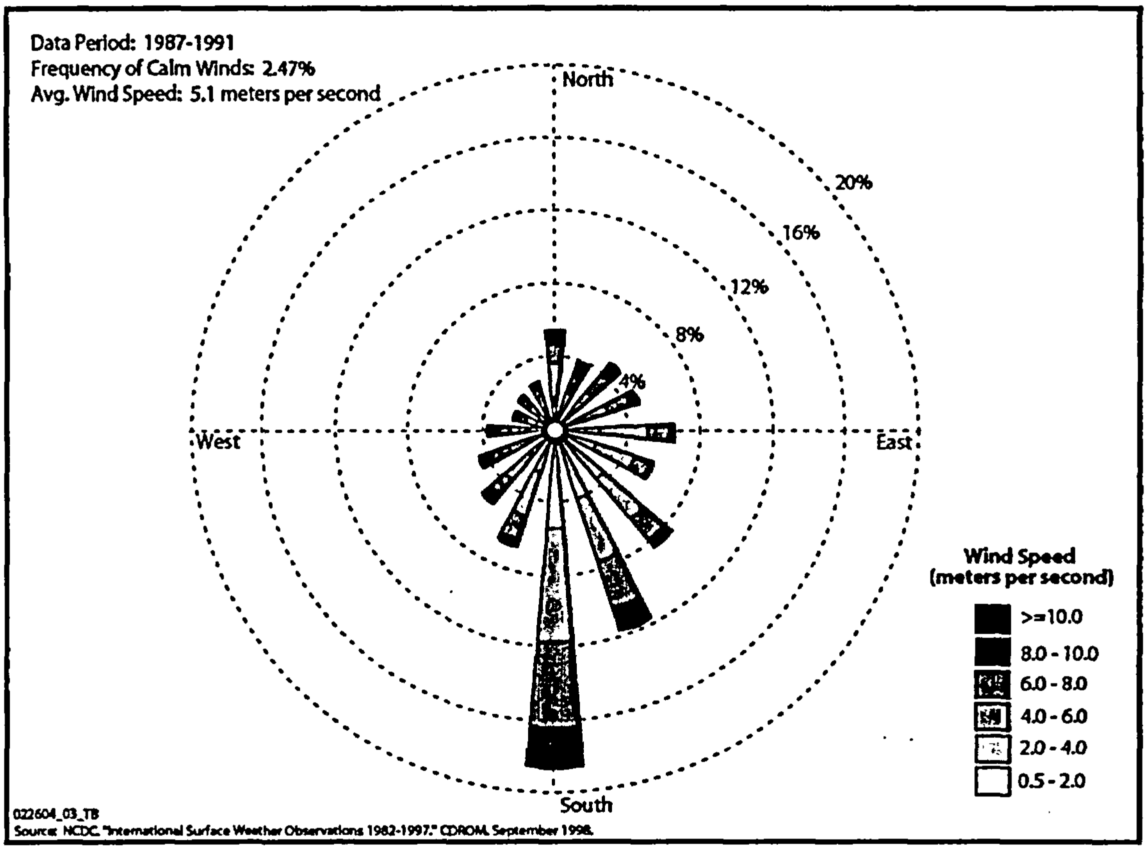

Figure 3-10 Wind Rose for Midland-Odessa, 1987-1991 (NCDC, 1998)

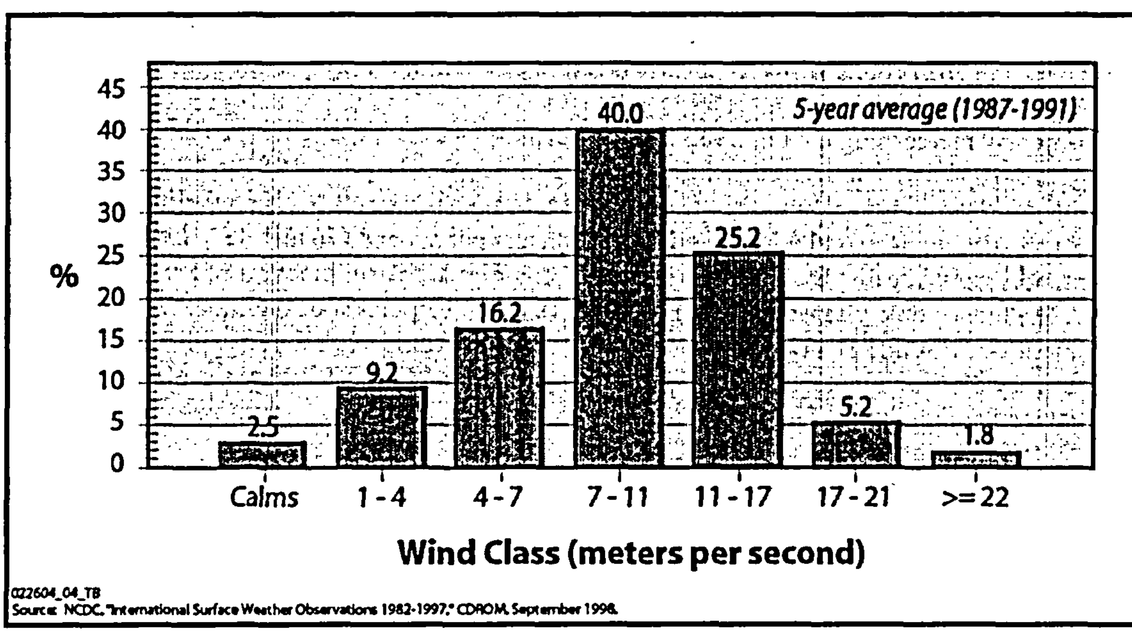

Figure 3-11 Wind Distribution for Midland-Odessa, 1987-1991 (NCDC, 1998)

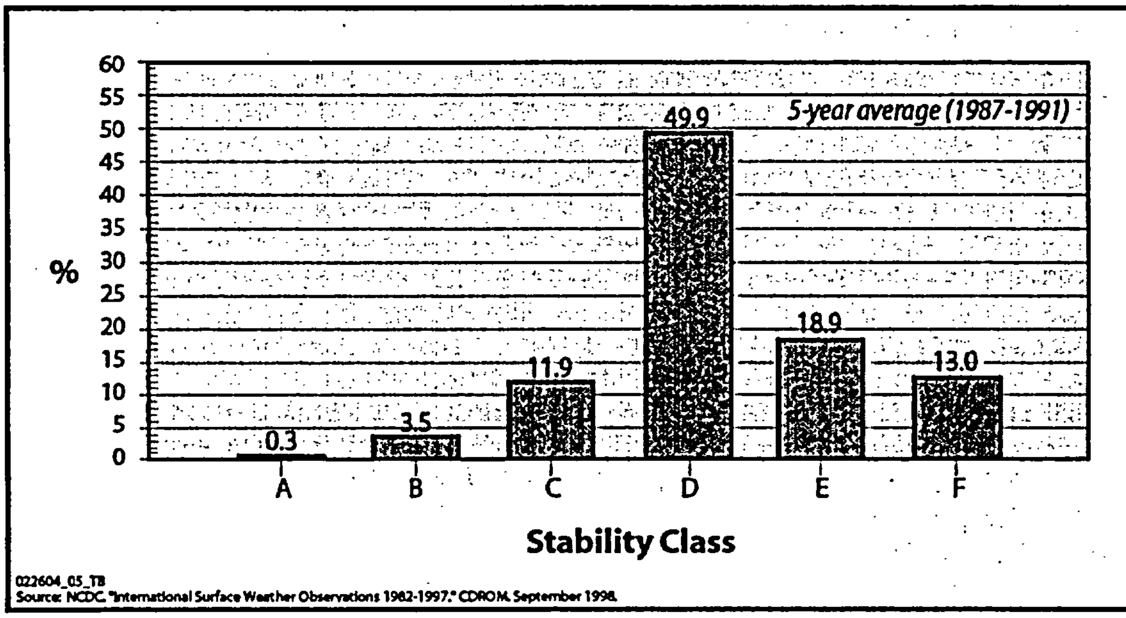

Figure 3-12 Distribution of Stability Classes for Midland-Odessa, 1987-1991 (NCDC, 1998)

3.5.2.5 Severe Weather Conditions

According to data from Midland-Odessa, thunderstorms occur an average of 36.4 days/year in the southeastern area of New Mexico where the proposed site is located. Thunderstorms are most frequent in summer, averaging 17.4 days per year, and least frequent in winter, averaging 1.3 days per year. Occasionally, thunderstorms are accompanied by hail.

Using Marshall's methodology for determining attractive area and lightning strike frequency, it was determined that the proposed NEF site has an attractive area of 0.34 square kilometer (0.13 square mile) and a lightning strike frequency of 1.36 flashes per year. Only two lightning events having sufficient intensity to cause loss of life, injury, significant property damage, and/or disruption to commerce were reported in Lea County, New Mexico, between January 1, 1950, and April 30, 2004 (NCDC, 2004). The closest lightning event occurred in Hobbs with minor property damage of $3,000 on August 12, 1997. The second occurred in Lovington on August 8, 1996, causing two deaths.

Tornadoes are occasionally reported in New Mexico, most frequently during afternoon and early evening hours from May through August. There is an average of nine tornadoes a year in New Mexico, and the occurrence of tornadoes in the vicinity of the proposed NEF site is rare. Tornadoes are classified using the F-scale with classifications ranging from F0-F5 (NOAA, 2004). F0-classified tornadoes have winds of 64 to 116 kilometers per hour (40 to 72 miles per hour), and F2-classified tornadoes have winds of 182 to 253 kilometers per hour (113 to 157 miles per hour). The F5-classified tornadoes have winds of 420 to 512 kilometers per hour (261 to 318 miles per hour). Eighty-seven tornadoes of low magnitude (F0 to F2) were reported in Lea County, New Mexico, between January 1, 1950, and April 30, 2004. Only one additional tornado was reported as F3 on May 17, 1954. Two tornadoes, one in 1998 and the second in 1999, had a magnitude of F0 and were located near Eunice. All the reported tornadoes were associated with very light damage (NCDC, 2004).

The proposed NEF site is located about 805 kilometers (500 miles) from the coast. Because hurricanes lose their intensity quickly once they pass over land, a hurricane would most likely lose its intensity before reaching the proposed NEF site and dissipate into a tropical depression.

Blowing sand or dust may occur occasionally in the area due to the combination of strong winds, sparse vegetation, and the semi-arid climate. High winds associated with thunderstorms are frequently a source of localized blowing dust. Sandstorms that cover an extensive region are rare. No dust storms were reported in Lea County, New Mexico, between January 1, 1950 and April 30, 2004 (NCDC, 2004).

3.5.2.6 Mixing Heights

Mixing height is defined as the height above the earth's surface through which relatively strong vertical mixing of the atmosphere occurs. G.C. Holzworth developed mean annual morning and afternoon mixing heights for the contiguous United States (Holzworth, 1972). According to Holzworth's calculations, the mean annual morning and afternoon mixing heights at the proposed NEF site are approximately 436 meters (1,430 feet) and 2,089 meters (6,854 feet), respectively. Table 3-5 shows the average morning and afternoon mixing heights for Midland-Odessa, Texas.

Table 3-5 Average Morning and Afternoon Mixing Heights for Midland-Odessa, Texas

	Winter	Spring	Summer	Fall	Annual
Morning	290 meters (951 feet)	429 meters (1,407 feet)	606 meters (1,988 feet)	419 meters (1,375 feet)	436 meters (1,430 feet)
Afternoon	1,276 meters (4,186 feet)	2449 meters (8,035 feet)	2,744 meters (9,003 feet)	1,887 meters (6,191 feet)	2,089 meters (6,854 feet)

Source: Holzworth, 1972.

3.5.3 Air Quality

To assess air quality, the EPA has established maximum concentrations for pollutants that are referred to as the National Ambient Air Quality Standards (EPA, 2003a). Table 3-6 presents a list of the National Ambient Air Quality Standards and the State of New Mexico Air Quality Standards. Six criteria pollutants are used as indicators of air quality: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead (EPA, 2003a). Figure 3-13 shows the criteria air-pollutants attainment areas (i.e., areas within which air quality standards are met). Both Lea and Andrews Counties are in attainment for all of the EPA criteria pollutants (EPA, 2004a).

EPA lists 54 sources of criteria pollutants in Lea County, 8 sources in Andrews County, and 5 sources in Gaines County for 2001. None of these sources are located near the proposed site. Table 3-7 presents a summary of the annual emissions for six of the criteria air pollutants for the three counties surrounding the proposed NEF site.

The New Mexico Environment Department Air Quality Bureau operates a monitoring station about 32 kilometers (20 miles) north of the proposed NEF site in Hobbs, New Mexico, that monitors particulate matter. Readings from this monitoring station show that there are no instances of particulate matter exceeding the National Ambient Air Quality Standards (EPA, 2002a).

Table 3-6 EPA National Ambient Air Quality Standards and State of New Mexico Air Quality Standards

Pollutant	EPA Standard Value[a]		Standard Type	New Mexico Standard
Carbon Monoxide (CO)				
8-hour Average	9 ppm	(10 mg/m^3)	Primary	8.7 ppm
1-hour Average	35 ppm	(40 mg/m^3)	Primary	13.1 ppm
Nitrogen Dioxide (NO_2)				
Annual Arithmetic Mean	0.053 ppm	(100 µg/m^3)	Primary and Secondary	0.05 ppm
Ozone (O_3)				
1-hour Average	0.12 ppm	(235 µg/m^3)	Primary and Secondary	None
8-hour Average	0.08 ppm	(157 µg/m^3)	Primary and Secondary	None
Lead (Pb)				
Quarterly Average	1.5 µg/m^3		Primary and Secondary	None
Particulate (PM_{10}) Particles with diameters of 10 µm or less				
Annual Arithmetic Mean	50 µg/m^3		Primary and Secondary	60 µg/m^3
24-hour Average	150 µg/m^3		Primary and Secondary	150 µg/m^3
Particulate ($PM_{2.5}$) Particles with diameters of 2.5 µm or less				
Annual Arithmetic Mean	15 µg/m^3		Primary and Secondary	None
24-hour Average	65 µg/m^3		Primary and Secondary	None
Sulfur Dioxide (SO_2)				
Annual Arithmetic Mean	0.03 ppm	(80 µg/m^3)	Primary	0.02 ppm
24-hour Average	0.14 ppm	(365 µg/m^3)	Primary	0.10 ppm
3-hour Average	0.50 ppm	(1,300 µg/m^3)	Secondary	None

[a] Parenthetical value is an approximately equivalent concentration.
µm - 10^{-6} meters or 0.000001 meters.
ppm - parts per million.
µg/m^3 - micrograms per cubic meter.
mg/m^3 - milligrams per cubic meter.
Source: EPA, 2003a; NMED, 2002.

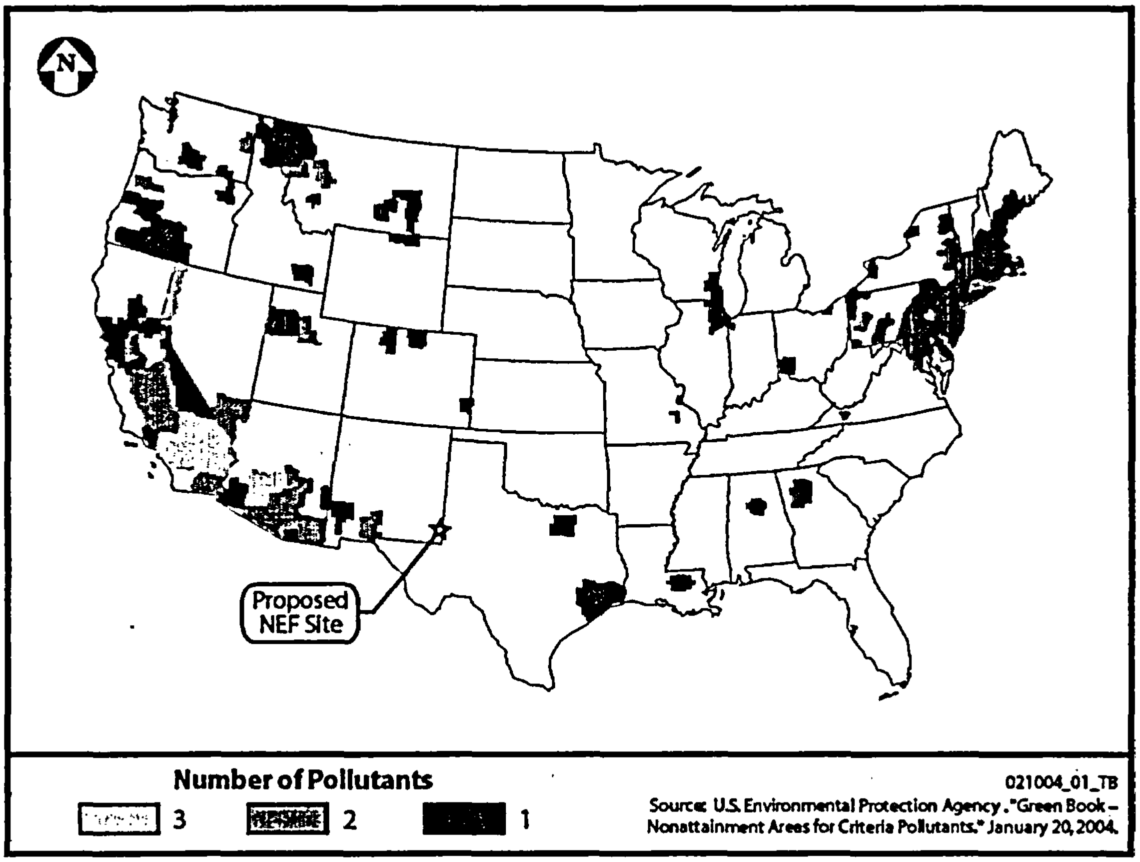

Figure 3-13 Criteria Air Pollutants Attainment Areas (EPA, 2004a)

Table 3-7 Total Annual Emissions (tons per year) of Criteria Air Pollutants at Lea County, New Mexico, and Andrews and Gaines Counties, Texas

County, State	VOC	NO_X	CO	SO_2	$PM_{2.5}$	PM_{10}
Lea County, New Mexico	6,713	38,160	31,185	16,096	5,188	28,548
Andrews County, Texas	2,873	3,259	6,680	1,398	440	1,577
Gaines County, Texas	2,696	2,791	7,709	735	1,825	8,650

A ton is equal to 0.9078 metric ton.
VOC: volatile organic compounds.
NO_X: nitrogen oxides.
CO: carbon monoxide.
SO_2: sulfur dioxide.
$PM_{2.5}$: particulate matter less than 2.5 microns.
PM_{10}: particulate matter less than 10 microns.
Source: Based on 1999 data (EPA, 2003d).

Criteria Pollutants

Nitrogen dioxide *is a brownish, highly reactive gas that is present in all urban atmospheres. Nitrogen dioxide can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. The major mechanism for the formation of nitrogen dioxide in the atmosphere is the oxidation of the primary air pollutant nitric oxide. Nitrogen oxides plays a major role, together with volatile organic carbons, in the atmospheric reactions that produce ozone. Nitrogen oxides form when fuel is burned at high temperatures. The two major emissions sources are transportation and stationary fuel combustion sources such as electric utility and industrial boilers.*

Ozone *is a photochemical (formed in chemical reactions between volatile organic compounds and nitrogen oxides in the presence of sunlight) oxidant and the major component of smog. Exposure to ozone for several hours at low concentrations has been shown to significantly reduce lung function and induce respiratory inflammation in normal, healthy people during exercise. Other symptoms include chest pain, coughing, sneezing, and pulmonary congestion.*

Lead *can be inhaled and ingested in food, water, soil, or dust. High exposure to lead can cause seizures, mental retardation, and/or behavioral disorders. Low exposure to lead can lead to central nervous system damage.*

Carbon monoxide *is an odorless, colorless, poisonous gas produced by incomplete burning of carbon in fuels. Exposure to carbon monoxide reduces the delivery of oxygen to the body's organs and tissues. Elevated levels can cause impairment of visual perception, manual dexterity, learning ability, and performance of complex tasks.*

Particulate matter *such as dust, dirt, soot, smoke, and liquid droplets are emitted into the air by sources such as factories, power plants, cars, construction activity, fires, and natural windblown dust. Exposure to high concentrations of particulate matter can affect breathing, cause respiratory symptoms, aggravate existing respiratory and cardiovascular disease, alter the body's defense systems against foreign materials, damage lung tissue, and cause premature death.*

Sulfur dioxide *results largely from stationary sources such as coal and oil combustion, steel and paper mills, and refineries. It is a primary contributor to acid rain and contributes to visibility impairments in large parts of the country. Exposure to sulfur dioxide can affect breathing and may aggravate existing respiratory and cardiovascular disease.*

Source: EPA, 2004a.

3.6 Geology, Minerals, and Soils

This section provides a brief description of regional and local geology and identifies the characteristics of the soil and mineral resources at the proposed NEF site. As described in Chapter 1 of this Draft EIS, the NRC staff process for reviewing the license application includes an examination of the ability of the proposed NEF to withstand earthquakes. The discussion of geology in this section, however, is not intended to support a detailed safety analysis of the proposed NEF to resist seismic events. The NRC staff will document its analysis of hazards related to earthquakes in the Safety Evaluation Report.

3.6.1 Regional Geology

The proposed NEF site is located near the boundary between the Southern High Plains section (Llano Estacado) of the Great Plains Province to the east and the Pecos Plains section to the west. Figure 3-14 shows the regional physiography of the area.

The primary difference between the Pecos Plains and the Southern High Plains physiographic sections is a change in topography. The High Plains is a large flat mesa that uniformly slopes to the southeast. The Pecos Plains section is characterized by its more irregular erosional topographic expression (Scholle, 2000). The boundary between the two sections is locally referred to as Mescalero Ridge. In southern Lea County, Mescalero Ridge is an irregular erosional topographic feature with a relief of about 9 to 15 meters (30 to 50 feet) compared with a nearly vertical cliff and relief of approximately 46 meters (150 feet) in northwestern Lea County. The lower relief of the ridge in the southeastern part of the county is due to partial cover by wind-deposited sand. The proposed NEF site is located on the Southern High Plains, about 6.2 to 9.3 kilometers (10 to 15 miles) from the ridge.

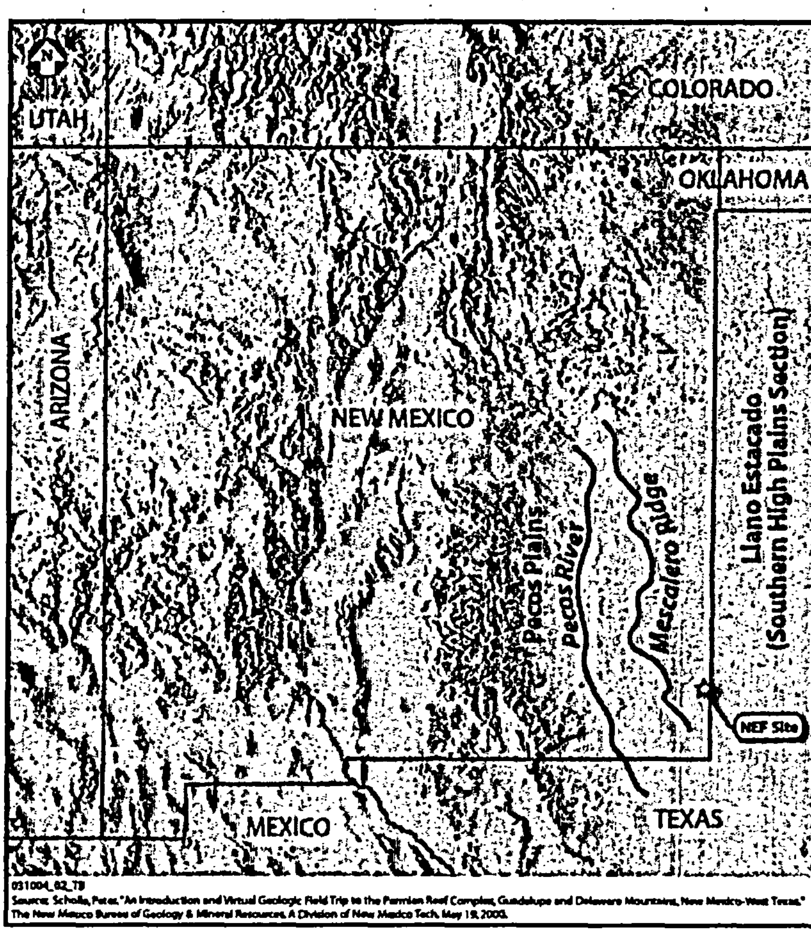

Figure 3-14 Regional Physiography (Scholle, 2000)

The dominant geologic feature of this region is the Permian Basin. The Permian Basin is a massive subsurface bedrock structure that has a downward flexure of a large thickness of originally flat-lying, bedded, sedimentary rock. The Permian Basin extends to 4,880 meters (16,000 feet) below mean sea level. Figure 3-15 shows the major physiographic features of the Permian Basin (LES, 2004a).

The proposed NEF site is located within the Central Basin Platform area. The Central Basin Platform divides the Permian Basin into the Midland and Delaware subbasins. The top of the Permian deposits are approximately 434 meters (1,425 feet) below ground surface at the proposed NEF site. Overlying the Permian are the sedimentary rocks of the Triassic Age Dockum Group.

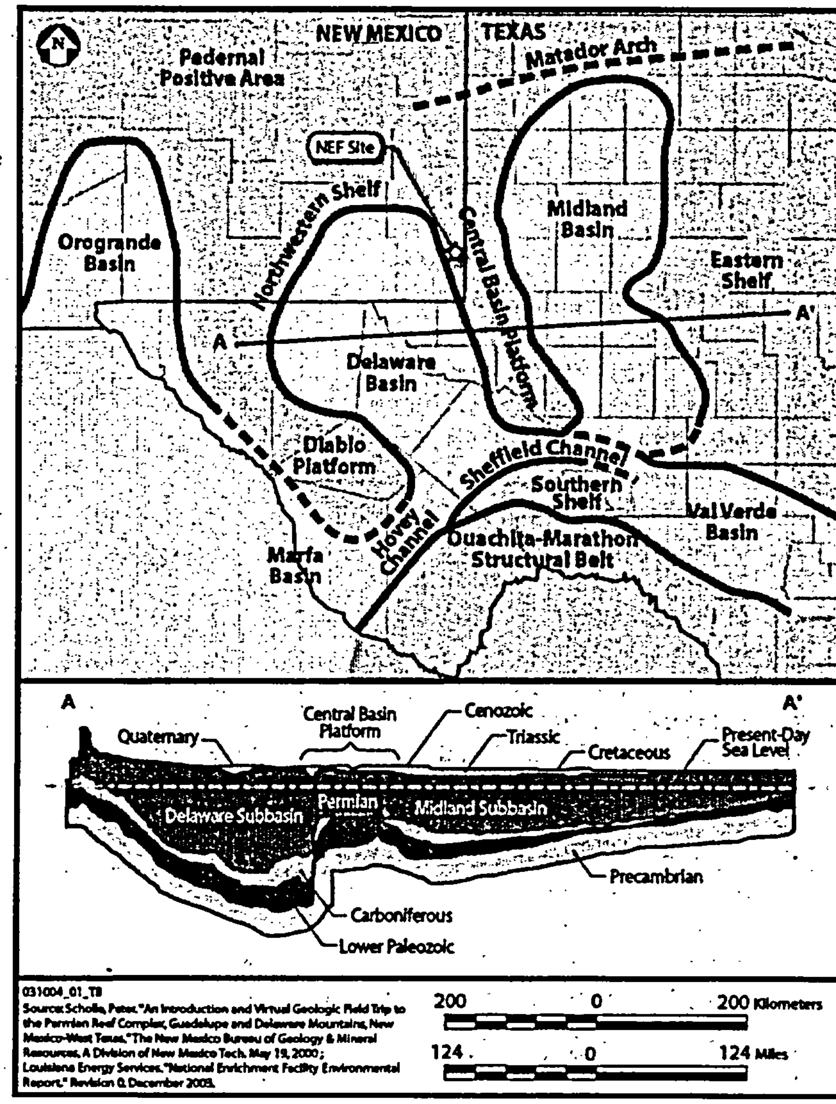

Figure 3-15 Major Physiographic Features of the Permian Basin (Scholle, 2000; LES, 2004a)

The upper formation of the Dockum Group is the Chinle Formation, a tight claystone and silty clay layer. The Chinle Formation is regionally extensive with outcrops as far away as the Grand Canyon region in Arizona. In the vicinity of the site, the Chinle Formation consists of red, purple, and greenish micaceous claystone and siltstone with interbedded fine-grained sandstone. The Chinle (also known as Red Bed) Formation is overlain by Tertiary Ogallala, Gatuña, or Antlers Formations (alluvial deposits). Only the latter two are found at the proposed NEF site. Caliche is a partly indurated zone of calcium carbonate accumulation formed in the upper layers of surficial deposits. Soft caliche is interbedded with the alluvial deposits near the surface. A fractured caliche layer can be found extending to the surface near the proposed NEF site. This "caprock" is not present at the proposed NEF site. Quaternary (dune) sands frequently overlie the Tertiary alluvial deposits (LES, 2004a). Figure 3-16 shows a generalized cross-section of these formations in the site area.

Red Bed Ridge is an escarpment of about 15 meters (50 feet) in height that occurs just north and northeast of the proposed NEF site. It is a buried ridge on the upper surface of the Red Bed Formation and extends for at least 161 kilometers (100 miles) from northern Lea County, New Mexico through western Andrews County, Texas and southward. The Red Bed Ridge is not associated with the Mescalero Escarpment.

The Southeast New Mexico-West Texas area is considered to be structurally stable. Since the Laramide Orogeny (a series of mountain-building events that affected much of western North America in Late

Cretaceous and Early Tertiary time), the Permian Basin has subsided slightly, most likely as a result of the dissolution of the Permian evaporate layers by ground-water infiltration and possibly from oil and gas extraction.

Two types of faulting are associated with the early Permian deformation. Most of the faults are long, high-angle reverse faults with well over 100 meters (328 feet) of vertical displacement that often involved the Precambrian basement rocks. The second type of faulting is found along the western margin of the platform where long strike-slip faults with displacements of tens of kilometers are found. The closest evaluated fault to the site is over 161 kilometers (100 miles) to the northwest associated with the deeper portions of the Permian Basin. No major tectonic event has occured within the Permian Basin since the Laramide Orogeny that ended about 35-million years ago (WCS, 2004c). Recently, a small reverse fault in the Triassic beds with about 3 to 6 meters (10 to 20 feet) of offset was observed on the WCS site approximately one mile to the east of the proposed NEF in Texas. Geologically, the fault has had no observable affect on the overlying Cretaceous Antlers Formation or the Caprock caliche. The fault in the Triassic beds, which is believed to be inactive, predates the Antlers Formation, which is about 135 million years old. (WCS, 2004c; NRC, 2004).

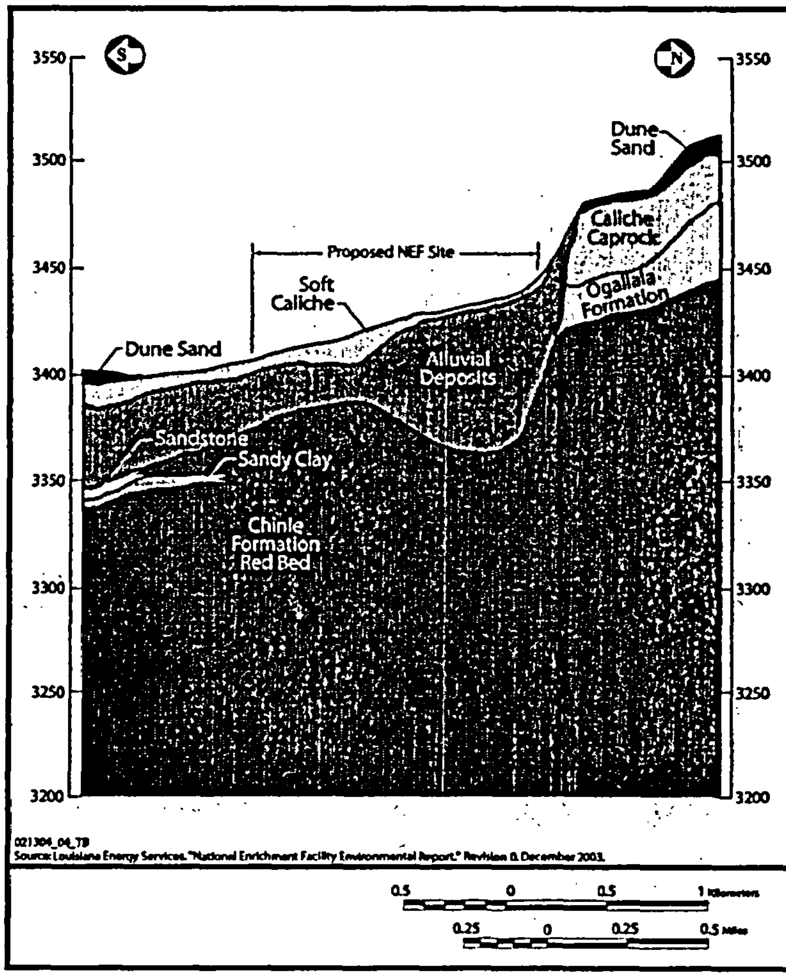

Figure 3-16 Geologic Units in the Proposed NEF Site Area (LES, 2004a)

There has been virtually no tectonic movement within the basin since the Permian period. The faults that uplifted the platform do not appear to have displaced the younger Permian sediments. No Quaternary age faults were identified in New Mexico within 161 kilometers (100 miles) of the site. Quaternary age faults within 240 kilometers (150 miles) of the site include the Guadalupe fault located approximately 191 kilometers (119 miles) west of the site in New Mexico and in Texas; and the West Delaware Mountains fault zone, the East Sierra Diablo fault, and the East Flat Top Mountain fault, located 185 kilometers (115 miles) southwest, and 196 kilometers (122 miles) southwest, and 200 kilometers (124 miles) west-southwest of the site, respectively. The East Baylor Mountain-Carrizo Mountain fault, located 201 kilometers (125 miles) southwest of the NEF site, is considered a possible capable fault but there has been no demonstration of movement within the last 35,000 years (LES, 2004a).

3.6.1.1 Regional Earthquakes

The majority of earthquakes in the United States are located in the tectonically active western portion of the country. Most of New Mexico's historical seismicity has been concentrated in the Rio Grande Valley between Socorro and Albuquerque (USGS, 2003a). The southwestern portion of the United States tends to experience earthquakes at a lower rate and lower intensity. Earthquakes in the vicinity of the proposed NEF site include isolated, small clusters of low- to moderate-size events. A review of earthquake data collected for the site and vicinity indicates that the earthquakes that occurred near the proposed NEF site were likely induced by gas/oil recovery methods and were not tectonic in origin (NMBMMR, 1998). The Permian Basin region has produced billions of barrels of oil (Vertrees, 2002). No volcanic activity exists in the region surrounding the proposed NEF site.

3.6.1.2 Mineral Resources

No significant nonpetroleum mineral deposits are known to exist on the proposed NEF site. According to information collected by the New Mexico Bureau of Mines and Mineral Resources on behalf of the U.S. Geological Survey (USGS), the top nonpetroleum minerals in New Mexico are, by value, potash, copper, construction sand and gravel, crushed stone, and cement. Figure 3-17 shows the potential mineral resources in the State of New Mexico.

According to the New Mexico Bureau of Mines and Mineral Resources/USGS survey, there are suitable mineral resources in Lea County for the excavation of construction sand and gravel, crushed stone, and salt. There is also an area of Lea County that has a concentration of mineral operations for sulfur (USGS, 2001). An active sand and gravel quarry located to the north of the proposed NEF site is operated by Wallach Concrete, Inc.

3.6.2 Site Geology

Geologically, the proposed NEF site is located in an area where surface exposures consist mainly of Quaternary-aged eolian and piedmont sediments along the far eastern margin of the Pecos River Valley. Surface soils in the vicinity of the site are described as sandy alluvium with subordinate amounts of gravel, silt, and clay. Other surficial units in the site vicinity include caliche. These upper layers include tough slabby gypsiferous, which is subject to wind erosion.

Topographic relief on the site is generally subdued. Site elevations range between about +1,033 and +1,045 meters (+3,390 and +3,430 feet) above mean sea level, generally sloping to the south and southwest. Eolian processes resulted in a closed depression evident at the northern center of the site. Dune sand creates a topographic high at the southwest corner of the site. The dune sands, also known as the Brownsfield-Springer Association, are reddish-brown, fine to loamy-fine sands (USDA, 1974a).

The major geologic features underlying the site generally follow those of the region. The Gatuna and Antlers formations are sand and silty sand with sand and gravel at the base. A layer of caliche below this alluvium is present at some locations on the proposed NEF site. The formation directly beneath the alluvium is the Chinle Formation. The Santa Rosa Formation lies between the base of the Chinle formation and the top of the Permian. This formation includes sandy beds containing a ground-water aquifer. Table 3-8 shows the stratigraphy, including the depths and thicknesses, underlying the proposed NEF site.

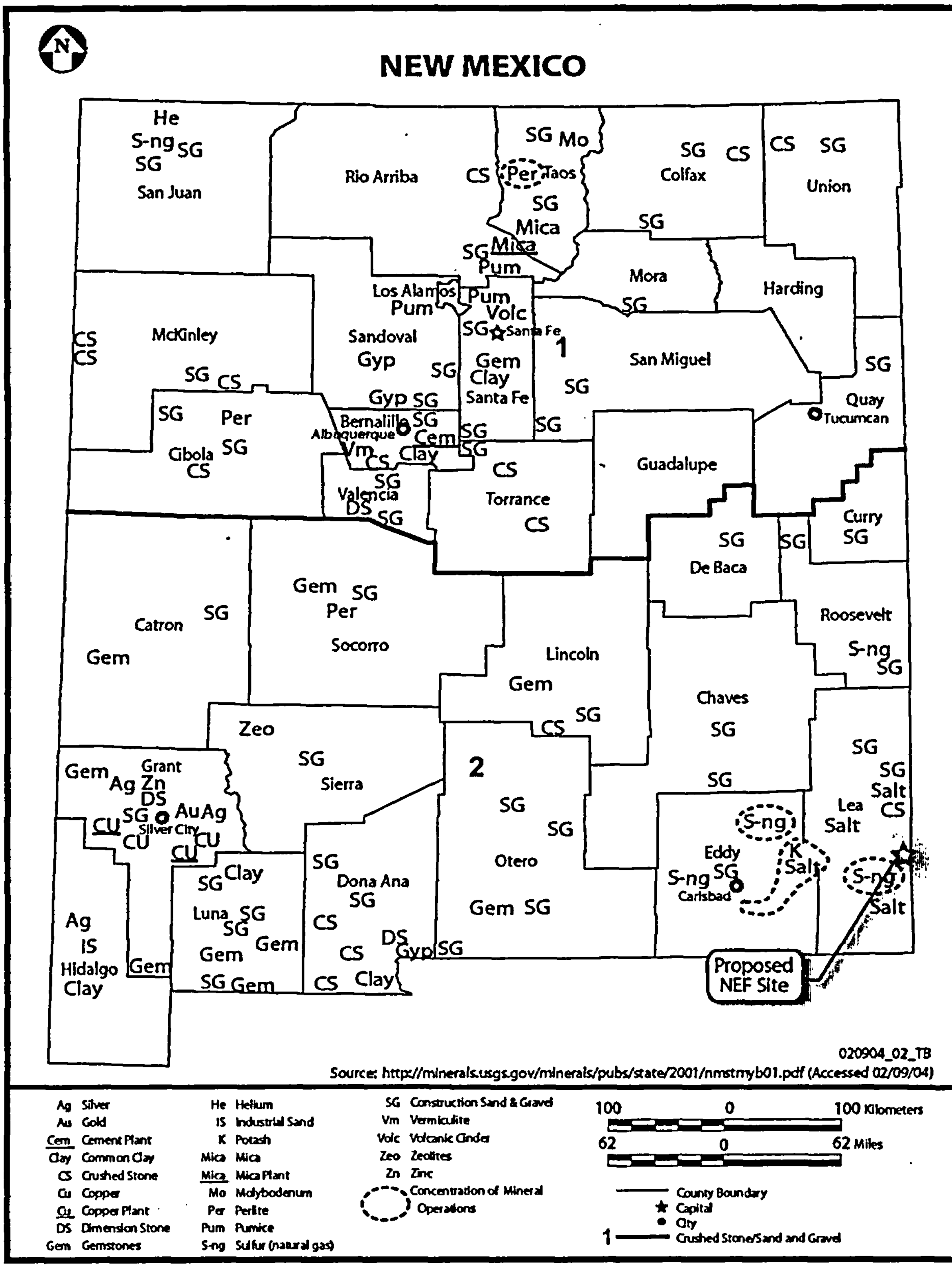

Figure 3-17 New Mexico Mineral Resources (USGS, 2004b)

Table 3-8 Geological Units Exposed at, near, or Underlying the Proposed NEF Site

Formation	Geologic Age	Descriptions	Estimates for the Proposed NEF Site Area[a]	
			Depths: meters (feet)	Thickness: meters (feet)
Topsoils	Recent	Silty fine sand with some fine roots—eolian	Range: 0 to 0.6 (0 to 2) Average (Top/Bottom): 0/0.4 (0/1.4)	Range: 0.3 to 0.6 (1 to 2) Average: 0.4 (1.4)
Mescalero Sands/ Blackwater Draw Formation	Quaternary	Dune or dune-related sands	Range (sporadic across site): 0 to 3 (0 to 10) Average: N/A[b]	Range (sporadic across site): 0 to 3 (0 to 10) Average: N/A[c]
Gatuña/ Antlers Formation	Pleistocene/ mid-Pliocene	Pecos River Valley alluvium: Sand and silty sand with interbedded caliche near the surface and a sand and gravel base layer	Range: 0.3 to 17 (1 to 55) Average (Top/Bottom): 0.4/12 (1.4/39)	Range: 6.7 to 16 (22 to 54) Average: 12 (38)
Mescalero Caliche	Quaternary	Soft to hard calcium carbonate deposits	Range: 1.8 to 12 (6 to 40) Average (Top/Bottom): 3.7/8 (12/26)	Range: 0 to 6 (0 to 20) Average (all 14 borings)[d]: 1.4 (5) Average (five borings that encountered caliche): 4.3 (14)
Chinle Formation	Triassic	Claystone and silty clay: red beds	Range: 7 to 340 (23 to 1,115) Average (Top/Bottom): 12/340 (39/1,115)	Range: 323 to 333 (1,060 to 1,092) Average: 328 (1,076)
Santa Rosa Formation	Triassic	Sandy red beds, conglomerates, and shales	Range: 340 to 434 (1,115 to 1,425) Average: N/A[b]	Range: N/A[e] Average: 94 (310)
Dewey Lake Formation	Permian	Muddy sandstone and shale red beds	Range: 434 to 480 (1,425 to 1,575) Average: N/A[b]	Range: N/A[e] Average: 46 (150)

[a] Range of depths is below ground level to shallowest top and deepest bottom of geological unit determined from site boring logs, unless noted. Average depths are below ground level to average top and average bottom of geological unit determined from site boring logs, unless noted. Range of thickness is from the smallest thickness to the largest thickness of geological unit determined from site boring logs, unless noted. Average thickness is the average as determined from site boring logs, unless noted. Bottom of Chinle Formation, top and bottom of Santa Rosa Formation, and top and bottom of Dewey Lake Formation are single values from a deep boring just south of the proposed NEF site.

[b] Average depths are not available.

[c] Average thickness is not available.

[d] Caliche is not present at some locations of the site. Where not present in a particular boring, a thickness of '0' meter (feet) is used in calculating the average.

[e] Range of thickness is not available.

Source: LES, 2004a; Nicholson and Clebsch, 1961.

3.6.3 Site Soils

Figure 3-18 presents a soil map of the proposed NEF site area. Geotechnical and site boring investigations confirm a thin layer of loose sand at the surface that overlies about 12 meters (40 feet) of alluvial silty sand, and sand and gravel cemented with caliche. Chinle Formation clay extends from about 12 meters (40 feet) below ground surface to a depth of approximately 340 meters (1,115 feet). The granular soils located in the uppermost 12 meters (40 feet) of the subsurface provide potentially high-quality bearing materials for building and heavy machine foundations. For extremely heavy or settlement-intolerant facilities, foundations can be constructed in the Chinle Formation, which has an unconfined compressive strength of over 195,000 kilograms per square meter (20 tons per square foot). The USDA soil survey indicates the proposed NEF site surface soils consist primarily of Dune Land, Kermit soils, and the Brownfield-Springer association (USDA, 1974a; 1974b). Soils associated with the Brownfield-Springer association, Kermit soils, and dune land are suitable for range, wildlife habitat, and recreational areas. On the western portion of the proposed NEF site in the vicinity of the sand dune

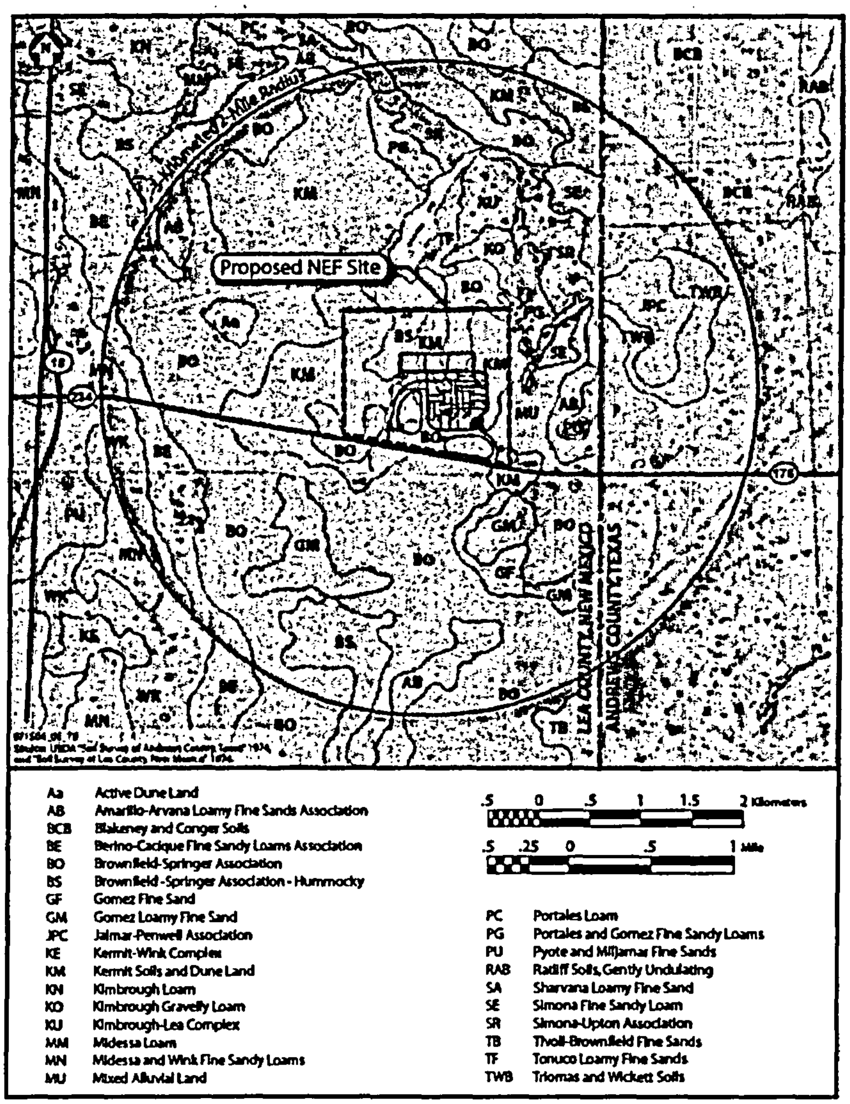

Figure 3-18 Soil Map of the Proposed NEF Site Area (USDA, 1974a; USDA, 1974b)

buffer, soils are mapped as active dune land, which is made up of light-colored, loose sands. Sloping ranges from 5 to 12 percent or more. The surface of active dune land soil is typically bare except for a few shinnery oak shrubs.

3.6.4 Soil Radiological and Chemical Characteristics

LES conducted soil sampling at 10 random locations across the proposed NEF site (LES, 2004a). The soil was sampled for radioactive components including uranium, thorium, and their daughter products. Potassium-40, a naturally occurring radionuclide, and cesium-137, produced by past weapons testing, were also measured. Subsequent to this, LES performed an additional round of testing of both radionuclides and nonradionuclide chemicals. Six of the eight sites sampled in the latter round were selected to represent background conditions at proposed plant structures (e.g., the proposed basins and storage pads). The other two sites were representative of upgradient, onsite locations (LES, 2004a). Table 3-9 presents the results of the most recent measurements; the previous sampling measurements were consistent with these latest results.

Table 3-9 Chemical Analyses of Proposed NEF Site Soil

Radionuclides	Measured Concentration becquerels/kilogram (picocuries/kilogram)[a,b]	Typical Soil Concentration[b] becquerels/kilogram (picocuries/kilogram)
Potassium-40	138 ± 3 (3,730 ± 82)	130 (3,500)
Cesium-137	2.9 ± 0.9 (77 ± 24)	N/A
Actinium-228	6.5 ± 0.7 (176 ± 19)	8.1 (218)
Thorium-228	7.0 ± 1.0 (187 ± 26)	8.1 (218)
Thorium-230	5.8 ± 0.5 (158 ± 13)	N/A
Thorium-232	7.0 ± 0.6 (187 ± 17)	8.1 (218)
Uranium-234	6.0 ± 0.3 (161 ± 7.9)	12 (333)
Uranium-235	0.33 ± 0.08 (8.8 ± 2.2)	N/A
Uranium-238	5.9 ± 0.2 (158 ± 6.5)	12 (333)
Chemicals	**Measured Concentration (milograms/kilogram)[a,b]**	**New Mexico Soil Screening Level (milograms/kilogram)[c]**
Barium	23 ± 12	1,440
Chromium	3.6 ± 0.9	180
Lead	2.7 ± 0.3	400

N/A = not available.
[a] Concentrations noted as average ± standard deviation.
[b] LES, 2004a; NCRP, 1992.
[c] NMEDHWB, 2004.

No nuclides other than those in the table were above minimum detectable concentrations in the laboratory. The measured radionuclides are all naturally occurring except for cesium-137, which is ubiquitous in the environment as a result of past atmospheric weapons testing. Chemicals analyzed for but not detected above minimum detectable concentrations include volatiles, semivolatiles, metals (arsenic, cadmium, mercury, selenium, and silver), organochlorine pesticides, organophosphorous compounds, chlorinated herbicides, and fluoride. Only barium, chromium, and lead were detected above minimum detectable concentrations in the soil samples. These measured levels were orders of magnitude less than the New Mexico soil-screening concentrations. The soil-screening concentrations are intended to be levels below which there are no health concerns (NMEDHWB, 2004).

3.7 Surface Water

This section addresses the surface-water features at or near the proposed NEF site.

3.7.1 Surface Water Features in the Vicinity of the Proposed NEF Site

There are no surface-water bodies or surface-drainage features on the proposed NEF site (USGS, 1979). The site topography is relatively flat, ranging between about 1,033 and 1,045 meters (3,390 and 3,430 feet) above mean sea level, with an average slope of 0.0064 centimeter/centimeter (2.5 inches/ inches). Wind erosion has created localized depressions; however, these depressions are not large enough to have an impact on surface-water collection. The vegetation on the site is primarily shrubs and native grasses. The surface soils tend to hold moisture in storage rather than allow rapid infiltration to depth. Water held in storage in the soil is subsequently subject to evapotranspiration. The evapotranspiration processes are significant enough to severely limit potential ground-water recharge. Essentially all of the precipitation that occurs at the site is subject to infiltration and subsequent evapotranspiration. Net evaporation/transpiration is estimated as 65 inches/year (Reed and Associates, 1977). Figure 3-19 illustrates local topography in the area of the proposed NEF site.

The site is contained within the Monument Draw watershed; however, there are no freshwater lakes, estuaries, or oceans in the vicinity of the site. Local surface hydrologic features in the vicinity of the site include Monument Draw, Baker Spring, and several ponds on the Wallach Concrete, Inc., Sundance Services, Inc., and WCS properties. Monument Draw is an intermittent stream and the closest surface-water-conveyance feature to the proposed NEF site. Figure 3-20 shows the location of Monument Draw. While Monument Draw is typically dry, the maximum historical flow occurred on June 10, 1972, and measured 36.2 cubic meters per second (1,280 cubic feet per second).

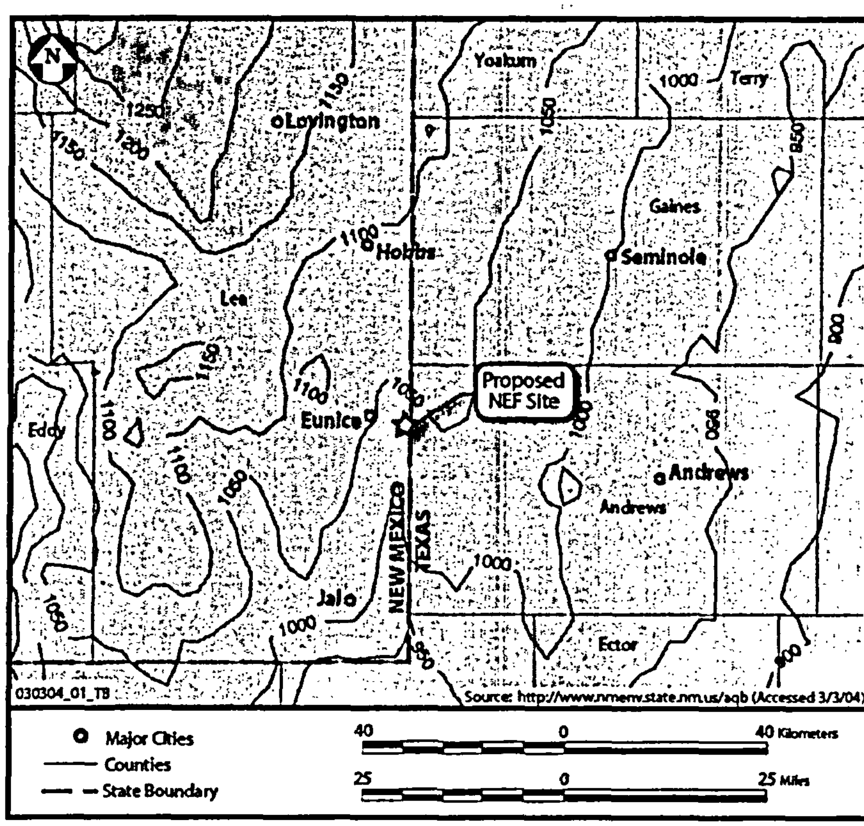

Figure 3-19 General Topography Around the Proposed NEF Site (NMAQB, 2004)

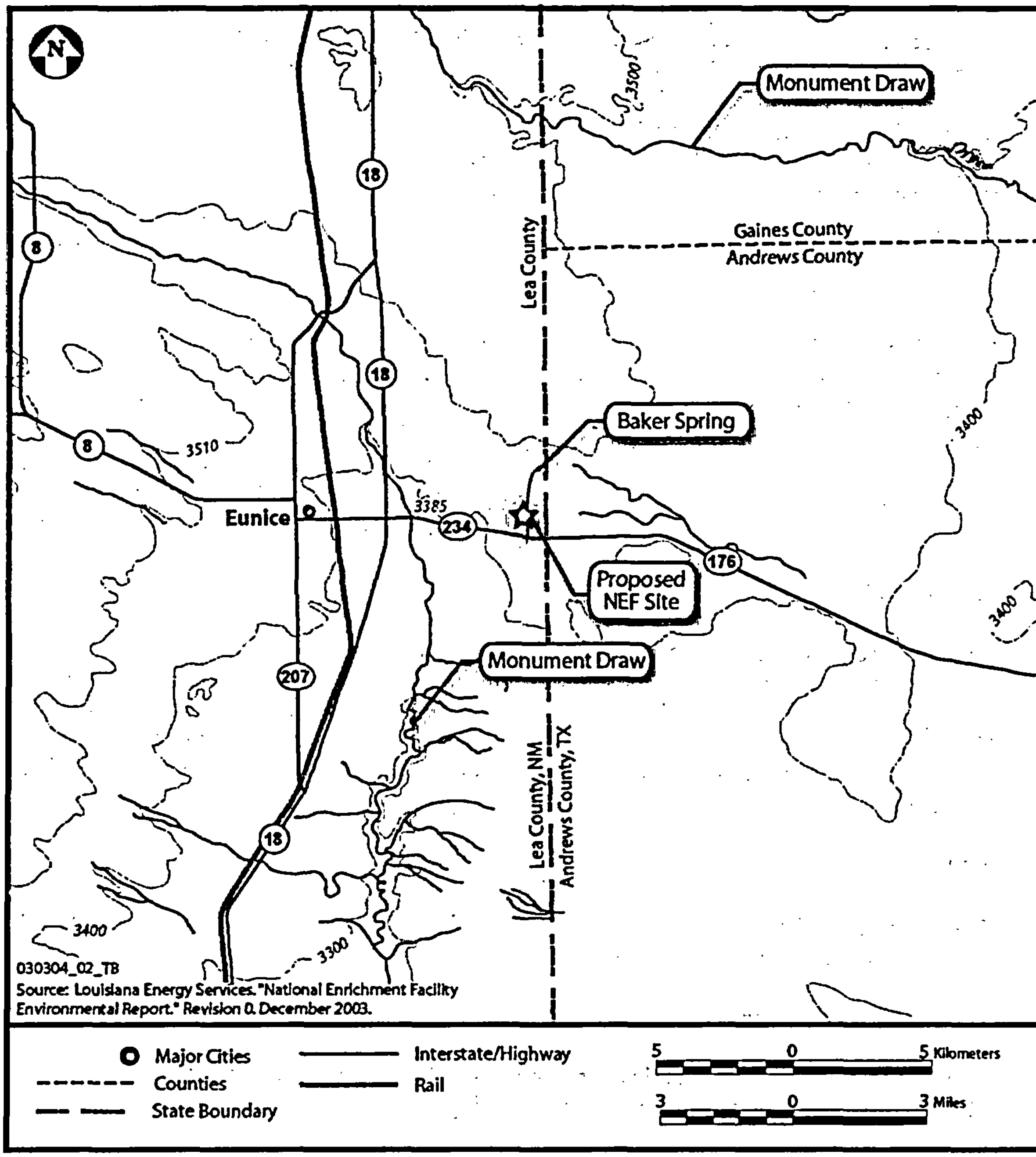

Figure 3-20 Regional Hydrologic Features (LES, 2004a)

Baker Spring is located to the northeast of the proposed NEF site at the edge of an escarpment where the caprock ends. Surface water is present in Baker Spring intermittently. The Baker Spring area is underlain by Chinle Formation clay, whose low permeability impedes deep infiltration of that water. Therefore, the intermittent localized flow and ponding of water in this area may be attributed to seepage and/or precipitation/runoff. LES conducted a pedestrian survey of the Baker Spring area and noted the presence of a surface engineering control or diversion berm just north of the Baker Spring area. Based on field observations, it appears that the berm was constructed to divert surface water from the north and redirect the flow to the east of the Baker Spring area. Aerial photographs suggest that the sand and gravel reserves in this area have been excavated to the top of the red bed. These excavation activities have resulted in the Baker Spring area having a lower elevation than the natural drainage features, and the surface water that formerly flowed through the natural drainage features now ponds in Baker Spring. Because the excavation floor consists of very low permeability red-bed clay, limited vertical migration of the ponded water occurs. Shading from the high wall and trees that have flourished in the excavated area slow the natural evaporation rates, and water stands in the pond for extended periods of time. It is also suspected that during periods of ponding, surface water infiltrates into the sands at the base of the excavated wall and is retained as bank storage. As the surface-water level declines, the bank storage is discharged back to the excavation floor.

On the Wallach Concrete, Inc., property, a shallow surface depression is located at the base of one of the gravel pits. Water is perennially present in the pit due to a seep at the base of the sand and gravel unit at the top of the Chinle Formation clay. Wallach Concrete, Inc., occasionally pumps water out of this depression for use onsite; however, the amount of water in the depression is insufficient to fully supply the quarry operations. While the rate of replenishment has not been quantified, it appears to be relatively slow. This shallow zone of ground water is not observed throughout Wallach's property; therefore, it appears to be representative of a local perched water condition and is not considered to be an aquifer.

3.7.1.1 Wetlands

The proposed NEF site does not contain wetlands, freshwater streams, rivers, or lakes. No commercial and/or sport fisheries are located on the proposed NEF site or in the local area. The closest fishery is situated about 121 kilometers (75 miles) west of the site on the Pecos River near Carlsbad, New Mexico. No important aquatic ecological systems are onsite or in the local area that are vulnerable to change or contain important species habitats such as breeding and feeding areas. Relative regional significance of the aquatic habitat is low.

3.7.1.2 Flooding

The proposed NEF site is not located near any floodplains. The site grade is above the elevation of the 100-year and the 500-year flood elevations. There is no direct outfall to a surface water body on the site.

3.8 Ground-Water Resources

This section describes the ground-water resources and uses in the area that are available for the proposed NEF construction, operations, and decommissioning.

3.8.1 Site and Regional Hydrogeology

Because the climate in southeastern New Mexico is semi-arid, the onsite vegetation consists predominately of shrubs and native grasses. The surface soils are predominately of an alluvial or eolian origin. The near-surface soils are primarily silts and silty sands. These silty types of soils have relatively low permeability compared with sands and tend to hold moisture in storage rather than allow for rapid infiltration to deeper below the ground surface (DeWiest, 1969).

The top approximately 17 meters (56 feet) of soil are comprised of a silty sand, grading to a sand and gravel just above the red-bed-clay unit. The porosity of the surface soils is on the order of 25 to 50 percent, and the saturated hydraulic conductivity of the surface soils is likely to range from 10^{-5} to 10^{-1} centimeters per second ($3.9x10^{-6}$ to $3.9x10^{-2}$ inches per second).

Field investigation and computer modeling were used to show that no precipitation recharge (i.e., rainfall seeping deeply into the ground) occurs in thick, desert vadose zones with desert vegetation (Walvoord et al., 2002). Precipitation that infiltrates into the subsurface is, instead, efficiently transpired by the native vegetation. Sites with thick vadose zones, such as the proposed NEF site, have a natural thermal gradient in the deeper part of the vadose zone that induces water vapor to diffuse upward toward the vegetation root zone. The water vapor creates a negative pressure potential at the base of the root zone that acts like a sink where water is taken up by the plants and transpired. Measurements in the High Plains of Texas, which indicated an upward hydraulic gradient in the upper 10-15 meters (33-49 feet) of the vadose zone, support this behavior (Walvoord et al., 2002).

Localized shallow ground-water occurrence exists to the east of the proposed NEF site on the WCS property and to the north on the Wallach Concrete, Inc., property. Several abandoned windmills are located on the WCS property. The windmills were used to supply water for stock tanks by tapping small saturated lenses above the Chinle Formation red beds. The amount of ground water in these zones is limited, and the source of recharge is likely to be "buffalo wallows" located near the windmills. The buffalo wallows are substantial surface depressions that collect surface-water runoff. Water collecting in these depressions is inferred to infiltrate below the root zone due to the ponding conditions. A subsurface investigation by WCS in the vicinity of the windmills found that when water was encountered in the sand and gravel above the Chinle Formation red beds, the water level was slow to recover following a sampling event. This slow recovery is attributed to the low permeability of the saturated zones and the high water storage in the overlying soils. The discontinuity of this saturated zone and its low permeability suggest that the ground water is representative of a perched water condition and not an aquifer.

Below this lies approximately 328 meters (1,076 feet) of Chinle Formation (red bed) clay with measured permeabilities in the range of $1x10^{-9}$ to $1x10^{-8}$ centimeters per second ($3.9x10^{-10}$ to $3.9x10^{-9}$ inches per second). Moisture content in the Chinle Formation generally averages from 8 to 12 percent, with a dry density of the clay averaging 2.12 grams per cubic centimeter (132 pounds per cubic foot) (JHA, 1993). The Chinle Formation has a surface slope of approximately 0.02 centimeter per centimeter (0.02 inch per inch) towards the south-southwest under the proposed NEF site. It is thought that the Chinle Formation is exposed in a large excavation about 2 miles southeast of Monument Draw and at Custer Mountain (Nicholson and Clebsch, 1961). The presence of the thick Chinle Formation clay beneath the site isolates the deep and shallow hydrologic systems. Although the presence of fracture zones that can significantly increase vertical water transport through the Chinle Formation has not been precluded, the low measured permeabilities indicate the absence of such zones. Visual inspection of this clay has also shown that it is continuous, solid, and tight with few fracture planes (Rainwater, 1996).

Ground water occurring beneath the surface of the red-bed clay occurs at distinct and distant elevations. The most shallow of these occurs approximately 67 meters (220 feet) beneath the land surface, just below the surface of the red-bed unit. This siltstone or silty sandstone unit has low permeability and does not yield ground water readily. The permeability of this layer was measured in the field at the proposed NEF site as $3.7x10^{-6}$ centimeters per second ($1.5x10^{-6}$ inches per second). The local gradient was 0.011 centimeter per centimeter (0.011 inch per inch) towards the south-southeast with a porosity estimated as 0.14.

There is also a 30.5-meter-thick (100-foot-thick) water-bearing sandstone layer at about 183 meters (600 feet) below ground surface. However, the first occurrence of a well-defined aquifer capable of producing significant volumes of water is the Santa Rosa Formation. This formation is located about 340 meters (1,115 feet) below ground surface (LES, 2004a). The Santa Rosa is recharged by precipitation on sand dunes in Lea County and Eddy County, New Mexico, and precipitation directly on outcrop areas (Nicholson and Clebsch, 1961). No local investigations of this aquifer were conducted due to the depth of the aquifer and the thickness and low permeability of the overlying Chinle Formation clay, which inhibits potential ground-water migration to the Santa Rosa. There is no indication of a hydraulic connection among the Chinle saturated horizons and the Santa Rosa Formation.

Ground-water velocities were estimated based on the above parameters for both the saturated siltstone unit in the red-bed clay and vertical travel through the clay. The velocity in the saturated siltstone unit within the clay is a slow 0.09 meters per year (0.3 feet per year) towards the south-southeast, reflecting the low permeability of this layer. Using the largest measured Chinle Formation permeability, vertical ground-water velocity through the clay is conservatively estimated as 0.04 meters per year (0.13 feet per year); the resulting travel time from the surface of the clay to its base (the top of the Santa Rosa Formation) would be greater than 8,000 years.

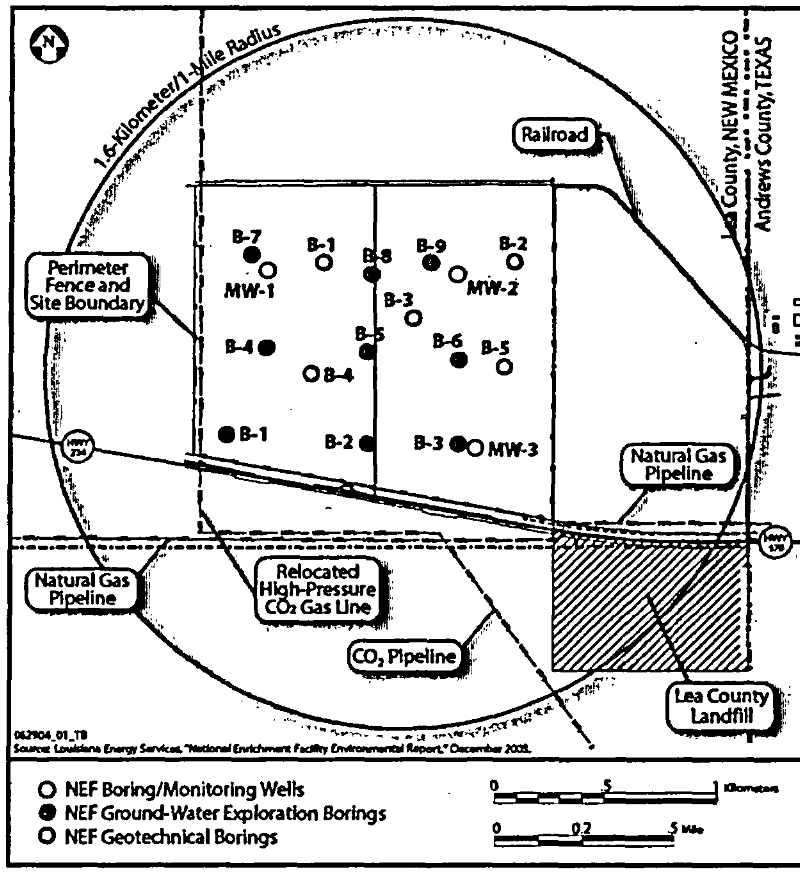

Figure 3-21 Borings on or near the Proposed NEF Site (LES, 2004a)

Figure 3-21 depicts the locations of borings on the proposed NEF site. Onsite borings include nine site ground-water exploration boreholes, the installation of three ground-water monitoring wells, and five geotechnical borings in the soil above the Chinle Formation. The nine borings were also to the top of the Chinle Formation ranging in depth from 10-18 meters (35-60 feet) (Cook-Joyce, 2003). No ground water was observed in any of the finished boreholes nor was ground water observed after allowing the boreholes to stand open for 24 hours. The cuttings taken from the boreholes were dry or contained only residual saturation. The dry nature of the soils from the boreholes indicates no recharge from the ground surface at the site.

The three ground-water monitoring wells were installed in the uppermost water-bearing zone. This 4.5-meter-thick (15-foot-thick) pocket of water is within the Chinle Formation (red beds) at a depth of approximately 67 meters (220 feet) below ground level. Ground water was not observed in any of the ground-water monitoring wells upon completion of the wells. One well (MW-2) did produce water after one month of monitoring, and the ground water in that well continued to recharge throughout the monitoring period.

3.8.2 Ground-Water Use

No surface water would be used from the proposed NEF site nor ground water from beneath the site. Instead, the proposed site would receive all of its water supply from the Eunice and/or Hobbs municipal water supply systems. No water wells are located within 1.6 kilometers (1 mile) of the site boundary.

The local municipalities obtain water from ground-water sources in the Ogallala Aquifer near the city of Hobbs, approximately 32 kilometers (20 miles) north of the site. The drinking water wells are positioned in the most productive portion of the Ogallala Formation in New Mexico where hydraulic conductivity approaches 70 meters per day (240 feet per day) (Woomer, 2004). Specific yields are between 0.1 and 0.28, and the saturated thickness is about 30 meters (90 feet) (LCWUA, 2003).

3.8.2.1 The Ogallala Aquifer

The Ogallala Aquifer, also known as the High Plains Aquifer, is a huge underground reservoir created millions of years ago that supplies water to the region which includes the proposed NEF site. The aquifer extends under the High Plains from west of the Mississippi River to the east of the Rocky Mountains. The aquifer system underlies 450,000 square kilometers (174,000 square miles) in parts of eight States (Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming). Figure 3-22 shows the Ogallala Aquifer and the proposed NEF site. Approximately 20 percent of the irrigated land in the United States is in the High Plains, and about 30 percent of the ground water used for irrigation in the United States is pumped from the Ogallala Aquifer. Irrigation accounts for about 94 percent of the daily aquifer use of more than 60 million cubic meters (16 billion gallons). Irrigation withdrawals in 1990 were greater than 53 million cubic meters (14 billion gallons) daily. Domestic drinking is the second largest ground-water use within the High Plains States, amounting to about 2.5 percent or 1.6 million cubic meters (418 million gallons) of total daily withdrawals (USGS, 2003b). In 1990, 2.2 million people were supplied by ground water from the Ogallala Aquifer with total public-supply withdrawals of 1.3 million cubic meters (332 million gallons) per day (USGS, 2004a). Withdrawals from the aquifer exceed recharge to it, and so the Ogallala Aquifer is considered a nonrenewable water source. The amount of water in storage in the aquifer in each State depends on the actual extent of the formation's saturated thickness.

The Ogallala Aquifer, the largest ground-water system in North America, contains approximately 4 trillion cubic meters (3.3 billion acre-feet) of water. About 65 percent of the Ogallala Aquifer's water is located under Nebraska (USGS, 2003b; RRAT, 2004); about 12 percent is located under Texas; about 10 percent is located under Kansas; about 4 percent is located under Colorado; and 3.5, 2, and 2 percent are located under Oklahoma, South Dakota, and Wyoming, respectively. The remaining 1.5 percent—or about 60 billion cubic meters (16 trillion gallons)—of the water is located under New Mexico (HPWD, 2004).

1

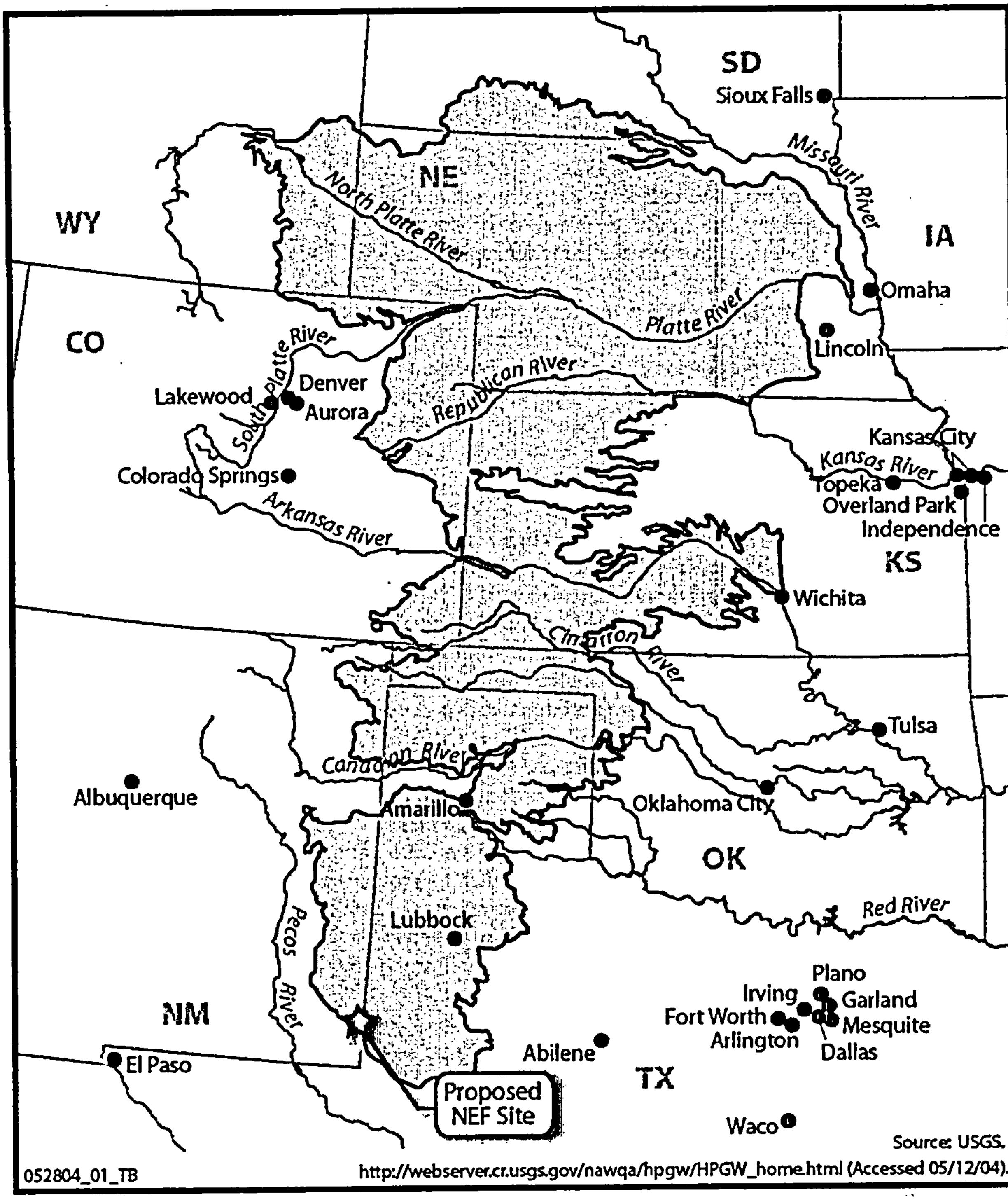

Figure 3-22 Ogallala Aquifer (USGS, 2004a)

3.8.2.2 Municipal Water Supply Systems

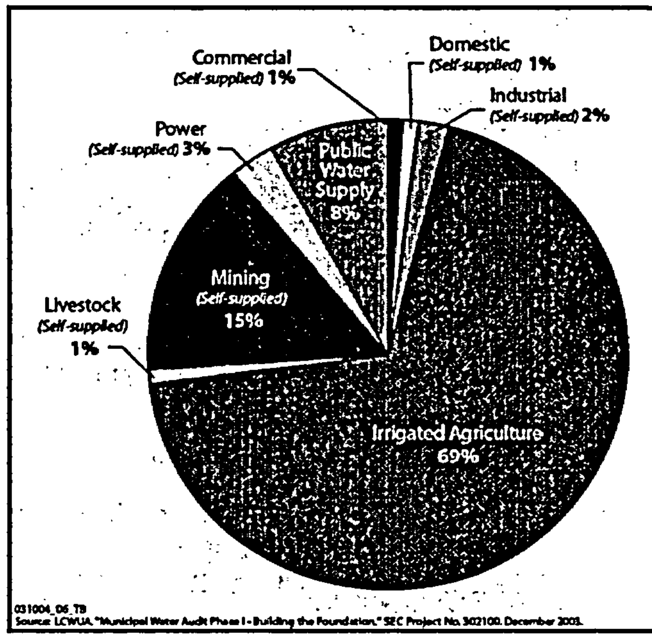

Figure 3-23 Lea County Water Use for 2000 (LCWUA, 2003)

The Eunice and Hobbs, New Mexico, municipal water-supply systems have capacities of 16,350 cubic meters per day (4.32 million gallons per day) and 75,700 cubic meters per day (20 million gallons per day), respectively. Current usage of the Eunice and Hobbs municipal water-supply systems are 5,600 cubic meter per day (1.48 million gallons per day) and 29,678 cubic meters per day (7.84 million gallons per day), respectively (LCWUA, 2000). Figure 3-23 reflects the local water uses (withdrawals) for community water systems (including Eunice and Hobbs) in Lea County for the year 2000.

The Lea County Water Users Association report also estimated the year 2000 uses for the water that Lea County pumps from the Ogallala Aquifer. Irrigation uses for agricultural purposes was 69 percent of the total usage (LCWUA, 2003). Public water supply constitutes 8 percent of the ground-water uses. Hobbs and Lovington pump more than 70 percent of the water needs for Lea County. Other Lea communities, including Eunice, Jal, and Tatum, together account for only 17 percent. Carlsbad, an Eddy County community, pumps about 10 percent of the water from Lea County public water-supply sources (LCWUA, 2003).

The city of Eunice's residential use poses the single largest demand for water from the municipal system (LCWUA, 2003). Figure 3-24 shows that it accounts for 41 percent of the total demand, while sales to retailers make up the second largest demand. Figure 3-25 shows that the city of Hobbs produces similar

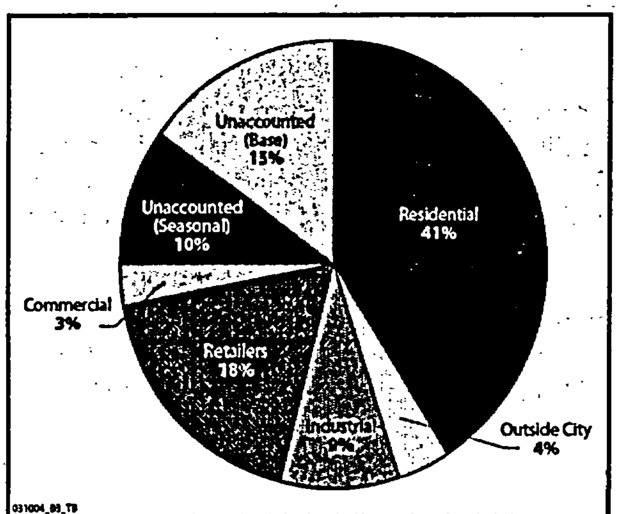

Figure 3-24 Eunice, New Mexico, Average Water Use for 2000-2002 (LCWUA, 2003)

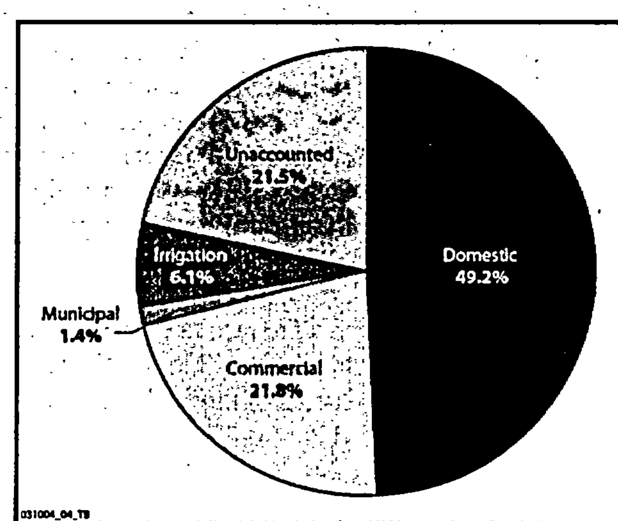

Figure 3-25 Hobbs, New Mexico, Average Water Use for 2000-2002 (LCWUA, 2003)

findings with residential (domestic) and commercial uses accounting for more than 70 percent of total water use (LCWUA, 2003).

Future regional demand for water would deplete Lea County's current water supply (LCWUA, 2003). County plans for increasing the water supply include conservation efforts and developing additional water supplies such as developing deeper aquifers (e.g., Santa Rosa Aquifer) and desalinization of saline waters. Model studies have shown that the Ogallala Aquifer may be completely dewatered in some areas by the year 2040 (LCWUA, 2003). In addition, the Lea County Water Users Association has drafted drought management plans (LCWUA, 2003) that include action levels denoted as Advisory, Alert, Warning, and Emergency with associated water-use actions ranging from voluntary reductions through allocation reductions of 20 (Warning) to 30 (Emergency) percent.

3.8.3 Ground-Water Quality

The waters of the Ogallala Aquifer, while very hard with a total dissolved solid content of less than 500 milligrams per liter, are consistently good quality and can be used for a variety of activities including public supply and irrigation (RRAT, 2004). The water in the southernmost region of the aquifer, mostly in Texas, is characterized by having higher levels of total dissolved solids that would exceed 1,000 milligrams per liter and in certain areas might reach 3,000 milligrams per liter. In this region, highly mineralized water in underlying rocks of marine origin seem to have invaded the aquifer. Increases of sodium and total dissolved solids contents may also be due to increased local industrial and irrigation practices (RRAT, 2004).

Table 3-10 lists recent water-quality testing results of local (Hobbs and Eunice) public water systems that obtain water from the Ogallala Aquifer. Total dissolved solids concentrations of 415 milligrams per liter are high but acceptable for various uses. Fluoride concentrations of 1.1 milligrams per liter are also high but acceptable. Chloride concentrations are moderate with concentrations up to 114 milligrams per liter, and sulfates are low ranging locally from 67 to 113 milligrams per liter (LCWUA, 2000).

The proposed NEF site has historically been used for cattle grazing. There is no documented history of manufacturing, storage, or significant use of hazardous chemicals on the property; therefore, there are no known previous activities that could have contributed to degradation of ground-water quality. To confirm this, LES installed nine soil boreholes and three monitoring wells as part of its ground-water investigation of the site. Of the three ground-water-monitoring wells installed on the site, only one has produced sufficient water to sample. This ground water, the first encountered below the site surface, was approximately 67 meters (220 feet) deep within a siltstone layer imbedded in the Chinle Formation clay. The ground water from this well was analyzed for standard inorganic compounds, volatile organic compounds, semivolatile organic compounds, pesticides, polychlorinated biphenyls, and radiological constituents.

Table 3-11 presents the results of the ground-water-quality sampling and testing program. Almost all of the elements tested were within the New Mexico regulatory limits and EPA maximum contaminant levels. Measurements of those elements which did not meet one standard or the other are highlighted in the table.

Table 3-10 Ogallala Aquifer Annual Water Quality Averages for Hobbs and Eunice, New Mexico

Parameter	Units	Hobbs	Eunice	EPA Maximum Contaminant Levels*
Alkalinity—Total	mg/l	163[a]	186.5	N/A
Color		not detected	0.25	250[g]
Specific Conductivity	µmhos/cm	839.9	716.8	N/A
Hardness	mg/l	293.3	248	N/A
pH	standard	7.5	7.2	6.5 - 8.5
Turbidity	NTU	not detected	1.0	N/A
Total Dissolved Solids	mg/l	410.0	415.7	500[g]
Arsenic	mg/l	0.008	0.008[d]	0.01 (as of 1/3/06)
Calcium	mg/l	80.7	80.5	N/A
Chloride	mg/l	114.0	63.4	250[g]
Fluoride	mg/l	1.1	1.0[e]	4.0
Iron	mg/l	0.05	<0.25[f]	0.3
Magnesium	mg/l	44.4	11.5	4.0
Mercury	mg/l	not detected	<0.0002[d]	N/A
Nitrate	mg/l	3.8	2.6	10
Potassium	mg/l	3.4[a]	4.8	
Sodium	mg/l	38.0	42.6	N/A
Sulfate	mg/l	113.1[b]	67.2	
Gross Alpha	pCi/l	3.1 ± 0.9 to 16.6 ± 2.9[c]	2.8 ± 1 to 6.6 ± 1[c]	15

*EPA, 2004c.
N/A - not applicable; mg/l - milligrams per liter; NTU - Nephelometric Turbidity Units; pCi/l - picocuries per liter; µmhos/cm - micromhos per centimeter.
[a] Sampled at entry point, August 23, 2004.
[b] Sampled at entry point, February 1996.
[c] Range in concentration, low and high; sampled from 1994 through 1997.
[d] Sampled at entry point, March 1995.
[e] Sampled at entry point, March 1996.
[f] Samples taken from 1975 to 1979.
[g] Results are either annual averages for all wells in a system, at the entry point of a system, or averages of all wells in a system for a particular sampling date.
Source: LCWUA, 2000.

Table 3-11 Chemical Analyses of Proposed NEF Site Ground Water

Parameter	Units	NEF Sample	Existing Regulatory Standards*	
			New Mexico	EPA Maximum Contaminant Levels
General Properties				
Total Dissolved Solids	mg/l	2,500	1,000	500 (a)
Total Suspended Solids	mg/l	6.2	NS	NS
Specific Conductivity	(µmhos/L)	6,800	NS	NS
Inorganic Constituents				
Aluminum	mg/l	0.480 (c)	5.0 (d)	0.05 – 0.2 (a)
Antimony	mg/l	<0.0036	NS	0.006
Arsenic	mg/l	<0.0049	0.1	0.01 (as of 1/3/06)
Barium	mg/l	0.021	1	2
Beryllium	mg/l	<0.00041	NS	0.004
Boron	mg/l	1.6	0.75 (d)	NS
Cadmium	mg/l	<0.00027	0.01	0.005
Chloride	mg/l	1600	250	250 (a)
Chromium	mg/l	0.043	0.05	0.1
Cobalt	mg/l	<0.00067	0.05 (d)	NS
Copper	mg/l	0.0086	NS	1.3 (b)
Cyanide	mg/l	<0.0039	0.2	0.2
Fluoride	mg/l	<0.5	1.6	4
Iron	mg/l	0.51	1	0.3 (a)
Lead	mg/l	<0.0021	0.05	0.015 (b)
Manganese	mg/l	1.0	0.2	0.05 (a)
Mercury	mg/l	<0.000054	0.002	0.002
Molybdenum	mg/l	0.04	1.0 (d)	NS
Nickel	mg/l	0.034	0.2 (d)	0.1
Nitrate	mg/l	<0.25	10	10
Nitrite	mg/l	<1	NS	1
Selenium	mg/l	<0.0046	0.05	0.05
Silver	mg/l	<0.0007	0.05	0.05
Sulfate	mg/l	2,200	600 (a)	250 (a)
Thallium	mg/l	<0.0081	NS	0.002
Zinc	mg/l	0.016	10	5 (a)
Radioactive Constituents				
Gross Alpha*	Bq/l	0.6	NS	0.6
	pCi/L	15.1		15

Parameter	Units	NEF Sample	Existing Regulatory Standards*	
			New Mexico	EPA Maximum Contaminant Levels
Gross Beta	Bq/L	1.2	NS	4 (mrem/yr)
	pCi/L	31.4		
Uranium			0.005	0.030
U-234	pCi/L	4.75		
	mg/L	0.00695	0.005	0.030
U-235	pCi/L	0.158		
	mg/L	0.000231	0.005	0.030
U-238	pCi/L	1.06		
	mg/L	0.001551	0.005	0.030

* The proposed standard excludes ^{222}Rn, ^{226}Ra, and uranium activity; New Mexico Standards (NMWQCC, 2002); EPA Maximum Contaminant Levels (EPA, 2004c).
Highlighted values exceed a regulatory standard.
NS - No standard or goal has been defined; mg/l - milligrams per liter; pCi/l - picocuries per liter; µmhos/cm - micromhos per centimeter.
(a): EPA Secondary Drinking Water Standard (EPA, 2004c)
(b): Action Level requiring treatment.
(c): Results of laboratory or field-contaminated sample.
(d): Crop irrigation standard.
Source: LES, 2004a.

3.9 Ecological Resources

This section describes the terrestrial and aquatic communities of the proposed NEF site and the associated plant and animal species. The interrelationships of these species are also discussed along with habitat requirements, life history, and population dynamics.

Ecological field surveys at the proposed NEF site were conducted in September 2003 (LES, 2004a), April 2004 (EEI, 2004a; LES, 2004a), and May 2004 (EEI, 2004b). These surveys focused on established empirical data for vegetation cover, mammals, birds, reptiles, and amphibians. A trapping or capture-and-release survey was not used during these initial surveys. Emphasis was placed on determining the habitats of candidate species that would occur at the proposed NEF site. In addition, Lea County conducted surveys in 1997 that covered the 350-acre (142-hectare) Lea County landfill located across from the proposed NEF site (LCSWA, 1998).

Due to the lack of suitable water-related habitat at the proposed NEF site, no waterfowl or water birds are currently found at the proposed NEF site. The lack of permanent water bodies at the site also results in the presence of few associated amphibian species. Therefore, no aquatic environment discussion is presented in this Draft EIS.

3.9.1 Fauna in the Vicinity of the Proposed Site

The proposed NEF site is located in an extensive deep sand environment. The area is a transitional zone between the short grass prairie of the Southern High Plains and the desert communities of the Chihuahuan Desert Scrub. It is dominated by deep-sand-tolerant or deep-sand-adapted plant species and is unique due to the dominance of the shinnery oak community.

The Plains Sand Scrub vegetation community at the proposed NEF site has remained stable since the introduction of domestic livestock grazing in the area by Spanish settlers. The site has not been impacted by farming or oil and gas development that is prevalent in the region.

The species composition of the wildlife at the site is reflective of the type, quality, and quantity of habitat present. Wildlife species at the proposed NEF site are those typical of species that occur in grassland and desert habitats. Table 3-12 lists the mammalian, bird, and amphibian/reptile species likely to be present at the site and vicinity, and presents information regarding their preferred habitats and probable distribution and abundance.

Table 3-12 Mammals, Birds, and Amphibians/Reptiles Potentially Inhabiting the Proposed NEF Site and Vicinity, and Their Habitat and Seasonal Preferences

Common Name	Scientific Name	
Mammals		***Preferred Habitat***
Black-Tailed Jackrabbit	*Lepus californicus*	Grasslands and open areas.
Black-Tailed Prairie Dog	*Cynomys ludovicianus*	Short grass prairie.
Cactus Mouse	*Peromyscus eremicus*	Grasslands, prairies, and mixed vegetation.
Collared Peccary	*Dicotyles tajacu*	Brushy, semi-desert, chaparral, mesquite, and oaks.
Coyote	*Canis latrans*	Open space, grasslands, and brush country.
Deer Mouse	*Peromyscus maniculatus*	Grasslands, prairies, and mixed vegetation.
Desert Cottontail	*Sylvilagus audubonii*	Arid lowlands, brushy cover, and valleys.
Mule Deer	*Odocoileus hemionus*	Desert shrubs, chaparral, and rocky uplands.
Ord's Kangaroo Rat	*Dipodomys ordii*	Hard desert soils.
Plains Pocket Gopher	*Geomys bursarius*	Deep soils of the plains.
Pronghorn Antelope	*Antilocapra americana*	Sagebrush flats, plains, and deserts.
Raccoon	*Procyon lotor*	Brushy, semi-desert, chaparral, and mesquite.
Southern Plains Woodrat	*Neotoma micropus*	Grasslands, prairies, and mixed vegetation.
Spotted Ground Squirrel	*Spermophilus spilosoma*	Brushy, semi-desert, chaparral, mesquite, and oaks.
Striped Skunk	*Mephitis mephitis*	All land habitats.
Swift Fox	*Vulpes velox*	Rangeland with short grasses and low shrub density.
White-Throated Woodrat	*Neotoma albigula*	Grasslands, prairies, and mixed vegetation.
Yellow-Faced Pocket Gopher	*Pappogeomys castanops*	Deep soils of the plains.

Common Name	Scientific Name	
Birds		***Seasonal Preference***
American Kestrel[*+]	*Falco sparverius*	Summer.
Ash-Throated Flycatcher[*+]	*Myiarchus cinerascens*	Summer.
Bewick's Wren[+]	*Thyromanes bewickii*	Spring.
Black-Chinned Hummingbird	*Archilochus alexandri*	Year round.
Blue Grosbeak[+]	*Guiraca caerulea*	Summer and winter.
Bullock's Oriole[+]	*Icterus bullockii*	Summer.
Cassin's Sparrow[+]	*Aimophila cassinii*	Spring.
Cactus Wren[+]	*Campylorhynchus brunneicapillus*	Spring.
Chihuahuan Raven[*+]	*Corvus cryptoleucus*	Rare.
Common Raven	*Corvus corax*	Summer and winter.
Crissal Thrasher[+]	*Toxostoma dorsale*	Summer and winter.
Eastern Meadowlark[+]	*Sturnella magna*	Spring.
European Starling[+]	*Sturnus vulgaris*	Spring.
Gambel's Quail	*Lophortyx gambelii*	Rare.
Great-Tailed Grackle[+]	*Quiscalus mexicanus*	Spring.
Green-Tailed Towhee	*Pipilo chlorurus*	Migrant.
House Finch[*+]	*Carpodacus mexicanus*	Summer and winter.
Killdeer[+]	*Charadrius vociferus*	Year round.
Lark Bunting[+]	*Calamospiza melanocorys*	Winter.
Lark Sparrow[+]	*Chondestes grammacus*	Summer.
Lesser Prairie Chicken	*Tympanuchus pallidicintus*	Rare
Loggerhead Shrike[*+]	*Lanius ludovicianus*	Uncommon.
Long-Eared Owl	*Asio otus*	Summer and winter.
Mallard[+]	*Anas platyrhynchos*	Summer.
Mourning Dove[*+]	*Zenaida macroura*	Summer and winter.
Nighthawk[+]	*Chordeiles minor*	Summer and winter.
Northern Mockingbird[*+]	*Mimus polyglottos*	Summer.
Northern Bobwhite[+]	*Colinus virginianus*	Summer and winter.
Pyrrhuloxia[+]	*Cardinalis sinuatus*	Uncommon.
Red-Tailed Hawk	*Buteo jamaicensis*	Summer and winter.
Red-Winged Blackbird[+]	*Agelaius phoeniceus*	Spring.

Common Name	Scientific Name	
Roadrunner	*Geococcyx californianus*	Summer and winter.
Sage Sparrow	*Amphispiza belli*	Summer and winter.
Scaled Quail*+	*Callipepla squamata*	Summer and winter.
Scissor-Tailed Flycatcher+	*Tyrannus forficatus*	Migrant.
Scott's Oriole	*Icterus parisorum*	Summer and winter.
Swainson's Hawk*+	*Buteo swainsoni*	Summer.
Turkey Vulture	*Cathartes aura*	Winter migrant.
Vermilion Flycatcher	*Pyrocephalus rubinus*	Winter migrant.
Vesper Sparrow+	*Pooecetes gramineus*	Spring.
Western Burrowing Owl	*Athene cunicularia hypugea*	Uncommon
Western Kingbird+	*Tyrannus verticalis*	Summer.
Amphibians/Reptiles		***Preferred Habitat***
Coachwhip	*Masticophis flagellum*	Mixed grass prairie and desert grasslands.
Collared Lizard	*Crotaphytus collaris*	Desert grasslands.
Eastern Fence Lizard	*Sceloporus undulates*	Mixed grass prairie and desert grasslands.
Garter Snake	*Thamnophis Sp.*	Desert grasslands.
Ground Snake	*Sonora semiannulata*	Desert grasslands.
Longnose Leopard Lizard	*Gambelia wislizenii*	Mixed grass prairie and desert grasslands.
Lesser Earless Lizard	*Holbrookia maculata*	Mixed grass prairie and desert grasslands.
Longnosed Snake	*Rhinocheilus lecontei*	Desert grasslands.
Ornate Box Turtle	*Terrapene ornata*	Desert grasslands and short grass prairie.
Pine-Gopher Snake	*Pituophis melanoleucus*	Short grass prairie and desert grasslands.
Plains Blackhead Snake	*Tantilla nigriceps*	Short grass prairie and desert grasslands.
Plains Spadefoot Toad	*Spea bombifrons*	Shallow to standing pools of water.
Rattlesnakes	*Crotalus Sp.*	Short grass prairie and desert grasslands.
Sand Dune Lizard	*Sceloporus arenicolus*	Open sand and takes refuge under shinnery oak.
Six-Lined Racerunner	*Cnemidophorus sexlineatus*	Mixed grass prairie and desert grasslands.
Tiger Salamander	*Ambystoma tigrinum*	Tall-grass and mixed prairie.
Texas Horned Lizard	*Phrynosoma cornutum*	Desert grasslands.
Western Whiptail Lizard	*Cnemidophorus tigris*	Mixed grass prairie and desert grasslands.

*Species detected during the April 2004 survey (EEI, 2004a).
+Species detected during the May 2004 survey (EEI, 2004b).
Source: LES, 2004a; EEI, 2004a, 2004b; LCSWA, 1998; WCS, 2004c.

3.9.1.1 Endangered and Threatened Species

The U.S. Fish and Wildlife Service (FWS) provided a list of endangered and threatened species, candidate species, and species of concern for Lea County (FWS, 2004a). Endangered species are any species which are in danger of extinction throughout all or a significant portion of its range. Threatened species are any species which are likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. For Lea County, the black-footed ferret and northern aplomado falcon are listed as endangered, and the bald eagle is listed as threatened. Surveys did not identify these animals at or near the proposed NEF site.

3.9.1.2 Candidate Species

Candidate species are those that the FWS has sufficient information to propose that they be added to the Federal list of threatened and endangered species. Three of the species that are likely to occur at the proposed NEF site are on the candidate list: the lesser prairie chicken (*Tympanuchus pallidicintus*), the sand dune lizard (*Sceloporus arenicolus*), and the black-tailed prairie dog (*Cynomys ludovicianus*).

The State of New Mexico has listed the sand dune lizard as a threatened species in Lea County (NMDGF, 2000). The black-tailed prairie dog and the lesser prairie chicken were listed as sensitive taxa in Lea County.

The three candidate species are described below.

<u>Lesser Prairie Chicken</u>

In the area of the proposed NEF site, the presence of a sand shinnery oak habitat would meet the requirements for suitable habitat for the lesser prairie chicken (NRCS, 2004). Figure 3-26 shows the male lesser prairie chicken. The area consists of prairie mixed shrub lands suitable for cover, food, water, and breeding areas (known as booming ground or leks). Two areas within Lea County have been nominated as an area of critical environmental concern for the lesser prairie chicken. One of these sites is located about 48 kilometers (30 miles) northwest of the site, and one is located further north. The nominations are under evaluation by the BLM (Johnson, 2000). The BLM plans to address this issue through an amendment to the Resource Management Plan in October 2004 (BLM, 2004).

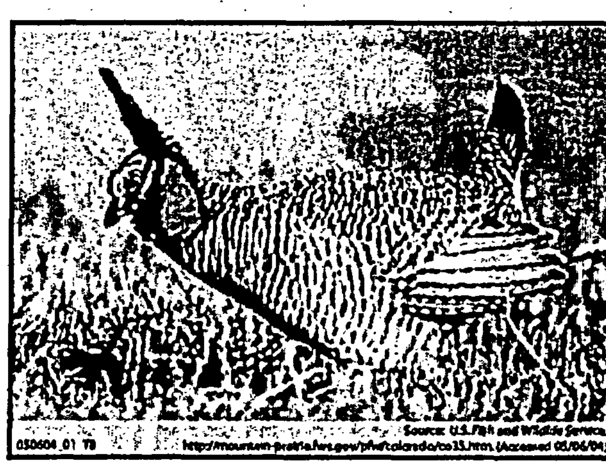

Figure 3-26 Male Lesser Prairie Chicken (FWS, 2004b)

The nearest known breeding area for the lesser prairie chicken is located about 6.4 kilometers (4 miles) north of the site (LES, 2004a). A field survey conducted in the fall of 2003 at the proposed NEF site did not locate any lesser prairie chickens (LES, 2004a). A subsequent field survey in the spring of 2004 confirmed that the lesser prairie chicken habitat at the proposed site is of moderate quality and is limited to a small area. The study highlighted the fact that the eastern portion of the site harbors dense mesquite, and the western portion is dominated by shinoak-grassland communities and short grass prairie that provide unfavorable habitats to the lesser prairie chicken. Water distribution can be a limiting factor for the lesser prairie chicken habitat in southeastern New Mexico. The proposed NEF site contains suitable food sources, but there are limited existing water sources onsite (Johnson, 2000).

Sand Dune Lizard

Sand dune lizards (Figure 3-27) only occur in areas with open sand, but they forage and take refuge under shinnery oak (NMDGF, 1996). They are restricted to areas where sand dune blowouts, topographic relief, or shinnery oak occur. They are seldom more than 1.2 to 1.8 meters (4 to 6 feet) from the nearest plant. The sand dune lizard feeds on insects such as ants, crickets, grasshoppers, beetles, spiders, ticks, and other arthropods. Feeding appears to take place within or immediately adjacent to patches of vegetation.

Figure 3-27 Sand Dune Lizard (CBD, 2003)

The proposed NEF site contains areas of sand dunes in the eastern central area of the site, southwestern quadrant, and a small area in the northwestern corner. Two surveys of the site did not identify favorable sand dune lizard habitats (Sias, 2003; Sias, 2004). The surveys indicated that the vegetation substrate at the proposed NEF site reflects conditions that would not support sand dune lizards. The dominance of the mesquite and grassland combinations at the site are not conducive environmental conditions for this species. The closest sand dune lizard population occurs about 5 kilometers (3 miles) north of the proposed NEF site (Sias, 2004).

Black-Tailed Prairie Dog

The black-tailed prairie dog (Figure 3-28) is a close cousin of the ground squirrel. A heavy-bodied rodent with a black-tipped tail, the black-tailed prairie dog is native to short-grass prairie habitats of western North America where they play an important role in the prairie ecosystem. They serve as a food source for many predators and leave vacant burrows for the burrowing owl, the black-footed ferret, the Texas horned lizard, rabbits, hares, and even rattlesnakes. Black-tailed prairie dogs avoid brush and tall-grass areas due to the reduced visibility these habitats impose. In Texas, they may be found in western portions of the State and in the Panhandle.

At one time, Texas reported huge prairie dog towns, such as one that covered 25,000 square miles and supported a population of about 400 million prairie dogs. Although prairie dog towns are still present in Texas, their current populations has been significantly reduced due to extensive loss of habitat during the last century.

Figure 3-28 Black-Tailed Prairie Dog (USGS, 2004c)

Black-tailed prairie dogs depend on grass as their dominant food source and usually establish colonies in short-grass vegetation types that allow them to see and escape predators. Plains-mesa sand scrub, the predominant vegetation type on the proposed NEF site, is not optimal black-tailed prairie dog habitat due to the high density of shrubs (LES, 2004a). There have been no sightings of black-tailed prairie dogs, no active or inactive prairie dog mounds/burrows, or any other evidence of prairie dogs at the proposed NEF site.

3.9.1.3 Species of Concern

The proposed site was also examined for suitable habitats that would be attractive to the listed Species of Concern in the State of New Mexico (FWS, 2004a). Species of concern are species for which further biological research and field study are needed to resolve their conservation status or which are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies. The Species of Concern for the proposed NEF site are the swift fox (*Vulpes velox*), the American peregrine falcon (*Falco peregrinus anatum*), the arctic peregrine falcon (*Falco peregrinus tundrius*), the Baird's sparrow (*Ammodramus bairdii*), the Bell's vireo (*Vireo bellii*), the western burrowing owl (*Athene cunicularia hypugea*), and the yellow-billed cuckoo (*Coccyzus americanus*). The swift fox is a species of concern for Lea County under the Federal listing and is listed as a sensitive species under the State of New Mexico classification (FWS, 2004b; NMDGF, 2000).

The examination of the habitats indicates the proposed NEF site has the potential to attract the swift fox and the western burrowing owl. Given the availability of neighboring open land in the immediate area of the proposed NEF site and the low population density of the swift fox, the proposed NEF site is marginally attractive to the swift fox. The western burrowing owl requires burrows (natural or human-constructed) for nesting such as the rip raps lining ditches and ponds. If there are burrowing mammals such as prairie dogs (which are not likely to occur) or badgers in the area, then it is likely that the area may be attractive to burrowing owls.

3.9.2 Flora in the Vicinity of the Proposed Site

The vegetation community on the proposed NEF site is classified as plains sand scrub. The dominant shrub species associated with this classification is Shinoak (*Quercus havardii*) with lesser amounts of sand sage (*Artemesia filifolia*), honey mesquite (*Prosopis glandulosa*), and soapweed yucca (*Yucca glauca*). The community is further characterized by the presence of forbs, shrubs, and grasses that are adapted to the deep sand environment that occurs in parts of southeastern New Mexico (NRCS, 1978).

The dominant perennial grass species is red lovegrass (*Eragrostis oxylepis*). Other grasses include dropseed (*Sporobolus Sp.*) and purple three awn (*Aristida purpurea*), which are present in a lesser degree.

The total vegetative cover for the proposed NEF site is approximately 26.5 percent. Herbaceous plants cover about 16.7 percent of the total ground area, and shrubs cover approximately 9.6 percent of the total ground area. Perennial grasses account for 63.1 percent of the relative cover, shrubs account for 36.1 percent, and forbs account for 0.8 percent. The relative cover is the fraction of total vegetative cover that is composed of a certain species or category of plants.

Total shrub density for the proposed NEF site is 16,660 individuals per hectare (6,748 individuals per acre). The most abundant shrubs are shinoak with 14,040 individuals per hectare (5,688 individuals per acre), followed by the soapweed yucca with 1,497 individuals per hectare (606 individuals per acre), and then the sand sage with 842 individuals per hectare (341 individuals per acre).

3.9.3 Pre-Existing Environmental Stresses

There are no onsite important ecological systems that are vulnerable to change or that contain important species habitats such as breeding areas, nursery, feeding, resting, and wintering areas, or other areas of seasonally high concentrations of individuals of candidate species or species of concern. The candidate species that have the potential to be present at the site are all highly mobile with the exception of the sand dune lizard. Ecological studies indicate, however, the absence of habitats for these species at the proposed NEF site (LES, 2004a; LES, 2004b; EEI, 2004a; EEI, 2004b; Sias, 2004). The vegetation type covering the proposed NEF site is not unique to that site and covers thousands of acres in southeastern New Mexico.

Past and present cattle grazing, fencing, and the maintenance of access roads and pipeline right-of-ways represent the primary preexisting environmental stress on the wildlife community of the site. The colonization of the disturbed areas by local plant species has alleviated the impact of pipeline installation and maintenance of pipeline right-of-ways. Disturbed areas immediately adjacent to the road, however, are being invaded by weeds. The proposed NEF site has large stands of mesquite indicative of long-term grazing pressure that has changed the vegetative community dominated by climax grasses to a sand scrub community and the resulting changes in wildlife habitat. Changes in local climatic and precipitation patterns are also an environmental stress for the southeastern New Mexico area.

Past and current uses of the proposed NEF site have most likely resulted in a shift from wildlife species associated with mature desert grassland to those associated with grassland shrub communities. Examples of this include a decrease in the pronghorn antelope, a species requiring large, open prairie areas, and an increase in species that thrive in a midsuccessional plant community like the black-tailed jackrabbit and the mule deer. Other environmental stresses on the terrestrial wildlife community, such as disease and chemical pollutants, have not been identified at the proposed NEF site.

3.10 Socioeconomic and Local Community Services

The socioeconomic characteristics for the 120-kilometer (75-mile) region of influence surrounding the proposed NEF site include Lea County, New Mexico, and Andrews County and Gaines County, Texas, as well as portions of Eddy County, New Mexico, and Ector, Loving, Winkler, and Yoakum Counties, Texas.

Established in March 1917, Lea County covers approximately 11,350 square kilometers (4,383 square miles). Its county seat, Lovington, is located 64 kilometers (39 miles) north-northwest of the proposed NEF site. The largest city in the county is Hobbs, and it is situated 32 kilometers (20 miles) to the north. Other incorporated communities in Lea County are Jal, 37 kilometers (23 miles) to the south; Eunice, 8 kilometers (5 miles) to the west; and Tatum, 72 kilometers (45 miles) to the north-northwest.

Due east of the proposed NEF site is Andrews County, Texas. Organized in 1910, Andrews County has a land area of 3,890 square kilometers (1,501 square miles). The county seat, city of Andrews, is 51 kilometers (32 miles) east-southeast of the proposed NEF site and is the only incorporated community in the county. There are no other major communities in Andrews County.

Northeast of the proposed NEF site is Gaines County, Texas, which was organized in 1905. Gaines County is approximately the same size as Andrews County (3,892 square kilometers (1,503 square miles). The county seat is Seminole, and it is located 51 kilometers (32 miles) to the northeast (Coward, 1974).

The majority of the impacts are expected to occur in Lea County, given its larger population and workers living in closer proximity to the proposed NEF site and, to a lesser extent, in Andrews and Gaines Counties, Texas. Portions of Eddy County, New Mexico, and Ector, Loving, Winkler, and Yoakum Counties, Texas, are within the region of influence but are not expected to be impacted to any great extent. Figure 3-29 shows the population density surrounding the proposed NEF site. Figure 3-1 shows the major communities and transportation routes in the region of influence. The remainder of this section presents information and data for population, housing, and education; employment and income; community services, infrastructure, and finances; utilities; waste disposal; and tax structure and distribution.

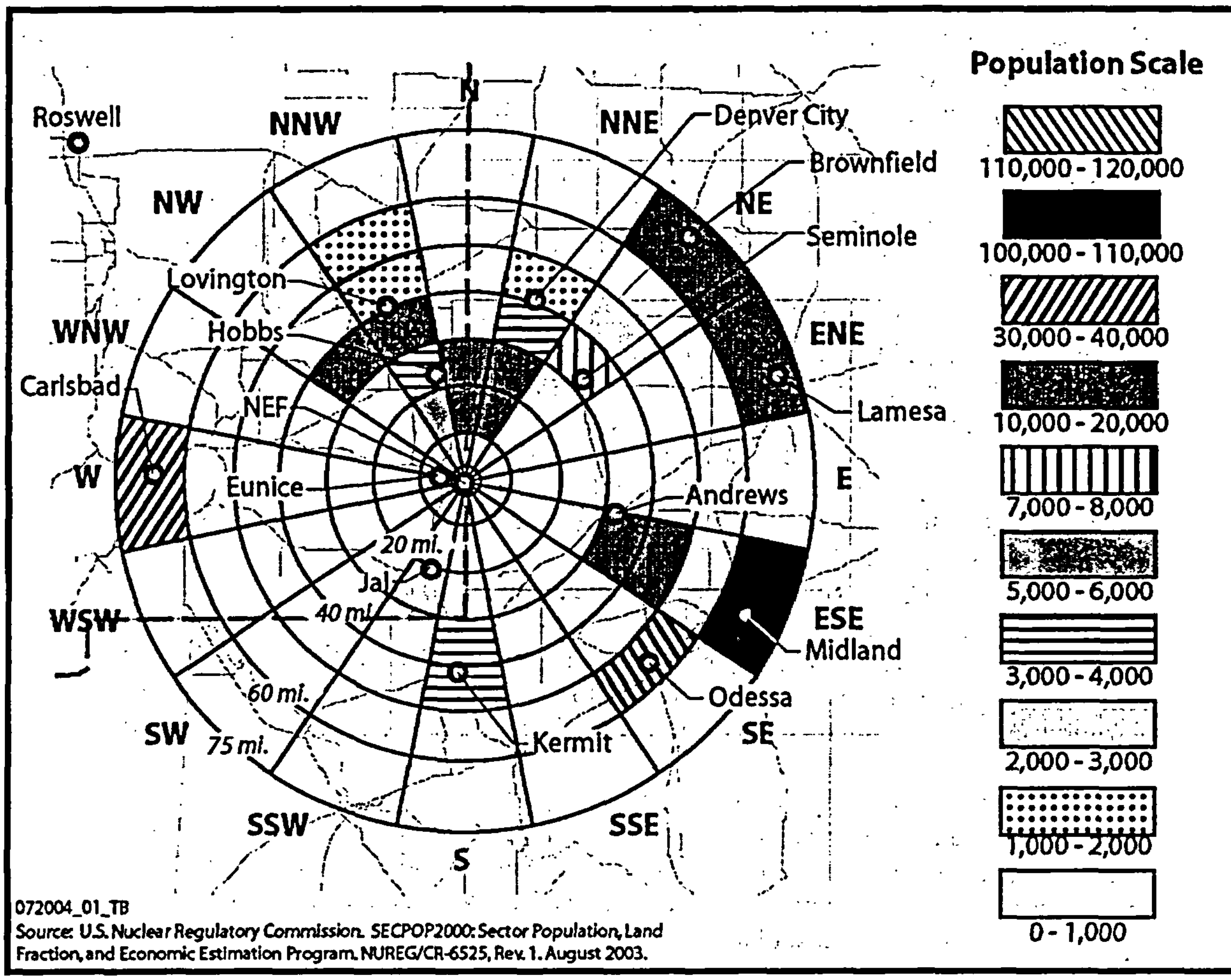

Figure 3-29 Population Density Surrounding the Proposed NEF Site (NRC, 2003b)

3.10.1 Population, Housing, and Education

In 2000, the population of Lea County was approximately 55,511 with slightly more than half (28,660) living in Hobbs. The county seat, Lovington, had a population of 9,470. The other three incorporated communities in the county had a combined population of 5,240. About 22 percent of the county population lives in the unincorporated areas. Overall, the county has a population density of 4.9 people per square kilometer (12.76 square miles) (USCB, 2004). As shown in Table 3-13, the population of Lea County declined by about 1 percent between 1980 and 2000. This decline is in sharp contrast to the State of New Mexico, whose population increased by more than a half million people—or by nearly 40 percent—over the same period. Table 3-13 does not show the rapid increase in population that occurred in the early 1980's followed by a more gradual decrease during the remainder of the decade because the table presents an average over the decade and not annual changes. Beginning in the late 1970's, the population of Lea County expanded by 10,000 residents reaching a peak of more than 66,000 by the end of 1983. This population growth and decline was due to the expansion and contraction of the oil industry. From 1985 to 1990, the county lost population as oil prices stabilized and subsequently fell.

Andrews County is the 151st largest of the 254 counties in Texas. According to the U.S. Census Bureau, the population of Andrews County was 13,004 in 2000 with a population density of 3.3 people per square kilometer (8.7 square miles) (USCB, 2004). Its population experienced a similar growth/decline pattern as that of Lea County. The population of Gaines County in 2000 was 14,467. Unlike in Andrews County, the population of Gaines County was relatively stable during the 1990's. The total population of the three principal counties in the region of influence was nearly 83,000 in 2000. The area did not experience the population increases that occurred in other areas of New Mexico and Texas.

Table 3-13 shows that population growth in Lea County is projected to decline through the remainder of the decade (BBER, 2002). This is in contrast to Andrews County and Gaines County, where the population is expected to increase by 8.3 and 12.5 percent, respectively, between 2000 and 2010 (WSG, 2004). For the region of influence as a whole, the population is projected to remain stable throughout the decade. Both New Mexico and Texas are expected to continue to experience high population growth rates. As shown earlier, there are no significant populations within 24 kilometers (15 miles) of the proposed NEF with the exception of the city of Eunice 8 kilometers (5 miles) due west. Figure 3-1 shows the town of Hobbs due north of the site and Lovington further away in the north-northwestern direction. Between 24 and 48 kilometers (15 and 30 miles) south-southwest of the proposed site is a concentration of about 2,000-3,000 people that includes the community of Jal. East-southeast between 48 and 80 kilometers (30 and 50 miles) away from the proposed NEF is the city of Andrews and surrounding area with a population concentration of 12,000 to 14,000 people. The two major population concentrations in Gaines County— Seminole and Denver City—are northeast of the proposed NEF site.

Table 3-14 shows that the housing density in Lea County is 2.0 units per square kilometer (5.3 units per square mile), and the median cost of a home is $50,100. The New Mexico State average housing density is 2.5 units per square kilometer (6.4 units per square mile), and the median cost of a home is $108,000. In Andrews and Gaines counties, the housing units density is 1.4 units per square kilometer (3.6 units per square mile). The median cost of a home in Andrews and Gaines Counties is $42,500 and $48,000, respectively. The Texas State average housing density is 12 units per square kilometer (31.2 units per square mile), and the median cost of a home is $82,500. The variation in housing between the counties and the State averages is reflective of the rural nature of the county areas. The percentage of vacant housing units is 15.8 percent for Lea County, 14.8 percent for Andrews County, and 13.5 percent for Gaines County. This compares to a housing vacancy of 13.1 percent in New Mexico and 9 percent in Texas.

Table 3-13 Baseline Values for Population and Growth in the Region of Influence

County	Population					
	1980	1990	2000	2010	2020	2030
Lea County, New Mexico	55,993	55,765	55,511	54,551	52,556	49,417
Andrews County, Texas	13,323	14,338	13,004	14,083	14,704	14,923
Gaines County, Texas	13,150	14,123	14,467	16,273	17,852	18,894
Region of Influence	82,466	84,226	82,982	84,907	85,112	83,234
New Mexico Total	1,303,303	1,515,069	1,819,046	2,112,957	2,382,999	2,626,333
Texas Total	14,225,512	16,986,335	20,851,820	24,395,179	27,917,492	31,197,014
County		**Percent Decade Change**				
		1980-1990	**1990-2000**	**2000-2010**	**2010-2020**	**2020-2030**
Lea County, New Mexico	–	-0.4	-0.5	-1.7	-3.7	-6.0
Andrews County, Texas	–	7.6	-9.3	8.3	4.4	1.5
Gaines County, Texas	–	7.4	2.4	12.5	9.7	5.8
Region of Influence	–	1.1	-2.3	0.2	-2.0	-4.3
New Mexico Total	–	16.3	20.1	16.2	12.8	10.2
Texas Total	–	19.4	22.8	17.0	14.4	11.7

Sources: USCB, 2002a; USCB, 2002b; BBER, 2002; Fedstats, 2004; WSG, 2004.

The population surrounding the proposed NEF site generally has a lower level of educational attainment than the State averages. Table 3-14 summarizes the school enrollment and educational attainment data for the three principal counties. These counties have approximately the same proportion of their residents in primary and secondary grades, and a significantly smaller proportion attending college than averages for New Mexico and Texas (WSG, 2004).

3.10.2 Employment and Income

In 2000, the labor force was nearly 33,573 (Lea County – 22,286, Andrews County – 5,511, and Gaines County – 5,776). The unemployment rate was 9.1 percent in Lea County and 8.1 percent in Andrews County. In Gaines County, the unemployment rate was less at 5.5 percent. For these counties, unemployment was higher than their State averages.

Table 3-14 Demographic, Housing, and Education Characteristics in the Region of Influence

Subject	Lea County	Andrews County	Gaines County	Region of Influence	New Mexico Total	Texas Total
Demographics (Year 2000)						
Total Population	55,511	13,004	14,467	82,982	1,819,046	20,851,820
Housing Characteristics (Year 2000)						
Total Housing Units	23,405	5,400	5,410	34,215	780,579	8,157,575
Occupied Units	19,699	4,601	4,681	28,981	677,971	7,393,354
Land Area	4,383	1,501	1,503	7,387	121,356	261,797
Housing Density (units per square mile)	5.3	3.6	3.6	4.6	6.4	31.2
Median Value (Year 2000 $)	$50,100	$42,500	$48,000	$48,570	$108,100	$82,500
Educational Characteristics (Year 2000)						
School Enrollment	16,534	3,864	4,369	24,767	533,786	5,948,260
Grades <8	48.4%	51.0%	57.8%	50.4%	55.2%	58.0%
Grades 9-12	25.5%	30.3%	25.1%	26.2%	22.3%	21.9%
College	16.7%	8.6%	6.1%	13.6%	22.5%	20.2%
Educational Attainment (>25 years age)	33,291	7,815	8,006	49,112	1,134,801	12,790,893
High School Graduate	67.1%	68.0%	56.2%	65.4%	78.9%	75.7%
Bachelor's Degree or Higher	11.6%	12.4%	10.5%	11.6%	23.5%	23.2%

Source: USCB, 2002a; USCB, 2002b.

Table 3-15 shows the employment and income for the region of influence. Petroleum production, processing, and distribution (which falls under Agriculture, Forestry, Fishing, and Mining in Table 3-15) and agriculture are the dominant industries in the surrounding area. Associated with this sector are various support services including machining and tooling, chemical production, specialty construction, metal fabrication, and transportation and handling. Approximately 21.5 percent of the jobs are classified in these industries. This percentage compares to 4 percent and 2.7 percent in New Mexico and Texas, respectively. The percentage of the labor force in professional, scientific, and management-related occupations in these counties is about half of the labor force for New Mexico and Texas. Other sectors are similar to State averages.

In the early 1980's, the median household incomes for Lea County, Andrews County, and Gaines County exceeded the median income for New Mexico and Texas as a whole. Since then, the median household income in both counties has fallen considerably below that of the State averages. The decline in income to levels below State averages is due to a shift in employment from relatively high-paying jobs in the oil and gas industry to lower paying jobs in the service sector. In 2000, per capita income ranged from $13,088 in Gaines County to $15,916 in Andrews County. Per capita income is about $3,100 per year less than the State average in Lea County and $3,700 per year less in Andrews County. In Gaines County, the per capita income is more than $6,500 lower than the State average. The median household income is $29,799 for Lea County, $34,036 for Andrews County, and $30,432 for Gaines County—well below their respective State averages.

Table 3-15 Employment and Income in the Region of Influence

Subject	Lea County, New Mexico	Andrews County, Texas	Gaines County, Texas	Region of Influence	New Mexico Total	Texas Total
Employment (Year 2000)						
In-Labor Force	22,286	5,511	5,776	33,573	823,440	9,830,559
Employed	20,254	5,064	5,460	30,778	763,116	9,234,372
Unemployed	2,032	447	316	2,795	60,324	596,187
Unemployment Rate	9.1%	8.1%	5.5%	8.3%	7.3%	6.1%
Industry			**Share of Total Employment**			
Agriculture, Forestry, Fishing, and Mining	20.7%	21.0%	25.0%	21.5%	4.0%	2.7%
Construction	6.3%	5.1%	7.3%	6.2%	7.9%	8.1%
Manufacturing	3.5%	8.6%	5.3%	4.7%	6.5%	11.8%
Trade (wholesale and retail)	15.2%	13.9%	14.5%	14.8%	14.9%	15.9%
Transportation and Utilities	6.7%	4.1%	7.4%	6.4%	4.7%	5.8%
Information	1.1%	1.8%	1.3%	1.3%	2.4%	3.1%
Finance, Insurance, and Real Estate	3.2%	3.5%	3.7%	3.3%	5.5%	6.8%
Professional, Scientific, Management, Administration, and Waste Management	4.5%	4.6%	1.5%	4.0%	9.4%	9.5%
Educational, Health, and Social Services	20.6%	24.6%	20.2%	21.2%	21.7%	19.3%
Arts, Entertainment, Recreation, etc.	6.6%	5.2%	4.7%	6.0%	9.8%	7.3%
Other Services	6.6%	4.5%	6.6%	6.3%	5.1%	5.2%
Public Administration	5.1%	3.2%	2.7%	4.4%	8.0%	4.5%
Income						
Median Household Income ($)	29,799	34,036	30,432	30,572	34,133	39,927
Per Capita Income ($)	14,184	15,916	13,088	14,264	17,261	19,617

Source: USCB, 2002a; USCB, 2002b.

3.10.3 Community Services, Infrastructure, and Finances

There are four schools located within an 8-kilometer (5-mile) radius of the proposed NEF site. These include an elementary school, a middle school, a high school, and a private K-12 school. The school system in Hobbs, New Mexico, includes a special education facility, 12 elementary schools, 3 junior high schools, and a high school that serves grades 10 through 12. There are also two private schools, a community vocational college (New Mexico Junior College), and a four-year college (College of the Southwest). The closest schools in Texas are located about 50 kilometers (32 miles) away from the proposed site.

The nearest hospital to the site is the Lea Regional Medical Center. It is located about 32 kilometers (20 miles) north of the proposed NEF site in Hobbs. It has 250 beds and handles both acute and stable chronic-care patients. Nursing or retirement homes are also located in Hobbs. The next closest hospital, Nor-Lea Hospital, is located in Lovington, about 64 kilometers (39 miles) north-northwest of the proposed NEF. It is a full-service hospital with 27 beds. The Eunice health clinic (Prime Care) is the closest medical clinic to the proposed NEF.

Public safety within the vicinity of the site includes fire support provided by the Eunice Fire and Rescue Service (with a full-time Fire Chief and 34 volunteers) and the Eunice Police Department (with 5 full-time officers). Mutual-aid agreements also exist with all of the county fire and police departments. If additional fire or police services are required, nearby counties can provide additional response services. In particular, members of the proposed NEF Emergency Response Organization can provide information and assistance in instances where radioactive/hazardous materials are involved. Table 3-16 describes the available fire and rescue equipment.

The main highway in the county is U.S. Highway 62-180, which runs east-west through Hobbs. It is designated as a primary feeder to the interstate highway system. The community of Eunice lies near the junction of New Mexico Highways 207 and 234. New Mexico Highways 234 (east-west) and 18 (north-south) are the major transportation routes near the proposed NEF site and intersect about 6.4 kilometers (4 miles) west. The nearest residences are located along the west side of New Mexico Highway 18, just south of its intersection with New Mexico Highway 234.

An active railroad line operated by the Texas-New Mexico Railroad runs parallel to New Mexico Highway 18 and is located just east of Eunice. There is also an active private railroad spur line that runs from the Texas-New Mexico Railroad along the north boundary of the proposed NEF site and terminates at the WCS facility just across the New Mexico-Texas border. Section 3.13.2 of this Chapter provides additional information on this railroad.

The nearest airport is about 16 kilometers (10 miles) west from the site. It is maintained by Lea County and is used primarily by privately owned planes. The airport has two runways that are 1,000 meters (3,280 feet) and 780 meters (2,550 feet) in length. There is neither a control tower nor commercial air carrier flights at this airport. Lea County Regional Airport is the nearest commercial carrier airport located 32 kilometers (20 miles) north in Hobbs, New Mexico (LES, 2004a). Section 3.13.3 of this Chapter provides additional information on the airports within the region of influence.

Table 3-16 Eunice Fire and Rescue Equipment in the Vicinity of the Proposed NEF Site

Type of Equipment	Quantity	Description
Ambulance	3	None
Pumper Fire Trucks	3	340 m^3/hr (1,500 gpm) pump; 3,785 L (1,000 gal) water capacity
		227 m^3/hr (1,000 gpm) pump; 1,893 L (500 gal) water capacity
		284 m^3/hr (1,250 gpm) pump; 2,839 L (750 gal) water capacity
Water Truck	1	114 m^3/hr (500 gpm) pump; 22,700 L (6,000 gal) water capacity
Grass Fire Truck	3	68 m^3/hr (300 gpm) pump; 3,785 L (1,000 gal) water capacity
		34 m^3/hr (150 gpm) pump; 1,136 L (300 gal) water capacity
		34 m^3/hr (150 gpm) pump; 946 L (250 gal) water capacity
Rescue Truck	1	45 m^3/hr (200 gpm) pump; 379 L (100 gal) water capacity

m^3/hr - cubic meters per hour.
gpm - gallons per minutes.
L - liters; gal - gallons.
Source: LES, 2004a.

3.10.4 Utilities

3.10.4.1 Electric Power Services

Southwestern Public Service Company, now operating as Xcel Energy, provides electricity to the area surrounding the proposed NEF (EDCLC, 2004). The electrical power for the proposed NEF would be derived by means of two synchronized 115-kilovolt overhead transmission lines from a substation east of the site. The Xcel Energy service territory encompasses about 134,700 square kilometers (52,000 square miles). Large commercial and industrial users are provided service under contract. There is a demand charge of $1,654 for the first 200 kilowatts that increases by $7.76 for each additional kilowatt. Energy rates are $0.02505 per kilowatt-hour for the first 230 kilowatt-hour per month-kilowatt or the first 120,000 kilowatts. Energy rates decline slightly for additional usage. Power-factor adjustments may apply to large users, and fuel-cost adjustments may be imposed on all customers.

3.10.4.2 Natural Gas Services

The Public Service Company of New Mexico provides natural gas services to the Eunice area (EDCLC, 2004). As with electricity service, natural gas is relatively inexpensive. The average cost of gas is about $2.51 per thousand cubic feet for all customer classes and is significantly below national averages.

3.10.4.3 Domestic Water Supply

Lea County municipal water comes from wells that tap the Ogallala Aquifer (EDCLC, 2004). In Eunice, water is pumped from a well field located near Hobbs and transported south in two parallel cross-country mains (LCWUA, 2003). The pumping depth is about 15 meters (50 feet). The water quality is good, and disinfection is the only treatment performed prior to delivery. Currently, Eunice is pumping about 2.04

million cubic meters (1654 acre-feet) annually with a difference between base winter demand and summer peak demand of nearly 240 percent (EDCLC, 2004).

3.10.4.4 Waste Disposal

In Eunice and Hobbs, solid-waste-disposal pickup is contracted to Waste Management, Inc. Pickups are offered once or twice a week. Solid wastes are disposed of in the Lea County landfill located about 8 kilometers (5 miles) east of Eunice just across from the proposed NEF site. The landfill accepts all types of residential, commercial, special wastes, and sludges (EDCLC, 2004).

3.10.5 Tax Structure and Distribution

Property taxes in New Mexico are among the lowest in the United States. Four governmental entities within New Mexico are authorized to tax—the State, counties, municipalities, and school districts. Property assessment rates are 33-1/3 percent of value. The tax applied is a composite of State, county, municipal, and school district levies. The Lea County tax rate for nonresidential property outside the city limits of Eunice is $18.126 per $1,000 of net taxable value of a property. Rates for nonresidential property are slightly higher within the city limits of Eunice. Residential property tax rates are somewhat lower for properties within and outside Eunice. For Hobbs, tax rates are somewhat higher.

New Mexico also imposes a gross receipts tax on producers and businesses. This tax is mostly passed onto the consumer. The State gross receipts tax rate is 5.00 percent, and local communities may also impose an additional 1.9375 percent.

In Texas, property taxes are based on the most current year's market value. Andrews County, Texas, has a county property tax rate (per $100 assessed value) of $0.539 per $100 assessment, a school district tax of $1.717 per $100 assessed value, and a municipal rate for the city of Andrews of $0.305 per $100 assessed value. The county tax rate for Gaines is $0.381, with municipal and school district rates for Seminole of $0.60 and $0.98, respectively. There is also a State sales tax of 6.25 percent and municipal sales tax of 1 percent.

3.11 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629), directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. In December 1997, the Council on Environmental Quality released its guidance on environmental justice under NEPA (CEQ, 1997). Although an independent organization, NRC has committed to undertake environmental justice reviews. The NRC Nuclear Material Safety and Safeguards (NMSS) environmental justice guidance is found in Appendix C to NUREG-1748 (NRC, 2003a).

This environmental justice review analyzes whether the proposed NEF has the potential for an environmental justice concern for low-income and minority populations resulting from the proposed action and its alternatives. The NRC staff analyzed demographic data to identify the minority and low-income groups within the area of environmental study. Next, the impacts from the proposed action and its alternatives were evaluated to determine if the impacts disproportionately affected minority and low-income groups in an adverse manner.

For the purpose of this procedure, minority is defined as individual(s) who are members of the following population groups: American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; African American (not of Hispanic or Latino origin); some other race; and Hispanic or Latino (of any race). In the States of New Mexico and Texas, it is likely that "some other race" mainly includes individuals who identified themselves on the 2000 Census in a Latino or Hispanic group under "race"(e.g., Mexican or Puerto Rican), even though Hispanic/Latino is not a Census racial category. The 2000 Census introduced the multiracial category. Anyone who identifies themselves as white and a minority is counted as that minority group. In the small number of cases where individuals identify themselves as more than one minority, the analysis counts that individual in a "Two or More Races" group.

To determine if environmental justice will have to be considered in greater detail, the NRC staff compares the percentage of minority and low-income populations in Census block groups in the area for assessment to the State and county percentages. If the minority or low-income population percentage in a block group exceeds 50 percent or is significantly greater than the State or county percentage, environmental justice will have to be considered in greater detail. Generally (and where appropriate), the NRC staff may consider differences greater than 20 percentage points to be significant. When determining the area for impact assessment for a facility located outside the city limits or in a rural area, a 6.4-kilometer (4-mile) radius (or 130-square kilometer [50-square mile]) could be used. A larger area should be considered if the potential impact area is larger. The staff also supplements the demographic analysis with scoping to identify low-income and minority populations (NRC, 2003a).

In the current situation, the States of New Mexico and Texas have very high percentages of minority populations, and rural areas in the State tend to have sparsely-populated large block groups (a block group is a cluster of census blocks that are normally comprised of up to several hundred people). As a result of the nature of the proposed action being examined and the local circumstances, the area for impact assessment was expanded to an 80-kilometer (50-mile) radius and includes an assessment along transportation routes. It is important to note that the expanded radius does not dilute the environmental justice impact of the proposed NEF because no averaging of environmental effects takes place; instead, each minority community is evaluated on its own. The criteria for identifying minority and low-income communities are not diluted by the wider radius because the demographic and income characteristics of each block group are individually compared against the States of New Mexico and Texas and the relevant counties. Rather, it simply expands the geographic area where additional minority and low-income block groups can be (and were) identified.

Usually, under NRC guidance, a minority population with environmental justice potential would be one with a minority percentage of at least 50 percent or at least 20 percentage points greater than the State and relevant counties. However, the State of New Mexico has a high Statewide minority population. Table 3-17 shows the Hispanic/Latino population in New Mexico is 42.1 percent and the total minority population is 55.3 percent, while the corresponding national percentages are 12.5 percent and 30.9 percent. A similar situation occurs in Texas, with an Hispanic/Latino population of 32.0 percent and a total minority population of 47.6 percent. Therefore, in both States, a census block group within the impact assessment area with a Hispanic/Latino population of at least 50 percent or with a minority population of at least 50 percent ordinarily would count as a minority population worthy of further study.

Table 3-17 Percentage of Minority and Low-Income Census Block Groups Within 80 Kilometers (50 Miles) of the Proposed NEF Site

	Total Census Block Groups in County	Below Poverty Level	African American/ Black	Native American	Asian and Pacific Islander	Other Races	Two or More Races	Hispanic or Latino (All Races)	Minorities (Racial Minorities plus White Hispanics)	Total Minority Block Groups
State of New Mexico (%)	--	18.4	2.1	10.2	1.4	19.0	0.6	42.1	55.3	--
Threshold for EJ Concerns (%)	--	38.4	22.1	30.2	21.4	39.0	20.6	50.0/42.1	50.0	--
Number of Block Groups Meeting Environmental Justice Criteria										
Eddy County	3	0	0	0	0	0	0	1	1	1
Lea County	63	8	1	0	0	15	0	28	29	31
New Mexico Counties	66	8	1	0	0	15	0	29	30	32
State of Texas (%)	--	15.4	11.7	0.9	3.0	13.0	0.4	32.0	47.6	--
Threshold for EJ Concerns (%)	--	35.4	31.7	20.9	23.0	33.0	20.4	50.0/32.0	50.0	--
Andrews County	15	0	0	0	0	1	0	11	6	11
Ector County	5	0	0	0	0	0	0	3	1	3
Gaines County	13	0	0	0	0	1	0	10	4	10
Loving County	1	0	0	0	0	0	0	0	0	0
Terry County	1	0	0	0	0	0	0	1	0	1
Winkler County	10	1	0	0	0	1	0	9	3	9
Yoakum County	6	0	0	0	0	1	0	6	2	6
Texas Counties	51	1	0	0	0	4	0	40	16	40
Grand Total	**117**	**9**	**1**	**0**	**0**	**19**	**0**	**69**	**46**	**72**

Source: USCB, 2002a; USCB, 2002b.

In view of the resulting anomalously high standard for designating minority populations in New Mexico and to better meet the spirit of the NRC guidance to identify minority and low-income populations, the NRC staff included Census block groups with a percentage of Hispanics and Latinos at least as great as the Statewide average. This more inclusive definition adds two additional minority block groups in Lea County and four in Andrews County. Each block group was compared to the corresponding State and county percentages for each individual racial category and the Hispanic/Latino category and for the sum of all minority categories taken together (all racial minorities, plus white Hispanic/Latinos) using the percentage criteria. Although New Mexico and Texas are both within the top 10 States for percentage of low-income individuals (with percentages of 18.4 and 15.4 percent, respectively) for the 80-kilometer (50-mile) region surrounding the proposed NEF, the percentage of low-income persons in almost all of the block groups is within 20 percentage points of the national average of 12.4 percent. The usual "50 percent or 20 percent greater than" standard based on the Statewide percentage appears adequate to identify the concentrations of low-income population.

In some cases, minority and low-income groups may rely on environmental resources for their subsistence and to support unique cultural practices. Therefore, NRC guidance specifies that the NRC staff review special resource uses or dependencies of identified minority and low-income populations including cultural practices and customs, previous environmental impacts, and features of previous and current health and economic status of the identified groups. In some circumstances, these groups could be unusually vulnerable to impacts from the proposed action.

Potential resource dependencies were sought in the course of public meetings and other information supplied by the Hispanic/Latino and African American/Black communities in meetings with the NRC staff. Letters were also sent to local Federally recognized Indian tribes to determine any potential resource dependencies. These letters described the construction and operation of the proposed NEF, solicited their concerns on the project, and inquired about whether the Indian tribes desired to participate in the Section 106 consultation process (see Appendix B). The Kiowa Tribe of Oklahoma, Comanche Tribe of Oklahoma, and Ysleta del Sur Pueblo and Mescalero Apache Tribe have indicated that there are no historic properties in the area of potential effects that could have cultural or religious significance to them. Currently, very few Indians live in the area. The NRC staff examined data provided by the States of New Mexico and Texas concerning the health status of the minority and low-income populations in Lea and Eddy Counties in New Mexico and Andrews County in Texas. The results are described in Section 4.2.9 of this Draft EIS.

The NRC staff examined the geographic distribution of minority and low-income populations within 80 kilometers (50 miles) of the proposed NEF site (see Appendix G). This data was based on 2000 U.S. Census information and supplemented by field inquiries by the NRC staff to the local planning departments in Lea, Eddy, and Andrews counties and to social service agencies in the two States. In addition, public comments during the scoping process were reviewed to see if any additional environmental justice populations could be identified.

3.11.1 Minority Populations

The significant minority populations near the proposed NEF are Hispanics/Latinos. Lea County had a 2000 Census population of 22,010 persons of Hispanic/Latino ethnicity out of a total resident population of 55,511 (39.6 percent). Figure 3-30 illustrates the minority population census block groups within 80 kilometers (50 miles) of the proposed NEF and shows the locations of the block groups that meet the minority criteria. Table 3-17 shows the number of minority populations and low-income census block groups within 80 kilometers (50 miles) that satisfy each criterion used for this analysis. Taken together, the criteria resulted in 72 minority block groups out of 117 total block groups within 80 kilometers (50 miles) of the NEF. Of these, 69 were identified using the total minority criterion, and an additional 3 were identified from 1 of the individual minority categories. Many of the minority block groups satisfied one or more individual minority group criteria in addition to the total minority criterion.

The minority and low-income percentages for each census block group within 80 kilometers (50 miles) of the proposed NEF are tabulated in Appendix G. In the table, the census block groups exceeding the 50 percent/20-percentage-point criterion are in boldface, while additional block groups with Hispanic/Latino populations at least as great as the Statewide percentage are shown in italics.

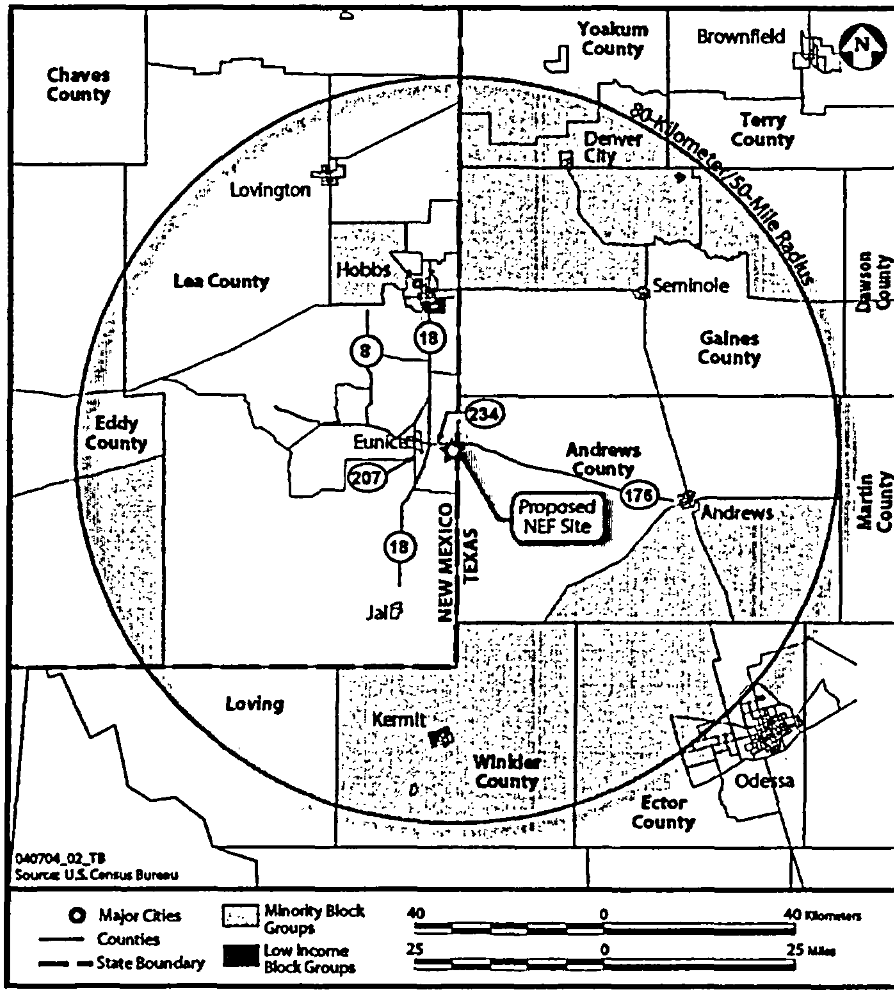

Figure 3-30 Geographic Distribution of Minority and Low-Income Census Block Groups Within an 80-kilometer (50-mile) Radius of the Proposed NEF Site (USCB, 2003)

It should be noted that for this analysis, the State was used as the area of geographic comparison. That is, the minority and low-income populations were based on a comparison to the State averages. Using county averages instead made no difference in the minority and low-income block groups identified. There is a small African American/Black population in Lea County. One block group in Lea County has an elevated African American/Black population, but would have qualified as a minority block group because it has a Hispanic/Latino majority.

Hispanics/Latinos are Lea County's principal minority group with 22,010 individuals. There is a significant Hispanic community in all towns in the county. Also, there are concentrations of Hispanics in all seven Texas counties within 80 kilometers (50 miles) of the proposed NEF site. There are Hispanic/Latino block groups along all of the principal commuting and construction access routes to the proposed NEF site. The African American/Black community on the south side of Hobbs also lies close to one of the these routes. No other significant minority populations were identified in any census block group either close to the proposed NEF site or along the proposed transportation corridors into the site.

In summary, 72 census block groups within 80 kilometers (50 miles) of the proposed NEF site were identified as satisfying the criteria used in this analysis to consider environmental justice in greater detail based on their minority population. The minority population nearest to the proposed site is the Hispanic/Latino population living on the west side of Eunice. Minority block groups also are located along the likeliest commuting and construction access routes. As a result, an extra effort was made to meet with representatives of the African-American and Hispanic/Latino groups in particular to determine if a disproportionately high and adverse impact might occur from construction and operation of the proposed NEF.

3.11.2 Low-Income Populations

Figure 3-30 also shows the location of low-income populations for the environmental study area out to 80 kilometers (50 miles) from the proposed NEF site. Table 3-17 shows that a total of 9 block groups exceed the 20-percentage-point criterion. However, many other block groups in the area also have relatively high percentages of people living below the poverty line. Appendix G shows detailed information on individual block groups within 80 kilometers (50 miles) that satisfy the criteria used for this analysis. The nearest block groups meeting the NRC low-income criteria are on the south side of Hobbs. About 19,000 (20 percent) of the 96,300 people estimated to be living within 80 kilometers (50 miles) of the proposed site are low income. The main low-income areas within 80 kilometers (50 miles) of the proposed NEF are located, as shown in Figure 3-30, within a mile or two of the principal commuting and construction access routes.

3.11.3 Resource Dependencies and Vulnerabilities of the Minority/Low-Income Population

While people in the area of the proposed NEF site do depend on ground water supplied from personal wells or public water utilities, inquiries to the minority and low-income community did not show any exceptional or disproportionate dependence on natural resources that might be affected by the proposed NEF.

Information from the New Mexico and Texas State Departments of Health was examined to see whether there were any exceptional patterns of diminished health status among residents of the area surrounding the proposed NEF site. In particular, this search was seeking any exceptional vulnerabilities among minority and low-income residents of the area. Tables 3-18 and 3-19, which summarize this information, show local populations that have lower cancer incidence than the Statewide averages and higher local crude (total, not age-adjusted) death rates from four other major groups of diseases (possibly due to differences in the age structure of the population in Lea and Andrews counties) (NMDH, 2003a; TDH, 2004; TDH, 2003). No unusual incidence of disease in the minority and low-income population was found in either county. Statewide data on crude death rates for both States do not show any unusual health vulnerabilities among minority populations (separate data on low-income residents were not available). Low crude death rates for Hispanics/Latinos in Texas appear to be the result of an exceptionally young Hispanics/Latino population in that State because age-specific death rates are more in line with those of the majority population (NMDH, 2003b; TDH, 2003).

Interviews with members of the minority community during the scoping process did not turn up any additional minority or low-income populations not identified by the mapping shown in Figure 3-30. Although there were no specific environmental health concerns among minority and low-income populations mentioned in these interviews, two types of pre-existing health conditions were mentioned. One was a high rate of heart disease among African American/Blacks in Lea County, which was believed to be diet-related. The other was a high national rate of diabetes incidence among Hispanics that could also be true of the Lea County area, although this could not be documented. The Statewide statistics for New Mexico and Texas shown in Table 3-19 tend to confirm possible high diabetes incidence, with elevated rates of death from diabetes in New Mexico and Texas among minority populations. Heart disease death rates in Table 3-18 are higher locally in Lea and Andrews counties than Statewide in New Mexico and Texas, although Statewide death rates among minority populations in Table 3-19 are lower than among non-Hispanic whites.

It was not possible to obtain comparative death rates or disease incidence rates for local ethnic groups. There were no other potential vulnerabilities identified for minority and low-income populations other than their geographic proximity to the proposed NEF site and potential transportation routes. The proximity of these populations means that there is a potential for environmental justice concerns. Section 4.2.9 evaluates the potential impact of construction and operation of the proposed NEF to determine whether there are likely to be any disproportionately high and adverse effects on the minority and low-income populations in the area.

Table 3-18 Selected Health Statistics for Counties Near the Proposed NEF Site

	Lea County	New Mexico	Andrews County	Texas
Cancer Incidence (Rate per 100,000 population)				
Male	456.5	468.7	496.4	537.9
Female	318.3	353.8	333.8	384.3
Age-Adjusted Cancer Deaths (Rate per 100,000 population)				
Male	251.9	210.8	238.0	260.8
Female	167.9	146.2	135.1	164.3
Leading Causes of Death 1996-2000 (Rate per 100,000 population)				
Diseases of Heart	231.2	184.6	286.4	218.8
Malignant Neoplasms	179.7	161.4	281.4	165.3
Cerebrovascular Diseases	61.1	46.4	72.6	51.8
Chronic Lower Respiratory Diseases	50.1	45.4	54.4	35.0

Source: NMDH, 2003a; NMDH, 2004; TDH, 2004; TDH, 2003.

Table 3-19 Incidence of Selected Causes of Death Among New Mexico and Texas Populations

	Annual Death Rates			
	White Non-Hispanics	White Hispanics	Native Americans	African American / Black
New Mexico	(No. Per 1,000, 1998-2002)			
Infant Mortality, All Causes	6.4	6.8	7.5	11.1
	(No. Per 100,000, 1998-2000)			
Diabetes Death	20.5	45.1	83.9	N/A
Influenza/ Pneumonia Death	20.0	21.6	41.7	N/A
Cancer Death	184.8	174.1	138.5	N/A
Heart Disease Death	221.6	194.4	185.6	N/A
Texas	(No. Per 1,000, 1998-2000)			
Infant Mortality All Causes	5.4	6.2	NA	11.3
	(No. Per 100,000, 1998-2000)			
Diabetes Death	22.9	25.4	NA	34.5
Influenza/ Pneumonia Death	27.0	9.1	NA	17.0
Cancer Death	207.6	73.8	NA	180.5
Heart Disease Death	275.3	93.1	NA	233.4

Source: NMDH, 2003b; TDH, 2003.

3.12 Noise

The proposed NEF site is located in an unpopulated area of southeastern New Mexico that is used primarily for intermittent cattle grazing. The nearest commercial noise receptors are five businesses located between a 0.8-kilometer (0.5-mile) and 2.6-kilometer (1.6-mile) radius of the proposed site. These five businesses are WCS, located due east of the site over the Texas border; Lea County Landfill, located to the southeast; Sundance Services, Inc., and Wallach Concrete, Inc., located to the north; and DD Landfarm, located just west of the site. The nearest residential noise receptors are homes located approximately 4.3 kilometers (2.6 miles) to the east near the city of Eunice, New Mexico.

LES conducted a background noise-level survey at the four corners of the site boundary on September 16-18, 2003 (LES, 2004a). The measured background noise levels at the site boundaries, which ranged between 40.1 and 50.4 decibels A-weighted, represent the nearest receptor locations for the general public. These locations are anticipated to receive the highest noise levels during construction and when the plant is operational. Noise intensity can be affected by many factors including weather conditions, foliage density, temperature, and land contours.

There are no city, county, or New Mexico State ordinances and regulations governing noise. There are no affected Indian tribes within the sensitive receptor distances from the site; therefore, the proposed NEF site is not subject to Federal, State, tribal, or local noise regulations. The U.S. Department of

Housing and Urban Development (HUD) and the Environmental Protection Agency (EPA) have standards for community noise levels. HUD has developed land use compatibility guidelines (HUD, 2002) for acceptable noise versus the specific land use. Table 3-20 shows these guidelines. The EPA has defined a goal of 55 decibels A-weighted for day-night sound level in outdoor spaces (EPA, 2002b). The background noise levels measured for the proposed NEF site are below both criteria for a daytime period.

Table 3-20 HUD Land Use Compatibility Guidelines for Noise

	Sound Pressure Level (dBA L_{dn})			
Land Use Category	**Clearly Acceptable**	**Normally Acceptable**	**Normally Unacceptable**	**Clearly Unacceptable**
Residential	<60	60-65	65-75	>75
Livestock Farming	<60	60-75	75-80	>80
Office Buildings	<65	65-75	75-80	>80
Wholesale, Industrial, Manufacturing & Utilities	<70	70-80	80-85	>85

dBa = decibels A-weighted.
L_{dn} = day-night sound level.
Source: HUD, 2002.

3.13 Transportation

3.13.1 Local Roads and Highways

The proposed NEF site is on land currently owned by the State of New Mexico. An onsite, gravel-surfaced road bisects the site in an east-west direction. New Mexico Highway 234 is located along the south side of the site and provides direct access to the site. New Mexico Highway 234 is a two-lane highway with 3.7-meter (12-foot) driving lanes, 2.4-meter (8-foot) shoulders, and a 61-meter (200-foot) right-of-way easement on either side. According to the New Mexico Department of Transportation, there are no plans to upgrade New Mexico Highway 234. Maintenance activities on New Mexico Highway 234 to perform maintenance on the road and shoulders are planned, but it is not known when this will occur (NMDOT, 2004a).

To the north of the site, U.S. Highway 62/180 intersects New Mexico Highway 18 and provides access from the city of Hobbs to New Mexico Highway 234. New Mexico Highway 18 is a four-lane divided highway that was rehabilitated within the last four to six years. To the east of the proposed site, U.S. Highway 385 intersects Texas Highway 176 and provides access from the town of Andrews, Texas, to New Mexico Highway 234. To the south of the proposed site and in the State of Texas, Interstate 20 intersects Texas Highway 18 in Texas, which becomes New Mexico Highway 18 when it enters the State of New Mexico. To the west, New Mexico Highway 8 provides access from the city of Eunice east to New Mexico Highway 234. Table 3-21 lists current traffic volume for the road systems in the vicinity of the proposed NEF site.

The State of New Mexico and the State of Texas have indicated that there are no known restrictions on the types of materials that may be transported along the important transportation corridors (NMDOT, 2004a; TDOT, 2004).

Table 3-21 Current Traffic Volume for the Road Systems In the Vicinity of the Proposed NEF Site

Road Name	Traffic Volume Per Day
New Mexico Highway 234 (between New Mexico Highway 18 and Texas border)	1,823
New Mexico Highway 18 (South of New Mexico Highway 234)	5,446
New Mexico Highway 18 (North of New Mexico Highway 207)	5,531
New Mexico Highway 18 (between New Mexico Highway 234 and New Mexico Highway 207)	5,446
Texas Highway 176 (near New Mexico/Texas border)	1,750

Source: NMDOT, 2004b.

3.13.2 Railroads

The Texas-New Mexico Railroad operates an active rail transportation line in Eunice, New Mexico, approximately 5.8 kilometers (3.6 miles) west of the proposed site. The rail line is predominately used for freight transport by the local oil and gas industry. Trains travel on this rail line at an average rate of one train per day. An active rail spur is located along the northern property line of the proposed site. The rail spur is owned by WCS, owner of the neighboring property to the east. Trains travel on this rail spur at an average rate of one train per week. The trains that travel on the spur typically consist of five to six cars. The rail spur has a speed limit of 16 kilometers (10 miles) per hour.

3.13.3 Other Transportation

The nearest commercial airport is the Lea County Regional Airport, located 32 kilometers (20 miles) north of the proposed NEF site near Hobbs, New Mexico. The nearest airport is located approximately 16 kilometers (10 miles) west of the site near Eunice. The airport is used by privately owned planes and has no control tower. The airport has two runways that are 1,000 meters (3,280 feet) and 780 meters (2,550 feet) in length.

Two major international airports are located within approximately 161 kilometers (100 miles) of the proposed NEF site. The nearest is the Midland International Airport (also known as the Midland/Odessa Airport). This four-runway airport is located in Texas about 103 kilometers (64 miles) southeast of the proposed site and is owned and operated by the city of Midland. The Midland/Odessa Airport is designated Foreign Trade Zone #165 (a Foreign-Trade Zone is a Federal program that designates an area within the United States that is considered outside of the U.S. Customs territory where certain types of merchandise can be imported without going through formal Customs entry procedures or paying import duties [FTZ, 2004]). The Grantee is the city of Midland (MIA, 2004). Lubbock International Airport, located along Interstate 27 in Texas (approximately 160 kilometers [100 miles] northeast of Eunice), can also serve the site. The Lubbock International Airport is a 3-runway airport and runs about 60 inbound and outbound flights daily (LIA, 2004).

3.14 Public and Occupational Health

This section describes the naturally occurring sources of radiation and chemicals and the levels of exposure that may be found at the proposed NEF site.

3.14.1 Background Radiological Exposure

Humans are exposed to ionizing radiation from many sources in the environment. Radioactivity from naturally occurring elements in the environment is present in soil, rocks, and in living organisms. A major proportion of natural background radiation comes from naturally occurring airborne sources such as radon. These natural radiation sources contribute approximately 3 millisieverts (300 millirem) per year to the radiation dose that everyone receives annually.

Manmade sources also contribute to the average amount of dose a member of the U.S. population receives. These sources include x rays for medical purposes (0.53 millisieverts [53 millirem] per year) and consumer products (0.1 millisieverts [10 mrem] per year) (e.g., smoke detectors). A person living in the United States receives an average dose of about 3.6 millisieverts (360 mrem) per year (NCRP, 1987). Figure 3-31 depicts the major sources and levels of background radiation near the proposed NEF site.

The U.S. Department of Energy (DOE) established radiological monitoring programs in southeastern New Mexico prior to the Waste Isolation Pilot Plant project to determine the widespread impacts of nuclear testing at the Nevada Test Site on the background radiation. DOE estimated the annual dose of approximately 0.65 millisieverts (65 millirem) is received from atmospheric particulate matter, ambient radiation, soil, surface water and sediment, ground water, and biota (DOE, 1997). These values fall within expected ranges and do not indicate any unexpected environmental concentrations. Lea County lies in an area that is characterized by radon concentrations of 2 to 4 picocuries per liter and is defined as of moderate radon potential (EPA, 2004b). In May 2004, direct background radiation was measured to be 8 to 10 microRad per hour (LES, 2004a), which corresponds to 0.70 to 0.88 milliSieverts (70 to 88 mrem) per year. The measured range falls within the average annual direct background radiation for the United States shown in Figure 3-31.

3.14.2 Background Chemical Characteristics

Eight soil samples taken at the proposed NEF site indicated only barium, chromium, and lead were detected above laboratory reporting limits. The concentrations of these elements in the soil were 23, 3.6, and 2.7 milligrams per kilogram, respectively (LES, 2004a). These concentrations are below health limits (NMEDHWB, 2004). Other nonradiological parameters were below the laboratory reporting limits.

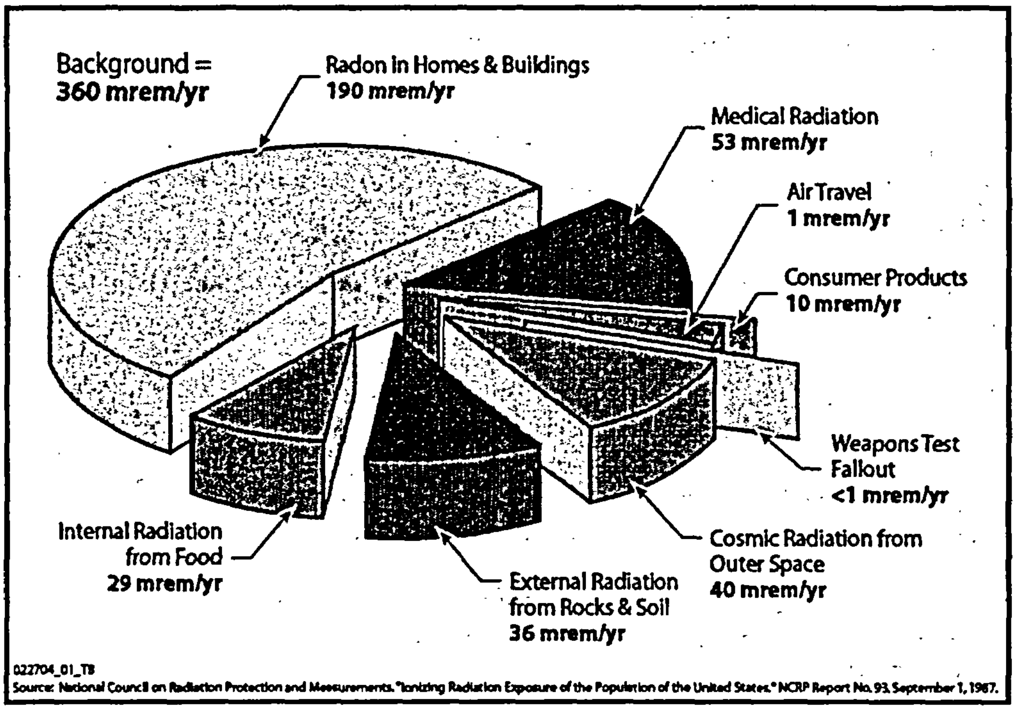

Figure 3-31 Major Sources and Levels of Background Radiation Exposure in the Proposed NEF Vicinity (NCRP, 1987)

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4 ENVIRONMENTAL IMPACTS

4.1 Introduction

This chapter presents the potential impacts associated with the construction, operation, and decommissioning of the proposed National Enrichment Facility (NEF). For the proposed action, this Draft Environmental Impact Statement (Draft EIS) considers impacts from site preparation and construction activities, normal operations, credible accidents, and cumulative impacts and resource commitments. The chapter is organized by environmentally affected areas (i.e., air, water, noise, public and occupational health, etc.). Impacts to each environmentally affected area are divided into two categories—site preparation/construction, and operation—except in those areas where the impacts occur over the entire proposed action and cannot be divided.

Section 4.2 discusses the proposed action under consideration in this Draft EIS—namely, the site preparation, construction, and operations of the proposed NEF in Lea County, New Mexico. Section 4.3 discusses decontamination and decommissioning impacts of the proposed NEF. Because decommissioning would take place well in the future, it is not possible to predict all the technological changes that could improve the decommissioning process. For this reason, the U.S. Nuclear Regulatory Commission (NRC) staff requires that an applicant for decommissioning of a uranium enrichment facility submit a Decommissioning Plan at least 12 months prior to the expiration of the NRC license (10 CFR § 70.38).

In addition, this chapter discusses the potential cumulative impacts (Section 4.4), irreversible and irretrievable commitment of resources (Section 4.5), unavoidable adverse environmental impacts (Section 4.6), the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity (Section 4.7), and the no-action alternative (Section 4.8).

Environmental impacts are separated into radiological and nonradiological areas of concern. Radiological impacts include radiation doses to the public and workers from the routine operations, transportation, potential accidents, and decommissioning and environmental impacts from potential releases in the air, soil, or water. Nonradiological impacts include chemical hazards, emissions (e.g., vehicle fumes), occupational accidents and injuries (e.g., vehicle collisions), and workplace accidents.

Determination of the Significance of Potential Environmental Impacts

A standard of significance has been established for assessing environmental impacts. Based on the Council on Environmental Quality's regulations, each impact is to be assigned one of the following three 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.*

Source: NRC, 2003a.

4.2 Proposed Action

As defined in Chapter 2 of this Draft EIS, the proposed action is the construction, operation, and decommissioning of the proposed NEF. The NRC would issue a license to Louisiana Energy Services (LES) in accordance with the requirements of 10 CFR Parts 30, 40, and 70 to possess and use source, byproduct, and special nuclear material.

4.2.1 Land Use Impacts

Impacts on land use are considered in terms of commitment of the land for the proposed use and its potential exclusion from other possible uses.

The land-exchange process proposed for the 220-hectare (543-acre) site would eventually transfer the land from public (State of New Mexico) to private ownership at the end of a 30-year lease between LES and Lea County (LES, 2004e). The transfer of the land would not conflict with any existing Federal, State, local, or Indian tribe land-use plans. Rather, the construction and operation of the proposed NEF would support a preferred land-use plan being pursued by the city of Eunice, New Mexico. The proposed NEF construction and operation would have no foreseeable conflicts with the Land and Water Conservation Fund and the Urban Park and Recreation Recovery programs in the area (NMEMN, 2004; Abousleman, 2004a).

4.2.1.1 Site Preparation and Construction

The most obvious land-use impact would be onsite disturbance during project construction and operation. Potential land-use impacts would be limited to about 81 hectares (200 acres) within a 220-hectare 543-acre) site. The remaining property (147 hectares or 363 acres) would be left in a natural state for the duration of the license. The impacts resulting from restricting the current land use (i.e., cattle grazing) would be SMALL due to the abundance of other nearby grazing land.

The relocation of the carbon dioxide (CO_2) pipeline would result in temporary disruption of CO_2 supplies to recipients. Because there would be no change in capacity once the relocation along the site boundaries is completed, the resultant impact would be SMALL and confined to the relocation period. The relocation activities would comply with all applicable regulations and best management practices (BMPs) to minimize any direct or indirect environmental impacts.

Installation of the necessary municipal water-supply piping and electrical transmission lines would also result in temporary land-use impacts (principally from the disruption of access to property along county right-of-way easements where these infrastructure projects would occur). As with the relocation of the CO_2 pipeline, these impacts would be SMALL and temporary. The electrical transmission lines would also be installed according to applicable regulations and BMPs within the proposed NEF site.

4.2.1.2 Operations

Operation of the proposed NEF would limit land use to those processes related to uranium enrichment. The operation of the proposed NEF would be consistent with the existing land use of the neighboring industrial facilities. Therefore, the impacts to the surrounding land use would be SMALL.

4.2.1.3 Mitigation Measures

Several BMPs would help minimize impacts to surrounding land use by limiting the impacts to within the proposed NEF boundaries. Construction BMPs would be used to mitigate potential short-term increases in soil erosion due to construction activities in addition to specific BMPs for relocating the CO_2 pipeline. A Spill Prevention Control and Countermeasures Plan would be implemented to address any potential spills that could occur within the proposed NEF site. A waste management program would be used to minimize solid waste and hazardous materials that could contaminate the surrounding soils.

4.2.2 Historical and Cultural Resources Impacts

This section discusses the potential impacts to the known historical and cultural resources on the proposed NEF site.

The *National Historic Preservation Act* (NHPA) as amended requires Federal agencies to take into account the potential effects of their undertakings on historic properties. Under Section 106 of the NHPA, two undertakings could create potential adverse effects to historic properties at the proposed NEF site—a Federal agency (i.e., NRC) licensing action and a State of New Mexico land-exchange process. As discussed below, impacts from both undertakings would be combined and evaluated under a single consultation process.

As indicated in Section 3.1 of Chapter 3 of this Draft EIS, a land-exchange process would eventually result in the property, now under State ownership, being deeded to private ownership. This process would proceed through a series of steps that would eventually result in the property being deeded to LES following a long-term lease. The New Mexico State Historic Preservation Office and New Mexico State Land Office consider this land-exchange process to be an adverse effect on historic properties (NMDCA, 2004).

The cultural resources inventory (Graves, 2004) indicated the presence of seven prehistoric archaeological sites recorded in the 220-hectare (543-acre) proposed NEF site. Two (LA 149701 and LA 140702) are located in the northeast sector of the proposed facility layout and would be directly impacted during construction activities. A third (LA 140705) is situated along the proposed access road. The remaining archaeological sites are located north and northwest of the facility layout, along the northern boundary of the property.

Three sites (LA 140701, LA 140702, and LA 140703) were originally recommended by the field investigators as not retaining sufficient integrity or research value for eligibility for listing on the National Register of Historic Places. The remaining four archaeological sites, LA 140404 through LA 140707, were recommended as being either potentially eligible or eligible for listing on the National Register of Historic Places. Subsequent review of the field results by the New Mexico State Historic Preservation Office and New Mexico State Land Office officials determined that all of the seven archaeological sites were similar in nature and that buried cultural resources could be present at each one (NMDCA, 2004). Consequently, each of the seven sites is now considered eligible for listing on the National Register of Historic Places and is considered to be an historic property.

The Section 106 consultation process with regional Federally recognized Indian tribes and other organizations has been initiated (see Appendix B). This course of action yielded no information on potential traditional cultural properties or other culturally significant resources at the proposed NEF site.

Consultations between LES, the New Mexico State Historic Preservation Office, the New Mexico State Land Office, the Advisory Council on Historic Preservation, and the NRC staff have led to an agreement that a single Memorandum of Agreement would be prepared to conclude the Section 106 consultation process (NRC, 2004b). The Memorandum of Agreement being prepared would record the terms and conditions agreed upon between the consulting parties to resolve adverse effects to historic properties at the proposed NEF site. It would include the above parties as well as Lea County as signatories, the potentially affected Indian tribes as concurring parties, and would reference and incorporate an historic properties treatment plan as an appendix. Once measures outlined in the treatment plan are executed, adverse impacts to all seven of the historic properties at the proposed NEF site would be mitigated, including effects from both the licensing and land-exchange processes. Mitigative tasks in the treatment plan would be fully implemented prior to construction of the proposed NEF.

Based on the successful completion of the identification of historic and archaeological sites, National Register of Historic Places evaluations, and effective treatment of potential adverse effects to historic properties, along with the existence of written procedures to provide immediate reaction and notification in the event of inadvertent discovery of cultural resources, the potential impacts on historical and cultural resources at the proposed NEF site would be expected to be SMALL.

4.2.2.1 Mitigation Measures

An historic properties treatment plan is being finalized between the NRC, LES, the New Mexico State Historic Preservation Office, the New Mexico State Land Office, Lea County, and the Advisory Council on Historic Preservation with Indian tribes as concurring parties that would establish the terms and conditions to resolve the potential for adverse effects to historic properties at the proposed NEF site (Proper, 2004).

Once finalized, the treatment plan would include several data-recovery approaches to retrieve scientific information from each of the seven archaeological sites. These approaches would include mapping and collection of surface artifacts, subsurface testing of cultural features and artifact concentrations, and mechanical cross-trenching of the site areas. A geoarchaeological study would accompany the subsurface testing and trenching efforts. Analyses of the retrieved data would focus on determining the age of the sites, site function, paleoenvironmental setting, and cultural attributes associated with the site occupancy. A final written report would be prepared and all artifacts and associated data would be permanently curated at an approved archival facility.

4.2.3 Visual and Scenic Resources Impacts

Although the construction and operation of the proposed NEF would modify the visual and scenic quality of the area, it would remain compatible with the surrounding land uses (Figure 4-1). The site is bordered by Wallach Concrete, Inc., and Sundance Services, Inc., to the north; the Lea County landfill to the south/southeast across New Mexico Highway 234; DD Landfarm to the west; and Waste Control Specialists (WCS) to the east. In addition, the general area has been developed by the oil and gas industry with several processing facilities having flame-off towers and other processing columns (one is physically located in the southern portion of Eunice, New Mexico), and hundreds of oil pump jacks and associated rigs. The proposed NEF site received the lowest scenic-quality rating using the U.S. Bureau of Land Management (BLM) visual resource inventory process (LES, 2004a). With its tallest structure at no more than 40 meters (131 feet), the proposed NEF would not affect the BLM scenic-quality rating.

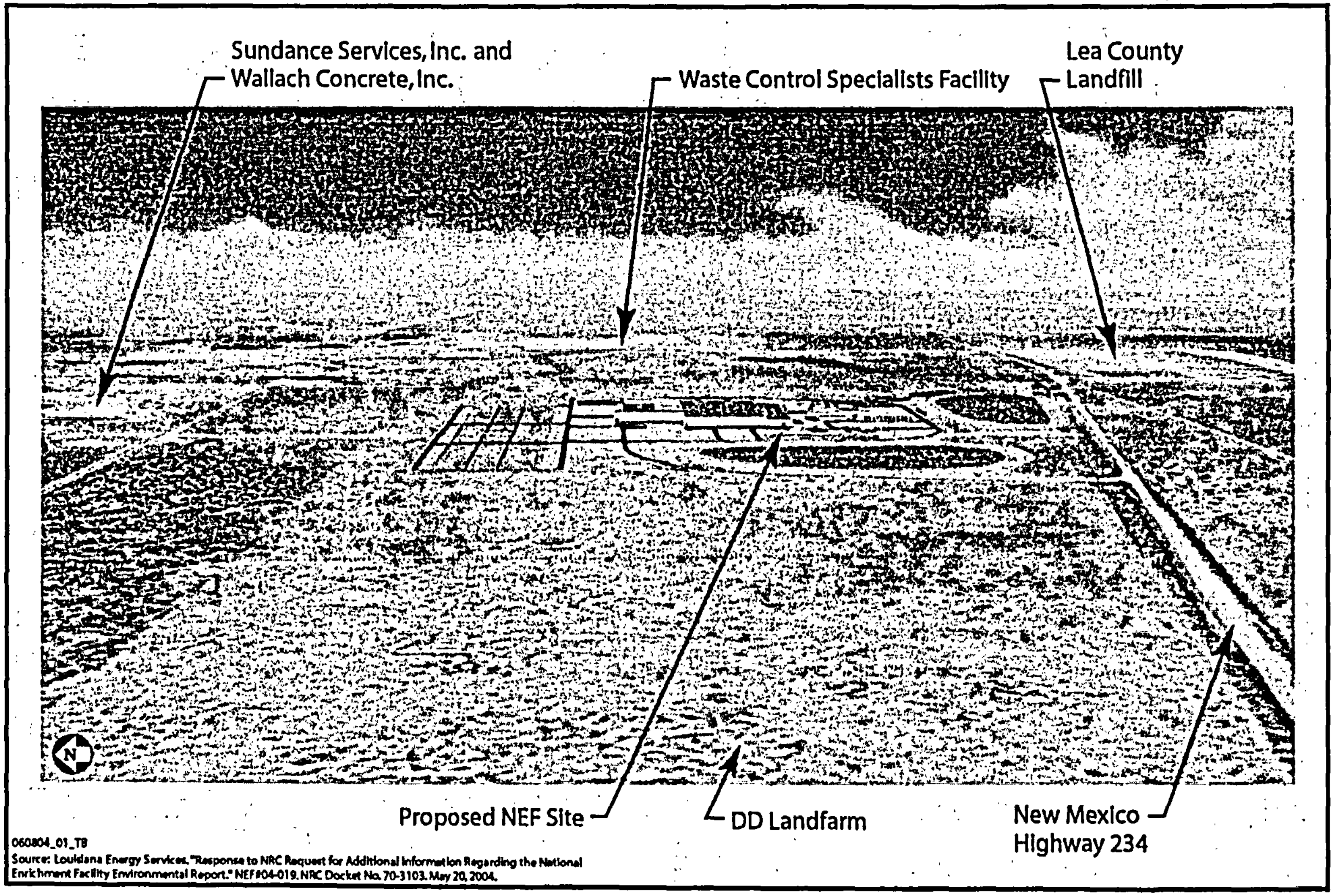

Figure 4-1 Visual Impact of the Proposed NEF on Nearby Facilities (LES, 2004a)

4.2.3.1 Site Preparation and Construction

Visibility impacts from construction would be limited to fugitive dust emissions. Fugitive dust would originate predominately from vehicle traffic on unpaved surfaces, earth moving, excavating and bulldozing, and to a lesser extent, wind erosion. Application of standard dust-suppression practices along with maintenance of appropriate vehicle speed controls and emission controls on diesel and gasoline motors would minimize the impact from fugitive dust emissions.

Visual impacts from construction are transitory and not significantly different from other excavation activities in the surrounding area such as building additional disposal cells at the Lea County landfill or mining aggregate at Wallach Concrete, Inc. Because the majority of the site would remain undeveloped, the overall impacts to visual resources from the proposed NEF site construction would be SMALL.

4.2.3.2 Operations

Visibility from both exiting and access roads to the proposed NEF would be limited to taller onsite structures. While onsite structures could be visible from nearby locations, the details of these structures would be indistinguishable from a distance.

Under low-wind-speed conditions and high relative humidity, the operation of the proposed NEF could produce fog or mist clouds from the cooling towers that might interfere with visibility. To investigate this possibility, data from hourly surface observations at the Midland-Odessa National Weather Station were analyzed in Appendix E for the ideal conditions to produce fog (i.e., high relative humidity, low wind speed, and stable weather conditions). The results of this analysis demonstrate that less than 0.5 percent of the total hours per year yield favorable conditions for the cooling towers to contribute to the creation of fog.

Security lights and additional vehicle traffic to and from the proposed NEF would also create long-term visual impacts to the surrounding land and existing facilities. The visual impacts from the security lighting at night would be less significant than those of the flame-off towers and lighting of nearby oil- and gas-processing facilities.

The impact from commuting traffic would only be for a short period of time and, due to the relatively flat topography, would affect only a very localized area near the roads. The potential visual impacts associated with the operation of the proposed NEF site on neighboring properties and the nearby oil and gas well fields would be considered SMALL.

4.2.3.3 Mitigation Measures

LES would apply a fugitive dust control program as a mitigation measure to minimize airborne dust during construction. Low-water-consumption landscaping techniques and prompt covering of bare areas would help keep the visual characteristics of the site consistent with the surrounding terrain.

4.2.4 Air-Quality Impacts

This section discusses air-quality impacts from construction and operation of the proposed NEF and assesses potential air-quality impacts in the context of National Ambient Air Quality Standards and National Emission Standards for Hazardous Air Pollutants established to protect human health and welfare with an adequate margin of safety (40 CFR Part 50).

4.2.4.1 Site Preparation and Construction

Air-quality impacts from site preparation and construction activities were evaluated using emission factors and air-dispersion modeling. The Industrial Source Complex Short-Term air-dispersion model (EPA, 1995b) was used to estimate both short-term and annual average air concentrations at the facility property boundary. Hourly meteorological observations from the Midland-Odessa National Weather Station for the years 1987 through 1991 were used to create an input file to the Industrial Source Complex Short-Term air-dispersion model (NCDC, 1998).

Emission estimates were used in this analysis and are provided in Table 2-2 in Section 2.1.4 of Chapter 2 of this Draft EIS (LES, 2004a). The emission rates of *Clean Air Act* criteria pollutants and nonmethane hydrocarbons (a precursor of ozone, a criteria pollutant) for exhaust emissions from construction vehicles and for fugitive dust were estimated using emission factors provided in AP-42, the EPA's "Compilation of Air Pollutant Emission Factors" (EPA, 1995a). Total emission rates were used to scale the output from the Industrial Source Complex Short-Term air-dispersion model (air concentrations derived using a unit source term) to estimate both short-term and annual average air concentrations at the facility property boundary. Emissions were modeled in the Industrial Source Complex Short-Term air-dispersion model as a uniform area source with unit emission rate.

A maximum of 18 hectares (45 acres) would be involved in construction work at any one time (LES, 2004a). Emissions from a rectangular box area of 427 meters by 427 meters (1,401 feet by 1,401 feet) (corresponding to 18 hectares [45 acres] total) were simulated as an area source in the Industrial Source Complex Short-Term air-dispersion model. Emissions were assumed to occur 10 hours per day (from 8 a.m. to 6 p.m) and 5 days per week (Monday through Friday) for every year from 1987 through 1991. The modeling extends 20 kilometers (12.4 miles) from each side of the proposed NEF site boundary.

As presented in Table 4-1, air concentrations of the criteria pollutants predicted for vehicle emissions are 3 to 20 times below the National Ambient Air Quality Standards (EPA, 2003). Particulate matter emissions from fugitive dust were also below the National Ambient Air Quality Standards.

Because the predicted air concentrations of expected vehicle emissions and fugitive dust are considerably less than the applicable National Ambient Air Quality Standards, the impacts to air quality from the construction of the proposed NEF would be considered SMALL.

Table 4-1 Predicted Property-Boundary Air Concentrations and Applicable National Ambient Air Quality Standards

		Max 1-hr	Max 3-hr	Max 8-hr	Max 24-hr	Annual
Vehicle Emissions ($\mu g/m^3$)						
HC	Modeled	<500	226	85	34	3
	NAAQS	---	---	---	---	---
CO	Modeled	<4,000	1,440	540	215	18
	NAAQS	40,000	---	10,000	---	---
NOx	Modeled	<7,500	3,000	1,125	450	38
	NAAQS	---	---	---	---	100
SOx	Modeled	<750	300	113	45	4
	NAAQS	---	1,310 (secondary)	---	365	80
PM_{10}	Modeled	<500	220	81	33	3
	NAAQS	---	---	---	150 (secondary)	50
Fugitive Dust ($\mu g/m^3$)						
PM_{10}	Modeled	<2,400	1,000	360	144	12
	NAAQS	---	---	---	150 (secondary)	50

HC - hydrocarbons; CO - carbon monoxide; NOx - nitrogen dioxide; SOx - sulfur oxides; PM_{10} - particulate matter less than 10 microns; NAAQS - National Ambient Air Quality Standards; $\mu g/m^3$ - microgram per cubic meter; hr - hour; ---- no standard
Source: EPA, 2003.

4.2.4.2 Operations

The surrounding air quality would be affected by nonradioactive gaseous effluent releases during operation of the proposed NEF. Nonradioactive gaseous effluents include hydrogen fluoride and acetone. The proposed NEF would release approximately 1 kilogram (2.2 pounds) per year of hydrogen fluoride, 40 liters (11 gallons) of ethanol, and 610 liters (161 gallons) of methylene chloride per year (LES, 2004a). The total amount of hazardous air pollutants emitted to the atmosphere would be less than 9.1 metric tons (10 tons) per year; therefore, a *Clean Air Act* Title V permit would not be required.

The following emission rates were estimated for criteria pollutants (from onsite boilers) (LES, 2004a):

- Volatile organic compounds - 0.8 metric ton (0.88 ton) per year.
- Carbon monoxide - 0.5 metric ton (0.55 ton) per year.
- Nitrogen dioxide - 5.0 metric tons (5.5 tons) per year.

The total amount is less than 91 metric tons (100 tons) per year; therefore, a *Clean Air Act* Title V permit would not be required.

In addition, there would be two diesel generators onsite for use as emergency power sources. The following emission rates from the two emergency diesel generators were estimated for criteria pollutants (LES, 2004a):

- Volatile organic compounds – 0.26 metric ton (0.29 ton) per year.
- Carbon monoxide – 0.85 metric ton (0.94 ton) per year.
- Nitrogen dioxide – 11.1 metric tons (12 tons) per year.
- Particulate matter (of less than 10 microns) – 0.1 metric ton (0.11 ton) per year.

Because the diesel generators have the potential to emit more than 91 metric tons (100 tons) per year of a regulated air pollutant, LES proposes to run these diesel generators only a limited number of hours per year for the above emission rates to avoid being classified as a *Clean Air Act* Title V source (LES, 2004a).

For the few National Emission Standards for Hazardous Air Pollutants (NESHAPs) of concern (hydrofluoric acid, and methylene chloride) for the proposed NEF, all estimated levels are below the amounts requiring an application for permits (9.1 metric tons [10 tons] per year of a single and 22.7 metric tons [25 tons] per year of any combination of NESHAPs). Therefore, the impacts to air quality from operations would be SMALL.

4.2.4.3 Mitigation Measures

Mitigation measures for air quality during construction would involve attempts to reduce the impacts from vehicle emissions. LES would maintain construction equipment and vehicles to ensure their emissions are below National Ambient Air Quality Standards. During operation of the proposed NEF, exhaust-filtration systems would collect and clean all potentially hazardous gases prior to release into the atmosphere and use monitoring and alarm systems for all nonroutine process operations. In addition to these actions, LES would limit the number of hours per year the emergency diesel generators run, employ proper maintenance practices, and adhere to operational procedures to ensure the proposed NEF stays below applicable limits for the NESHAPs of concern.

4.2.5 Geology and Soils Impacts

This section discusses the assessment of potential environmental impacts on geologic resources and soils during site preparation and construction and operation of the proposed NEF. Impacts could result from planned excavation activities for the proposed NEF and the consumption of mineral resources for use in roadbeds and as construction materials. There are no known nonpetroleum mineral deposits on the proposed NEF; therefore, there are no impacts to mineral resources. Chapter 3 of this Draft EIS describes site soil uses, which are suitable as range land and have been used for cattle grazing. The soils are not well suited for farming and are typical of regional soils.

4.2.5.1 Site Preparation and Construction

Site preparation and construction activities for the proposed NEF site have the potential to impact the site soils in the construction area. Only 81 hectares (200 acres), including 8 hectares (20 acres) for contractor parking and construction lay-down areas, within the 220-hectare (543-acre) site would be disturbed. The remainder would be left in a natural state for the life of the proposed NEF. Construction activities at the site would include surface grading and excavation of the soils for utility lines and rerouting of the CO_2 pipeline, stormwater retention/detention basins, and building and facility foundations.

The proposed NEF would be located on an area of flat terrain; cut and fill would be required to bring the site to final grade. Onsite soils are suitable for fill, although they could require wetting to achieve adequate compaction (Mactec, 2003). Present plans are for a total of 611,000 cubic meters (797,000 cubic yards) of soil to be cut and used as fill. The resulting terrain change over 73 hectares (180 acres) from gently sloping to flat would result in SMALL impacts; numerous such areas of flat terrain exist in the region due to natural erosion processes. Only onsite soils would be used in the site grading, and no import of borrow materials would be required.

Construction activities could cause some short-term impacts such as increases in soil erosion at the proposed NEF site. Soil erosion could result from wind action and precipitation, although there is limited rainfall in the vicinity of the proposed NEF. Several mitigative measures would be taken to minimize soil erosion and control fugitive construction dust.

Preliminary site geotechnical investigations indicate that facility footings could be supported by the firm and dense sandy subsurface soils (Mactec, 2003). Although not presently foreseen, if final design studies indicate the necessity to extend footings through the sand into the Chinle Formation, then more soils would be disturbed and the clay layer could be penetrated.

These same geotechnical investigations also considered the suitability of the site subsurface soils to support a septic leach field. Two test locations were used to establish a percolation rate of 3.3 minutes per centimeter (8.4 minutes per inch). The final design would require additional percolation testing at the design leach field locations and elevations to comply with applicable State and local regulations.

Because site preparations and construction result in only short-term effects to the geology and soils, the impacts would be SMALL.

4.2.5.2 Operations

During operations of the proposed NEF, the exposed surface soils could experience the same types of impacts as the undisturbed soils in the surrounding area. The primary impact to these soils would be wind and water erosion. However, this environmental impact would be SMALL as the rate of wind and water erosion of the exposed surface soils surrounding the proposed NEF site would likely be small.

Releases to the atmosphere during normal operation of the proposed NEF could contribute to a small increase in the amount of uranium and fluorides in surrounding soils as they are transported downwind. Section 4.2.4 notes that all estimated atmospheric releases of pollutants would be below the amounts requiring permits, and the impacts to air quality from operations would be SMALL. Section 4.2.12 presents the potential human health impacts from this deposition to the surrounding soils. Based on the discussion above, the proposed NEF would be expected to result in SMALL impacts on site geologic and soil resources.

4.2.5.3 Mitigation Measures

Application of construction BMPs and a fugitive dust control plan would lessen the short-term impacts from soil erosion by wind or rain during construction. LES would comply with National Pollutant Discharge Elimination System (NPDES) general permits. To mitigate the impacts of stormwater runoff on the soils, earthen berms, dikes, and sediment fences would be used as needed during construction, and permanent structures such as culverts and ditches would be stabilized and lined with rock aggregate/riprap to reduce water-flow velocity and prohibit scouring. Stormwater detention basins would be used during construction, and retention/detention basins would be used during operation. Implementation of the Spill Prevention Control and Countermeasures Plan would reduce impacts to soil by mitigating the potential impacts from chemical spills that could occur around vehicle maintenance and fueling locations, storage tanks, and painting operations during construction and operation. Waste management procedures would be used to minimize the impacts to the surrounding soils from solid waste and hazardous materials that would be generated during construction and operation.

4.2.6 Water Resources Impacts

This section discusses the assessment of potential environmental impacts to surface water and ground water during construction and operation of the proposed NEF. The discussion includes the potential impact to natural drainage on and around the proposed NEF site and the effect of the proposed NEF on the regional water supply.

4.2.6.1 Site Preparation and Construction

Because construction activities would disturb over 0.4 hectares (1 acre), an NPDES Construction Stormwater General Permit from EPA Region 6 and an oversight review by the New Mexico Environment Department/Water Quality Bureau would be required. Stormwater runoff and wastewater discharges would be collected in retention/detention basins. The stormwater detention basin would allow infiltration into the ground as well as evaporation. In addition, the stormwater detention basin would have an outlet structure to allow drainage. The retention basins, once constructed, would allow disposition of collected stormwater by evaporation only. No flood-control measures are proposed because the site grade is above the 500-year flood elevation. Sanitary waste generated at the site would be handled by portable systems until such time that the site septic systems are available for use. Compliance with the permit would minimize the impacts to surface features and ground water.

The NRC staff estimates that approximately 7,570 cubic meters (2 million gallons) of water would be used annually during the construction phase of the proposed NEF based on the design estimates for the formerly proposed Claiborne Enrichment Facility (NRC, 1994). Water would be used for concrete formation, dust control, compaction of the fill, and revegetation. These usage rates are well within the excess capacities of Eunice or Hobbs water supply systems and would not affect local uses (Abousleman, 2004b; Woomer, 2004). Current capacities for the Eunice and Hobbs municipal water supply systems are about 6 million cubic meters (1.6 billion gallons) per year and 27.6 million cubic meters (7.3 billion gallons) per year, respectively. As a result, small short-term impacts to the municipal water supply system would occur. In addition, a Spill Prevention Control and Countermeasures Plan would be implemented to address potential spills during construction activities.

Because there are no existing easily accessible water resources onsite and BMPs would be used to minimize the impacts of construction stormwater and wastewater within the site boundaries, the impacts to water resources during construction would be expected to be SMALL.

4.2.6.2 Operations

The proposed NEF site liquid effluent discharge rates would be relatively small. The proposed NEF wastewater flow rate from all sources would be expected to be about 28,900 cubic meters (7.6 million gallons) annually (LES, 2004a). This includes approximately 2,540 cubic meters (670,000 gallons) annually of wastewater from the liquid effluent treatment system, while domestic sewage and cooling tower blowdown waters constitute the remaining amount.

The liquid effluent treatment system and shower/hand wash/laundry effluents would be discharged onsite into a double-lined Treated Effluent Evaporative Basin, whereas the cooling tower blowdown water and

Uranium Byproduct Cylinder (UBC) Storage Pad stormwater runoff would be discharged onsite to a single-lined retention basin. Runoff water from developed areas of the site other than the UBC Storage Pad would be collected in the unlined Site Stormwater Detention Basin. Domestic sewage would be discharged to onsite septic tanks and subsequently to an associated leach field system. No process waters would be discharged from the site. There is the potential for intermittent discharges of stormwater offsite. Figure 4-2 shows the onsite location of the water basins and septic tanks.

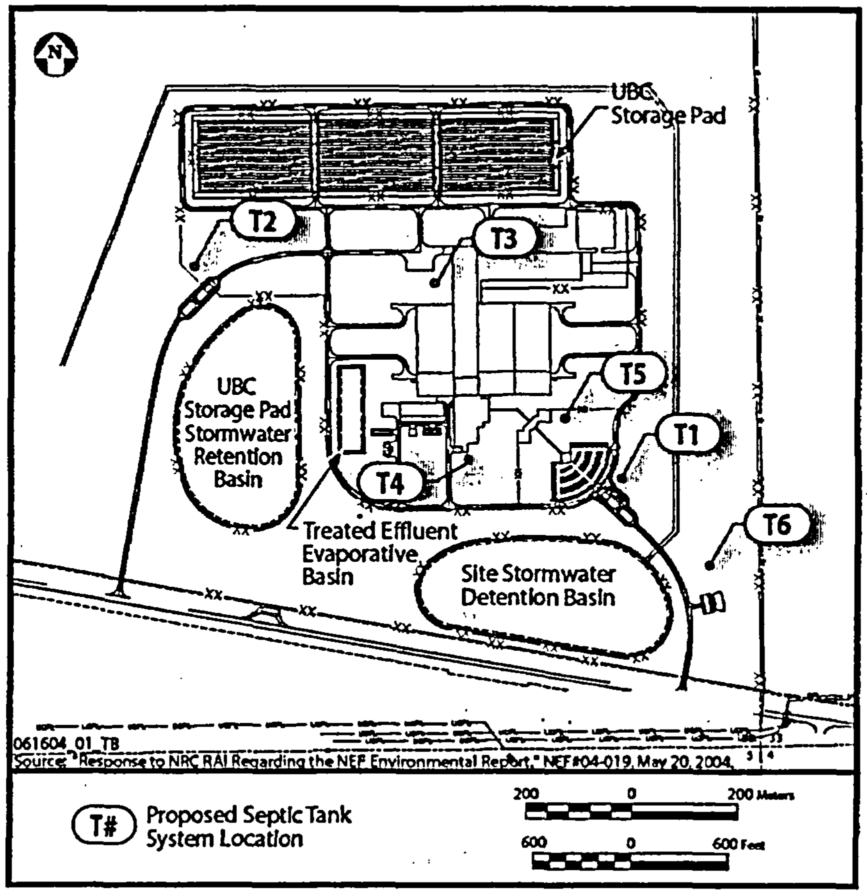

Figure 4-2 Basins and Septic Tank System Locations (LES, 2004a)

Approximately 174,000 cubic meters (46 million gallons) of stormwater would be expected to be released annually to the onsite retention/detention basins. In addition, about 617,000 cubic meters (163 million gallons) of annual runoff from the undeveloped site areas could be expected. Site drainage would be to the southwest with runoff not able to reach any natural water body before it evaporates.

Treated Effluent Evaporative Basin

Total annual effluent discharge to the Treated Effluent Evaporative Basin would be 2,540 cubic meters (670,000 gallons). The effluent would be disposed of by evaporation of all of the water and impoundment of the remaining dry solids. A water balance of the basin, including consideration of effluent and precipitation inflows and evaporation outflows, indicates that the basin would be dry for 1 to 8 months of the year depending on annual precipitation rates (LES, 2004f). The volume of the basin is expected to be sufficient to contain all inflows for the life of the proposed facility. In the unlikely event of consecutive years of very high precipitation, it could become necessary for the site operators to develop strategies to prevent basin overflows. Because such an unlikely event could occur gradually over a long period of time (years), there would be sufficient time to take necessary actions.

During the proposed NEF operation, only liquids meeting site administrative limits based on prescribed standards would be discharged into the Treated Effluent Evaporative Basin. It is expected that operation of the waste treatment system would result in 14.4×10^6 becquerels (390 microcuries) per year of uranium discharged to the Treated Effluent Evaporative Basin. These levels are small and would not impact area water resources. Effluents unsuitable for release to the basin could be recycled through the liquid effluent treatment system or processed into a solid and disposed of offsite in a suitable manner. The Treated Effluent Evaporative Basin would be expected to have only a SMALL impact on water resources. Section 4.2.12 describes potential impacts from atmospheric resuspension of the uranium when the basin is dry.

UBC Storage Pad Stormwater Retention Basin

Total annual effluent discharge from blowdown to the UBC Storage Pad Stormwater Retention Basin would be 19,300 cubic meters (5.1 million gallons) (LES, 2004a). The effluent would be disposed of by evaporation of all of the water and impoundment of the remaining dry solids. A water balance of this basin, including consideration of effluent and precipitation inflows and evaporation outflows, indicates that the basin would be dry for 11 to 12 months of the year, depending on annual precipitation rates (LES, 2004f). The basin would have the capacity to hold all inflows for the life of the proposed NEF. UBCs (i.e., depleted uranium hexafluoride [DUF_6]-filled Type 48Y cylinders) would be surveyed for external contamination before being placed on the UBC Storage Pad and would be monitored while stored on the pad. Any external contamination would be removed prior to cylinder placement on the pad. Therefore, rainfall runoff to this basin would be clean and would not result in an exposure pathway. Because all of the water discharged to the lined UBC Storage Pad Stormwater Retention Basin would evaporate, the basin would have a SMALL impact on water resources.

Site Stormwater Detention Basin

The Site Stormwater Detention Basin would be unlined, and discharges would be through infiltration and evaporation. A water balance of this basin shows that it would be dry except during rainfall events (LES, 2004f). Most of the water discharged into the basin would seep into the ground before evaporating at an average rate of 17 centimeters (6.7 inches) per month.

Water seeping into the ground from the Site Stormwater Detention Basin could be expected to form a perched layer on top of the highly impermeable Chinle Formation clay similar to the "buffalo wallows" described in Chapter 3 of this Draft EIS. The water would be expected to have limited downgradient transport due to the storage capacity of the soils and the upward flux to the root zone. A conservative estimate of the impact from this basin assumes that the local ground-water velocity of the plume coming from the Site Stormwater Detention Basin could be 252 meters (0.16 mile) per years. The cross-section (perpendicular to the flow direction) of this plume would be 2,850 square meters (30,700 square feet). The depth of the plume would be about 2.85 meters (9.3 feet) for a nominal plume width of 1,000 meters (3,280 feet).

The water quality of the basin discharge would be typical of runoff from building roofs and paved areas from any industrial facility. Except for small amounts of oil and grease expected from normal onsite traffic, which would readily adsorb into the soil, the plume would not be expected to contain contaminants. There are no ground-water users within 3.2 kilometers (2 miles) downgradient of the proposed NEF site, and there are no downgradient users of ground water from the sandy soil above the Chinle Formation. Portions of the plume not evapotranspired and traveling downgradient could result in a minor seep at Custer Mountain or in the excavation 3.2 kilometers (2 miles) southeast of Monument Draw where the Chinle Formation is exposed (Nicholson and Clebsch, 1961). Accordingly, the Site Stormwater Detention Basin seepage would have a SMALL impact on water resources of the area.

Septic Tanks and Leach Fields

Water seeping into the ground from the septic systems could be expected to form a perched layer on top of the highly impermeable Chinle Formation similar to the "buffalo wallows" described in Chapter 3 of this Draft EIS. The water can be expected to have limited downgradient transport because of the storage capacity of the soils and the upward flux to the root zone. A conservative estimate of the impact from the septic systems assumes all of the infiltrating water is transported downgradient. The local ground-water velocity of the plumes coming from the septic system would then be about 252 meters (0.16 mile) per year. The total cross-section (perpendicular to the flow direction) of the septic system plumes would be 116 square meters (1,250 square feet). The depth of the plumes was calculated to be about 1.16 meters (3.8 feet) for a nominal total plume width of 100 meters (328 feet).

The proposed septic systems are included in the ground-water discharge permit application filed with the New Mexico Environment Department/Ground-Water Quality Bureau (LES, 2004a). Sanitary wastewater discharged to the septic system would meet required levels for all contaminants stipulated in the permit (LES, 2004a). There are no ground-water users within 3.2 kilometers (2 miles) downgradient (toward the southwest) of the proposed NEF site, and there are no downgradient users of ground water from the sandy soil above the Chinle Formation. Contaminants would leach out of the septic system discharge as water is transported vertically. Portions of the plume not evapotranspired traveling downgradient could result in a minor seep at Custer Mountain or in the excavation 3.2 kilometers (2 miles) southeast of Monument Draw where the Chinle Formation is exposed (Nicholson and Clebsch, 1961). The septic systems would also be expected to have a SMALL impact on water resources.

4.2.6.3 Water Uses of Operation

The proposed NEF water supply would be obtained from the municipal supply systems of the cities of Eunice and Hobbs, New Mexico. Water rights, if any, required for this arrangement would be negotiated with the municipalities. The proposed NEF would consume water to meet potable, sanitary, and process consumption needs. None of this water would be returned to its original source. The waters originate from the Ogallala Aquifer north of Hobbs, New Mexico (Woomer, 2004). New potable water supply lines would be approximately 8 kilometers (5 miles) in length from Eunice, New Mexico, and approximately 32 kilometers (20 miles) in length from Hobbs, New Mexico, along county right-of-way easements along New Mexico Highways 18 and 234. The impacts of such activity would be short-term and SMALL (e.g., access roads to the highway could be temporarily diverted while the easement is excavated and the pipelines are installed) (Woomer, 2004).

Eunice and Hobbs, New Mexico, have excess water capacities of 66 and 69 percent, respectively. Average and peak water requirements for the proposed NEF operation would be expected to be approximately 240 cubic meters (63,423 gallons) per day and 2,040 cubic meters (539,000 gallons) per day, respectively. These usage rates are well within the excess capacities of both water systems and would not affect local uses (Abousleman, 2004b; Woomer, 2004). The annual proposed NEF water use would be less than the daily capacity of these systems. Figure 4-3 illustrates the relationships between the proposed NEF projected water uses and Eunice and Hobbs water demand and system capacities. The average and peak water use requirements would be approximately 0.26 and 2.2 percent, respectively, of the combined potable water capacity for Eunice and Hobbs of 92,050 cubic meters (24.3 million gallons) per day.

The proposed NEF operation would be expected to use on an average approximately 87,600 cubic meters (23.1 million gallons) of water annually. For the life of the facility, the proposed NEF could use up to

2.63 million cubic meters (695 million gallons) of the Ogallala waters, encompassing both construction and operations use. This constitutes a small portion, 0.004 percent, of the 60 billion cubic meters (49 million acre-feet or 16 trillion gallons) of Ogallala reserves in the State of New Mexico territory (HPWD, 2004) and, therefore, the impacts to water resources would be SMALL.

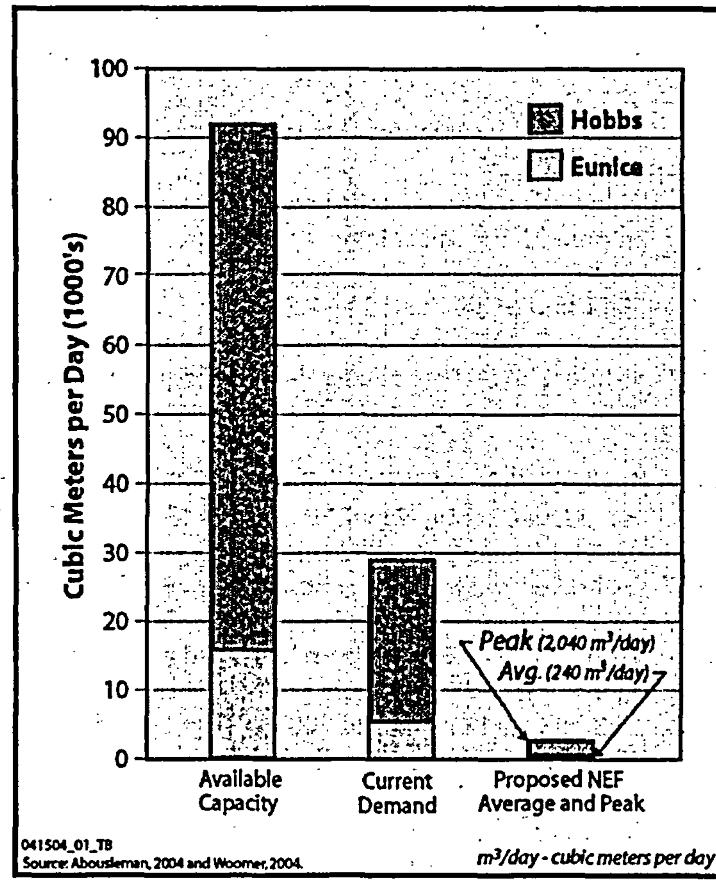

Figure 4-3 Eunice and Hobbs Water Capacities in Relation to the Proposed NEF Requirements (LES, 2004a; Abousleman, 2004; Woomer, 2004)

4.2.6.4 Mitigation Measures

Construction BMPs would limit the impacts from the installation of potable water supply lines and would also limit the impact of construction stormwater and wastewater to within the site boundaries. All construction activities would comply with NPDES Construction Stormwater General Permits and a ground-water discharge permit.

The Liquid Effluent Collection and Treatment System would be used throughout operations to control liquid waste within the facility including the collection, analysis, and processing of liquid wastes for disposal. Liquid effluent concentration releases to the Treated Effluent Evaporative Basin and the UBC Storage Pad Stormwater Retention Basin would be below the uncontrolled release limits set forth in 10 CFR Part 20. A Spill Prevention Control and Countermeasures Plan would minimize the impacts for infiltration of hazardous chemicals into any formation of perched water that could occur during operation.

A Stormwater Pollution Prevention Plan would be implemented at the proposed NEF site. Staging areas would be established to manage waste materials, and a waste management and recycling program would be implemented to segregate and minimize industrial and hazardous waste generation. Low-water-consumption landscaping techniques; low-flow toilets, sinks, and showers; and efficient water-using equipment would be used.

Because the Ogallala Aquifer is a nonrenewable water source and future demand for water in the region would exceed the recharge rate, the present local water supplies could be affected. The Lea County Water Plan includes mitigation actions to be taken to increase water supplies in the future and actions to deal with drought conditions should supplies be insufficient. LES would comply with any drought-related conditions that would be imposed through the Lea County Water Plan or through other State or local actions. The drought management plan has four action levels: Advisory, Alert, Warning, and Emergency. Recommended actions for these levels include voluntary reductions, mandatory nonessential water-use restrictions (e.g., restrictions on car washing, landscape watering, ornamental water use), and allocation reductions of 20 percent and 30 percent, respectively. Billing surcharges would be imposed for exceeding allocations for the latter two action levels (LCWUA, 2003).

4.2.7 Ecological Resources Impacts

This section discusses the potential impacts of site preparation, construction, and operation of the proposed NEF on ecological resources.

Field studies conducted by LES at the proposed NEF site indicated that no communities or habitats have been defined as rare or unique, and none support threatened or endangered species (LES, 2004a). In addition, no State- or Federal-listed threatened or endangered species have been identified during these studies at the proposed NEF site.

The U.S. Fish and Wildlife Service (FWS) listed several candidate species of concern that may be found in the Lea County, New Mexico, area (FWS, 2004). These candidate species are proposed to be added to the list of endangered and threatened species or the agency wants to ensure that their decline does not go unchecked and to avoid actions that may affect their populations (FWS, 2004).

The proposed NEF site is undeveloped and currently serves as cattle grazing. There is no surface water on the site, and appreciable ground-water reserves are deeper than 340 meters (1,115 feet). The results of LES surveys in the fall of 2003 and spring and summer of 2004 suggest that the site supports a limited diversity of wildlife. The listed candidate species, namely the lesser prairie chicken (*Tympanuchus pallidicintus*), the sand dune lizard (*Sceloporun arenicolus*), and the black-tailed prairie dog (*Cynomys ludovicianus*), were not detected at the proposed NEF site, and it was concluded that the habitat of the proposed NEF site is unsuitable for any of these candidate species (EEI, 2004; LES, 2004a; Sias, 2004).

Two species of concern, the swift fox (*Vulpes velox*) and the western burrowing owl (*Athene cunicularia hypugea*), could be vulnerable to the proposed NEF activities (LES, 2004a). The swift fox could be vulnerable because the species' inquisitive nature allows it to adapt to areas of human activities. However, swift fox generally require 518 to 1,296 hectares (1,280 to 3,200 acres) of short- to mid-grass prairie habitat with abundant prey to support a pair. Habitat loss, rodent control programs, and other human activities that reduce the prey base could impact the viability of swift fox at the proposed NEF site (FWS, 1995).

The western burrowing owl is generally vulnerable to construction activities because of the possibility that its burrows, and possibly birds or eggs in the burrows, may be destroyed by machinery or structures. The western burrowing owl is generally tolerant of human activity provided it is not harassed. Burrowing owls are very site tenacious, and burrow fidelity is a widely recognized trait of burrowing owls. The presence of this species is strongly associated with prairie dog towns (The Nature Conservancy, 2004). The lack of evidence of the presence of prairie dog towns and western burrowing owl burrows at the proposed NEF site would negate the potential vulnerability of this species to the proposed NEF activities (LES, 2004a). Artificial burrows could not easily attract the species (Trulio, 1997). While the construction activities at the proposed NEF site could create artificial burrows (i.e., cavities within the riprap material), the lack of existing burrows and the absence of prairie dogs at the proposed NEF site would reduce the potential for burrowing owls to relocate to the new artificial burrows.

4.2.7.1 Site Preparation and Construction

Most of the potential ecological disturbances from the proposed NEF would occur during the construction phase of the site. Approximately 81 hectares (200 acres) of land would be disturbed along with 8 hectares (20 acres) that would be used for temporary contractor parking and lay-down areas. Once the proposed NEF site construction was completed, the temporary contractor parking and lay-down areas would be restored to their natural condition and would be revegetated with native plant species and other natural, low-water-consumption landscaping to control erosion.

Construction disturbances would mostly affect the Plains Sand Scrub vegetation community. The dominant shrub species associated with this classification is shinoak with lesser amounts of sand sage, honey mesquite, and soapweed yucca. This diversity does not create a unique habitat in the area. The community is further characterized by the presence of forbs, shrubs, and grasses that have adapted to the deep sand environment that occurs in parts of southeastern New Mexico (NRCS, 1978).

The disturbed area represents about one-third of the total site area. This allows highly mobile resident wildlife located within the disturbed areas of the proposed NEF site an opportunity to relocate to the undisturbed onsite areas (147 hectares [363 acres]). The undisturbed areas would be left in a natural state for the life of the proposed NEF site. Wildlife would also be able to migrate to adjacent suitable habitat bordering the proposed NEF site. On the other hand, less mobile species, such as small reptiles and mammals, could be impacted. Due to the limited diversity of wildlife and the relatively small area disturbed, the potential impacts of the proposed NEF site to these less mobile species would be SMALL. To reduce any temporary impacts during construction, LES would minimize the number of open trenches and implement BMPs recommended by the State of New Mexico (LES, 2004a). The relocation of the CO_2 pipeline would be specifically targeted with mitigation measures under LES's wildlife management practices (LES, 2004a).

The proposed NEF site is presently interrupted by a single access road that is void of vegetation. Because roadway maintenance practices are currently being performed by Wallach Concrete, Inc., and Sundance Services, Inc., along the existing access road, new or significant impacts to biota are not anticipated due to the use of the access road.

Chemical herbicides would not be used during construction of the proposed NEF. None of the construction activities would permanently affect the biota of the site. Standard land-clearing methods would be used during the construction phase. Stormwater detention basins would be built prior to land clearing and used as sedimentation collection basins during construction. Once the proposed NEF site was revegetated and stabilized, the basins would be converted to retention/detention basins. After completion of construction, any eroded areas would be repaired and stabilized with native grass species, pavement, and crushed stone. Ditches would be lined with riprap, vegetation, or other suitable materials, as determined by water velocity, to control erosion. In addition, water conservation would be considered in the application of dust-suppression sprays in the construction areas.

Due to the lack of rare or unique communities, habitats, or wildlife on the proposed NEF site and the short duration of the site preparation and construction phase, the impacts to ecological resources would be SMALL during construction.

4.2.7.2 Operations

No additional lands beyond those disturbed during site preparation and construction would be affected by the proposed NEF operation. The undisturbed area would be left in its natural state. Therefore, no additional impacts on local ecological resources beyond those described during construction would be expected during operations. The tallest proposed structure for the proposed NEF site is 40 meters (131 feet), which is lower than the height at which structures are required to be marked or lighted for aviation safety (FAA, 1992). This avoidance of lights, which attract wildlife species, and the low above-ground-level structure height, would reduce the relative potential for impacts on wild animals. Therefore, the impacts to birds would be SMALL. Due to the lack of direct discharge of water and the absence of an aquatic environment and the implementation of stormwater management practices, the impacts to aquatic systems would be SMALL.

None of the previously discussed wildlife species at the proposed NEF site discussed in Section 3.9 of Chapter 3 of this Draft EIS have established migratory travel corridors because they are not migratory in this part of their range. Migratory species with potential to occur at the proposed NEF site include mule deer (*Odocoileus hemoionus*) and scaled quail (*Callipepla squamata*). They are highly mobile, and their travel corridors are linked to habitat requirements such as food, water, and cover. They may change from season to season and can occur anywhere within the species home range. Mule deer and scaled quail thrive in altered habitats, and travel corridors that would potentially be blocked by the proposed NEF would easily and quickly be replaced by an existing or new travel corridor. Therefore, the impacts to migratory wildlife would be SMALL.

The level of safety required for the protection of humans is adequate for other animals and plants. Therefore, no additional mitigation efforts would be necessary beyond those required to protect humans (IAEA, 1992). Section 4.2.12 includes a discussion of these impacts. The greatest exposures would be to the personnel handling the UBCs. The potentially highest exposures to wildlife are expected to be to small animals occupying the UBC Storage Pad. Effective wildlife management practices, periodic surveys of the UBCs, and mitigation would prevent permanent nesting and lengthy stay times on the UBC Storage Pad. Thus, the impacts (radiological and nonradiological) to local wildlife would be SMALL.

4.2.7.3 Mitigation Measures

LES would implement several BMPs to minimize the construction impacts to the proposed NEF site and would install appropriate barriers to minimize the impacts to wildlife during site preparation, construction, and operation. BMPs would also be instituted to control erosion and manage stormwater. The number of trenches and length of time they are open would be minimized to mitigate the effects of trenching work during construction. Other procedural steps that would be applied during trenching include digging trenches during cooler months (when possible) due to lower animal activity, keeping trenching and backfilling crews close together, ensuring trenches are not left open overnight, using escape ramps, and inspecting trenches and removing animals prior to backfilling. During operation, wildlife management practices would include managing open areas, restoring disturbed areas with native grasses and shrubs for the benefit of wildlife, and installing appropriate netting over the Treated Effluent Evaporative Basin and animal-friendly fencing where necessary. Landscaping techniques would employ native vegetation.

LES would install appropriate barriers to minimize the impacts to wildlife during operation of the proposed NEF. These would include fencing around noncontaminated evaporative basins to exclude wildlife, along with netting for the process basin surface areas or other suitable means to minimize the use of process basins by birds and waterfowl. The pond netting would be specifically designed to ensure that migratory birds are excluded from evaporative ponds that do not meet New Mexico Water Quality Control Commission surface-water standards (i.e., the Treated Effluent Evaporative Basin) for wildlife usage (LES, 2004a).

4.2.8 Socioeconomic Impacts

This section presents the potential socioeconomic impacts from the construction and operation of the proposed NEF on employment and economic activity, population and housing, and public services and finances within the 120-kilometer (75-mile) region of influence. The socioeconomic impacts are estimated using data contained in the Environmental Report and Regional Input-Output Modeling System (RIMS II) multipliers obtained for the region of influence from the U.S. Bureau of Economic Analysis (LES, 2004a; BEA, 2004).

4.2.8.1 Site Preparation and Construction

Employment and Economic Activity

Estimated employment during the 8-year construction period would average 397 jobs per year. The highest employment would occur in the second through fifth construction years with employment peaking at 800 jobs in the fourth year (LES, 2004a). Most of the construction jobs (about 75 percent) are expected to pay between $34,000 and $49,000 annually, and average slightly more than $39,000 (LES, 2004a). The pay for these jobs would be considerably higher than the median household income of Lea County and the region of influence. The average construction wage would be about 15 percent higher than median incomes in New Mexico and on par with household incomes in Texas.

Initial employment would consist predominately of structural trades with the majority of these workers coming from the local area. As construction progresses, there would be a gradual shift from structural trades to mechanical and electrical trades. The majority of these higher paying skilled jobs would be expected to be filled outside of the immediate area surrounding the proposed site but within the 120-kilometer (75-mile) region of influence because of the region's rural road system that would allow long-distance commuting.

The nearly 400 new construction jobs (8-year average) would represent about 19 percent of the Lea, Andrews, and Gaines Counties construction labor force and 4.4 percent of the construction labor force of the combined eight-county region.

Facility construction would take approximately 8 years to complete and cost $1.2 billion (in 2002 dollars), excluding escalation, contingencies, and interest (LES, 2004a). LES estimates that it would spend about $390 million locally on construction—about one-third on wages and benefits and two-thirds on goods and services.

The direct spending or local purchases made by LES would generate indirect impacts in other local industries—additional output, earnings, and new jobs. Estimating these indirect impacts is typically done using a regional input-output model and multipliers. The multipliers measure the total (direct and indirect) changes in output (i.e., spending, earnings, and employment). Although there are alternative regional input-output models, the total economic impacts of constructing the proposed NEF are estimated using the U.S. Bureau of Economic Analysis RIMS II model (BEA, 1997). This model is widely used in both private and public sector applications including the NRC in licensing of nuclear-electricity-generating facilities.

According to the RIMS II analysis, the approximate $48.6 million in average annual construction spending would generate additional annual output of $65.5 million and earnings of $18.1 million for each year the facility is under construction (Appendix F). In addition, spending on goods, services, and wages would create 582 indirect jobs on average. Figure 4-4 shows the predicted distribution of jobs over the eight-year construction period. In the first year of construction, total direct and indirect jobs would be about 760, rising to nearly 2,000 in the fourth construction year and then declining rapidly as construction of the facility nears completion. The economic impacts of construction to the region of influence would be considered MODERATE.

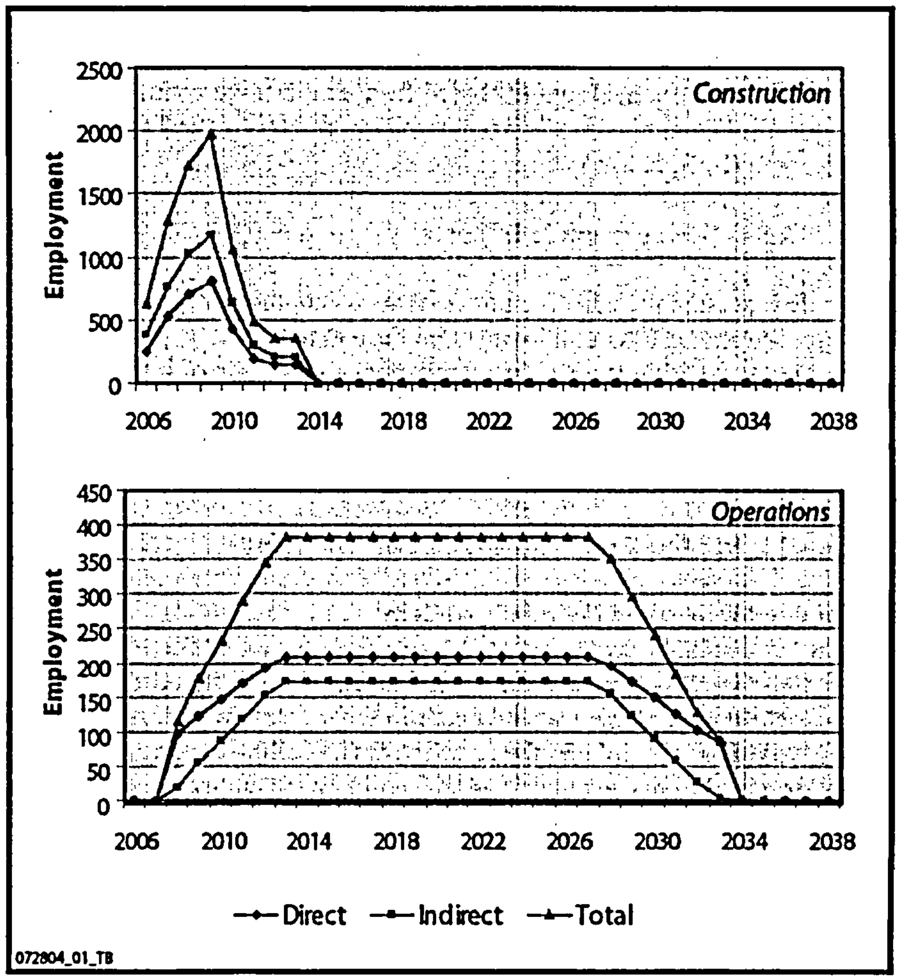

Figure 4-4 Estimated Total Employment (Direct and Indirect) over the Construction and Operation Phases of the Proposed NEF

Population and Housing

During construction of the proposed NEF, about 15 percent of the construction work force would be expected to take up residency in the surrounding community (LES, 2004a). Sixty-five percent of these workers would bring families consisting on average of a spouse and one school-age child (USCB, 2002). The total population increase in the area at peak construction would be about 280 residents and half as many on average over the 8-year construction period (LES, 2004a). In later stages of construction (i.e., the years 2012 and 2013), an increase in the local population of only 50 people would be expected. With approximately 15 percent of the housing units (owner and rental occupied) in the region of influence currently unoccupied and the relatively small number of people expected to move into the local area, there would not be any measurable impact related to demand for additional housing during facility construction. Thus, the impacts to population and housing would be SMALL.

Public Services and Financing

The increase in employment and population in the region of influence would require additional public services (e.g., schools, fire and police protection, medical services) and means to finance these services. The increase in numbers of school-age children would be expected to be 80 at peak construction and 40 on average. Given the number of schools in the vicinity of the proposed NEF (see Chapter 3 of this Draft EIS), the impact to the education system would be SMALL (less than one new student per grade).

LES estimates that it would pay between $177 and $212 million in total taxes to the State of New Mexico and Lea County over the 8-year construction life and the approximate 20-year operating life of the proposed NEF (LES, 2004a). Gross receipts taxes paid by LES and local businesses could approach $3 million during the eight-year construction period. Income taxes from earnings (direct and indirect) are estimated to be about $4 million annually during construction. The tax revenue impacts of site preparation and construction activities to Lea County and the city of Eunice would be MODERATE given the size of current property tax collections and gross receipts taxes received from the State of New Mexico.

4.2.8.2 Operations

Employment and Economic Activity

The proposed NEF operating work force would consist of an estimated 210 people with an average salary of approximately $50,100 (LES, 2004a). As discussed in Chapter 3 of this Draft EIS, this average salary compares to average household and per capita incomes in the region of influence of $30,572 and $14,264, respectively. Total payroll during operations would be expected to total more than $10.5 million in salaries and wages with another $3.2 million in benefits (LES, 2004a). Ten percent of the positions are expected to be in management, 20 percent in professional occupations, 60 percent in various skilled positions, and 10 percent in administrative positions. All positions would require at least a high school diploma plus training, which would be provided by LES in partnership with local institutions (LES, 2004f).

Local annual spending by LES on goods and services and on wages would be approximately $9.6 million and $10.5 million, respectively. This local spending during operations would generate indirect impacts on the local economy. The approximate $20 million in annual operations spending would generate an estimated $23.2 million in additional output, $5.6 million in additional earnings, and 173 indirect jobs during peak operations (Appendix F). Figure 4-4 summarizes operations jobs over the operating life of the facility. At peak production, total operations employment due to the presence of the facility would be more than 381 jobs—210 direct and 173 indirect. The labor force in Lea, Andrews, and Gaines Counties totals over 33,000 and the labor force is well over 100,000 for the 8 counties within the region of influence. The impact on local employment during operations would be MODERATE (approximately 1 percent of the jobs in Lea, Andrews, and Gaines Counties).

Population and Housing

The population increase during the operations phase would be expected to be less than that experienced during construction. Therefore, the potential impact to population and housing would be expected to be SMALL.

Public Services and Financing

The creation of permanent jobs would lead to some additional demands for public services. However, this increase in demands would be SMALL in the region of influence given the expected level of in-migration.

During peak operations, LES would expect to pay about $475,000 annually to the State of New Mexico and about $122,800 to the city of Eunice and Lea County in gross receipt taxes. New Mexico corporate income taxes depend on company earnings, but LES estimates that income taxes would range between $120 and $140 million over the facility's operating life. Payments in-lieu-of-taxes depend on the value of the property and would approach $1 million annually at peak operations (LES, 2004a). Finally, income taxes from earnings paid (direct and indirect) would be about $2 million annually during operations. Gross receipts taxes paid by local businesses could approach $1 million annually. The tax revenue impacts of the proposed NEF operations to Lea County and the city of Eunice would be MODERATE given the size of current property tax collections and gross receipts taxes received from the State of New Mexico.

4.2.8.3 Mitigation Measures

Educational programs coordinated by LES with local colleges would help develop a pool of qualified local workers (LES, 2004d).

4.2.9 Environmental Justice Impacts

For each of the areas of technical analysis presented in this Draft EIS, a review of impacts to the human and natural environment was conducted to determine if any minority or low-income populations could be subject to disproportionately high and adverse impacts from the proposed action. The review includes potential impacts from the construction and operation of the proposed NEF.

Through the scoping process, affected members of the African American/Black, Hispanic/Latino, and Indian tribe communities were contacted and asked to express their concerns about the project and to discuss how they perceived the construction and operation of the proposed NEF would affect them. These discussions elicited the following concerns:

- Potential loss of property values for houses owned by nearby residents.
- Potential ground-water conflicts.
- Potential radiological contamination (probably airborne given the locations involved) of persons near the proposed NEF and potential transportation routes.

For each area of analysis, impacts were reviewed to determine if any potential adverse impacts to the surrounding population would occur as a result of the proposed NEF construction and operations. If potential adverse impacts were identified, a determination was made as to whether minority or low-income populations would be disproportionately affected. Table 4-2 presents a summary of the potential exceptional vulnerabilities of minority and low-income communities in the region.

Adverse impacts are defined as negative changes to the existing conditions in the physical environment (e.g., land, air, water, wildlife, vegetation, human health, etc.) or negative socioeconomic changes. Disproportionate impacts are defined as impacts that may affect minority or low-income populations at levels appreciably greater than effects on non-minority or non-low-income populations. These impacts are discussed in the following subsections.

Table 4-2 Exceptional Circumstances Leading to Minority/Low-Income Communities Vulnerability

Circumstance	Exceptional Circumstances of Minority and Low-Income Communities: Hispanic/Latino	African American/Black	American Indian	Low-Income
Residences/ Locations	Possibly closest to proposed NEF, but at a minimum 4.3 km (2.6 mi) distance.	Possibly closest to proposed NEF, but at a minimum 4.3 km (2.6 mi) distance.	Possibly closest to proposed NEF, but at a minimum 4.3 km (2.6 mi) distance.	Possibly closest to proposed NEF, but at a minimum 4.3 km (2.6 mi) distance.
Use of Water	None identified (use city water).	None identified (use city water).	None identified (use city water).	None identified (use city water).
Use of Other Natural Resources	None identified.	None identified.	None identified.	None identified.
Exceptional Preexisting Health Conditions	None identified.	None identified.	None identified.	None identified.
Occupations/ Cultural Practices/ Activities	None identified.	None identified.	None conducted in area.	None identified.

km - kilometers.
mi - miles.

4.2.9.1 Impacts to the Land Use, Visual and Scenic, Air Quality, Geology and Soils, Ecological Resources, Noise, and Traffic

Land disturbances and changes to land forms could result from such activities as the construction of roads and buildings at the proposed NEF site. Fugitive dust and noise emissions from such activities, if not properly controlled (and if the wind were from the east), might also be a minor issue at the nearest houses, which could have minority or low-income residents and are about 4.3 kilometers (2.6 miles) away from the proposed NEF. These impacts would be most likely to occur where most construction activity would take place, in and around the proposed NEF, which is either vacant or low-density industrial land.

Noise, dust, and other emissions associated with the construction and operation of the proposed NEF would not be expected to affect the nearest residents and would only slightly and temporarily affect wildlife. Vegetation and wildlife would be expected to be affected only within the 81-hectare (200-acre) area disturbed at the site, the access road, and the old and new CO_2 pipeline corridors crossing the site. The impacts to land use would be expected to be SMALL. The scenic qualities to neighbors of the proposed NEF site would be SMALL because the area around it is already devoted to industrial purposes and has low scenic value.

A significant increase in traffic on New Mexico Highway 234, New Mexico Highway 18, and Texas Highway 176 would occur during the initial phase of construction, and this period of inconvenience would be short. Although traffic would increase, all travelers on New Mexico Highway 234, including those workers traveling to the site, would be affected. No disproportionate impact on minority or low-income residents would be expected.

4.2.9.2 Impacts from Restrictions on Access

Access to the proposed NEF site would be restricted once construction begins. However, the land is used for cattle grazing and zoned industrial, and has very little other productive economic, cultural, or recreational use. The restricted land area is small in size when compared to the overall size of the raw land inventory in the county and even in the local area.

Inquiries to Indian tribes with some historical ties to the area have not identified any cultural resource or service that would impact the Indian tribes. A survey of the proposed NEF site found seven archaeological sites. LES has committed to protect and avoid disturbing any cultural artifacts that might be found during construction or operations. For this reason, the impacts from restrictions on access to the proposed NEF would be SMALL.

4.2.9.3 Impacts to Water Resources

No surface-water impacts or contamination would be expected, and no ground-water conflicts between the site and the region's other water users would be anticipated. Although the facility would use up to 2.6 million cubic meters (687 million gallons) of water from the Ogallala Aquifer during its operation, this is a small portion of the 60 billion cubic meters (49 million acre-feet or 16 trillion gallons) Ogallala reserves in the New Mexico portion of the aquifer. Water requirements would be well within the excess capacities of the Eunice and Hobbs water supply systems and the impacts would be SMALL.

4.2.9.4 Human Health Impacts from Transportation

The transportation impacts of the proposed NEF are discussed in Section 4.2.11. The transportation analysis found that construction impacts would be short term and would be SMALL to MODERATE. During operation, the transportation impacts would be SMALL. Minority and low-income populations are not expected to be affected any differently than others in the community. Therefore, no disproportionately high and adverse effects are expected for any particular segments of the population, including minority and low-income populations that could live along the proposed transportation routes.

4.2.9.5 Human Health Impacts from Operation of the Proposed NEF

Human health impacts of the proposed NEF for normal operations are discussed in Section 4.2.12 and for accidents in Section 4.2.13. Although minority and possibly low-income populations live relatively near the proposed NEF site (i.e., within a 5-kilometer [3-mile] radius including the nearest residence, which is about 4.3 kilometers [2.6 miles] from the proposed NEF), it is unlikely that normal operations would affect them with radiological and nonradiological health impacts or other risks. These risks during normal operations would be small for any offsite population at any site location discussed in this Draft EIS. Inquiries by the NRC staff to the local Hispanic/Latino and African American/Black communities, and to the States of New Mexico and Texas found no activities, resource dependencies, preexisting health conditions, or health service availability issues resulting from normal operations at the proposed NEF that would cause a health impact for the members of minority or low-income communities (either as an individual facility or combined with the impacts of other nearby facilities). Therefore, it is unlikely that any minority or low-income population would be disproportionately and adversely affected by normal operations of the proposed NEF.

In addition, inquiries to the New Mexico and Texas Departments of Health produced no data that identified any exceptional health problems among low-income and minority residents in the Eunice-Hobbs-Andrews area. It was not possible to identify any unusual incidences of birth defects, chronic diseases, or cancer clusters in Lea or Andrews Counties, the smallest area for which published health information is available. Age-adjusted incidence of cancer is slightly lower in Lea County than in New Mexico as a whole, but it is not clear that the difference is statistically significant and the income and ethnicity of individuals with chronic diseases is not available. The same is true of Andrews County in comparison with Texas. Hispanic populations in both States show lower age-adjusted cancer incidence than the majority population, but the differences are not statistically significant in most cases. While sufficient data do not exist that show any unique health conditions among the local minority and low-income populations, there is also no evidence that the proposed NEF would compound any preexisting health problems of nearby residents or visitors in the Eunice vicinity (see Chapter 3 of this Draft EIS).

Section 4.2.13 discusses potential accident scenarios for the proposed NEF that would result in potentially significant releases of radionuclides to air or soil, and some effects to offsite populations. NRC regulations and operating procedures for the proposed NEF are designed to ensure that the accident scenarios in Section 4.2.13 would be highly unlikely. The most significant accident consequences would be those associated with the release of uranium hexafluoride (UF_6) caused by rupturing an over-filled and/or over-heated cylinder. Such an accident would results in exposures above regulatory limits at the site boundaries and seven latent cancer fatalities in the exposed population. These exposures and fatalities could happen if the wind was from the south at the time of the accident and sent the plume toward Hobbs and Lovington, New Mexico. In this scenario, minority and low-income populations would not be more obviously at risk than the majority population.

There is no mechanism for disproportionate environmental effects through accidents on minority residents near the proposed NEF. Section 4.2.13 shows that even the most severe hypothetical accident scenario would result in an exposure five times less than the 0.05 sieverts (5 rem) exposure limit for a credible intermediate-consequence accident event to any individual located outside the controlled area defined in 10 CFR § 70.61. Therefore, the risk to any population, including low-income and minority communities, would be considered SMALL.

4.2.9.6 Impacts of Housing Market on Low-Income Populations

The population in the region of influence would be expected to grow slightly due to the proposed NEF construction by as many as 280 persons during the peak construction period. Some of these persons would be expected to live in the cities of Hobbs, Eunice, or Andrews. There is a substantial vacancy rate in the local housing market; however, due to population increase and the proposed NEF-driven increase in regional purchasing power, there would be a slight increase in demand for housing in the local area. This increase should have a modest positive effect on housing demand and the nominal value of existing homes. Any negative effect on housing values would likely be offset by this increase in demand. Due to the number of workers who would be expected to move to the area, however, the impact on housing prices would be SMALL. It is likely that the 210 operations workers would want to be nearer to the proposed NEF than the construction work force.

4.2.9.7 Positive Socioeconomic Impacts

The proposed NEF would cost approximately $1.2 billion to build and could provide added tax income to local governments. These revenues would benefit the local community including its low-income members. The current labor force can supply some of the construction labor and services required to build the proposed NEF, but it cannot currently supply the specialized skills needed for the proposed NEF operations. However, all community members would share to some degree in the economic growth expected to be generated by the proposed NEF. No one group is likely to be disproportionately benefitted, with the possible exception of educated individuals who are currently underemployed. Targeted technical training programs could increase the pool of eligible local workers.

4.2.9.8 Summary

Table 4-3 summarizes the potential impacts on minority and low-income populations. Examination of the various environmental pathways by which low-income and minority populations could be disproportionately affected reveals no disproportionately high and adverse impacts from either construction or normal operations of the proposed NEF. In addition, no credible accident scenarios exist in which such impacts could take place. The NRC staff has concluded that no disproportionately high and adverse impacts would occur to minority and low-income populations living near the proposed NEF or along likely transportation routes into and out of the proposed NEF as a result of the proposed action. Thus, when considering the effect of the proposed NEF on environmental justice through direct environmental pathways, the impacts would be considered SMALL.

Table 4-3 Potential Impacts of the Proposed Action on Minority and Low-Income Populations

Potential Impact[a]	Potentially Affected Minority Population or Low-Income Community	Level of Impact
Land Use	Hispanic/Latino	SMALL
Historic and Cultural Resources	Indian Tribes	SMALL
Visual and Scenic Resources	Low-Income and Minority Populations near Proposed NEF Site	SMALL
Air Quality	Hispanic/Latino	SMALL
Geology and Soils	Hispanic/Latino	SMALL
Water Resources	Hispanic/Latino	SMALL
Ecological Resources	None	SMALL
Socioeconomic and Community Resources: Employment Population Housing Values	All Minorities, Low-Income	SMALL to MODERATE (but generally beneficial and not disproportionate)
Recreation	Low-Income and Minority Populations	SMALL

Potential Impact[a]	Potentially Affected Minority Population or Low-Income Community	Level of Impact
Economic Structure	Low-Income and Minority Populations	SMALL to MODERATE (and beneficial)
Noise	Low-Income and Minority Populations near Proposed NEF Site	SMALL
Transportation	Hispanic/Latino, African American/Black, Low-Income	MODERATE (but not disproportionate)
Human Health Radiological Nonradiological	Low-Income and Minority Populations near Proposed Transport Routes and Downwind of the Proposed NEF Site	SMALL

[a] All other potential impacts would be SMALL and not disproportionate.

4.2.10 Noise Impacts

This section discusses the noise impacts from the construction and operation of the proposed NEF. The effects of noise on human health can be considered from both physiological and behavioral perspectives. Historically, physiological hearing loss was considered the most serious effect of exposure to excessive or prolonged noises, with such effects largely related to human activities in the workplace and near construction activities. Excessive noises would also repel wildlife and affect their presence. Noise levels at the proposed NEF site are generated predominately by traffic movements and, to a much lesser extent, by commercial, industrial, and across-State-line-related traffic.

4.2.10.1 Site Preparation and Construction

During preparation and construction at the site, noise from earth-moving and construction activities would add to the noise environment in the immediate area. Construction activities would be expected to occur during normal daytime working hours. It should be noted that no specific Federal, State, tribal, or local standards regulate noise from daytime construction activities. Noise sources include the movement of workers and construction equipment, and the use of earth-moving heavy vehicles, compressors, loaders, concrete mixers, and cranes. Table 4-4 provides a list of construction equipment and corresponding noise levels at a reference distance of 15 meters (50 feet) and the attenuated noise levels associated with increasing distance from those sources.

The noise estimates are based on noise produced by single sources. Multiple sources generate additional noise, and that noise is additive but not in a simple linear way (Bruce et al., 2003). For example:

- Two 90-decibel noise sources make 93 decibels.
- Four 90-decibel noise sources make 96 decibels.
- Eight 90-decibel noise sources make 99 decibels.
- Sixteen 90-decibel noise sources make 102 decibels.
- Each doubling of identical noise sources results in a 3-decibel increase in noise.

Table 4-4 Attenuated Noise Levels (Decibels A-Weighted[a]) Expected for Operation of Construction Equipment

Source	Distance from Source					
	15 m (50 ft)	30 m (98 ft)	45 m (148 ft)	60 m (197 ft)	120 m (394 ft)	360 m (1,181 ft)
Heavy Truck	85	79	76	73	68	56
Dump Truck	84	78	75	72	67	55
Concrete Mixer	85	79	76	73	68	56
Jackhammer	85	79	76	73	68	56
Scraper	85	79	76	73	68	56
Dozer	85	79	76	73	68	56
Generator (< 25 KVA)	82	76	73	70	64	52
Crane	85	79	76	73	68	56
Loader	80	74	71	68	62	50
Paver	85	79	76	73	68	56
Excavator	85	79	76	73	68	56
Claw Shovel	93	87	83	81	75	66
Pile Driver	95	89	86	83	77	65

[a] The most common single-number measure is the A-weighted sound level, often denoted dBA. The A-weighted response simulates the sensitivity of the human ear at moderate sound levels (Bruce et al., 2003).
KVA - kilovolt amps; ft - feet; m - meters.
Source: Thalheimer, 2000.

A conservative estimate of construction site noise has been developed by assuming an average of about 20 heavy equipment items of various types operating in the same general area over a 10-hour workday. Hourly average noise levels during the active workday would average 90 to 104 decibels A-weighted at 15 meters (50 feet) from the work site. This value is consistent with the noise exposures among construction workers at industrial, commercial, and institutional construction sites. Employees who work in close proximity to the equipment would be exposed to noise levels of 81 to 108 decibels A-weighted (Sutter, 2002).

For comparison, the NRC staff projected 110 decibels A-weighted for the earlier LES facility near Homer, Louisiana (NRC, 1994). Distance attenuation and atmospheric absorption would reduce construction noise levels at greater distances. Estimated noise levels would be about 86 decibels A-weighted at 120 meters (394 feet), 77 decibels A-weighted at 360 meters (1,181 feet), 64 decibels A-weighted at 1.6 kilometers (1 mile), and 59 decibels A-weighted at 2.6 kilometers (1.6 miles). Actual noise levels probably would be less than these estimates due to terrain and vegetation effects. There are no residences closer than 4.3 kilometers (2.6 miles) of the project site, and nighttime construction activity, while it could occur, is not anticipated.

The nearest manmade structures of the proposed NEF to the site boundaries, excluding the two driveways, are the Site Stormwater Detention Basin and the Visitor's Center at the southeast corner of the site. The southern edge of the Site Stormwater Detention Basin is approximately 15.2 meters (50 feet) from the south perimeter fence and approximately 53.3 meters (175 feet) from New Mexico Highway 234. The eastern edge of the Visitor's Center is approximately 68.6 meters (225 feet) from the east perimeter fence (LES, 2004a).

The highest noise levels are predicted to be within the range of 84 to 98 decibels A-weighted at the south fence line during construction of the Site Stormwater Detention Basin and between 68 to 86 decibels A-weighted at the east fence line during construction of the Visitor's Center. These projected noise level ranges are within the U.S. Department of Housing and Urban Development (HUD) unacceptable sound pressure level guidelines (HUD, 2002). Noise levels exceeding 85 decibels A-weighted are considered as "clearly unacceptable" and could call for efforts to improve the conditions. However, these predicted high noise levels would be expected to occur only during the day and only during the construction phase. Also, these levels are associated with the use of specific equipment, such as claw shovels or pile drivers (Table 4-4). Because the site is bordered by a main trucking thoroughfare, a landfill, an industrial facility, and a vacant property, these intermittent noise levels would not be expected to impact any sensitive receptors surrounding the site. Noise levels at the nearest residence location (approximately 4.3 kilometers [2.6 miles] away) would be negligible.

There would be an increase in traffic noise levels from construction workers and material shipments. These short-term noise impacts would be SMALL and may be limited to workday mornings and afternoons.

4.2.10.2 Operations

The location of the enrichment facilities of the proposed NEF relative to the site boundaries and sensitive receptors would mitigate noise impacts to members of the public. Based on the Almelo Enrichment plant in the Netherlands, noise levels during operations would average 39.7 decibels A-weighted with a peak level of 47 decibels A-weighted at the site boundaries (LES, 2004a). These noise levels are below the HUD guidelines of 65 decibels A-weighted for industrial facilities with no nearby residences (HUD, 2002). The noise sources would be far enough away from offsite areas (i.e, the nearest residence is 4.3 kilometers [2.6 miles] from the site) that their contribution to offsite noise levels would be SMALL. Some noise sources (e.g., public address systems, and testing of radiation and fire alarms) could have onsite impacts. Such onsite noise sources would be intermittent and are not expected to disturb members of the public outside of facility boundaries.

Noise from traffic associated with the operation of this type of facility would likely produce a very small increase in the noise level that would be limited to daytime. The roads mostly impacted during operations would be New Mexico Highway 234 and New Mexico Highway 18. These two highways already receive a heavy load of truck traffic, and the impacts due to the proposed NEF operation would be SMALL (LES, 2004a).

4.2.10.3 Mitigation Measures

During construction, LES would maintain noise-suppression systems in proper working condition on the construction vehicles and could limit the operation of construction equipment to daylight hours to help mitigate noise (however, construction could occur during nights and weekends, if necessary [LES, 2004a]). For the operating facility, noise generation from gas centrifuges and other processes would be primarily limited to the inside of buildings. The relative distance to the site boundaries would also mitigate noise impacts to members of the public. Both phases (construction and operation) would also adhere to Occupational Safety and Health Administration (OSHA) standards in 29 CFR § 1926.52 for occupational hearing protection (OSHA, 2004).

4.2.11 Transportation Impacts

This section discusses the potential impacts from transportation to and from the proposed NEF site. Transportation impacts would involve the movement of personnel and material during both construction and operation of the proposed NEF and includes:

- Transportation of construction materials and construction debris.
- Transportation of the construction work force.
- Transportation of the operational work force.
- Transportation of feed material (including natural UF_6 and supplies for the enrichment process).
- Transportation of the enriched UF_6 product.

- Transportation of process wastes (including radioactive wastes) and DUF_6 waste.

Transportation impacts are discussed below for site preparation and construction, and operations.

4.2.11.1 Site Preparation and Construction

> ***Latent Cancer Fatality from Exposure to Ionizing Radiation***
>
> *A latent cancer fatality (LCF) is a death from cancer resulting from, and occurring an appreciable time after, exposure to ionizing radiation. Death from cancer induced by exposure to radiation may occur at any time after the exposure takes place. However, latent cancers would be expected to occur in a population from one year to many years after the exposure takes place. To place the significance of these additional LCF risks from exposure to radiation into context, the average individual has approximately 1 chance in 4 of dying from cancer (LCF risk of 0.25).*
>
> *The U.S. Environmental Protection Agency has suggested (Eckerman et al., 1999) a conversion factor that for every 100 person-Sievert (10,000 person-rem) of collective dose, approximately 6 individuals would ultimately develop a radiologically induced cancer. If this conversion factor is multiplied by the individual dose, the result is the individual increased lifetime probability of developing an LCF. For example, if an individual receives a dose of 0.00033 Sieverts (0.033 rem), that individual's LCF risk over a lifetime is estimated to be 2 $\times 10^{-5}$. This risk corresponds to a 1 in 50,000 chance of developing a LCF during that individual's lifetime. If the conversion factor is multiplied by the collective (population) dose, the result is the number of excess LCFs.*
>
> *Because these results are statistical estimates, values for expected LCFs can be, and often are, less than 1.0 for cases involving low doses or small population groups. If a population group collectively receives a dose of 50 Sieverts (5,000 rem), which would be expressed as a collective dose of 50 person- Sievert (5,000 person-rem), the number of potential LCFs experienced from within the exposure group is 3. If the number of LCFs estimated is less than 0.5, on average, no LCFs would be expected.*
>
> *Source: NRC, 2003b; NRC, 2004a.*

The construction of the proposed NEF would cause an impact on the transportation network surrounding the site due to the daily commute of up to 800 construction workers during the peak years of construction (LES, 2004a). During the 8 years of construction, there would be an average of approximately 400 workers. The commute of the peak number of construction workers could increase the daily traffic on New Mexico Highway 234 from 1,823 vehicle trips (Table 3-21 of Chapter 3) to 3,423 vehicle trips (1,823 plus 2 trips for each of 800 vehicles). In addition to the increased traffic that might result from the construction along New Mexico Highway 234, there would be an increased potential for traffic accidents. Assuming a 64-kilometer (40-mile) round-trip commute (LES, 2004a) (i.e., the round trip distance between the city of Hobbs and the proposed NEF site), 800 vehicles would travel an estimated 32,000 miles daily for 250 days per year. Based on the vehicle accident rate of 34.86 injuries and 3.02 fatalities per 100 million vehicle miles in Lea County, 3 injuries and less than 1 fatality could occur during the peak construction employment year (UNM, 2003). The increased traffic due to commuting construction workers would have a SMALL to MODERATE impact on the volume of traffic on New Mexico Highway 234.

Approximately 3,400 trucks would arrive and depart the site in each of the 3 peak years of construction (about 14 trucks per day) (LES, 2004a). Assuming an average round-trip distance of 64 kilometers (40 miles), 209,214 vehicle kilometers (130,000 vehicle miles) per year would accrue, resulting in less than 1 injury and less than 1 fatality from the construction truck traffic. The impacts from the truck traffic to and from the site would have only a SMALL impact on overall traffic.

Two construction access roadways off New Mexico Highway 234 would be built to support construction (LES, 2004a). The materials delivery construction access road would run north from New Mexico Highway 234 along the west side of the proposed NEF site. The personnel construction access road would run north from New Mexico Highway 234 along the east side of the proposed NEF site. Both roadways would eventually be converted to permanent access roads upon completion of construction; as a result, impacts from access road construction would be SMALL.

4.2.11.2 Operations

Operation impacts could occur from the transport of personnel, nonradiological materials and radioactive material to and from the proposed NEF site. The impacts from each are discussed below.

Transportation of Personnel

There would be minimal impact on traffic (an increase of 10 percent) based on an operational work force of 210 workers (LES, 2004a) and assuming 1 worker per vehicle. Given this traffic volume and assuming a round-trip distance of 64.4 kilometers (40 miles), less than one injury and less than one fatality would result from traffic accidents per year. Operations at the proposed NEF would require 21 shift changes per week to provide personnel for continuous operation. Based on 5 shifts worked per employee, approximately 4.2 employees would be required to staff each position resulting in about 50 positions per shift on an average, or 50 vehicles per shift (LES, 2004a), assuming no carpooling. This traffic would have a SMALL impact on the traffic on New Mexico Highway 234.

Transportation of Nonradiological Materials

The transportation impacts of nonradiological materials would include the delivery of routine supplies necessary for operation and the removal of nonradiological wastes. Supplies delivered to and waste removed from the site would require 2,800 and 149 truck trips, respectively, on an annual basis (LES, 2004a). Supplies would range from janitorial supplies to laboratory chemicals. This traffic would have a SMALL impact on the traffic on New Mexico Highway 234. Assuming a round-trip distance of 64.4 kilometers (40 miles) for the supplies and 8 kilometers (5 miles) for the waste removal, 113,000 vehicle miles per year would occur resulting in less than one injury and less than one fatality per year of operation. The 8-kilometer (5-mile) distance would be the round-trip distance from the proposed NEF site to the Lea County landfill, the proposed destination for all of the nonhazardous and nonradioactive waste generated by the proposed NEF.

Transportation of Radiological Materials

Transportation of radiological materials would include shipments of feed material (natural UF_6), product material (enriched UF_6), DUF_6, and radioactive wastes. LES did not propose rail transportation as a means of shipping radioactive material and wastes (LES, 2004a); however, the NRC staff believes that shipment by rail could be possible in the foreseeable future. Therefore, impacts of both truck and rail shipments are presented below. The transportation of the radiological materials is subject to NRC and DOT regulations. All the materials shipped to or from the proposed NEF can be shipped in Type A containers. The product (enriched UF_6) is considered by the NRC to be fissile material and would require additional fissile packaging considerations such as using an overpack surrounding the shipping container. However, when impacts are evaluated, the effects of the overpackage are not incorporated into the assessment and result in a set of conservative assumptions.

In addition to the potential radiological impacts from the shipment of UF_6, chemical impacts from an accident involving UF_6 could affect the surrounding public. When released from a shipping cylinder, UF_6 would react to the moisture in the atmosphere to form hydrofluoric acid and uranyl fluoride.

The potential impacts from these shipments, other than normal truck traffic on New Mexico Highway 234, were analyzed using two computer codes: WebTragis (ORNL, 2003) and RADTRAN 5 (Neuhauser and Kanipe, 2003). WebTragis is a web-based version of the Transportation Routing Analysis Geographic Information System (Tragis) used to calculate highway, rail, or waterway routes within the United States. RADTRAN 5 is used to calculate the potential impacts of radiological shipments using the routing information generated by WebTragis. Appendix D presents details of the methodology, calculations, and results of the analyses. The potential chemical impacts have been analyzed in previously published environmental impact statements by DOE (DOE 2004a; DOE, 2004b).

RADTRAN 5 presents results from several different types of impacts. The term "Incident-Free" includes potential impacts of transportation without a release of radioactive material from shipping. The impacts include health impacts (fatalities) from traffic accidents, health impacts (LCF) from the vehicle exhaust emissions, and health impacts (LCF) from the direct radiation from a shipment passing by the public. These impacts were estimated based on one year of shipments and are presented for both the general public surrounding the transportation routes and the maximally exposed individual. The accident results contain the impacts from a range of accidents severe enough to release radioactive material to the environment and represent the risk (the impact of the accident times the probability of the accident occurring). It was conservatively assumed that the once the container is breached, the material that is released is assumed to be airborne and respirable.

The potential chemical impacts are presented in a scenario in which an accident has occurred with a fire under stable meteorological conditions (Pasquill stability Class E and F, see Section 3.5.2.3 of Chapter 3 of this Draft EIS). The impacts are categorized according to the number of persons with the potential for adverse health effects and the number of persons with the potential for irreversible adverse health effects. The impact on the maximally exposed individual is also presented.

Radiological Shipments by Truck

Impacts in this section include the traffic impacts from the truck traffic as well as the radiation exposure from the radiological shipments involving UF_6, triuranium octaoxide (U_3O_8), and other low-level radioactive wastes. Figure 4-5 shows the various shipping routes assuming the shipments would follow routes that are used for highway routing controlled quantities. These routes are designated by the U.S. Department of Transportation to minimize the potential impacts to the public from the transportation of radioactive materials.

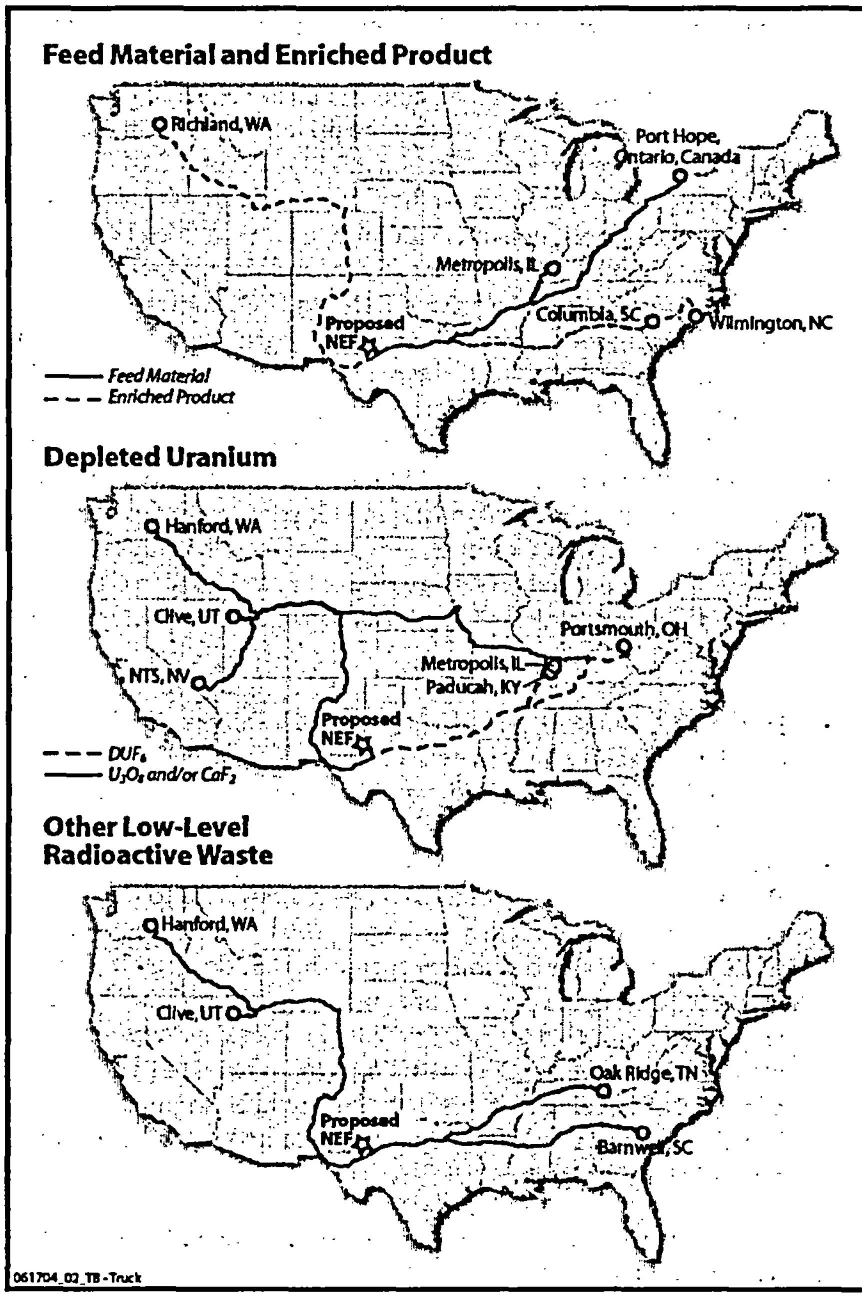

Figure 4-5 Proposed Transportation Routes via Truck for Radioactive Shipments

The NRC staff evaluated the number of shipments of each type of material based on the amount and type of material being transported to and from the site. The feed material (natural UF_6) would arrive onsite in up to 690 Type 48Y cylinders or 890 Type 48X cylinders per year delivered from Metropolis, Illinois, or Port Hope, Ontario, Canada (LES, 2004a). There would be one Type 48X or one 48Y cylinder per truck (up to three per day). The product (enriched UF_6) would be shipped in 350 Type 30B cylinders to any of three fuel manufacturing plants located in Richland, Washington; Wilmington, North Carolina; or Columbia, South Carolina. Up to five Type 30B cylinders could be shipped on one truck; however, LES proposes to ship only three cylinders per truck (LES, 2004a). Therefore, 117 truck shipments per year (approximately 1 every 3 days) would leave the site.

In addition, 350 Type 30B cylinders would be brought to the site every year so that they could be filled with enriched UF_6 and shipped back offsite. Assuming 12 empty cylinders per truck, 30 truck deliveries would be required per year (about 1 every 2 weeks).

The impacts of transporting the depleted uranium to a conversion facility were also analyzed. Conversion could be performed either at a DOE or a private conversion facility. Currently DOE conversion facilities are being constructed at Paducah, Kentucky, and Portsmouth, Ohio. For the purpose of this analysis, it is assumed that the private conversion facility will be located at Metropolis, Illinois. As discussed previously in Section 2.1.9 of Chapter 2 of this Draft EIS, LES suggested the construction of a DUF_6 to U_3O_8 conversion facility near Metropolis, Illinois. The existing ConverDyn plant at Metropolis, Illinois, converts natural uranium dioxide (UO_2) (yellow cake) from mining and milling operations into UF_4 and UF_6 for feed to enrichment facilities such as the proposed NEF (Converdyn, 2004). Construction of a private DUF_6 to U_3O_8 conversion facility near the ConverDyn plant in Metropolis, Illinois, would allow the hydrogen fluoride produced during the DUF_6 to U_3O_8 conversion process to be reused to generate more UF_6 feed material while the U_3O_8 would be shipped for final disposition. The NRC staff has determined that construction of a private DUF_6 to U_3O_8 conversion plant near Metropolis, Illinois, would have similar environmental impacts as construction of an equivalent facility anywhere in the United States. The advantage of selecting the Metropolis, Illinois, location is the proximity of the ConverDyn UO_2 to UF_6 conversion facility and, for the purposes of assessing impacts, the DOE conversion facility in nearby Paducah, Kentucky, for converting DOE-owned DUF_6 to U_3O_8. Because the proposed private plant would be similar in size and the effective area would be the same as the Paducah conversion plant, the environmental impacts would be similar.

The DUF_6 would be placed in Type 48Y cylinders for either temporary onsite storage or shipment offsite. If the DUF_6 were shipped offsite, 627 truck shipments with 1 cylinder per truck would be transported to a conversion facility located near Paducah, Kentucky; Portsmouth, Ohio; or Metropolis, Illinois. At the conversion facility, the DUF_6 would be converted into U_3O_8. After conversion, the U_3O_8 could be shipped from Paducah, Kentucky, and Portsmouth, Ohio, to Envirocare near Clive, Utah, or, if converted at a DOE facility, the Nevada Test Site for disposal. The U_3O_8 from Metropolis, Illinois, could be shipped to Envirocare. If the DUF_6 were converted to the more chemically stable form of U_3O_8 at an adjacent conversion facility to the proposed NEF, the conversion products of U_3O_8 and calcium fluoride (CaF_2) could be shipped to Envirocare or U.S. Ecology in Hanford, Washington. The hydrofluoric acid generated during the process of converting the DUF_6 to U_3O_8 could be reused in the process of generating UF_6 or neutralized to CaF_2 for potential disposal at the same site as the U_3O_8. The conversion process would generate over 6,200 metric tons (6,800 tons) of U_3O_8 and 5,200 metric tons (5,700 tons) of CaF_2 annually. Assuming that this material would be shipped in 11.3 metric ton (25,000 pound) capacity bulk bags, 547 and 461 bulk bags would be required annually to ship the U_3O_8 and CaF_2, respectively, with one bulk bag per truck.

Other radiological waste of approximately 87,000 kilograms (191,800 pounds) per year (LES, 2004a), would be shipped offsite requiring eight truck shipments per year to GTS-Duratek in Oak Ridge, Tennessee, for processing or to either Envirocare near Clive, Utah, or U.S. Ecology in Hanford, Washington, or Barnwell, South Carolina, for disposal. The NRC staff included the Barnwell, South Carolina, site to encompass the range of sites which could be available in the future. The resulting total number of trucks containing radiological shipments would be about six per day, which would have a minimal impact on New Mexico Highway 234 traffic.

Table 4-5 presents a summary of the potential impacts for one year of shipments via truck, calculated by RADTRAN 5. The results are presented in terms of a range of values for each type of shipment. The range represents the lowest to highest impacts for the various proposed shipping routes. For example, for the feed material, the values represent one year of shipments from both Metropolis, Illinois, and Port Hope, Ontario, Canada. If some feed materials were provided from Metropolis and the remaining from Port Hope, the impacts would be somewhere between the low and high values (impacts could be

Table 4-5 Summary of Impacts to Humans from Truck Transportation for One Year of Radioactive Shipments

Type of Material	Range of Impact	Incident-Free							Accident (Risk of LCF to the General Population)
		General Population			Occupational Workers			Maximum Individual In-Transit (Increased Risk of LCF)	
		Traffic Accidents (Fatalities)	LCF		Traffic Accidents (Fatalities)	LCF			
			Vehicle Emissions	Direct Radiation		Vehicle Emissions	Direct Radiation		
Feed Material	Low	1×10^{-1}	3×10^{-1}	9×10^{-4}	3×10^{-2}	4×10^{-3}	1×10^{-3}	5×10^{-9}	7×10^{-2}
	High	2×10^{-1}	1	3×10^{-3}	6×10^{-2}	1×10^{-2}	6×10^{-3}	5×10^{-8}	2×10^{-1}
Product	Low	2×10^{-2}	8×10^{-2}	1×10^{-4}	6×10^{-3}	9×10^{-4}	5×10^{-4}	4×10^{-10}	6×10^{-2}
	High	4×10^{-2}	8×10^{-2}	1×10^{-4}	1×10^{-2}	1×10^{-3}	7×10^{-4}	4×10^{-10}	7×10^{-2}
Disposition of Depleted uranium	Low	2×10^{-1}	3×10^{-1}	1×10^{-3}	5×10^{-2}	6×10^{-3}	8×10^{-4}	7×10^{-9}	1×10^{-4}
	High	4×10^{-1}	6×10^{-1}	3×10^{-3}	9×10^{-2}	1×10^{-2}	3×10^{-3}	9×10^{-9}	5×10^{-2}
Waste	Low	1×10^{-3}	5×10^{-3}	3×10^{-7}	4×10^{-4}	5×10^{-5}	9×10^{-6}	1×10^{-12}	3×10^{-5}
	High	3×10^{-3}	5×10^{-3}	4×10^{-7}	7×10^{-4}	1×10^{-4}	9×10^{-5}	1×10^{-12}	4×10^{-5}
Total Impacts	Low	3×10^{-1}	7×10^{-1}	2×10^{-3}	8×10^{-2}	1×10^{-2}	3×10^{-3}	1×10^{-8}	1×10^{-1}
	High	6×10^{-1}	2	6×10^{-3}	6×10^{-1}	2×10^{-2}	1×10^{-2}	6×10^{-8}	3×10^{-1}

LCF - latent cancer fatalities.

evaluated by taking the fraction of material from Metropolis times the impacts from Metropolis plus the fraction of material from Port Hope times the impacts from Port Hope). Also included in the table are the range of impacts summed over the shipments of the feed, product, depleted uranium and waste.

For the members of the general public, the largest impacts are from the nonradiological incident-free transportation of the radioactive materials (less than 1 fatality from traffic accidents and about 2 LCFs from the vehicle emissions.) For the radiological impacts, the risk of LCFs from postulated accidents is about two orders of magnitude higher than the direct radiation received from the incident-free transportation due to the fact that during a postulated accident, the inhalation of the radioactive material is much more significant than the direct radiation.

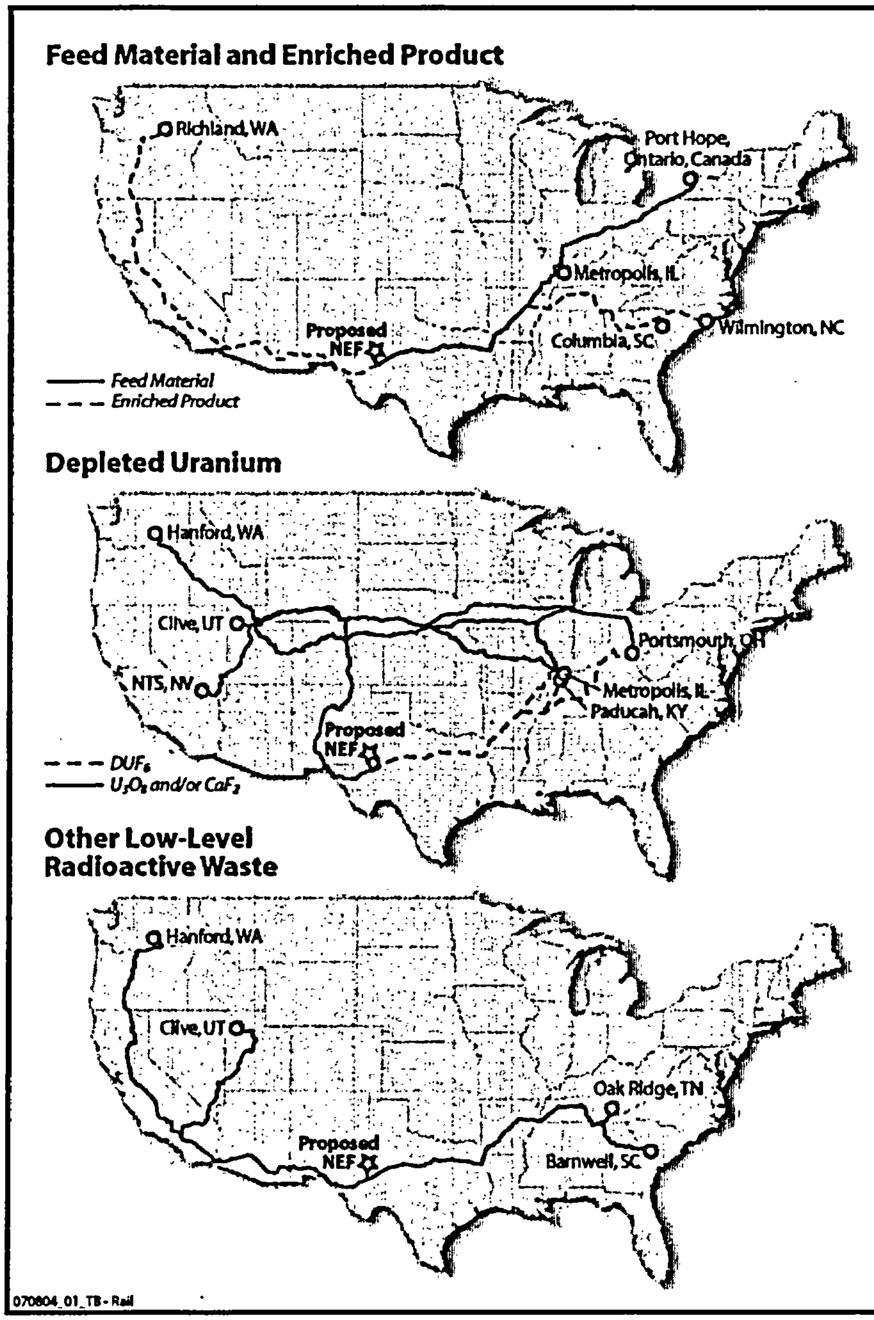

Figure 4-6 Proposed Transportation Routes via Rail for Radioactive Shipments

Radiological Shipments by Rail

Impacts in this section include the traffic impacts from rail traffic as well as radiation exposure from radiological shipments involving UF_6, U_3O_8, and other low-level radioactive wastes. For rail shipments it was assumed that the contents of four trucks would be carried by one railcar (based on the analysis results presented in DOE, 2004a and DOE, 2004b). The feed material (natural UF_6) would arrive onsite in 173 or 223 deliveries per year (see Figure 4-6.). The feed material would arrive in either Type 48X or Type 48Y cylinders delivered from Metropolis, Illinois, or Port Hope, Ontario, Canada. The product (enriched UF_6) would be shipped in 350 Type 30B cylinders to any of three fuel manufacturing plants in Richland, Washington;

Wilmington, North Carolina; or Columbia, South Carolina, in 39 shipments per year. Up to 12 cylinders could be shipped in one railcar. In addition, 350 Type 30B cylinders would be brought to the site every year so that they could be filled with enriched UF_6 and shipped offsite. It was assumed that one rail delivery of these cylinders would be made per year.

The DUF_6 would be placed in Type 48Y cylinders for either temporary storage onsite or shipment offsite. If the DUF_6 were shipped offsite, 157 rail shipments with four cylinders per railcar would be used to transport the cylinders to Paducah, Kentucky; Portsmouth, Ohio; or Metropolis, Illinois, where it would be converted into U_3O_8. After conversion, the U_3O_8 would be shipped from either Paducah or Portsmouth to Envirocare in Clive, Utah, or the Nevada Test Site for disposal or it would be shipped to Envirocare from Metropolis in gondola railcars with four bulk bags per car. The hydrofluoric acid generated during the process of converting the DUF_6 to U_3O_8 could be reused in the process of generating UF_6 or neutralized to CaF_2 for potential disposal at the same site as the U_3O_8. If the DUF_6 were converted to the more chemically stable form of U_3O_8 at an adjacent conversion facility to the proposed NEF, the conversion products of U_3O_8 and CaF_2 would be shipped to a disposal site in 137 and 116 gondola railcars, respectively.

Other radiological waste of approximately 87,000 kilograms (191,800 pounds) per year (LES, 2004a) would be shipped offsite requiring two rail shipments per year to either Envirocare, Barnwell, South Carolina; GTS-Duratek in Oak Ridge, Tennessee (for processing only); or U.S. Ecology in Hanford, Washington.

Table 4-6 presents a summary of the potential impacts for one year of shipments via rail, calculated by RADTRAN 5. The results are presented in terms of a range of values for each type of shipment. The range represents the potential impacts from the lowest to highest impact for the various proposed shipping routes. Also included in the table are the range of impacts summed over the shipments of the feed, product, depleted uranium and waste.

Similar to truck transportation, the largest impacts to the general public result from the nonradiological incident-free transportation, however, the impacts are smaller for the rail transport than for the truck transport. This is due primarily due to the number of shipments is about one quarter of the number of truck shipments. Since the rail cars can carry about four times the radioactive material than a truck, the incident-free direct radiation and the accident risk is greater than for truck transport. When comparing the traffic accidents to the occupational workers, the rail transport has higher results because the number of workers was assumed to be five as opposed to two for truck transport.

Table 4-6 Summary of Impacts to Humans from Rail Transportation for One Year of Radioactive Shipments

Type of Material	Range of Impact	Incident-Free							Accident (Risk of LCF to the General Population)
		General Population			Occupational Workers			Maximum Individual In-Transit (Increased Risk of LCF)	
		Traffic Accidents (Fatalities)	LCF		Traffic Accidents (Fatalities)	LCF			
			Vehicle Emissions	Direct Radiation		Vehicle Emissions	Direct Radiation		
Feed Material	Low	6×10^{-2}	1×10^{-2}	6×10^{-2}	6×10^{-2}	4×10^{-4}	6×10^{-4}	5×10^{-9}	1×10^{-1}
	High	1×10^{-1}	4×10^{-2}	8×10^{-2}	1×10^{-1}	7×10^{-4}	1×10^{-3}	5×10^{-9}	3×10^{-1}
Product	Low	1×10^{-2}	5×10^{-3}	3×10^{-3}	1×10^{-2}	8×10^{-5}	1×10^{-4}	3×10^{-10}	7×10^{-2}
	High	2×10^{-2}	5×10^{-3}	3×10^{-3}	2×10^{-2}	1×10^{-4}	1×10^{-4}	3×10^{-10}	8×10^{-2}
Disposition of Depleted Uranium	Low	8×10^{-2}	2×10^{-2}	2×10^{-2}	8×10^{-2}	5×10^{-4}	7×10^{-5}	2×10^{-9}	2×10^{-2}
	High	1×10^{-1}	3×10^{-2}	2×10^{-2}	1×10^{-1}	7×10^{-4}	3×10^{-3}	2×10^{-9}	2×10^{-2}
Waste	Low	8×10^{-4}	2×10^{-4}	2×10^{-4}	8×10^{-4}	5×10^{-6}	4×10^{-6}	2×10^{-11}	4×10^{-5}
	High	1×10^{-3}	3×10^{-4}	2×10^{-4}	1×10^{-3}	7×10^{-6}	4×10^{-6}	2×10^{-11}	8×10^{-5}
Total Impacts	Low	1×10^{-1}	3×10^{-2}	8×10^{-2}	1×10^{-1}	9×10^{-4}	8×10^{-4}	7×10^{-9}	2×10^{-1}
	High	2×10^{-1}	7×10^{-2}	1×10^{-1}	2×10^{-1}	2×10^{-3}	5×10^{-3}	9×10^{-9}	4×10^{-1}

LCF - latent cancer fatalities.

Chemical Impacts from Transportation Accidents

This section presents the chemical impacts from potential transportation accidents involving UF_6 and U_3O_8. If UF_6 is released to the atmosphere, it reacts with water vapor in the air to form hydrofluoric acid and uranyl fluoride (UO_2F_2). These products are chemically toxic to humans. Hydrofluoric acid is extremely corrosive and can damage the lungs and cause death if inhaled at high enough concentrations. Uranium compounds, in addition to being radioactive, can have toxic chemical effects (primarily on the kidneys) if it enters by way of ingestion and/or inhalation (DOE, 2004a; DOE, 2004b).

Results from chemical impact analyses performed by DOE (DOE, 2004a; DOE, 2004b) were used to estimate the chemical impacts associated with the proposed NEF. In two EISs that assessed the construction and operation of a DUF_6 conversion facility, DOE presented an evaluation of the chemical impacts resulting from transportation accidents involving DUF_6. The results are applicable because the chemical impacts would be independent of the shipping route and the amount of enrichment. Chemical impacts would be only dependent on the amount of UF_6 being transported and not on enrichment. In addition, the proposed NEF would use the same containers (Type 48Y cylinders) that DOE evaluated.

Table 4-7 shows the potential chemical impacts to the public from a hypothetical severe transportation accident (both truck and rail) that involves a fire (DOE, 2004a; DOE, 2004b). The results are based on the assumption that the accident occurred. The probability that the accident could happen is very remote. Since the accident location is not known, DOE evaluated the impacts for three different population densities. In addition, DOE presented the number of people that could be affected by two levels of effects (potential for adverse health effects and irreversible adverse health effects). The assumptions supporting the impacts summarized in the table are provided in Appendix D, Section D.5.

Table 4-7 Potential Chemical Consequences to the Population from Severe Transportation Accidents

Source	Mode	Rural	Suburban	Urban
Number of Persons with the Potential for Adverse Health Effects[b]				
DUF_6	Truck	6	760	1,700
	Rail	110	13,000	28,000
Depleted U_3O_8 (in bulk bags)	Truck	0	12	28
	Rail	0	47	103
Number of Persons with the Potential for Irreversible Adverse Health Effects[a, b]				
DUF_6	Truck	0	1	3
	Rail	0	2	4
Depleted U_3O_8 (in bulk bags)	Truck	0	5	10
	Rail	0	17	38

[a] Exposure to hydrofluoric acid or uranium compounds is estimated to result in fatality to approximately 1 percent or less of those persons experiencing irreversible adverse effects.
[b] An adverse health effect includes respiratory irritation or skin rash associated with lower chemical concentrations. An irreversible adverse health effect generally occur at higher chemical concentrations and are permanent in nature.
Source: DOE, 2004a; DOE, 2004b.

For transporting DUF_6 by truck, up to 1,700 people could suffer adverse health effects, depending on where the accident occurs. Up to three people in an urban setting could suffer irreversible adverse health effects that could include death, impaired organ function (such as central nervous system or lung damage), and other effects that could impair daily functions. For transporting depleted U_3O_8 in bulk bags from a DUF_6 conversion facility to a low-level radioactive waste disposal facility by truck, up to 28 people could potentially suffer adverse health effects and up to 10 people could potentially suffer irreversible adverse health effects if an accident occurs in an urban setting.

For rail, the chemical impacts of an accident would be higher than for transportation by truck because of the larger quantity of material being transported in a shipment (four times greater by rail than by truck). Up to 28,000 people could experience adverse health effects for an accident in an urban setting that involves a rail shipment of DUF_6, with four additional people potentially suffering irreversible effects. When transporting depleted U_3O_8 in bulk bags by rail (four times the quantity than by truck), up to 103 people could suffer adverse health effects with 38 people potentially suffering irreversible effects if an accident occurs in an urban setting.

Due to the range in potential impacts of chemical exposure if an accident occurs during transportation, the impacts could be from SMALL to MODERATE dependent on the location (rural, suburban, or urban).

4.2.11.3 Summary of Transportation Impacts

There is the potential for one fatality as a result of construction worker traffic to and from the site during each of the three peak years of construction. This traffic would almost double the overall traffic on New Mexico Highway 234; however, any potential traffic impacts could be mitigated by varying the starting and quitting times of the construction workers and building turning lanes. The increased traffic due to commuting construction workers would have a SMALL to MODERATE impact on the volume of traffic on New Mexico Highway 234. The impacts from the truck traffic to and from the site would have only a SMALL impact on overall traffic.

Tables 4-5 and 4-6 present the various impacts from either truck or rail transport of radioactive materials on a yearly basis. There is a potential for less than one fatality to either the general public or occupational workers from traffic accidents using either truck or rail transport. The emissions of either trucks or trains could result in about two latent cancer fatalities. Incident-free direct radiation could result in less than one latent cancer fatality to either the general public or occupational workers. The accident risk was assessed to be less that one latent cancer fatality to the general public resulting from accidents involving either a truck or rail.

4.2.11.4 Mitigation Measures

A dust-suppression program would be implemented to control dust that would be created from construction traffic. BMPs would be used to maintain temporary roads to minimize the risk of accidents. Bare earthen areas would be stabilized, and earthen materials would be removed from paved areas and contained during excavation activities to ensure that traffic is not impeded. Open-bodied trucks would be covered when in motion. Temporary access roads and parking areas would be upgraded to permanent structures upon completion of construction. Only approved transport vehicles, containers, and casks would be used. Equipment operators would be qualified in the equipment they would operate. Procedures would be in place for manifesting all materials that enter and exit the facility including radiological materials and wastes. To mitigate for traffic-impacts during construction, LES would implement work shifts and would encourage car pooling to minimize the impact to traffic (LES, 2004a). Dedicated turning lanes could also be constructed at both entrances to the proposed NEF site.

4.2.12 Public and Occupational Health Impacts

Except for transportation impacts, this section presents the environmental impacts to the surrounding public and the proposed NEF site work force from site preparation and construction and operation of the facility for both radiological and nonradiological (i.e., hazardous chemical) exposures. For members of the public, this Draft EIS considered the affected population would be within an 80-kilometer (50-mile) radius of the proposed NEF site with the primary exposure pathway being from gaseous effluents. Workers at the proposed NEF site could also be affected by airborne or gaseous releases in addition to direct chemical and radiation exposure due to handling UF_6 cylinders, working near the enrichment equipment, and decontaminating cylinders and equipment.

Because there is a distinct separation between the construction and operational phases of the proposed NEF, the construction phase impacts would likely be exclusively nonradiological. Even with the overlap in time between the construction and operational phases, this segregation can still be applied for the assessment of public and occupational health impacts due to very limited similarities between the sources of the impacts during each phase. For the most part, the construction phase does not involve radioactive material or the same hazardous chemicals that are employed during the operational phase. However, near the conclusion of the construction phase, hazardous chemicals that are directly associated with the assembly and installation of the enrichment process equipment would be used, presenting similar to chemical hazards as those present in the operational phase.

4.2.12.1 Site Preparation and Construction

<u>Nonradiological Impacts</u>

The proposed action is a major construction activity with the potential for industrial accidents related to construction vehicle accidents, material-handling accidents, falls, etc., that could result in temporary injuries, long-term injuries and/or disabilities, and even fatalities. The proposed activities are not anticipated to be any more hazardous than those for a major industrial construction or demolition project.

To estimate the number of potential fatal and nonfatal occupational injuries from the proposed action, data on fatal and nonfatal occupational injuries per worker per year were collected from the U.S. Department of Labor's Bureau of Labor Statistics. Nonfatal occupational injury rates specific to New Mexico for the year 2002 and State of New Mexico fatal occupational injury rates for the year 2000 for both the construction and manufacturing industries were used to calculate each of the rates for the proposed NEF (DOL, 2004). Table 4-8 presents the rates and the estimated fatal and nonfatal injuries associated with the construction of the proposed NEF.

The expected fatal and nonfatal injuries are based on a peak labor force of 800 employees and a total work force of 3,175 person-years performing construction and excavation work over the time of site preparations and construction activities for the years of 2006 to 2013 (LES, 2004a). Nonfatal workday injuries are expected to occur for an estimated 6 percent of the work force. The expected number of fatalities that could occur in a year is estimated to be less than 1 (0.3). Over the eight-year construction period, this has the potential for approximately two fatalities. Precautions would be taken to prevent industrial injuries and fatalities including adherence to policies and worker-safety procedures.

Table 4-8 Expected Occupational Impacts Associated with Construction of the Proposed NEF

Category	Injury Rate (Injuries per 100 Worker per Year)	Expected Injuries per Year for All Workers	
		Peak Year	Average[a]
Nonfatal Injuries	6.1[b]	~49	~24
Fatal Injuries	7.4×10^{-4}	0.6	0.3

[a] Construction injuries based on a total construction period from 2006 to 2013 with a total 3,175 worker-years of involvement.
[b] Incidence rate for entire construction or miscellaneous manufacturing industry activity in New Mexico for the year 2002.
Source: DOL, 2004; LES, 2004a.

In addition, impacts from criteria pollutants have been considered. Criteria pollutants would result from the combustion engines used in heavy equipment. The impacts to human health from air pollutants would be SMALL as shown in Section 4.2.4.

Radiological Impacts

Construction workers building those portions of the proposed NEF next to completed Cascade Halls would have the potential of being exposed to uranium material. Segregation of the areas to prevent construction workers from entering operational areas of the facility would minimize their exposures to those of the general office staff with annual doses of less than 0.05 millisieverts (5 millirem).

4.2.12.2 Operations

This section evaluates the potential environmental impacts to members of the public and workers from the proposed NEF. The evaluation process involved applying the methodology from Appendix C and reviewing information and site-specific data provided from LES, technical reports and safety analyses related to the potential hazards, and other independent information sources.

Nonradiological Impacts

The potential nonradiological impacts during operations of the proposed NEF are associated with the hazardous chemicals that are necessary for the operation and maintenance of the equipment as well as components of the facility's effluent releases (LES, 2004a). The hydrogen fluoride and methylene chloride are regulated under National Emission Standards for Hazardous Air Pollutants in accordance with EPA and State of New Mexico regulations where the impacts to the public would be SMALL. Occupational exposure to the airborne release of hydrogen fluoride would be no greater than at the point of discharge with a concentration of 3.9 micrograms per cubic meters (LES, 2004a). This concentration level is significantly below the OSHA and National Institute for Occupational Safety and Health limits for an 8-hour work shift of 2.5 milligrams per cubic meter; thus the associated occupational chemical impacts would also be SMALL (DHHS, 2004).

Many of the chemicals proposed for use are common to industrial facilities and include cleaning agents (acetone, ethanol, and methylene chloride), lubricants (i.e., Fomblin® oil), maintenance fluid, and laboratory-related chemicals (i.e., anhydrous sodium carbonate). The quantity of hazardous material and resulting wastes would be low enough for the proposed NEF to be considered a small-quantity generator for solid hazardous and mixed wastes under the *Resource Conservation and Recovery Act* (RCRA).

Other nonradiological occupational impacts include potential industrial injuries and fatalities. Table 4-9 shows the occupational injury and fatality rates within the State of New Mexico based on values associated with similar manufacturing industries and, for comparison, the reported occupational injury rates for the Capenhurst facility (LES, 2004a). Based on the past operational history of the Capenhurst and Almelo facilities, the chances of a fatality during operation of the proposed NEF are considered unlikely at 4×10^{-4} fatalities per year.

The overall nonradiological impacts resulting from the operation of the proposed NEF would be SMALL for members of the public and workers.

Table 4-9 Expected Occupational Impacts Associated with the Operation of the Proposed NEF

Category	Injury Rate (Injuries per 100 Worker per Year)	Injuries per Year for All Workers	
		Average[b]	Reported[c]
Nonfatal Injuries	3.8[a]	~8	~5
Fatal Injuries	1.9×10^{-4}	$\sim4\times10^{-4}$	0

[a] Incidence rate for miscellaneous manufacturing industry activity in the State of New Mexico for the year 2002.
[b] Operational injuries based on a total operation period from 2008 to 2028 with a constant work force of 210 employees.
[c] Reported average injuries per year from Capenhurst facility for injuries at the A3, E22, and E23 plants (total of 2.96 million separative work units [SWU]) during the years 1999-2003.
Source: DOL, 2004; LES, 2004a.

<u>Radiological Impacts</u>

Exposure to uranium may occur from routine operations as a result of small controlled releases to the atmosphere from the uranium enrichment process lines and decontamination and maintenance of equipment, releases of radioactive liquids to surface water as well as a result of direct radiation from the process lines, storage, and transportation of UF_6. Direct radiation and skyshine (radiation reflected from the atmosphere) in offsite areas due to operations within the Separations Building would be expected to be undetectable because most of the direct radiation associated with the uranium would be almost completely absorbed by the heavy process lines, walls, equipment, and tanks that would be employed at the proposed NEF, and would have to travel a significant distance to reach the nearest member of the public.

Under the proposed action, the major source of occupational exposure would be expected to be direct radiation from the UF_6 with the largest exposure source being the empty Type 48Y cylinders with residual material, full Type 48Y cylinders containing either the feed material or the DUF_6, Type 30 product cylinders, and various traps that help minimize UF_6 losses from the cascade.

Atmospheric releases would be expected to be a source of public exposure. Such releases would be primarily controlled through the Technical Services Building and Separations Building gaseous effluent vent systems. Table 4-10 shows the expected isotopic release mix resulting from the annual gaseous release of 10 grams (0.022 pounds) of uranium and for the bounding annual gaseous release of approximately 9×10^{6} becquerels (240 microcuries) of uranium (LES, 2004a). For gaseous effluents resulting from the sublimation of UF_6, no significant amount of radioactive particulate material (uranium or its radioactive decay daughters) would be expected to be introduced into the process ventilation system and released to the environment after gaseous effluent vent system filtration.

Dose Evaluation Methods

Radioactive material released to the atmosphere, surface water, and ground water is dispersed during transport through the environment and could be transferred to humans through inhalation, ingestion, and direct exposure pathways. Therefore, evaluation of impacts requires consideration of potential receptors, source terms, environmental transport, exposure pathways, and conversion of estimates of intake to radiation dose. The dose evaluation applies the methodology, assumptions, and data presented in

Table 4-10 Annual Effluent Releases

	Estimated Releases[a]		Bounding Releases	
Radionuclide	TSB GEVS kBq/year (µCi/year)	SB GEVS kBq/year (µCi/year)	TSB GEVS kBq/year (µCi/year)	SB GEVS kBq/year (µCi/year)
^{234}U	77.7 (2.10)	45.5 (1.23)	2,738 (74.0)	1,591 (43.0)
^{235}U	3.59 (0.097)	2.11 (0.057)	125.8 (3.4)	74.0 (2.0)
^{236}U	0.48 (0.013)	0.30 (0.008)	17.0 (0.46)	11.1 (0.3)
^{238}U	77.7 (2.10)	45.5 (1.23)	2,738 (74.0)	1,591 (43.0)
Total	159.5 (4.31)	93.6 (2.53)	5,619 (151.9)	3,267 (88.3)

[a] Equivalent to 10 grams (0.022 pounds) of uranium.
GEVS - gaseous effluent vent system; SB - Separations Building; TSB - Technical Service Buildings;
kBq - kilobecquerels; µCi - microcuries
Source: LES, 2004a.

Appendix C to calculate the potential impacts to members of the public. A summary of the Appendix C results for public exposure follows.

Public Exposure Impacts

Radioactive material would be released to the atmosphere from the proposed NEF site through stack releases from the Technical Service Buildings and Separations Building gaseous effluent vent system and from the potential resuspension of contaminated soil within the Treated Effluent Evaporative Basin. While a member of the public would not be expected to spend a significant amount of time at the site boundary closest to the UBC Storage Pad, this possibility is included in this impact assessment. Thus, the analyses estimated the potential dose to a hypothetically maximally exposed individual located at the proposed NEF site boundary along with members of the public who may be present or live near the proposed NEF. The expected exposure pathways include inhalation of airborne contaminants and direct exposure from material deposited on the ground. In addition to these expected routes of exposure, members of the public may also consume food containing deposited radionuclides and inadvertently ingest re-suspended soil from the ground or on local food sources (e.g., leafy vegetables, carrots, potatoes, and beef from nearby grazing livestock).

Table 4-11 presents potential effective dose equivalents for the maximally exposed individuals and the general population. The general population within 80 kilometers (50 miles) of the proposed NEF would receive a collective dose of 0.00014 person-sieverts (0.014 person-rem), equivalent to 8.4×10^{-6} LCFs from normal operations.

Due to the potential for the resuspension of contaminated soil at the bottom of the Treated Effluent Evaporative Basin, the health impacts analysis was based on 30 years of 0.57 kilograms (1.3 pounds) per year of uranium being placed into the Treated Effluent Evaporative Basin soil (LES, 2004a). The resulting 27.4×10^{6} becquerels (7.4 millicuries) of uranium of material at risk with a resuspension factor of 4×10^{-6} per hour would result in an additional annual effective dose of 1.7×10^{-6} millisieverts (1.7×10^{-4} millirem) to the nearest resident with the largest offsite dose at the south site boundary of 1.7×10^{-5} millisieverts (1.7×10^{-3} millirem) (LES, 2004a). The resuspension factor for soils could be as high as 9×10^{-5} per hour for areas that are fairly open to the prevailing winds (DOE, 1994). Because the Treated

Table 4-11 Radiological Impacts to Members of the Public Associated with Operation of the Proposed NEF

Receptor	Location from NEF Stacks	Airborne Pathway CEDE[a]	Direct Radiation[b]	Annual Dose	LCF
Population, person-Sv (person-rem)	Within 80.5 km (50 mi) of Proposed NEF	1.4×10^{-4} (1.4×10^{-2})	N/A	1.4×10^{-4} (1.4×10^{-2})	8.4×10^{-6}
Highest Boundary (Stack Releases), mSv (mrem)	Northern Boundary 1,010 m (0.6 mi)	5.3×10^{-5} (5.3×10^{-3})	0.189 (18.9)	0.189 (18.9)	1.1×10^{-5}
Nearest Resident[c], mSv (mrem)	4,300 m (2.6 mi) West	1.3×10^{-5} (1.3×10^{-3})	N/A	1.3×10^{-5} (1.3×10^{-3})	7.9×10^{-10}
Lea County Landfill Worker, mSv (mrem)	917 m (0.57 mi) Southeast	1.9×10^{-5} (1.9×10^{-3})	N/A	1.9×10^{-5} (1.9×10^{-3})	1.1×10^{-9}
Wallach Concrete, mSv (mrem)	1,867 m (1.16 mi) North-Northwest	2.2×10^{-5} (2.2×10^{-3})	0.021 (2.1)	0.021 (2.1)	1.3×10^{-6}
Sundance Services, mSv (mrem)	1,706 m (1.06 mi) North-Northwest	2.6×10^{-5} (2.6×10^{-3})	0.026 (2.6)	0.026 (2.6)	1.6×10^{-6}
WCS, mSv (mrem)	1,513 m (0.94 mi) East-Northeast	9.3×10^{-6} (9.3×10^{-4})	0.021 (2.1)	0.017 (1.7)	1.0×10^{-6}

[a] Committed effective dose equivalent.
[b] Direct radiation from the maximum number of UBCs over the lifetime of the proposed NEF.
[c] Includes airborne contamination from the Treated Effluent Evaporative Basin.
LCF - latent cancer facilities; m - meters; mi - miles; km - kilometers; mSv - millisieverts; Sv - sieverts; mrem - millirem.

Effluent Evaporative Basin would be excavated below ground with a net covering the basin, the ability of prevailing winds to resuspend contaminated soils would be expected to be less than that assumed by LES, and the resulting impacts are considered conservative.

Normal operations at the proposed NEF would have SMALL impacts to public health. The total annual dose from all exposure pathways would be significantly less than the regulatory requirement of 1 millisieverts (100 millirem) (10 CFR § 20.1301). The most significant impact would be from direct radiation exposure to receptors close to the UBC Storage Pad (filled and empty Type 48Y cylinders). The results are based on very conservative assumptions, and it is anticipated that actual exposure levels would be less than those presented in Table 4-11. All exposures are significantly below the 10 CFR Part 20 regulatory limit of 1 millisieverts (100 millirem) and 40 CFR Part 190 regulatory limit of 0.25 millisieverts (25 millirem) for uranium fuel-cycle facilities. Members of the public who are located at least a few miles from the UBC Storage Pad would have annual direct radiation exposures combined with exposure through inhalation result in SMALL impacts significantly less than 0.01 millisieverts (1 millirem).

Occupational Exposure Impacts

Tables 4-12 and 4-13 provide the estimated occupational dose rates and annual exposures to representative workers within the proposed NEF site.

Table 4-12 Estimated Occupational Dose Rates for Various Locations or Buildings Within the Proposed NEF

Location	Dose Rate, mSv per hour (mrem per hour)
Plant General Area (excluding Separations Building Modules)	< 0.0001 (< 0.01)
Separations Building Module - Cascade Halls	0.0005 (0.05)
Separations Building Module - UF_6 Handling Area and Process Services Area	0.001 (0.1)
Empty Used UF_6 Shipping Cylinder	0.1 on Contact (10.0) 0.010 at 1 m (3.3 ft) (1.0)
Full UF_6 Shipping Cylinder	0.05 on Contact (5.0) 0.002 at 1 m (3.3 ft) (0.2)

ft - feet; m - meters; mSv - millisieverts; mrem - millirem.
Source: LES, 2004a.

Table 4-13 Estimated Occupational Annual Exposures for Various Occupations for the Proposed NEF

Position	Annual Dose Equivalent[a] mSv (mrem)
General Office Staff	< 0.05 (< 5.0)
Typical Operations and Maintenance Technician	1 (100)
Typical Cylinder Handler	3 (300)

[a] The average worker exposure at the Urenco Capenhurst facility during the years 1998 through 2002 was approximately 0.2 millisieverts (20 mrem).
mSv - millisieverts; mrem - millirem.
Source: LES, 2004a.

The proposed NEF personnel-monitoring program would monitor for internal exposure from intake of soluble uranium (LES, 2004b). LES would also apply an annual administrative limit of 10 millisieverts

(1,000 millirem) that includes external radiation sources and internal exposure from no more than 10 mg of soluble uranium in a week. Appendix C also provides historical data for past occupational exposures at U.S. and European enrichment facilities. Tables C-10, C-11, and C-12 of Appendix C demonstrate that the LES estimated occupational exposures are consistent with the historical data.

The occupational exposure analysis and the historical exposure data from Capenhurst, Almelo, and U.S. enrichment facilities, demonstrate that a properly administered radiation protection program at the proposed NEF would maintain the radiological occupational impacts below the regulatory limits of 10 CFR § 20.1201. Therefore, the impacts from occupational exposure at the proposed NEF would be SMALL.

4.2.12.3 Mitigation Measures

Plant design features such as controls and processes would be incorporated into the proposed NEF to minimize the gaseous and liquid effluent releases, and to maintain the impacts to workers and the surrounding population below regulatory limits. This would include maintaining system process pressures that are sub-atmospheric, reclaiming any off-gasses to recover as much UF_6 as possible, and subsequently passing effluents through prefilters, high-efficiency particulate air filters, and activated carbon filters. All emissions would be monitored, and alarm systems would activate and shutdown facility systems/processes if contaminants exceed prescribed limits. Procedures would ensure that a UF_6 cylinder is handled only when the material is in the solid state; liquid wastes are processed through precipitation, ion exchange, and evaporation; all onsite stormwater is directed to basins within the proposed NEF boundaries; and environmental monitoring and sampling is performed to ensure compliance with regulatory discharge limits. An as-low-as-reasonably-achievable (ALARA) program would be implemented in addition to routine radiological surveys and personnel monitoring. BMPs associated with compliance with 20 CFR Part 1910 regarding OSHA standards would be implemented.

4.2.13 Public and Occupational Health Impacts from Accidents During Operations

The operation of the proposed NEF would involve risks to workers, the public, and the environment from potential accidents. The regulations in 10 CFR Part 70, Subpart H, "Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material," require that each applicant or licensee evaluate, in an Integrated Safety Analysis, its compliance with certain performance requirements. Appendix C of this Draft EIS summarizes the methods and results used by the NRC to independently evaluate the consequences of potential accidents identified in LES's Integrated Safety Analysis. The accidents evaluated are a representative selection of the types of accidents that are possible at the proposed NEF.

The analytical methods used in this consequence assessment are based on NRC guidance for analysis of nuclear fuel-cycle facility accidents (NRC, 1990; NRC, 1991; NRC, 1998; NRC, 2001). With the exception of the criticality accident, the hazards evaluated involve the release of UF_6 vapor from process systems that are designed to confine UF_6 during normal operations. As described below, UF_6 vapor poses a chemical and radiological risk to workers, the public, and the environment.

4.2.13.1 Selection of Representative Accident Scenarios

The Safety Analysis Report and Emergency Plan (LES, 2004b; LES, 2004c) describe potential accidents that could occur at the proposed NEF. Potential transportation accidents and consequences are discussed in Section 4.2.11. Accident descriptions are provided for two groups according to the severity of the accident consequences: high consequence events and intermediate consequence events (as presented in Table C-13 of Appendix C). The accident types are summarized in the Emergency Plan as follows:

High Consequence Events

- Earthquake.
- Tornado.
- Flood.
- Inadvertent nuclear criticality.
- Fires propagating between areas.
- Fires involving transient combustibles.
- Heater controller failure.
- Over-filled cylinder heated to ambient conditions.
- Product liquid sampling autoclave heater failure followed by reheat.
- Open sample manifold purge valve and blind flange.
- Pump exhaust plugged.
- UF_6 sub-sampling unit hot box heater controller failure.

Intermediate Consequence Events

- Carbon trap failure.
- Chemical dump trap failure.
- Pump exhaust plugged.
- Spill of failed centrifuge parts.
- Dropped contaminated centrifuge.
- Empty UF_6 cold trap (UF_6 release).
- Fire in ventilated room.

In this Draft EIS, a range of possible accidents was selected for detailed evaluation to bound the potential human health accidents. The accident sequences selected vary in severity from high- to intermediate-consequence events and include accidents initiated by natural phenomena, operator error, and equipment failure. The accident sequences evaluated are as follows:

- Generic inadvertent nuclear criticality.
- Hydraulic rupture of a UF_6 cylinder in the blending and liquid sampling area.
- Natural phenomena hazard—earthquake.
- Fire in a UF_6 handling area.
- Process line rupture in a product low-temperature takeoff station.

4.2.13.2 Accident Consequences

The five accident sequences were analyzed using the methodology presented in Appendix C.

Table 4-14 presents the consequences from the accidents. The accident consequences vary in magnitude and include accidents initiated by natural phenomena, operator error, and equipment failure. Analytical results indicate that accidents at the proposed NEF pose acceptably low risks. The most significant accident consequences are those associated with the release of UF_6 caused by rupturing an over-filled and/or over-heated cylinder. The proposed NEF design reduces the likelihood of this event by using redundant heater controller trips. Accidents at the proposed NEF would pose SMALL to MODERATE impacts to workers, the environment, and the public.

Table 4-14 Summary of Health Effects Resulting from Accidents at the Proposed NEF

	Worker[a]		Environment at Restricted Area Boundary	Individual at Controlled Area Boundary, SW direction		Collective Dose		
Accident	U intake, mg (rem)	[HF], mg/m³	mg U/m³	U intake mg (rem)	[HF], mg/m³	Direction	person-rem	LCFs
Inadvertent Nuclear Criticality	High[b]		0.66[c]	(0.14[d])	---	West	44	0.03
Hydraulic Rupture of a UF_6 Cylinder	High[b]		44	150 (0.97)	86	North	12,000	7[e]
Earthquake	High[b]		0.11	0.39 (0.00099)	0.13	North	19	0.008
Fire in a UF_6 Handling Area	3.2 (0.0055)	11	0.012	0.042 (0.000072)	0.024	North	0.92	0.0006
Process Line Rupture	0.92 (0.0059)	3.1	0.0035	0.012 (0.000078)	0.0069	North	0.97	0.0006

[a] Worker exits after 5 minutes.
[b] High consequence could lead to a fatality.
[c] Pursuant to 10 CFR § 70.61(c)(3), this value is the sum of the fractions of individual fission product radionuclide concentrations over 5,000 times the concentration limits that appear in 10 CFR Part 20, Appendix B, Table 2.
[d] The dose to the individual at the Controlled Area Boundary is the sum of internal and external doses from fission products released from the Technical Services Building gaseous effluent vent systems stack.
[e] Though the consequences of the rupture of a liquid-filled UF_6 cylinder would be HIGH, redundant heater controller trips would make this event highly unlikely to occur.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
mg/m³ - milligrams per cubic meter.
To convert rem to sievert, multiply by 0.01.

4.2.13.3 Mitigation Measures

NRC regulations and LES's operating procedures for the proposed NEF are designed to ensure that the high and intermediate accident scenarios would be highly unlikely. The NRC staff's Safety Evaluation Report (SER) would assess the safety features and operating procedures required to reduce the risks from accidents. The combination of responses by items relied on for safety that mitigate emergency conditions, and the implementation of emergency procedures and protective actions in accordance with the proposed NEF Emergency Plan, would limit the impacts of accidents that could otherwise extend beyond the proposed NEF boundaries.

4.2.14 Waste Management Impacts

This section describes the analysis and evaluation of the solid, hazardous, and radioactive waste management program at the proposed NEF including impacts resulting from temporary storage, conversion, and disposal of the DUF_6. An evaluation of mixed waste is also addressed in this section because LES is required by RCRA regulations to manage mixed wastes at the proposed NEF.

Due to the nature, design, and operation of a gas centrifuge enrichment facility, the generation of waste materials can be categorized by three distinct facility operations: (1) construction, which generates typical construction wastes associated with an industrial facility; (2) enrichment process operations, which generate gaseous, liquid, and solid waste streams; and (3) generation and temporary storage of DUF_6 (Section 4.3 of this chapter discusses decommissioning wastes). Waste materials include radioactive waste (i.e., DUF_6 and material contaminated with UF_6), designated hazardous materials, and nonhazardous materials. Hazardous materials include any fluids, equipment, and piping generated due to the construction, operation, and maintenance programs.

The handling and disposing of waste materials is govern by various Federal and State regulations. To satisfy the Federal and State regulations, LES must have waste management programs for the collection, removal, and proper disposal of waste materials. The LES waste management program is intended to minimize the generation of waste through reduction, reuse, or recycling (LES, 2004a). This program would assist in identifying process changes that can be made to reduce or eliminate mixed wastes, methods to minimize the volume of regulated wastes through better segregation of materials, and

> ***DOE Role in Accepting DUF_6***
>
> *"A future decision to extend operations or expand throughput [of the proposed DOE conversion facilities] might also result from the fact that DOE could assume management responsibility for DUF_6 in addition to the current [DOE] inventory. Two statutory provisions make this possible. First, Sections 161v. [42 USC 2201(v)] and 1311 [42 USC 2297b-10] of the Atomic Energy Act of 1954 [P.L. 83-703], as amended, provide that DOE may supply services in support of U.S. Enrichment Corporation (USEC). In the past, these provisions were used once to transfer DUF_6 cylinders from USEC to DOE for disposition in accordance with DOE orders, regulations, and policies. Second, Section 3113 (a) of the USEC Privatization Act [42 USC 2297h-11(a)] requires DOE to accept low-level radioactive wastes, including depleted uranium that has been determined to be low-level radioactive wastes, for disposal upon request and reimbursement of costs by USEC or any other person licensed by the NRC to operate a uranium enrichment facility. This provision has not been invoked, and the form in which depleted uranium would be transferred to DOE...is not specified. However, DOE believes depleted uranium transferred under this order...would most likely be in the form of DUF_6."*

the substitution of nonhazardous materials as required under RCRA regulations. Based on the available information and waste data from similar facilities, the waste-management impacts are assessed for site preparation and construction, operations, and DUF_6 disposition.

4.2.14.1 Solid Waste Management During Site Preparation and Construction

Solid nonhazardous wastes generated during site preparation and construction would be very similar to wastes from other construction sites of industrial facilities. These wastes would be transported offsite to an approved local landfill. Approximately 3,058 cubic meters (4,000 cubic yards) per year of packing material, paper, and scrap lumber would be generated (LES, 2004a). In addition, there would also be scrap structural steel, piping, sheet metal, etc., that would not be expected to pose any significant impacts to the surrounding environment because most of this material could be recycled or directly placed in an offsite landfill.

Nonhazardous wastes would be transported to the Lea County Landfill for disposal. This landfill is expected to receive approximately 8,000 cubic meters (10,464 cubic yards) of uncompacted waste daily, or 2,288,000 cubic meters (2,992,591 cubic yards) annually by year 9 (2006) of its operation according to its permit application (LCSWA, 1996). The proposed NEF construction activities would begin in 2006. Therefore, the total volume of construction wastes from the proposed NEF over 8 years would be less than solid waste landfill receipts in three days of operation from all other sources.

The generation of hazardous wastes (i.e., waste oil, greases, excess paints, and other chemicals) associated with the construction of the facility due to the maintenance of construction equipment and vehicles, painting, and cleaning would be packaged and shipped offsite to licensed facilities in accordance with Federal and State environmental and occupational regulations. Table 4-15 shows the hazardous wastes that would be expected from construction of the proposed NEF. The quantity of all construction-generated hazardous and nonhazardous waste material would result in SMALL impacts that can be effectively managed.

Table 4-15 Hazardous Waste Quantities Expected During Construction

Waste Type	Annual Quantity
Paint, Solvents, Thinners, Organics	11,360 liters (3,000 gallons)
Petroleum Products – Oils, Lubricants	11,360 liters (3,000 gallons)
Sulfuric Acid (Batteries)	380 liters (100 gallons)
Adhesives, Resins, Sealers, Caulking	910 kilograms (2,000 pounds)
Lead (Batteries)	91 kilograms (200 pounds)
Pesticide	380 liters (100 gallons)

Source: LES, 2004b.

4.2.14.2 Solid Waste Management During Operations

Gaseous effluents, liquid effluents, and solid wastes would be generated during normal operations. Appropriate treatment systems would be established to control releases or collect the hazardous material for onsite treatment or shipment offsite. Gaseous releases would be minimized, liquid wastes would be kept onsite, and solid wastes would be appropriately packaged and shipped offsite for further processing or final disposition. The impacts from gaseous and liquid effluents are described in Sections 4.2.4, 4.2.6, and 4.2.12. This section presents the onsite and offsite impacts from the management of solid wastes and cites impacts from other *National Environmental Policy Act* (NEPA) assessments when appropriate.

The operation of the proposed NEF would generate approximately 172,500 kilograms (380,400 pounds) of solid nonradioactive waste annually, including approximately 1,900 liters (500 gallons) of hazardous liquid wastes (LES, 2004a). Approximately 87,000 kilograms (191,800 pounds) of radiological and mixed waste would be generated annually with about 50 kilograms (110 pounds) of mixed wastes.

Solid wastes during operations would be segregated and processed based on whether the material can be classified as wet solid or dry solid wastes and segregated into radioactive, hazardous, or mixed-waste categories. The radioactive solid wastes would be Class A low-level radioactive wastes as defined in 10 CFR Part 61, appropriately packaged, and shipped to a commercial licensed low-level radioactive wastes disposal facility or shipped for further processing for volume reduction. The annual volume of nonradioactive solid wastes would be 1,184 cubic meters (1,549 cubic yards) assuming a standard container with a volume of 7.65 cubic meters (10 cubic yards) holds 553 kilograms (0.61 tons) of nonhazardous wastes (NJ, 2004). Nonhazardous wastes would be transported to the Lea County Landfill for disposal. This landfill is expected to have received uncompacted gate receipts of approximately 16,000 cubic meters (20,927 cubic yards) per day, or 4,576,000 cubic meters (5,985,182 cubic yards) per year in 2013, according to its permit application that assumes a 10-percent increase in gate receipts per year (LCSWA, 1996). The nonradioactive solid waste generation from the proposed NEF would potentially increase the volume at the landfill by less than 0.03 percent. Therefore, impacts to the Lea County Landfill could be considered accounted for in the assumed 10-percent annual increase in gate receipts previously documented in the landfill's permit application. Based on the quantities of solid wastes and the application of industry-accepted procedures, the impacts from solid wastes would be SMALL.

Because over 20 years of disposal space is currently available in the United States for Class A low-level radioactive wastes (GAO, 2004), the impact of low-level radioactive wastes generation would be SMALL on disposal facilities. EPA and New Mexico regulations, including 20.4.1 *New Mexico Administrative Code* 20.4.1, "Hazardous Waste Management," would be the guiding laws to manage hazardous wastes (LES, 2004a).

4.2.14.3 DUF_6 Waste-Management Options

As discussed in Chapter 2 of this Draft EIS, until a conversion facility is available, UBCs (i.e., DUF_6-filled Type 48Y cylinders) would be temporarily stored on the UBC Storage Pad. Storage of UBCs at the proposed NEF could occur for up to 30 years during operations and before removal of DUF_6 from the site through one of the disposition options (see text box *DUF_6 Disposition Options Considered*). However, LES has committed to a disposal path outside of the State of New Mexico which would be utilized as soon as possible and would aggressively pursue economically viable paths for UBCs as soon as they become available (LES, 2004a).

Temporary Onsite Storage Impacts

Proper and active cylinder management, which includes routine inspections and maintaining the anti-corrosion layer on the cylinder surface, has been shown to limit exterior corrosion or mechanical damage necessary for the safe storage of DUF_6 (DNFSB, 1995a; DNFSB, 1995b; DNFSB, 1999). DOE has stored DUF_6 in Type 48Y or similar cylinders at the Paducah and Portsmouth Gaseous Diffusion Plants and the East Tennessee Technical Park in Oak Ridge, Tennessee, since approximately 1956. Cylinder leaks due to corrosion led DOE to implement a cylinder management program (ANL, 2004). Past evaluations and monitoring by the Defense Nuclear Facility Safety Board of DOE's cylinder maintenance program confirmed that DOE met all of the commitments in its cylinder maintenance implementation plan, particularly through the use of a systems engineering process to develop a workable and technically justifiable cylinder management program (DNFSB, 1999). Thus, an active cylinder maintenance program by LES would assure the integrity of the UBCs for the period of time of temporary onsite storage of DUF_6 on the UBC Storage Pad.

DUF_6 Disposition Options Considered

Option 1a: Private Conversion Facility (LES Preferred Option). Transporting the UBCs from the proposed NEF to an unidentified private conversion facility outside the region of influence. After conversion to U_3O_8, the wastes would then be transported to a licensed disposal facility for final disposition.

Option 1b: Adjacent Private Conversion Facility. Transporting the UBCs from the proposed NEF to an adjacent private conversion facility. This facility is assumed to be adjacent to the site and would minimize the amount of DUF_6 onsite by allowing for ship-as-you-generate waste management of the converted U_3O_8 and associated conversion byproducts (i.e., CaF_2). The wastes would then be transported to a licensed disposal facility for final disposition.

Option 2: DOE Conversion Facility. Transporting UBCs from the proposed NEF to a DOE conversion facility. For example, the UBCs could be transported to one of the DOE conversion facilities either at Paducah, Kentucky, or Portsmouth, Ohio (DOE, 2004a; DOE, 2004b). The wastes would then be transported to a licensed disposal facility for final disposition.

The principal impacts would be the radiological exposure resulting from the radioactive material temporarily stored in 15,727 UBCs under normal conditions and the potential release (slow or rapid) of DUF_6 from the UBCs due to an off-normal event or accidents (operational, external, or natural hazard phenomena events). These radiation exposure pathways are analyzed in Sections 4.2.12 and 4.2.13, and based on these results, the impacts from temporary storage would be SMALL to MODERATE. The annual impacts from temporary storage would continue until the UBCs would be removed from the proposed NEF site.

Option 1a: Private Conversion Facility Impacts

Under Option 1a, the Type 48Y cylinders, or UBCs, would be transported from the proposed NEF to an unidentified private facility (potentially ConverDyn facility in Metropolis, Illinois). After being converted to U_3O_8, the waste would be further transported to a licensed disposal facility. The impacts of conversion at a private conversion facility or at DOE conversion facilities are similar because it is assumed that the facility design of a private conversion facility would be similar to the DOE conversion facilities.

The transportation of the Type 48Y cylinders from the proposed NEF to the conversion facility would have environmental impacts. Appendix D provides the transportation impact analysis of shipping the

Type 48Y cylinders, and Section 4.2.11 summarizes the impacts. The selected routes would be from Eunice, New Mexico, to Metropolis, Illinois.

If the private conversion facility cannot immediately process the Type 48Y cylinders upon arrival, potential impacts would include radiological impacts proportional to the time of temporary storage at the conversion facility. The DOE has previously assessed the impacts of temporary storage during the operation of a DUF_6 conversion facility (DOE, 2004a; DOE, 2004b). The proposed action is not expected to change the impacts of temporary storage of Type 48Y cylinders at the conversion facility site from that previously considered in these DOE conversion facility Final EISs. Therefore, the NRC staff has concluded that the environmental impacts of temporary storage at the private conversion facility are bounded by the environmental impacts previously evaluated in the DOE conversion facility Final EISs. At the Paducah and Portsmouth conversion facilities, the maximum collective dose to a worker would be 0.055 person-sieverts (5.5 person-rem) per year and 0.03 person-sieverts (3 person-rem) per year, respectively. There would be no exposure to noninvolved workers or the public because air emissions from the cylinder preparation and maintenance activities would be negligible (DOE, 2004a; DOE, 2004b).

Because Metropolis, Illinois, lies just across the Ohio River from the Paducah conversion facility site (within 6.4 kilometer [4 miles]), if a private conversion facility is built at Metropolis, Illinois, then the public and occupational health impacts from this conversion facility would be bounded by the impacts from the Paducah conversion facility because both conversion facilities would be located in the same area and would be approximately the same size. In addition, other impacts to resources such as land use, historic and cultural, visual, air quality, geology, water quality, ecology, noise, and waste management, would be similar to the Paducah conversion facility. Therefore, the NRC staff considers the impacts for these resources from the construction and operation of a conversion facility at Metropolis, Illinois, to be bounded by the impacts previously considered in the Paducah conversion facility Final EIS (DOE, 2004a). Because the impacts to resources discussed above and the health impacts are within regulatory requirements, the impacts from the private conversion facility would be SMALL.

<u>Option 1b: Adjacent Private Conversion Facility Impacts</u>

The conversion facility could be constructed adjacent to the proposed NEF. For the purposes of analyzing impacts, "adjacent" is defined as being within at least 6.4 kilometers (4 miles) of the proposed NEF. Although no adjacent conversion facility site has been identified, there would be advantages (i.e., transportation and speed of processing) for having a conversion facility adjacent to the proposed NEF. With an adjacent conversion facility, transfer and conversion could be completed within days of the filling of the Type 48Y cylinder, thus minimizing the amount of DUF_6 onsite. Once the waste was converted to U_3O_8, depleted uranium and the associated waste streams would subsequently be transported to a licensed disposal facility for final disposition. Such immediate waste-management action would allow for no buildup of DUF_6 wastes at the proposed NEF and would removes the impacts and risks associated with the temporary storage of UBCs at the proposed NEF and the potential conversion facility.

Because the operations would be the same as the DOE conversion facilities, the environmental impacts from normal operations of an adjacent conversion facility would be representative of the impacts of the DOE facilities and the proposed NEF. Therefore, the maximum occupational and member of the public annual exposures would be approximately 6.9 millisieverts (690 millirem) and 5.3×10^{-5} millisieverts (5.3×10^{-3} millirem), respectively. The impacts due to accidents would be bounded by the proposed NEF's highest accident consequence—the hydraulic rupture of a UF_6 cylinder. This maximum accident impact would be a collective dose of 12 person-sieverts (12,000 person-rem) or equivalent to 7 latent cancer fatalities.

If a DUF_6 conversion facility is built adjacent to the proposed NEF site within New Mexico, its water could also come from the Hobbs and Eunice municipal systems. Based on water use at the existing conversion facility at Portsmouth, Ohio (DOE, 2004b), and allowing for the decreased throughput of a facility built to handle only the proposed NEF's output, such a facility's operational water needs could be approximately 200 cubic meters per day (19 million gallons per year), approximately 82 percent of the water use of the proposed NEF. This increase in water use would still be well within the capacity of the local municipal water supply systems. If such a facility were built in nearby Andrews County, Texas, it would use different water suppliers, although the water would still be withdrawn from the Ogallala Aquifer. Therefore, the water resource impacts would be SMALL.

Other impacts to resources such as land use, historic and cultural, visual and scenic, geology, ecology, socioeconomics, and environmental justice would be similar to the proposed NEF because they would be located in the same area and would be approximately the same size. Therefore, the NRC staff considers the impacts for these resources from the construction and operation of an adjacent conversion facility to be bounded by the impacts considered in this Draft EIS for the proposed NEF. Based on the description and design parameters of the Portsmouth DOE conversion facility, the adjacent conversion facility would likely affect a similar area of land, employ a similar number of workers, and similar building size as the proposed NEF. Due to similar construction methods and design, impacts to resources at the adjacent conversion facility, such as air quality, water quality, noise, and waste management, would be similar to the Portsmouth conversion facility (DOE, 2004b). Because the radiological impacts are within regulatory requirements, the impacts from an adjacent conversion facility would be SMALL.

Option 2: DOE Conversion Facilities Impacts

Under option 2, the Type 48Y cylinders would be transported from the proposed NEF to either of the DOE's conversion facilities (Paducah, Kentucky, or Portsmouth, Ohio). After being converted to U_3O_8, the waste would be further transported to a licensed disposal facility. The transportation of the Type 48Y cylinders from the proposed NEF to the conversion facility would have environmental impacts. Appendix C provides the transportation impact analysis of shipping the Type 48Y cylinders, and Section 4.2.11 summarizes the impacts. The selected routes are from Eunice, New Mexico, to Paducah, Kentucky, and Portsmouth, Ohio.

If the DOE conversion facility could not immediately process the UBCs upon arrival, potential impacts would include radiological impacts proportional to the time of temporary storage at the conversion facility. The DOE has previously assessed the impacts of UBC storage during the operation of a DUF_6 conversion facility (DOE, 2004a; DOE, 2004b) and bound the impacts of temporary storage of LES's UBCs at the conversion facility site. At the Paducah and Portsmouth conversion facilities, the maximum collective dose to a worker (i.e., a worker at the cylinder yard) would be 0.055 person-sieverts (5.5 person-rem) per year and 0.03 person-sieverts (3 person-rem) per year, respectively. There would be no exposure to noninvolved workers or the public because air emissions from the cylinder preparation and maintenance activities would be negligible (DOE, 2004a; DOE, 2004b).

To assess the impacts of the proposed NEF generated DUF_6 on the DOE's conversion facilities, one must understand the relative amount of additional material as compared to the DOE's existing DUF_6 inventory. The Paducah conversion facility would operate for approximately 25 years beginning in 2006 to process 436,400 metric tons (481,000 tons) (DOE, 2004a). The Portsmouth conversion facility would operate for 18 years also beginning in 2006 to process 243,000 metric tons (268,000 tons) (DOE, 2004b). Based on the projected maximum amount of DUF_6 generated by the proposed NEF (197,000 metric tons [217,000 tons]), this would represent 81 percent of the Portsmouth (243,000 metric tons [268,000 tons]) and 45 percent of the Paducah (436,400 metric tons [481,000 tons]) existing inventories. The proposed NEF would produce approximately 7,800 metric tons (8,600 tons) of DUF_6 per year at full production capacity (LES 2003a). This value represents 43 percent of the annual conversion capacity of the Paducah facility (18,000 metric tons [20,000 tons] per year) and 58 percent of the Portsmouth facility (13,500 metric tons [15,000 tons] per year). The proposed NEF maximum DUF_6 inventory could extend the time of operation by approximately 11 years for the Paducah conversion facility or 15 years for the Portsmouth conversion facility.

With routine facility and equipment maintenance, and periodic equipment replacements or upgrades, DOE indicates that the conversion facilities could be operated safely beyond this time period to process the DUF_6 originating at the proposed NEF. In addition, DOE indicates the estimated impacts that would occur from prior conversion facility operations would remain the same when processing the proposed NEF wastes. The overall cumulative impacts from the operation of the conversion facility would increase proportionately with the increased life of the facility (DOE, 2004a; DOE, 2004b).

Table 4-16 presents a summary of the potential treatment and disposition pathways for the Paducah and Portsmouth conversion facilities that could also be appropriate for conversion of the DUF_6 originating at

Table 4-16 Conversion Waste Streams, Potential Treatments, and Disposition Paths

Conversion Product	Annual Waste Stream		Treatment	Proposed Disposition	Optional Disposition
	Portsmouth	Paducah			
Depleted U_3O_8	10,800 MT (11,800 tons)	14,300 MT (15,800 tons)	Loaded into bulk bags and loaded into rail or truck[a].	Envirocare.	Nevada Test Site[a].
CaF_2	18 MT (20 tons)	24 MT (26 tons)	Similar to depleted U_3O_8.	Sale to commercial CaF_2 supplier.	Envirocare[a].
70% HF Acid	2,500 MT (2,800 tons)	3,300 MT (3,600 tons)	HF acid should be commercial grade.	Sale to commercial HF acid supplier.	Neutralization by CaF_2.
49% HF Acid	5,800 MT (6,300 tons)	7,700 MT (8,500 tons)	HF acid should be commercial grade.	Sale to commercial HF acid supplier.	Neutralization by CaF_2.
Type 48Y Cylinders[b]	~1,000 cylinders 1,777 MT (1,300 tons)	~1,100 cylinders 1,980 MT (2,200 tons)	Emptied cylinders would have a stabilizing agent added to neutralize residual fluorine, be stored for 4 months, crushed to reduce size, sectioned, and packaged in intermodal containers.	Envirocare.	Nevada Test Site[c].

[a] U_3O_8 would be loaded into bulk bags (lift liners, 25,000-pound [11,340-kilogram] capacity) and loaded into gondola railcars (8 to 9 bags per car, depending on the car selected) or on a commercial truck (one bag per truck).
[b] Empty cylinders to be disposed if not used as U_3O_8 disposal containers.
[c] For DUF_6 converted at DOE facilities, final disposition at the Nevada Test Site is an option.
HF - hydrogen fluoride; MT - metric ton.
Source: DOE, 2004a; DOE, 2004b.

the proposed NEF. Based on the above assumptions and data, Tables 4-17 and 4-18 show the environmental impacts from the conversion of the DUF_6 from the proposed NEF at an offsite location such as Portsmouth or Paducah. The additional impacts for converting the proposed NEF DUF_6 at these conversion facilities would be SMALL.

Table 4-17 Radiological Impacts from an Offsite DUF_6 Conversion Facility During Normal Operations

	Occupational		Members of the Public	
Radiation Doses	**Dose, mSv per year (mrem per year)**	**Collective Dose, person-Sv per year (person-rem per year)**	**MEI Dose, mSv per year (mrem per year)**	**Collective Dose, person-Sv per year (person-rem per year)**
Portsmouth Conversion Facility	0.75 (75)	0.101 (10.1)	$<2.1\times10^{-7}$ ($<2.1\times10^{-5}$)	6.2×10^{-7} (6.2×10^{-5})
Portsmouth Cylinder Yard	5.10-6.00 (510-600)	0.026-0.030 (2.6-3.0)	N/A	N/A
Paducah Conversion Facility	0.75 (75)	0.107 (10.7)	$<3.9\times10^{-7}$ ($<3.9\times10^{-5}$)	4.7×10^{-7} (4.7×10^{-5})
Paducah Cylinder Yard	4.30-6.90 (430-690)	0.034-0.055 (3.4-5.5)	N/A	N/A
Cancer Risks	**Average Risk[a] (LCF per year)**	**Collective Risk[a] (LCF per year)**	**MEI Risk[a] (LCF per year)**	**Collective Risk[a] (LCF per year)**
Portsmouth Conversion Facility	5×10^{-5}	6×10^{-3}	1×10^{-11}	4×10^{-8}
Portsmouth Cylinder Yard	$3\times10^{-4}-4\times10^{-4}$	2×10^{-3}	N/A	N/A
Paducah Conversion Facility	5×10^{-5}	6×10^{-3}	2×10^{-11}	3×10^{-8}
Paducah Cylinder Yard	$3\times10^{-4}-4\times10^{-4}$	$2\times10^{-3}-3\times10^{-3}$	N/A	N/A

[a] DOE risk values adjusted for a conversion factor of 6×10^{-4} LCF per person-rem.
LCF - latent cancer fatalities; Sv - sieverts; mSv - millisieverts; mrem - millirem; MEI - maximally exposed individual.
Source: DOE, 2004a; DOE, 2004b.

Table 4-18 Radiological Impacts from an Offsite DUF_6 Conversion Facility Under Accident Conditions

		Onsite Worker		Members of the Public	
Accident	Frequency (per year)	MEI Dose, Sv (rem) PORTS/PGDP	Population, person-Sv (person-rem) PORTS/PGDP	MEI Dose, Sv (rem) PORTS/PGDP	Population, person-Sv (person-rem) PORTS/PGDP
Corroded Cylinder	$>1.0\times10^{-2}$	0.00078 / 0.00078 (0.078/0.078)	0.014 / 0.024 (1.4 / 2.4)	0.00078 / 0.00078 (0.078/0.078)	0.0012 / 0.0024 (0.12 / 0.24)
Failure of U_3O_8 Container While in Transit	$>1.0\times10^{-2}$	0.0053 / 0.0053 (0.53 / 0.53)	0.096 / 0.17 (9.6 / 17)	0.0053 / 0.0053 (0.53 / 0.53)	0.0051 / 0.01 (0.51 / 1.0)
Earthquake	1.0×10^{-4} to 1.0×10^{-6}	0.30 / 0.40 (30 / 40)	5.3 / 12.7 (530 / 1,270)	0.30 / 0.40 (30 / 40)	0.30 / 0.73 (30 / 73)
Rupture of UBC – Fire	1.0×10^{-4} to 1.0×10^{-6}	0.0002 / 0.0002 (0.02 / 0.02)	0.051 / 0.080 (5.1 / 8.0)	0.0002 / 0.0002 (0.02 / 0.02)	0.23 / 0.21 (23 / 21)
Tornado	1.0×10^{-4} to 1.0×10^{-6}	0.075 / 0.075 (7.5 / 7.5)	1.3 / 2.3 (130 / 230)	0.075 / 0.075 (7.5 / 7.5)	0.17 / 0.34 (17 / 34)

Sv - sieverts; MEI - maximally exposed individual; PORTS - Portsmouth Gaseous Diffusion Plant; PGDP - Paducah Gaseous Diffusion Plant.
Sources: DOE, 2004a; DOE, 2004b.

4.2.14.4 Impacts from Disposal of the Converted Waste

Under option 1a or 1b, once converted to U_3O_8, the waste would subsequently be transported to a licensed commercial disposal facility for final disposition, as discussed in Section 2.1.9 of Chapter 2 of this Draft EIS. Section 4.2.11 of this chapter discusses the impacts of transporting the waste to a licensed disposal facility for final disposition. The impacts due to transportation would be SMALL.

The environmental impacts at the shallow disposal sites considered for disposition of low-level radioactive wastes would have been assessed at the time of the initial license approvals of these facilities. Final disposal of large quantities of depleted uranium at a licensed facility could require additional environmental impact evaluations depending on the location of the disposal facility and quantity of depleted uranium to be deposited.

The quantity of depleted uranium potentially requiring disposition could also affect the available disposal volume. However, a June 2004 Government Accounting Office report concluded that there is sufficient disposal volume for currently licensed Class A low-level radioactive wastes that would last for more than 20 years (GAO, 2004). Since U_3O_8 is a Class A low-level radioactive waste, the potential impact on national disposal space that would be incurred due to potential NEF operations would be considered SMALL.

In addition to shallow disposal, LES also presented the potential for disposition in an abandoned mine as a geologic disposal site and the postulated radiological impacts from such a disposal site are also presented in this section. The analysis of the radiological impacts from the disposal of the converted wastes as U_3O_8 in a geologic disposal site was previously presented in the EIS for the Claiborne Enrichment Center (NRC, 1994). Two postulated geologic disposal sites (i.e., an abandoned mine in granite or in sandstone/basalt) were evaluated for impacts from contaminated well or river water. The pathways included drinking the water or the consumption of crops irrigated by the well water or of fish from a contaminated river. The potential impacts from the disposal of the proposed NEF-generated U_3O_8 for similar geologic disposal sites would be proportional to the quantity of material postulated from the Claiborne Enrichment Center enrichment facility. In the year of maximum exposure, the estimated doses for both scenarios and for both potential mine sites for the proposed NEF-generated U_3O_8 are presented in Table 4-19. All estimated impacts for either geologic disposal site would not result in an annual dose exceeding an equivalent of 0.25 millisieverts (25 millirem) to the whole body provided in 10 CFR § 61.41; thus, the overall disposal impacts would be SMALL.

Table 4-19 Maximum Annual Exposure from Postulated Geologic Disposal Sites

Scenario	Pathway	Granite Site		Sandstone/Basalt Site	
		millisieverts	millirem	millisieverts	millirem
Well	Drinking Water	3×10^{-4}	3×10^{-2}	2×10^{-7}	2×10^{-5}
	Agriculture	4×10^{-3}	4×10^{-1}	3×10^{-6}	3×10^{-4}
River	Drinking Water	9×10^{-13}	3×10^{-11}	3×10^{-16}	3×10^{-14}
	Fish Ingestion	2×10^{-12}	2×10^{-10}	5×10^{-11}	5×10^{-9}

4.2.14.5 Mitigation Measures

LES would implement a materials waste recycling plan to limit the amount of nonhazardous waste generation. LES would perform a waste assessment to determine waste-reduction opportunities and what materials would best be recycled. Employee training would be performed regarding the materials to be recycled and the use of recycling bins and containers. For low-level radioactive wastes, the cost of disposal necessitates the need for a waste-minimization program that includes decontamination and reuse of these materials when practicable. The use of chemical solutions for decontamination processes would be limited to minimize the volume of mixed waste that would be generated (LES, 2004a). An active DUF_6 cylinder management program would maintain "optimum storage conditions" to mitigate the potential for adverse events. Surveys of the UBC Storage Pad would be regularly conducted to inspect parameters that are outlined in Table 5-2 of Chapter 5 of this Draft EIS.

4.3 Decontamination and Decommissioning Impacts

This section summarizes the potential environmental impacts of decontamination and decommissioning of the site through comparison with normal operational impacts. Decontamination and decommissioning involves the removal and disposal of all operating equipment while leaving the structures and most support equipment fully decontaminated to free release levels and suitable for use by the general public. Decommissioning activities are generally described in Section 2.1.8 of Chapter 2 of this Draft EIS based on the information provided by LES in the Safety Analysis Report (LES, 2004b). However, a complete description of actions taken to decommission the proposed NEF at the expiration of its NRC license period cannot be fully determined at this time. In accordance with 10 CFR § 70.38, LES must prepare and submit a Decommissioning Plan to the NRC at least 12 months prior to the expiration of the NRC license for the proposed NEF. LES would submit a final decommissioning plan to the NRC prior to the start of decommissioning. This plan would be the subject of further NEPA review, as appropriate, at the time the Decommissioning Plan is submitted to the NRC.

The Cascade Halls would undergo decontamination and decommissioning sequentially over a nine-year period (LES, 2004b). Cascade Halls 1 and 2 in Separations Building Module 1 are scheduled to be the first enrichment cascades to operate and would be the first to undergo decontamination and decommissioning. Cascade Halls 3 through 6 would follow in turn. Once all the UF_6 containment and processing equipment was removed, the building and generic support equipment would be decontaminated to free release levels and abandoned in place.

Decontamination and decommissioning activities would be accomplished in three phases over nine years. The first phase would require about two years and include:

- Characterization of the proposed NEF site.
- Development of the Decommissioning Plan.
- NRC review and approval of the Decommissioning Plan.
- Installation of decontamination and decommissioning equipment on the site of the proposed NEF.

The primary environmental impacts of the decontamination and decommissioning of the proposed NEF site include changes in releases to the atmosphere and surrounding environment, and disposal of industrial trash and decontaminated equipment. The types of impacts that may occur during decontamination and decommissioning would be similar to many of those that would occur during the initial construction of the facility. Some impacts, such as water usage and the number of truck trips, could increase during the decontamination and disposal phase of the decommissioning but would be less than the construction phase, thus bounded by the impacts in Sections 4.2.4 through 4.2.11.

During the first phase of the decontamination and decommissioning period, electrical and water use would decrease as enrichment activities are terminated and preparations for decontamination and decommissioning are implemented. Environmental impacts of this phase are expected to be SMALL as normal operational releases have stopped. During the second phase of the decontamination and decommissioning process, water use would increase and aluminum and low-level radioactive wastes would be produced. Contaminated decontamination and decommissioning solutions would be treated in a liquid waste disposal system that would be managed as during normal operations.

A significant amount of scrap aluminum, along with smaller amounts of steel, copper, and other metals, would be recovered during the decontamination and decommissioning process. For security and convenience, the uncontaminated materials would likely be smelted to standard ingots and, if possible, sold at market price. The contaminated materials would be disposed of as low-level radioactive wastes after appropriate destruction for Confidential and Secret Restricted Data components. No credit is taken for any salvage value that might be realized from the sale of potential assets during or after decommissioning.

Low-level radioactive wastes 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 the Treated Effluent Evaporative Basin. The total volume of radioactive waste generated during the decontamination and decommissioning period would be estimated to be 5,000 cubic meters (6,600 cubic yards). This waste would be disposed of in a licensed low-level waste disposal facility. Releases to the atmosphere would be expected to be minimal compared to the small normal operational releases. The final step in the decontamination and decommissioning process, the radiation surveys, does not involve adverse environmental impacts. The proposed NEF site would then be released for unrestricted use as defined in 10 CFR § 20.1402

4.3.1 Land Use

Because the site of the proposed NEF is located in a sparsely populated semi-arid area of New Mexico surrounded by several industrial installations, the site would most likely retain its industrial status, and it is unlikely that any changes would be made during decommissioning for other purposes after the closure and decommissioning of the facility. Therefore, the impacts would be SMALL.

4.3.2 Historical and Cultural Resources

Because no further disturbance of land surface would accompany decommissioning activities, there would be no impact on cultural resources. Mitigation measures established by the historic properties treatment plan would remain in effect or be renegotiated prior to decontamination and decommissioning. The impacts would remain SMALL.

4.3.3 Visual and Scenic Resources

If the buildings and structures of the proposed NEF were allowed to remain, then the scenic qualities of the area would remain the same as described in Section 4.2.3 of this chapter. Any cleared areas could be revegetated with natural species after decommissioning is complete. The impacts would remain SMALL.

4.3.4 Air Quality

During the decontamination phase of the facility, transportation and heavy vehicles would produce exhaust emissions and dust as they move on the road and around the proposed NEF site. The exhaust emissions would be minimal and would not cause any noticeable change in air quality in the area. Dust from the heavy equipment used for decommissioning and from re-entrainment of dust and dirt that is carried or deposited on the road by vehicles hauling trash and recycled material would have the most significant impact on air quality. Fugitive dust should be less than that generated during construction because the buildings and stormwater retention basins would remain. The use of BMPs during the decontamination and decommissioning of the facility would ensure that proper dust control and mitigation measures are implemented.

The current state-of-the-art technologies in decontamination and decommissioning of radiologically contaminated equipment require the use of a limited amount of solvents to fully clean some metallic and nonmetallic equipment. The quantity of solvents required has been dramatically reduced in recent years and, assuming a similar trend, should be minimized when the proposed NEF undergoes decontamination and decommissioning. Nevertheless, there is the potential for emission of solvents during the decontamination phase if solvent cleaning methods are employed. These emissions would be of short duration (i.e., a few weeks) and would probably involve less than 9.1 metric tons (10 tons) of solvent. Gaseous effluent volume that occurs during decontamination and decommissioning would be slightly reduced because the operational process off-gas inputs to the stack would be shut down. The BMP dust-control measures are expected to be similar to measures taken during construction, and the air-quality impacts due to decontamination and decommissioning activities should be equal to or less than the SMALL air-quality impacts from construction and operation of the proposed NEF site.

4.3.5 Geology and Soils

The proposed NEF site terrain would remain after license termination. There would be no impacts to the geology and soils from decontamination and decommissioning activities other than the potential to use a portion of the site for equipment laydown and disassembly. This could require the removal of existing vegetation from this area; however, less land clearing would be expected than during construction. Therefore, the impacts would be SMALL.

4.3.6 Water Resources

Potable water use is expected to increase during part of the decommissioning phase, particularly during the middle of the nine-year decommissioning program. This would be caused by the increased use of water for equipment decontamination and rinsing. Liquid effluents from the decontamination operation would be higher than during normal operations. These effluents would include the spent citric acid solution used to decontaminate equipment and recover uranium and other metals. Spent citric acid solution would be treated through the liquid effluent treatment system and sent to the Treated Effluent Evaporative Basin as during the operation phase of the proposed NEF. Water use during decontamination and decommissioning would be less than or equal to the water consumption during operations.

The site has no permanent surface water. Runoff from the buildings, roads, and parking areas would be routed to two stormwater retention/detention basins for evaporation. During decontamination and decommissioning, the mud or soil in the bottom of the retention/detention basins would be sampled for contamination and properly disposed of if it is found to contain contaminants in excess of regulatory limits. The basins would remain as part of the structures and components turned over to the State at the end of facility operations.

The Treated Effluent Evaporative Basin would remain in operation throughout most of the decontamination phase. Liquids used to clean and decontaminate buildings and equipment would be treated in the liquid effluent treatment system before being discharged to the Treated Effluent Evaporative Basin. Upon completion of the large-scale decontamination, the Treated Effluent Evaporative Basin would be isolated and allowed to evaporate. The sludge and soil in bottom of the Treated Effluent Evaporative Basin would be tested and disposed of in accordance with regulatory requirements such that the area would be released for unrestricted use as defined in 10 CFR § 20.1402. Therefore, the water resources during decommissioning would not be affected any differently than during operations, the impacts to water resources would remain SMALL.

4.3.7 Ecological Resources

After operation, the site ecology would have adapted to the existence of the proposed NEF. Decommissioning the facility would remove vegetation and temporarily displace animals close to the structures. The site retention/detention basins would remain after decontamination and decommissioning. As during operations, the basins could not support permanent aquatic communities because they do not permanently hold water. Direct impacts on vegetation during decontamination and decommissioning of the proposed NEF would include removal of existing vegetation from the area required for equipment laydown and disassembly. This disturbed area would be significantly less than the 81 hectares (200 acres) disturbed during construction, and such decontamination and decommissioning impacts would be bounded by the construction activities. Replanting the disturbed areas with native species after completion of the decontamination and decommissioning activities would restore the site to a condition similar to the preconstruction condition. For these reasons, the impacts on the local ecology would continue to be SMALL during decontamination and decommissioning of the proposed NEF.

Because the Decommissioning Plan would leave the buildings and adjacent land the same as during operation of the proposed NEF, this would result in permanent elimination of a small percentage of wildlife habitat from the area (about 73 hectares [180 acres] of the 220-hectare [543-acre] site). This would have a SMALL impact on the wildlife population in the general area due to the extensive open range land surrounding the proposed NEF.

4.3.8 Socioeconomics

The cost for decontamination and decommissioning of the proposed NEF would be approximately $837.5 million in 2002 dollars. The majority of this cost estimate ($731 million) is the fee for disposal of the DUF_6 generated during operation assuming the DUF_6 would not be disposed of prior to decommissioning.

As operations cease, some operational personnel would gradually migrate to decommissioning activities. These workers would require additional training before such work begins. Approximately 10 percent of the operations work force would be transferred to decontamination and decommissioning activities (LES, 2004a). Removal, decontamination, and disposal of the enrichment equipment, while labor intensive, is not a difficult operation and would not require the same highly skilled labor as operation of the enrichment cascade. Thus, the pay scale of the decommissioning crew would be lower on average than that planned for the full operation of the proposed NEF. As the enrichment cascades are shutdown, the skilled operator and technicians would be replaced with construction crews skilled in dismantling and decontaminating the systems. Since no additional employment would be expected, the economic impact of decontamination and decommissioning would be expected to be SMALL.

At the conclusion of both the operations phase and the decontamination and decommissioning phase, the reduction in direct and indirect employment at the proposed NEF would impose socioeconomic dislocations in the immediate area surrounding the region of influence. The extent of such impacts (small, moderate, or large) would depend on other businesses in the area and whether or not a stable, continuing community existed at the time of decommissioning. For example, if the proposed NEF becomes the major employer in the Eunice, New Mexico, area, its closure could have a SMALL to MODERATE impact. If, however, alternative businesses are located in the area, the loss of an estimated 210 jobs would have only a SMALL impact on the local community.

4.3.9 Environmental Justice

After considering the environmental impacts, there are no disproportionate high or adverse impacts to low and minority populations during decommissioning. The impacts would remain SMALL.

4.3.10 Noise

Noise during decommissioning would be generated by heavy construction equipment and the movement of large pieces of scrap metal. The noise levels would be similar to those experienced during the construction of the plant. Levels of 110 decibels within the fenced area and around 70 decibels immediately offsite would be expected. The activity would be expected to occur during daytime and last for a few months. Nighttime noise levels would drop to preconstruction levels due to the reduction in nighttime traffic volume related to worker shift changes. The overall noise impacts would be similar to or less than the SMALL noise impacts from the construction of the proposed NEF site.

4.3.11 Transportation

Traffic during the initial portion of the decontamination and decommissioning activities would be slightly greater than traffic during normal operations, but not as great as during construction. Vehicular traffic would be less than the amount experienced during either the construction or the operational phase of the plant. The roads would be able to sustain the traffic volume easily; however, the number of heavy trucks would be substantial for brief periods of time as waste materials were removed and, therefore, transportation impacts for construction are bounding.

If the DUF_6 has not been removed previously, it would be shipped offsite during decommissioning. As shown in Table 2-5 of Chapter 2 of this Draft EIS, the operation of the proposed NEF would generate up to 15,727 Type 48Y cylinders of DUF_6 during its operation. Type 48Y cylinders would be shipped with one cylinder per truck or four cylinders per railcar.

Assuming that all of the material is shipped during the first eight years of decommissioning (the final radiation survey and decontamination would occur during year nine), the proposed NEF would ship approximately 1,966 trucks per year. If the trucks are limited to weekday, nonholiday shipments, approximately 10 trucks or 2-1/2 railcars per day would leave the site for the DUF_6 conversion facility. Section 4.2.11 of this chapter presents the impacts of shipping DUF_6 to the conversion facility, which would be considered SMALL.

4.3.12 Public and Occupational Health

The current decontamination and decommissioning plans call for cleaning the structures and selected facilities to free-release levels and allowing them to remain in place for future use. Allowing the buildings to remain in place would reduce the potential number of workers required for decommissioning, which would reduce the number of injured workers. If residual contamination is discovered, it would be decontaminated to free-release levels or removed from the site and disposed of in a low-level radioactive wastes facility. Occupational exposures during decontamination and decommissioning would be bounded by the potential exposures during operation (approximately 0.3 millisieverts [300 millirem] per year) because standard quantities of uranium material (i.e., UF_6 in Type 48Y cylinders) could be handled, at least during the portion of the decontamination and decommissioning operations that purges the gaseous centrifuge cascades of UF_6. Once this decontamination operation is completed, the quantity of UF_6 would be residual amounts and significantly less than handled during operations. Because systems containing residual UF_6 would be opened, decontaminated (with the removed radioactive material processed and packaged for disposal), and dismantled, an active environmental monitoring and dosimetry (external and internal) program would be conducted to maintain ALARA doses and doses to individual members of the public as required by 10 CFR Part 20. Therefore, the impacts to public and occupational health would be SMALL.

4.3.13 Waste Management

The waste management and recycling programs used during operations would apply to decontamination and decommissioning. Materials eligible for recycling would be sampled or surveyed to ensure that contaminant levels would be below release limits. Staging and laydown areas would be segregated and managed to prevent contamination of the environment and creation of additional wastes. Therefore, the impacts would be SMALL.

4.3.14 Summary

The adverse environmental impacts of decontamination and decommissioning of the proposed NEF site could be SMALL to MODERATE on the order of the construction and operations impacts. The mitigating environmental impacts include release of the facilities and land for unrestricted use, termination of releases to the environment, discontinuation of a large portion of water and electrical power consumption, and reduction in vehicular traffic. Decommissioning impacts would be localized in the immediate proposed NEF developed site. No disposal of waste, including radioactive waste, would occur at the proposed NEF site.

4.4 Cumulative Impacts

The Council on Environmental Quality regulations implementing the 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). Cumulative impacts are presented below for 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 (e.g., WCS application for a low-level radioactive wastes disposal license). Areas in which there would not be cumulative impacts include cultural and historical resources, visual/scenic resources, ecological resources, noise, and waste management.

4.4.1 Land Use

As described in Sections 4.2.1 and 4.3.1 of this chapter, the proposed NEF site is located in a sparsely populated area surrounded by several industrial installations. Land further to the north, south, and west of the proposed NEF site has been mostly developed by the oil and gas industry with hundreds of oil pump jacks and associated rigs. Range cattle are also raised on this land. WCS submitted a license application for disposal of low-level radioactive wastes approximately 1.6 kilometers (1 mile) east of the proposed NEF (WCS, 2004). Of the 582 hectares (1,438 acres) of the land owned by WCS, 81 hectares (200 acres) are occupied by the existing disposal and waste storage facilities and the proposed disposal cells would occupy an additional 81 hectares (200 acres) (WCS, 2004). This would be in addition to a sanitary landfill, several land farms, and disposal facilities for oil industry wastes operated by others in the area. The construction and operation of the proposed NEF would not substantially change the land use in the region other than the small displacement of grazing land from the proposed NEF site. Therefore, the impacts would be SMALL.

4.4.2 Geology and Soils

The proposed NEF site is located in a region where there has been contamination of soils and ground-water aquifers from activities related to the oil and gas industry. The contamination has not been quantified on a regional scale but potential contaminants from such activities would be in the form of hydrocarbons. Any contamination resulting from the proposed NEF operations would most likely be radioactive in nature. WCS's operations (the storage of radioactive material), on the other hand, are passive in nature and are not expected to result in the release of a similar mix of radioactive contaminants to the soils. The WCS application for the proposed disposal cells would require excavations that extend to a maximum depth of 36.6 meters (120 feet) below the surface (WCS, 2004). Surface soils from the proposed WCS disposal cells would be stockpiled for later use in construction of the cover system. The disposal cells would also have to meet State of Texas regulations to ensure the disposal cell would not contaminate the surrounding geology and soils. However, the proposed NEF operations would not result in soil contamination that could not be cleaned up through mitigation measures such as those described in the Spill Prevention Control and Countermeasures Plan. WCS would also employ BMPs to reduce the potential for both water and wind erosion (WCS, 2004). Therefore, cumulative impacts to soils would be considered SMALL.

4.4.3 Water Resources

There has been regional ground-water contamination from the oil and gas industry activities. Sundance Services, Inc., has a ground-water monitoring well network to monitor for possible future offsite contamination resulting from its own operations. As with potential soil contamination, potential ground-water contaminants from its activities would be in the form of hydrocarbons. Any contamination resulting from the proposed NEF operations would most likely consist of manmade radionuclides. However, implementation of the Spill Prevention Control and Countermeasures Plan would result in the cleaning of soil contamination prior to such releases affecting ground water.

The proposed NEF would receive its water supply from the Eunice and Hobbs municipal water-supply systems. The proposed NEF water use would be a small percentage of the systems' capacity. Forecasts predict that future regional water demand would deplete current regional supplies and, if required, the proposed NEF would be expected to comply with the Lea County Drought Management Plan.

WCS estimates that the construction of the proposed disposal cells would require approximately 3,785 cubic meters (1 million gallons) of water to be obtained either from the onsite well or would be brought in from offsite (WCS, 2004). During operations of the proposed disposal cell, WCS projects that there would be no changes in water use.

A privately owned casino/hotel/racetrack is under construction in Hobbs, New Mexico (Valdez, 2004). Non-resort casinos typically use approximately 34 cubic meters per day (10 acre-feet per year) of water (Dornbusch, 1999). Therefore, this casino would be expected to require about 14 percent of the water use of the proposed NEF. This increase in water use would still be well within the capacity of the local municipal water supply systems. The cumulative impacts to local water resources would be SMALL.

4.4.4 Air Quality

Despite the presence of the oil and gas industry, the EPA declared that both Lea County, New Mexico, and Andrews County, Texas, are in attainment for all of the criteria pollutants (EPA, 2004). For example, Table 4-20 presents a comparison of the emissions from WCS and the proposed NEF to the total of all point sources in Lea County, New Mexico, and Andrews County, Texas.

WCS's annual emissions are generally less than those expected from the proposed NEF (except for volatile organic compounds) and significantly less than 1 percent of the total point source contribution for all criteria pollutants. The construction of the proposed disposal cells would add some fugitive dust emissions and the emissions of criteria pollutants but would be well below the NAAQS values (WCS, 2004), as for the proposed NEF. Therefore, WCS's cumulative impacts to the surrounding area would also be SMALL. In addition, no other foreseeable point-source activity can be identified that would cumulatively impact the air quality.

Table 4-20 Comparison of the Total Annual Emissions (Tons Per Year) of Criteria Air Pollutants for the Area of the Proposed NEF[a]

County, State	VOC	NO_X	CO	SO_2	$PM_{2.5}$	PM_{10}
Lea County, New Mexico	6,713	38,160	31,185	16,096	5,188	28,548
Proposed NEF	1.0	4.3	5.5	0.04	N/A	0.37
Andrews County, Texas	2,873	3,259	6,680	1,398	440	1,577
WCS	1.93	0.34	0.05	0.02	0.01	0.11
Gaines County, Texas	2,696	2,791	7,709	735	1,825	8,650

[a] A ton is equal to 0.9078 metric ton.
VOC - volatile organic compounds; NO_X - nitrogen oxides; CO - carbon monoxide; SO_2 - sulphur dioxide; $PM_{2.5}$ - particulate matter less than 2.5 microns; PM_{10} - particulate matter less than 10 microns; N/A - no data available.
Source: EPA, 2003; LES, 2004a; TCEQ, 2004. Latest available data is from 1999 for the counties and 2002 for WCS.

4.4.5 Socioeconomics

At the time of this Draft EIS, the privately owned casino/hotel/racetrack in Hobbs, New Mexico, is under construction with plans to complete the casino in November 2004 and the racetrack in the fall of 2005. A hotel and restaurant are planned several years afterward with additional employment impacts at that time. The project now employs 200 construction workers. The casino and racetrack are expected to employ up to 400 workers during the September to December racing season and 275 to 300 workers during the off season (Valdez, 2004). This would mean about a 1-percent increase in direct and indirect jobs for the three principal counties in the region of influence. The full-time casino jobs and the seasonal racetrack jobs would be low-paying positions for largely unskilled workers as compared to the proposed NEF because the casino project would obtain workers from a different pool of workers than the proposed NEF.

The employment of proposed WCS disposal facility would have a peak construction force of about 40 full-time workers with an expected range of 30 to 50 persons and operations would have approximately 38 workers (WCS, 2004). The source of employees would likely be filled by residents in the region. The slight population increases predicted by WCS from constructing and operating the proposed disposal cells would have SMALL impacts to the housing and community services in the region of influence.

No other large-scale projects are anticipated in the near future that would significantly impact the socioeconomics of Lea County, New Mexico, or Andrews and Gaines Counties, Texas. Therefore, cumulative impacts would be MODERATE.

4.4.6 Environmental Justice

Environmental justice analysis performed on the potential cumulative impacts concluded there would be no disproportionally high-minority and low-income populations that exist warranting further examination of environmental impacts to those populations (WCS, 2004). It is unlikely that minority and low-income persons would be disproportionately affected by adjacent activities at WCS and Lea County Landfill. Any impacts from traffic during construction or the proposed disposal cells by WCS would be short termed and SMALL.

4.4.7 Transportation

The construction, operation, and decommissioning of the proposed NEF would result in SMALL to MODERATE impact due to increased traffic from commuting construction workers and no level-of-service changes are currently needed. With the implementation of all current and planned or proposed future actions within the vicinity of the proposed NEF (e.g., construction and operation of the proposed WCS and operation at Lea County Landfill), traffic volumes would contribute to cumulative impacts. However, no changes are anticipated in the SMALL to MODERATE cumulative effects concerns for transportation.

4.4.8 Public and Occupational Health

At the time of publishing this Draft EIS, the only reasonably foreseeable radiological actions in the area not related to the proposed NEF is the application by WCS to seek and obtain a low-level radioactive wastes burial site license through the State of Texas (an NRC Agreement State) (WCS, 2004). The existing WCS license only allows for the storage of radioactive material (BRC, 2003). This radioactive material is packaged and stored such that it would not contribute to the annual dose for members of the public. For the WCS application, the impacts to members of the public were analyzed at the site boundary and for the nearest resident, the same nearest resident as for the proposed NEF (WCS, 2004). The annual doses for normal operations would be 4.9×10^{-4} millisieverts (4.9×10^{-2} millirem) at the site boundary and 1.9×10^{-6} millisieverts (1.9×10^{-4} millirem) for the nearest resident. The largest potential accident impact could be from a truck fire with doses of 0.49 millisieverts (49 millirem) and 7.7×10^{-4} (7.7×10^{-2} millirem) for the site boundary and the nearest resident, respectively. When added to the maximally exposed individual airborne dose of 5.3×10^{-5} millisieverts (5.3×10^{-3} millirem) per year projected for the proposed NEF, this cumulative dose would still be considered SMALL.

The cumulative collective radiological impacts to the offsite population, from all sources, would be SMALL by being below the 1 millisieverts (100 millirem) per year dose limit (10 CFR Part 20) to the offsite maximally exposed individual during the time of the construction, operation, and decommissioning of the proposed NEF.

4.5 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable commitment of resources for the new proposed NEF would include the commitment of land, water, energy, raw materials, and other natural and manmade resources for construction. The impacts from such commitment of resources would be SMALL.

About 81 hectares (200 acres) within a 220-hectare (543-acre) site would be used for the construction and operation of the proposed NEF. This parcel of land would likely remain industrial even after the facility is decontaminated and decommissioned.

The construction and operation of the proposed NEF would use up to 2.6 million cubic meters (687 million gallons) of ground-water resources from the Eunice and/or Hobbs municipal water-supply systems. The proposed NEF is a consumptive water-use facility, meaning all water would be used and none would be returned to its original source. Although the amount of water that would be used from the Ogallala Aquifer represents a small percentage of the total capacity of the two municipalities, this resource would be lost. Water used would be released to the atmosphere through evaporation and to the ground through infiltration from two lined basins, one unlined basin, and a septic leaching field, all of which would be within the site boundaries. The replenishment of amounts of water used by area municipalities and the proposed NEF back into the Ogallala Aquifer would take a long time due to a low regional recharge rate.

Energy expended would be in the form of fuel for equipment and vehicles, electricity for facility operations, and natural gas for steam generation used for heating. It is estimated that 236 cubic meters (62,350 gallons) of diesel fuel may be used annually.

The electrical energy requirement represents a small increase in electrical energy demand of the area. Improvements in the local area's electrical power capacity to support the proposed NEF, namely the addition of transmission lines, transmission towers, and substations, would contribute to increasing the irreversible and irretrievable commitment of resources due to the dedication of land and material necessary for such improvements and expansion of services. During normal operation, the average and peak electrical power requirements of the facility are approximately 30.3 million volt-amperes and 32 million volt-amperes, respectively (LES, 2004a). Based on the relationship that the generation of one SWU would require approximately 40 kilowatt-hours of electrical energy (Urenco, 2004), the proposed NEF's centrifuge equipment would use approximately 120 million kilowatt-hours.

The proposed NEF operations would generate a small amount of nonrecyclable waste streams, such as radiological and hazardous waste that are subject to RCRA regulations. Disposal of these waste streams would require irreversible and irretrievable commitment of land resources. However, certain materials and equipment used during operations of the proposed facility could be recycled when the facility is decontaminated and decommissioned.

Resources that would be committed irreversibly or irretrievably during construction and operation of the proposed NEF include materials that could not be recovered or recycled and materials that would be consumed or reduced to unrecoverable forms. It is expected that about 60,000 cubic meters (2.1 million cubic feet) of concrete, 80,000 square meters (861,000 square feet) of asphalt, 288,000 square meters (3.1 million square feet) of crushed stone, and more than 500 metric tons (551 tons) of steel products would be committed to the construction of the proposed NEF.

Chemical additives would be used during operation to control bacteria and corrosion. Approximately 8,000 kilograms (17,637 pounds) of corrosion inhibitors and 1,800 kilograms (3,968 pounds) of bio-growth inhibitors may be used annually. Table 4-21 lists process chemicals and gases that would be irreversibly and irretrievably committed.

4.6 Unavoidable Adverse Environmental Impacts

Implementing the proposed action would result in unavoidable adverse impacts on the environment. Generally, the impacts are SMALL and would be from the proposed NEF site preparation, construction, and operation.

Site preparation and construction of the proposed NEF would use at least one-third of the 220-hectare (543-acre) proposed NEF site. This construction area would be cleared of vegetation and graded by filling approximately 611,000 cubic meters (797,000 cubic yards) of soil and caliche. In addition, construction activities to relocate the CO_2 pipeline would be performed. The impact from the loss of grazing lands from the proposed NEF site would be minimal due to the abundance of other nearby grazing areas. These activities would also lead to the displacement of some local wildlife populations that can also relocate to nearby habitat. In addition, there would be temporary impacts from the construction of new facilities associated with the proposed NEF site. These impacts would consist of increased fugitive dust, increased potential for erosion and stormwater pollution, and increased construction vehicle traffic and emissions. The construction activities would be associated with increased soil erosion.

Table 4-21 Process Chemicals and Gases Used at the Proposed NEF

Chemical	Form[a]	Locations[b]	Quantity	Notes
Acetone	L	SB	27 liters	
Acetylene	G	TSB	6 m^3	
Activated Carbon	S	CAB, TSB	730 kg	plus 210 liters
Aluminum Oxide	S	CAB, TSB	1,312 kg	plus 210 liters
Argon	G	CAB, TSB	380 m^3	
Carbon Fibers	S	TSB		classified
Carbon/Potassium Carbonate	S	TSB		only states as filter
Citric Acid	L (5-10%), S (crystalline)	TSB	800 liters	crystalline form is in one bottle
Cutting Oil	L	TSB	2.4 liters	plus 0.08 kg
Degreaser Solvent, SS25	L	TSB	2.4 liters	
Detergent	L	TSB	205 liters	
Diatomaceous Earth	S	TSB	10 kg	
Diesel Fuel (Outdoors)	L	CUB	37,854 liters	
Ethanol	L	CAB, TSB	85 liters	80 liters per year in the CAB
Filters, Radioactive and Industrial	S	TSB	37,044 kg	
Helium	G	CAB	440 m^3	
Hydrogen	G	TSB	Standard cylinder	
Ion Exchange Resin	S	TSB	1.6 m^3	
Metals (Aluminum)	S	CAB		classified
Methylene Chloride	L	CUB	670 liters	80 Liters per year in the CAB
Nitric Acid (65%)	L	TSB	26 liters	
Nitrogen	L, G	CAB, CUB, TSB	37,858 liters	Liquid quantity, gaseous is in pipe volume
Oil	L	CAB, SB, TSB	1 kg	CAB & SB quantities are classified
Organic Chemicals	L	TSB	50 liters	

Chemical	Form[a]	Locations[b]	Quantity	Notes
Oxygen	G	TSB	11 m^3	
Paint	L	TSB	12 liters	
Papers, Wipes, Gloves, etc.	S	CAB	1 m^3	
Penetrating Oil	L	TSB	0.44 liter	
Peroxide	L	TSB	4 liters	
Petroleum Ether	L	TSB	10 liters	
PFPE (Fomblin®) Oil	L	TSB	20 liters	
PFPE (Tyreno®) Oil	L	TSB	120 liters	
Phosphoric Acid	L	TSB	44 liters	
Potassium or Sodium Hydroxide	L	TSB	210 liters	
Primus Gas	G	TSB	0.5 kg	
Propane	G	TSB	0.68 kg	
R23 Trifluoromethane	L, G	SB	42.5 kg	
R404A Fluoroethane blend	L, G	SB	375 kg	
R507 Penta/tri Fluoroethane	L, G	SB	1,590 kg	
Sandblasting Sand	S	TSB	50 kg	
Shot Blasting Media	S	TSB	1 bag	
Silicone Oil	L	SB	1,750 liters	
Sodium Carbonate	S	TSB	10 kg	
Sodium Fluoride	S	SB, TSB	14,500 kg	
Sodium Hydroxide (0.1N)	L	TSB	5 liters	
Sulfuric Acid	L	TSB	10 liters	
Toluene	L	TSB	2 liters	

[a] L - liquid; G - gas; and S - solid.
[b] SB - Separations Building; CAB - Centrifuge Assembly Building; TSB - Technical Services Building; CUB - Central Utilities Building.
m^3 - cubic meter.
kg - kilogram.
To convert from kilograms to pounds, multiply by 2.2.
To convert from cubic meters to cubic feet, multiply by 35.3.
To convert from liters to gallons, multiply by 0.26.
Source: LES, 2004a.

Water consumption during the site preparation and construction phase would be less than that required during operations. The water originates from wells positioned in the most productive portion of the Ogallala Aquifer in New Mexico. The proposed NEF site water supply would be obtained from the cities of Eunice and Hobbs, New Mexico. The impact of water use during this phase would be SMALL if compared to the combined water capacities of the two municipalities.

During operations, workers and members of the public would face unavoidable exposure to radiation and chemicals. Workers would be exposed to direct radiation and other chemicals associated with operating the proposed NEF and handling and transporting radioactive material and waste. The public would be exposed to radioactive contaminants released to the air and through exposure to radioactive materials, including waste, that would be transported to both of the proposed ultimate disposition sites for radioactive wastes. Small quantities of hydrofluoric acid and uranium would be released to the air with the potential for chemical exposure. Although relatively small compared to the total pumping capacity of the Eunice and Hobbs municipalities, the total water use for the 30-year life of this facility is projected to exceed 2.6 million cubic meters (687 million gallons) from the Ogallala Aquifer.

4.7 Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The construction and operation of the proposed NEF would necessitate short-term commitments of resources and would permanently commit certain resources (such as energy and water). The short-term use of resources would result in potential long-term socioeconomic benefits to the local area and the region. The short-term commitments of resources would include 81 hectares (200 acres) of natural land for construction, the use of materials required to construct new buildings, the commitment of new operations support facilities, transportation, and other disposal resources and materials for the proposed NEF operations.

Workers, the public, and the environment would be exposed to increased amounts of hazardous and radioactive materials over the short term from the operations of the proposed NEF and the associated materials, including process emissions and the handling of waste and DUF_6 cylinders. Construction and operation of the proposed NEF would require a long-term commitment of terrestrial resources. Short-termed impacts would be minimized with the application of proper mitigation measures and resource management. Upon the closure of the proposed NEF, LES would decontaminate and decommission the buildings and equipment and restore them to unrestricted use. This would make the site available for future reuse.

Continued employment, expenditures, and tax revenues generated during the implementation of any of the proposed action would directly benefit the local, regional, and State economies over the short term. Long-term economic productivity could be facilitated by investing in dependent businesses that would induce tax revenues into other required services.

4.8 No-Action Alternative

As presented in Section 2.2.1 of Chapter 2 of this Draft EIS, the no-action alternative would be to not construct, operate, and decommission the proposed NEF in Lea County, New Mexico. Utility customers would continue to depend on uranium enrichment services needs through existing suppliers (e.g., existing uranium enrichment facilities, foreign sources and from the "Megatons to Megawatts" program). Current U.S. contract commitments for low-enriched uranium total about 12 million SWU annually (EIA, 2004). USEC is currently the only domestic supplier of enrichment services. USEC currently sells enriched uranium to both domestic and foreign users. The existing activities would include the continued operation of the aging Paducah Gaseous Diffusion Plant, the down-blending of highly enriched uranium covered under the "Megatons to Megawatts" program that is managed by USEC and scheduled to expire in 2013, and the importation of foreign enrichment product. In the domestic market, USEC currently supplies approximately 56 percent of enriched uranium needs while foreign suppliers provide remaining 44 percent. (USEC, 2004b).

Under the no-action alternative, there is only one remaining domestic enrichment facility, the Paducah Gaseous Diffusion Facility, which could continue to serve as a source of low-enriched uranium into the foreseeable future. The "Megaton to Megawatts" program managed by USEC would continue to provide low-enriched uranium until 2013 under the current program. After the cessation of this program in 2013, the availability of low-enriched uranium through the downblending of highly enriched uranium is uncertain. Reliance on only one domestic source for enrichment services could result in disruptions to the supply of low-enriched uranium, and consequently to reliable operation of U.S. nuclear energy production, should there be any disruptions to foreign supplies and/or the operations of the domestic supplier.

The need for generating capacity within the United States is expected to increase substantially, so that by 2020 nuclear-generating capacity is expected to increase by more than 5 gigawatts (5,000 megawatts), the equivalent of adding about five large nuclear power reactors. In the short term, any excess demand can be accommodated by depleting existing inventories at USEC, commercial utilities, and the Federal Government. In the long term, this could lead to more reliance on foreign suppliers for enrichment services unless other new domestic suppliers are constructed and operated. In this regard, USEC has announced its intention to build and operate a uranium enrichment facility (i.e., proposed American Centrifuge Plant) which could supplement domestic and international demands.

The likelihood that low-enriched uranium would be available from foreign suppliers in the long term is also subject to uncertainty. The current world enrichment demand is about 35 million SWU per year, and world production capacity is about 38 million SWU (Lenders, 2001). There could also be large, long-term uncertainty concerning the impacts from potential future changes in world-wide supplies of low-enriched uranium. Therefore, the fading of the down-blending "Megaton to Megawatts" program could lead to excess world-wide demand. Foreign sources of enrichment services would continue to provide commercial nuclear reactors with their fuel supplies.

The associated impacts to the existing uranium fuel cycle activities in the United States would continue as expected today if the proposed NEF is not constructed, operated or decommissioned. To the extent that the failure to construct and operate the proposed NEF causes increased reliance on foreign sources for low-enriched uranium, the environmental impacts resulting from DU production which is shifted from the United States to foreign countries would be avoided.

The following section also discusses additional environmental impacts from not constructing, operating, and decommissioning the proposed NEF. The abovementioned existing activities such as enrichment services from existing uranium enrichment facilities, from foreign sources and from the "Megatons to Megawatts" program would have impacts as previously analyzed in their respective NEPA documentation and historical environmental monitoring.

4.8.1 Land Use Impacts

Under the no-action alternative, no local impact would occur because the proposed NEF would not be constructed or operated. The land use of cattle-grazing would continue and the property would be available for alternative use. There would also be no land disturbances. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on land use similar to the proposed action. Impacts to land use would be expected to be SMALL.

4.8.2 Historical and Cultural Resources Impacts

Under the no-action alternative, the land would continue to be used for cattle-grazing and historical and cultural resources would remain in place unaffected by the proposed action. Without the treatment plan and its mitigation measures proposed by LES, historical sites identified at the proposed NEF site could be exposed to the possibility of human intrusion. Additional domestic enrichment facilities in the future could be constructed, and could have potential impacts to cultural resources. Impacts to historical and cultural resources would be expected to be SMALL to MODERATE, providing that requirements included in applicable federal and state historic preservation laws and regulations are followed.

4.8.3 Visual/Scenic Resources Impacts

Under the no-action alternative, the visual and scenic resources would remain the same as described in the affected environment section. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on visual and scenic resources similar to the proposed action. Impacts to visual and scenic resources would be expected to be SMALL.

4.8.4 Air Quality Impacts

Under the no-action alternative, air quality in the general area would remain at its current levels described in the affected environment section. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely impact on air quality would be similar to the proposed action. Impacts to air quality would be expected to be SMALL.

4.8.5 Geology and Soils Impacts

Under the no-action alternative, the land would continue to be used for cattle-grazing. The geology and soils on the proposed site would remain unaffected because no land disturbance would be occur. Natural events such as wind and water erosion would remain as the most significant variable associated with the geology and soils of the site. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on geology and soils similar to the proposed action. Impacts to geology and soils would be expected to be SMALL.

4.8.6 Water Resources Impacts

Under the no-action alternative, water resources would remain the same as described in the affected environment section. Water supply demand would continue at current rate. The natural surface flow of stormwaters on the site would continue, and potential ground-water contamination could occur due to surrounding operations related to the oil industry. Additional domestic enrichment facilities in the future could be constructed. Depending on these facilities, the likely impact on water resources including water usage would be similar to the proposed action. Impacts to water resources would be expected to be SMALL.

4.8.7 Ecological Resources Impacts

Under the no-action alternative, the land would continue to be used for cattle grazing and the ecological resources would remain the same as described in the affected environmental section. Land disturbances would also be avoided. Additional domestic enrichment facilities in the future could be constructed,.

Potential impacts on ecological resources from these facilities could arise from activities associated with land disturbances of existing habitats. Impacts to ecological resources would be expected to be SMALL.

4.8.8 Socioeconomic Impacts

Under the no-action alternative, socioeconomics in the local area would continue as described in the affected environmental section. Approximately 800 construction jobs during the peak construction years and 210 operational jobs would not be created. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely socioeconomic impact would be similar to the proposed action. Socioeconomic impacts would be expected to be MODERATE.

4.8.9 Environmental Justice Impacts

Under the no-action alternative, no changes to environmental justice issues other than those that may already exist in the community would occur. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on environmental justice concerns similar to the proposed action. No disproportionately high or adverse impacts would be expected. Environmental justice impacts would be expected to be SMALL.

4.8.10 Noise Impacts

Under the no-action alternative, there would be no construction or operational activities or processes that would generate noise. Noise levels would remain as is currently observed at the site. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely noise impact would be similar to the proposed action. Noise impacts would be expected to be SMALL.

4.8.11 Transportation Impacts

Under no-action alternative, traffic volumes and patterns would remain the same as described in the affected environment section. The current volume of radioactive material and chemical shipments would not increase. Additional domestic enrichment facilities in the future could be constructed, with a likely impact on transportation similar to the proposed action. Transportation impacts would be expected to be SMALL.

4.8.12 Public and Occupational Health Impacts

Under the no-action alternative, the public health would remain as described in the affected environment. No radiological exposure are estimated to the general public other than background levels. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely public and occupation health impacts would be similar to the proposed action. Public and occupation health impacts would be expected to be SMALL.

4.8.13 Waste Management Impacts

Under the no-action alternative, new wastes including sanitary, hazardous, low-level radioactive wastes, or mixed wastes would not be generated that would require disposition. Additional domestic enrichment facilities in the future could be constructed. Depending on the construction methods and design of these facilities, the likely waste management impacts would be similar to the proposed action. Impacts from waste management would be expected to be SMALL.

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5 MITIGATION MEASURES

Mitigation measures are those actions or processes (e.g., process controls and management plans) that would be implemented to control and minimize potential impacts from construction and operation activities. These measures are in addition to actions taken to comply with applicable laws and regulations (including permits). This chapter summarizes the mitigation measures that were proposed by Louisiana Energy Services (LES) for the proposed National Enrichment Facility (NEF). The proposed mitigation measures provided in this chapter do not include environmental monitoring activities. Environmental monitoring activities are described in Chapter 6 of this Draft Environmental Impact Statement (Draft EIS).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the mitigation measures proposed by LES for the proposed NEF and has concluded that no additional mitigation measures other than those proposed by LES are required because impacts, as presented in Chapter 4, are considered small to moderate.

5.1 Mitigation Measures Proposed by LES

LES identified mitigation measures in the Environmental Report and in responses to requests for additional information that would reduce the environmental impacts associated with the proposed action (LES, 2004). Tables 5-1 and 5-2 list the mitigation measures impact areas. No mitigation measures are identified for the impact areas of socioeconomics and environmental justice for construction and operations, or for air quality for operations.

Table 5-1 Summary of Potential Mitigation Measures Proposed by LES for Construction

Impact Area	Activity	Proposed 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.
Geology and Soil	Soil disturbance	Use construction BMPs and comply with a fugitive dust control plan and a Spill Prevention, Control, and Countermeasures Plan. Use earthen berms, dikes, and sediment fences as necessary to limit suspended solids in runoff. Stabilize and line drainage culverts and ditches with rock aggregate/riprap to reduce flow velocity and prohibit scouring.

Impact Area	Activity	Proposed 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 a Spill Prevention, Control, and Countermeasures Plan and a site Stormwater Pollution Prevention Plan.
	Water use	Use low-water-consumptive landscaping techniques and install low-flow toilets, sinks, and showers and other efficient water-using equipment.
		Berm all aboveground diesel storage tanks.
		Implement a waste management and recycling program to segregate and minimize industrial and hazardous waste.
Ecological Resources	Disturbance of habitats defined as rare or unique or that support threatened or endangered species	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.
		Use animal-friendly fencing and netting 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 meters (295 feet) and make the slope of the ramps less than 45 degrees. Inspect trenches that are left open overnight and remove animals prior to backfilling.
Historical and Cultural Resources	Disturbance of prehistoric archaeological sites and sites eligible for listing in the National Register of Historic Places	Develop a treatment plan in coordination with the NRC, the New Mexico State Historic Preservation Office, the State Land Office, Lea County, the Advisory Council on Historic Preservation, and affected Indian tribes for the sites eligible for the National Register of Historic Places.
Air Quality	Fugitive dust and construction equipment emissions	Use BMPs for fugitive dust and for maintenance of vehicles and equipment to minimize air emissions.

Impact Area	Activity	Proposed Mitigation Measures
Public and Occupational Health	Nonradiological effects from construction activities	Use BMPs and management programs associated with promoting safe construction practices.
Transportation	Traffic volume	Use construction BMPs to suppress dust by watering down roads as necessary and maintain temporary roads. Convert the temporary access roads into permanent access roads upon completion of the construction. 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.
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 nonhazardous materials. Conduct employee training on the recycling program.
Visual and Scenic Resources	Potential visual intrusions in the existing landscape character	Use accepted natural, low-water-consumption landscaping techniques. Conduct prompt revegetation or covering of bare areas.
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 gears for workers.

Table 5-2 Summary of Potential Mitigation Measures Proposed by LES for Operations

Impact Area	Activity	Proposed Mitigation Measures
Land Use	Land disturbance	Stabilize bare areas with natural, low-water-maintenance landscaping and pavement.
Geology and Soil	Soil disturbance	Implement a Spill Prevention, Control, and Countermeasures Plan. 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.
	Water use	Implement a Spill Prevention, Control, and Countermeasures Plan and a site Stormwater Pollution Prevention Plan during construction. Use low-water-consumptive landscaping techniques.
Ecological Resources	Disturbance of habitats defined as rare or unique or that support threatened or endangered species	Manage unused open areas (i.e., leave undisturbed), including areas of native grasses and shrubs for the benefit of wildlife. Use native, low-water-consumptive vegetation in restored and landscaped areas. Use animal-friendly fencing and netting over basins to prevent use by migratory birds.
Historical and Cultural Resources	Disturbance of prehistoric archaeological sites and sites eligible for listing in the National Register of Historic Places	Develop a treatment plan in coordination with the NRC, the New Mexico State Historic Preservation Office, the State Land Office, Lea County, the Advisory Council on Historic Preservation, and affected Indian tribes for the sites eligible for the National Register of Historic Places.
Public and Occupational Health	Radiological and nonradiological effects from normal operations and off-normal operations	For nonradiological sources, use BMPs and a safety management program to promote worker safety. Move uranium hexafluoride (UF_6) cylinders when UF_6 is in solid form, which minimizes the risk of inadvertent release due to mishandling. Separate uranium compounds and various other heavy metals in the waste material generated by decontamination of equipment and systems.

Impact Area	Activity	Proposed Mitigation Measures
Public and Occupational Health *(continued)*		Use liquid- and solid-waste-handling systems and techniques to control wastes and effluent concentrations. Monitor and sample effluent to ensure compliance with regulatory discharge limits. Conduct routine plant radiation and radiological surveys to characterize and minimize potential radiological dose/exposure. Monitor all radiation workers via the use of dosimeters and area air sampling to ensure that radiological doses remain within regulatory limits and are as low as reasonably achievable (ALARA). Use radiation monitors in the gaseous effluent stacks to detect and alarm, and initiate the automatic safe shutdown of process equipment in the event contaminants are detected in the system exhaust. Systems will either automatically shut down, switch trains, or rely on operator actions to mitigate the potential release.
Waste Management	Generation of industrial, hazardous, radiological, and mixed wastes (air and liquid emissions are addressed under "Water Resources," above).	Use a storage array that permits easy visual inspection of all cylinders, with uranium byproduct cylinders (UBCs) stacked no more than two high. 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 (46.5 square inches). Take steps to ensure that UBCs do not have the defective valves (identified in NRC Bulletin 2003-03, "Potentially Defective 1-Inch Valves for Uranium Hexafluoride Cylinders") (NRC, 2003) installed. Allow only designated vehicles with less than 280 liters (74 gallons) 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:

Impact Area	Activity	Proposed Mitigation Measures
Waste Management *(continued)*		• Lifting points are free from distortion and cracking. • Cylinder skirts and stiffener rings are free from distortion and cracking. • Cylinder surfaces are free from bulges, dents, gouges, cracks, or significant corrosion. • Cylinder valves are fitted with the correct protector and cap. • Cylinder valves are straight and not distorted, two to six threads are visible, and the square head of the valve stem is undamaged. • 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 would 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 nonhazardous materials. Conduct employee training on the waste recycling program. Implement ALARA concepts and waste minimization and reuse techniques to minimize radioactive waste generation. Implement a Spill Prevention, Control, and Countermeasures Plan.
Visual and Scenic Resources	Potential visual intrusions in the existing landscape character	Use accepted natural, low-water-consumption landscaping techniques. Conduct prompt revegetation or covering of bare areas.
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 gears for workers.

5.2 References

(LES, 2004) Louisiana Energy Services. "National Enrichment Facility Environmental Report." Revision 2. NRC Docket No. 70-3103. July 2004.

(NRC, 2003) U.S. Nuclear Regulatory Commission. "Locations of Low-Level Waste Disposal Facilities." June 23, 2003. <http://www.nrc.gov/waste/llw-disposal.html> (Accessed 4/16/04).

6 ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

This chapter describes the proposed monitoring program used to characterize and evaluate the environment, to provide data on measurable levels of radiation and radioactivity, and to provide data on principal pathways of exposure to the public at the proposed National Enrichment Facility (NEF) site in Lea County, New Mexico. The monitoring program is described in terms of radiological and physiochemical (i.e., pertaining to chemical interactions that affect physical characteristics as opposed to organic or nuclear characteristics) gaseous and liquid effluents, and ecological impacts from NEF operations.

Figure 6-1 shows the locations at the proposed NEF where gaseous and liquid effluents would be emitted. These would include three exhaust stacks for the Technical Services Building, an exhaust stack for the Centrifuge Assembly Building, boiler stacks at the Central Utilities Building, an outfall for the stormwater diversion ditch from the site stormwater detention basin, and an outfall from the stormwater detention basin to the unrestricted area along New Mexico Highway 234.

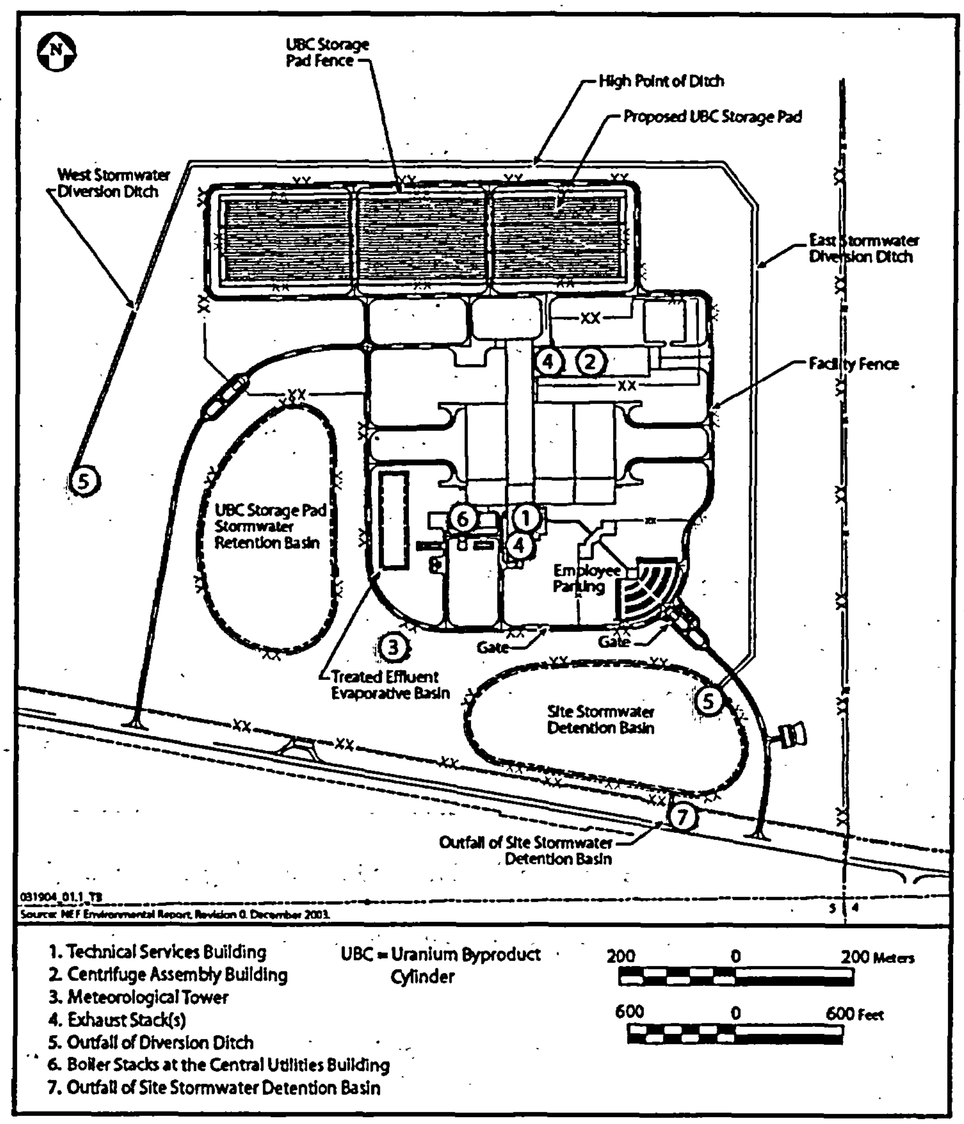

Figure 6-1 Effluent Release Points (LES, 2003)

Figure 6-2 shows the following proposed sampling and monitoring locations for gaseous and liquid effluents and ground water (LES, 2004a):

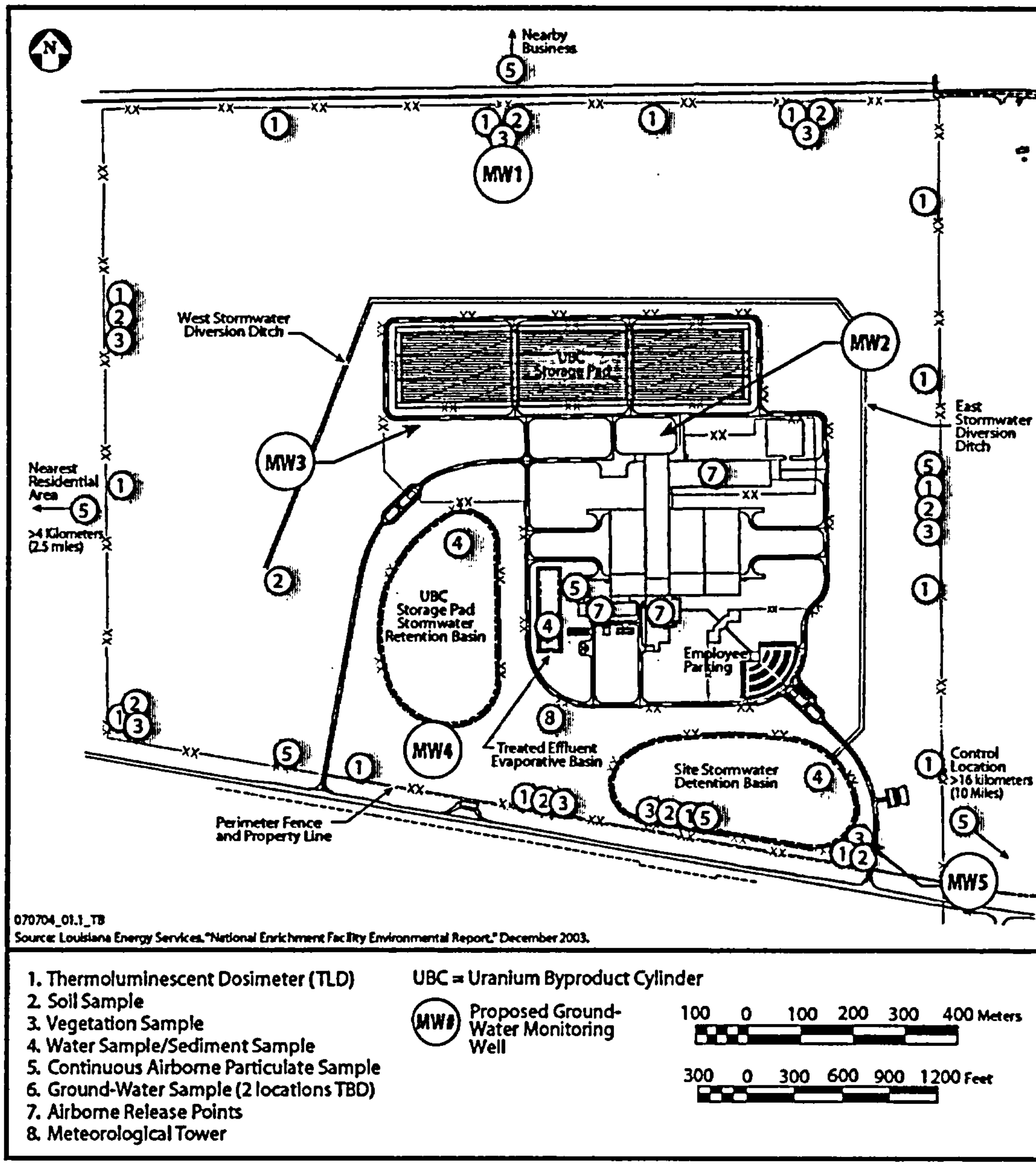

Figure 6-2 Proposed Sampling Stations and Monitoring Locations (LES, 2003)

- Sixteen thermoluminescent dosimeters along the site perimeter fence in the north, south, east, and west.

- Eight soil-sampling and vegetation-sampling locations along the site perimeter fence (north, south, east, and west), and an additional soil-sampling location at the diversion ditch outfall.

- Three water/sediment-sampling locations:
  - The Site Stormwater Retention Basin (1).
  - The Uranium Byproduct Cylinder (UBC) Storage Pad Stormwater Retention Basin (1).
  - The Treated Effluent Evaporative Basin (1).

- Seven continuous airborne-particulate sampling locations:
  - Sampler on the south side of the fenceline (2).
  - Sampler on the east side of the fenceline (1).
  - Sampler to the west at the nearest residential area (1).
  - Sampler to the north at the sand/aggregate quarry (1).
  - Sampler adjacent to the Treated Effluent Evaporative Basin (1).
  - Control sampler 16 kilometers (10 miles) to the southeast (1).

- Five ground-water monitoring wells:
  - Background ground-water monitoring well located on the northern boundary of the site (1).
  - Monitoring wells located on the southern edge of the UBC Storage Pad (2).
  - Monitoring well located on the south side of the UBC Storage Pad Stormwater Retention Basin (1).
  - Monitoring well located on the southeastern corner of the Site Stormwater Detention Basin (1).

Radiological, physiochemical, and ecological monitoring may not occur at all of the locations shown in Figure 6-2, and sampling locations may change based on meteorological conditions and operations. The following sections describe the monitoring programs more fully.

6.1 Radiological Monitoring

The proposed NEF would address radiological monitoring through two programs: the Effluent Monitoring Program and the Radiological Environmental Monitoring Program. The Effluent Monitoring Program would address the monitoring, recording, and reporting of data for radiological contaminants being emitted from specific emission points such as an airborne release stack or liquid waste outfall. The Radiological Environmental Monitoring Program would address the monitoring of the general environmental impacts (i.e., soil, sediment, ground water, ecology, and air) within and outside the proposed NEF site boundary. The following subsections provide information on the two radiological monitoring programs.

6.1.1 Effluent Monitoring Program

The U.S. Nuclear Regulatory Commission (NRC) requires that a radiological monitoring program be established by the proposed NEF to monitor and report the release of radiological air and liquid effluents to the environment. Table 6-1 lists the guidance documents that apply to the radiological monitoring program.

Public exposure to radiation from routine operations at the proposed NEF could occur due to the following releases (LES, 2004a):

- Controlled releases of liquid and gaseous effluents from stacks and evaporation ponds.
- Uncontrolled liquid and gaseous releases due to accidents.
- Controlled liquid and gaseous releases from the uranium enrichment equipment during decontamination and maintenance of equipment.

- Transportation and temporary storage of uranium hexafluoride (UF_6) feed cylinders, product cylinders, and UBCs.

Table 6-1 Guidance Documents that Apply to the Radiological Monitoring Program

Document	Applicable Guidance
Regulatory Guide 4.15[1]	"Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment." This guide describes a method acceptable to the NRC for designing a program to ensure the quality of the results of measurements for radioactive materials in the effluents and the environment outside of nuclear facilities during normal operations.
Regulatory Guide 4.16[2]	"Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants." This guide describes a method acceptable to the NRC for submitting semiannual reports that specify the quantity of each principal radionuclide released to unrestricted areas to estimate the maximum potential annual dose to the public resulting from effluent releases.

[1] NRC, 1979.
[2] NRC, 1985.

Of these potential release pathways, discharge of gaseous effluents would be considered the principal release pathway. Chapter 4 of this Draft Environmental Impact Statement (Draft EIS) presents the impacts from the assessment of the potential release pathways.

Compliance with Title 10, "Energy," of the *U.S. Code of Federal Regulations* (10 CFR) § 20.1301 would be demonstrated using a calculation of the total effective dose equivalent (TEDE) to the individual who would be likely to receive the highest dose in accordance with 10 CFR § 20.1302(b)(1). Regulatory Guide 1.109 (NRC, 1977) describes the methodology to be used for determining the TEDE. The dose conversion factors used in the models would be obtained from Federal Guidance Report numbers 11 (EPA, 1988) and 12 (EPA, 1993).

Administrative action levels, as described below, would be established for effluent samples and monitoring instrumentation as an additional step in the effluent control process. Action levels would be divided into the following three priorities:

1. The sample parameter is three times the normal background level.
2. The sample parameter exceeds any existing administrative limits.
3. The sample parameter exceeds any regulatory limits.

For the first two priorities, the exceedance of an administrative action level would initiate steps such as increasing monitoring, reviewing operations that could lead to the increased release, restricting personnel access near the release locations, and implementing corrective measures that would reduce the releases to below the administrative action levels. The third priority represents the worst case scenario that would be prepared for but would not be expected. Corrective actions for the third priority would be implemented to ensure that the cause for the action level exceedance would be identified and immediately corrected; applicable regulatory agencies would be notified, if required; communications to address lessons learned would be made to appropriate personnel; and applicable procedures would be revised accordingly, if needed. All action plans would be commensurate to the severity of the exceedance. Under routine operating conditions, the impact analyses in Chapter 4 of this Draft EIS show that radioactive material in effluents discharged from the proposed NEF would comply with the regulatory release criteria (LES, 2004a).

Compliance with action levels would be demonstrated through effluent and environmental sampling data. If an accidental release of uranium would occur, then routine operational effluent data and environmental data would be used to assess the extent of the release. Processes would be designed to include, when practical, provisions for automatic shutdown in the event action levels were exceeded. In other cases, manual shutdown could be necessary as specified in the proposed NEF operating procedures.

The NEF Quality Assurance Program would oversee the Effluent Monitoring Program and conduct audits on a regular basis. Written procedures would be in place to ensure the collection of representative samples; use of appropriate sampling methods and equipment; establishment of proper locations for sampling points; and proper handling, storage, transport, and analyses of effluent samples. The NEF's written procedures would address the maintenance and calibration of sampling and measuring equipment, including ancillary equipment such as airflow meters at regular intervals. The Effluent Monitoring Program procedures would also address functional testing and routine checks to demonstrate that monitoring and measuring instruments are in working condition. Employees involved in implementing this program would be trained in the program procedures (LES, 2004a).

6.1.1.1 Gaseous Effluent Monitoring

All potentially radioactive effluents from the proposed NEF would be discharged through monitored pathways. As required by 10 CFR Part 70, effluent sampling procedures would be designed in a manner that allows determination of the quantities and concentrations of radionuclides discharged to the environment. The uranium isotopes uranium-238 (^{238}U), uranium-236 (^{236}U), uranium-235 (^{235}U), and uranium-234 (^{234}U) would be expected to be the prominent radionuclides in the gaseous effluent. The annual uranium source term for routine gaseous effluent releases from the proposed NEF would be 8.9 megabecquerels (240 microcuries) per year. This value would be conservative because it is twice the amount assumed for the Claiborne enrichment facility radiological emissions, which is the facility LES originally planned (the Claiborne facility was half the size of the proposed NEF) (NRC, 1994a).

Representative samples would be collected from each release point of the proposed NEF. Uranium compounds expected in the proposed NEF gaseous effluent could include depleted hexavalent uranium, triuranium octaoxide (U_3O_8), and uranyl fluoride (UO_2F_2). Effluent data would be maintained, reviewed, and assessed by the NEF Radiation Protection Manager to ensure that gaseous effluent discharges comply with regulatory release criteria for uranium. Table 6-2 provides an overview of the Gaseous Effluent Sampling Program (LES, 2004a).

When sampling particulate matter within ducts with moving airstreams, sampling conditions within the sampling probe would be maintained to simulate as closely as possible the conditions in the duct. This would be accomplished by implementing the following criteria, where practical:

- Calibrate air-sampling equipment so that the air velocity in the sampling probe is made equivalent to the airstream velocity in the duct being sampled.

- Maintain the axis of the sampling probe head parallel to the airstream flow lines in the ductwork.

- Sample (if possible) at least 10 duct diameters downstream from a bend or obstruction in the duct.

- Use shrouded-head air-sampling probes when they are available in the size appropriate to the air-sampling situation (LES, 2004a).

Table 6-2 Gaseous Effluent Sampling Program

Location	Sampling and Collection Frequency	Type of Analysis
Separations Building GEVS Stack TSB GEVS Stack TSB HVAC Stack CAB Stack	Continuous Air Particulate Filter	Gross Beta/Gross Alpha - Weekly Isotopic Analysis[a] - Quarterly
Process Areas[b]	Continuous Air Particulate Filter[b]	Isotopic Analysis[a]
Nonprocess Areas[b]	Continuous Air Particulate Filter[b]	Isotopic Analysis[a]

[a] Isotopic analysis for ^{234}U, ^{235}U, ^{236}U, and ^{238}U.
[b] As required to complement the bioassay program.
CAB - Centrifuge Assembly Building.
GEVS - Gaseous Effluent Vent System.
TSB - Technical Services Building.
HVAC - Heating Ventilation and Air Conditioning.
Source: LES, 2004a.

Particle size distributions would be determined from process knowledge or measured to estimate and compensate for sample line losses and momentary conditions not reflective of airflow characteristics in the duct. Sampling equipment (pumps, pressure gages, and airflow calibrators) would be calibrated by qualified individuals. All airflow and pressure-drop calibration devices (e.g., rotometers) would be calibrated periodically using primary or secondary airflow calibrators (wet test meters, dry gas meters, or displacement bellows). Secondary airflow calibrators would be calibrated annually by the manufacturer(s). Air-sampling train flow rates would be verified and/or calibrated with tertiary airflow calibrators (rotometers) each time a filter is replaced or a sampling train component is replaced or modified. Sampling equipment and lines would be inspected for defects, obstructions, and cleanliness. Calibration intervals would be developed based on manufacturer recommendations and nuclear industry operating experience (LES, 2004a).

Gaseous effluent from the proposed NEF that has the potential for airborne radioactivity would be discharged from the following facilities (LES, 2004a; LES, 2004b):

- *The Separations Building Gaseous Effluent Vent System.* This system would discharge to a stack on the Technical Services Building roof. The Separations Building Gaseous Effluent Vent System would provide for continuous monitoring and periodic sampling of the gaseous effluents in the exhaust stack. The stack-sampling system would provide the required samples. The exhaust stack would be equipped with monitors for alpha radiation. In addition, gamma monitors would be used within the Gaseous Effluent Vent System to monitor the accumulation of ^{235}U. The alpha/gamma monitors and their specifications would be selected in the final design.

- *The Technical Services Building Gaseous Effluent Vent System.* This system would be used to monitor gaseous effluents from the Chemical Laboratory, the Mass Spectroscopy Laboratory, and the Vacuum Pump Rebuild Workshop. The Technical Services Building Gaseous Effluent Vent System would provide filtered exhaust for potentially hazardous contaminants via fume hoods for these facilities. The gaseous effluent would include argon effluent from an inductively coupled plasma-mass spectrometer that would be used to analyze for uranium in liquid samples. The Technical Services Building Gaseous Effluent Vent System would discharge to an exhaust stack on the Technical Services Building roof and would provide for continuous monitoring and periodic sampling of the gaseous effluent in the exhaust stack. This stack-sampling system would provide the required samples. The exhaust stack would contain monitors for alpha radiation (LES, 2004a). In addition, gamma monitors would be used within the Gaseous Effluent Vent System to monitor the accumulation of ^{235}U.

- *The Centrifuge Test and Postmortem Facilities Exhaust Filtration System.* This system would discharge through a stack on the Centrifuge Assembly Building. The Centrifuge Test and Postmortem Facilities Exhaust Filtration stack-sampling system would provide for continuous monitoring and periodic sampling of the gaseous effluent in the exhaust stack. The exhaust stack would contain monitors for alpha radiation.

- *Portions of the Technical Services Building Heating, Ventilating, and Air-Conditioning System.* For the portions of the Technical Services Building Heating, Ventilating, and Air-Conditioning System that provide the confinement ventilation function for areas of the Technical Services Building with the potential for contamination (i.e., Decontamination Workshop, Cylinder Preparation Room, and the Ventilated Room), this system would maintain the room temperature in various areas of the Technical Services Building, including some potentially contaminated areas. The confinement ventilation function of the Technical Services Building heating, ventilating, and air-conditioning system would maintain a negative pressure in the above rooms and would discharge the gaseous effluent to an exhaust stack on the Technical Services Building roof near the Gaseous Effluent Vent System. The stack-sampling system would provide for continuous monitoring and periodic sampling of gaseous effluents from the rooms served by the Technical Services Building heating, ventilating, and air-conditioning confinement ventilation function.

- *The Environmental Laboratory in the Technical Services Building and the Cylinder Receipt and Dispatch Building.* Gaseous effluent from these two facilities would be expected to be very low and would not be removed and filtered through vent/exhaust systems. Quarterly samples would be taken from these facilities to demonstrate that these grab samples would be representative of actual releases from the proposed NEF, in accordance with Regulatory Guide 4.16.

- *The Mechanical, Electrical, and Instrumentation Workshop in the Technical Services Building.* This workshop is designed to provide space for the normal maintenance of uncontaminated plant equipment and would contain no process confinement systems and no radioactive material in dispersable form. However, during the final design phase, LES would evaluate the workshop using Regulatory Guide 4.16 (NRC, 1985).

During the final design phase for the proposed NEF, facilities would be evaluated in accordance with Regulatory Guide 4.16 (NRC, 1985). Using the results of this evaluation, periodic sampling or continuous sampling provisions, as appropriate, would be implemented in accordance with Regulatory Guide 4.16 (LES, 2004b).

A minimum detectable concentration of 3.7×10^{-11} becquerels per milliliter (1.0×10^{-15} microcuries per milliliter) would be required (NRC, 2002) for all gross alpha analyses performed on gaseous effluent samples. This value would represent less than 2 percent of the limit for any uranium isotope (the regulatory requirement is less than 5 percent of the limit for any uranium isotope as stated in 10 CFR Part 20) (LES, 2004a). Table 6-3 summarizes detection requirements for gaseous effluent sample analyses. Minimum detectable concentration values would be less than administrative action levels.

Table 6-3 Minimum Detectable Concentration Values for Gaseous Effluents

Nuclide	Minimum Detectable Concentration bequerels per milliliter (microcuries per milliliter)
^{234}U	3.7×10^{-13} (1.0×10^{-17})
^{235}U	3.7×10^{-13} (1.0×10^{-17})
^{236}U	3.7×10^{-13} (1.0×10^{-17})
^{238}U	3.7×10^{-13} (1.0×10^{-17})
Gross Alpha	3.7×10^{-11} (1.0×10^{-15})

Source: LES, 2004a.

6.1.1.2 Liquid Effluent Monitoring

Liquid effluents to be generated at the proposed NEF would contain low concentrations of radioactive material consisting mainly of spent decontamination solutions, floor washings, liquid from the laundry, and evaporator flushes. Table 6-4 provides estimates of the expected annual volume and radioactive material content in liquid effluents by source prior to processing.

Potentially contaminated liquid effluent would be routed to the Liquid Effluent Collection and Treatment System for treatment. Most of the radioactive material would be removed from wastewater in the Liquid Effluent Collection and Treatment System through a combination of precipitation, evaporation, and ion exchange. Post-treatment liquid wastewater would be sampled and undergo isotopic analysis prior to discharge to ensure that the released concentrations were below the concentration limits established in Table 3 of Appendix B to 10 CFR Part 20.

After treatment, the effluent would be released to the double-lined Treated Effluent Evaporative Basin, which would have a leak-detection monitoring system comprised of leak-detection piping located between the two liners. The piping would lead to a sump that would be equipped with a level monitor that would alert staff if water levels in the sump indicate a possible leak (LES, 2004a). Chapter 2 of this Draft EIS describes the leak-detection system in more detail. Concentrated radioactive solids generated by the liquid treatment processes at the proposed NEF would be handled and disposed of as low-level radioactive waste.

The amount of uranium in routine liquid effluent discharge to the Treated Effluent Evaporative Basin would be 14.4 megabecquerels (389 microcuries) per year. Release of liquid radiological effluents to unrestricted areas would not occur (LES, 2004a).

Table 6-4 Estimated Uranium in Pre-Treated Liquid Waste From Various Sources

Source	Typical Annual Quantities cubic meters (gallons)	Typical Annual Uranic Content kilograms (pounds)*
Laboratory/Floor Washings/ Miscellaneous Condensates	23 (6,112)	16 (35)
Degreaser Water	4 (980)	18.5 (41)
Citric Acid	3 (719)	22 (49)
Laundry Effluent Water	406 (107,213)	0.2 (0.44)
Hand Wash and Shower Water	2,100 (554,820)	N/A
Total	2,535 (669,844)	56.7 (125)

* Uranic quantity before treatment. After treatment, approximately 1 percent, or 0.57 kilogram (1.26 pounds), of uranic material would be expected to be discharged into the Treated Effluent Evaporative Basin.
Source: LES, 2004a.

Representative liquid samples would be collected from each liquid batch and analyzed prior to any transfer to the Treated Effluent Evaporative Basin. Isotopic analysis would be performed prior to discharge. Table 6-5 shows the minimum detectable concentrations for analysis of liquid effluent. Tank agitators and recirculation lines would be used to help ensure the sample would be representative of the batch. All collection tanks would be sampled before the contents would be sent through any treatment process. Treated water would be collected in monitoring tanks that would be sampled before discharge to the Treated Effluent Evaporative Basin (LES, 2004a).

Table 6-5 Minimum Detectable Concentration Values for Liquid Effluents

Nuclide	Minimum Detectable Concentration bequerels per milliliter (microcuries per milliliter)
^{234}U	1.4×10^{-4} (3.0×10^{-9})
^{235}U	1.4×10^{-4} (3.0×10^{-9})
^{236}U	1.4×10^{-4} (3.0×10^{-9})
^{238}U	1.4×10^{-4} (3.0×10^{-9})

Source: LES, 2004a.

In addition, each of the six septic tanks that would process sanitary wastes would be sampled (prior to pumping to the leach field) and analyzed for isotopic uranium. While no plant-process-related effluents would be introduced into the septic systems, sampling of the septic systems would help mitigate any unexpected release of isotopic uranium to the soils (LES, 2004a).

NRC Information Notice 94-07 describes the method for determining solubility of discharged radioactive materials (NRC, 1994b). At the proposed NEF, insoluble uranium would be removed from liquid effluents as part of the treatment process. Releases would be in accordance with the as low as reasonably achievable (ALARA) principle (LES, 2004a).

General site stormwater runoff would be routed to the Site Stormwater Detention Basin. The UBC Storage Pad Stormwater Retention Basin would collect rainwater from the UBC Storage Pad as well as cooling tower blowdown water. The two basins would be expected to collect approximately 174,100 cubic meters (46 million gallons) of stormwater each year, and both would be included in the site's Radiological Environmental Monitoring Program as described below (LES, 2004a).

6.1.2 Radiological Environmental Monitoring Program

The Radiological Environmental Monitoring Program would provide an additional monitoring system to the effluent monitoring program to perform the following activities:

- Establish a process for collecting data for assessing radiological impacts on the environment.

- Estimate the potential impacts to the public.

- Support the demonstration of compliance with applicable radiation protection standards and guidelines.

During the course of proposed NEF operations, revisions to the Radiological Environmental Monitoring Program (including changes to sampling locations) could be necessary and appropriate to ensure reliable sampling and collection of environmental data. The proposed NEF would document the rationale and actions behind such revisions to the program and report the changes to the appropriate regulatory agency as required by the NRC license. Radiological Environmental Monitoring Program sampling would focus on locations within 4.8 kilometers (3 miles) of the proposed NEF. Control sites at distant locations would also be monitored, such as one for particulate air concentrations (LES, 2004a). Sampling locations would be based on NRC guidance found in NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors" (NRC, 1991); meteorological information; and current land use.

6.1.2.1 Sampling Program

Representative samples from various environmental media would be collected and analyzed for the presence of radioactivity associated with the proposed NEF operations. Table 6-6 summarizes the types and frequency of sampling and analyses (Table 6-2 shows the sampling protocol for airborne particulates). Environmental media identified for sampling would consist of ambient air, ground water, soil/sediment, and vegetation. All environmental samples would be analyzed onsite or shipped to a qualified independent laboratory for analyses.

Table 6-7 shows the minimum detectable concentrations for gross alpha and isotopic uranium in various environmental media that would be required.

The Radiological Environmental Monitoring Program would include the collection of data during pre-operational years to establish baseline radiological information that would be used to determine and evaluate impacts from operations at the proposed NEF on the local environment. The Radiological Environmental Monitoring Program would be initiated at least two years prior to the proposed NEF operations to develop a baseline. Radionuclides in environmental media would be identified using technically appropriate, accurate, and sensitive analytical instruments. Data collected during the operational years would be compared to the baseline generated by the pre-operational data. Such comparisons would provide a means of assessing the magnitude of potential radiological impacts on members of the public and the environment and in demonstrating compliance with applicable radiation protection standards (LES, 2004a).

Table 6-6 Radiological Sampling and Analysis Program

Sample Type	Location	Sampling and Collection Frequency	Type of Analysis
Continuous Airborne Particulate	Seven locations along fenceline and in the region of influence.	Continuous operation of air sampler with sample collection as required by dust loading but at least biweekly. Quarterly composite samples by location.	Gross beta/gross alpha analysis each filter change. Quarterly isotopic analysis on composite sample.
Vegetation/Soil Analyses	Eight locations along fenceline.	For each vegetation and soil sample, 1 to 2 kilograms (2.2 to 4.4 pounds). Samples collected semiannually.	Isotopic analysis[a].
Ground Water	Five wells (see Figure 6-2).	Samples (4 liters [1.1 gallons]) collected semiannually.	Isotopic analysis[a].
Thermoluminescent Dosimeters	Sixteen locations along fenceline.	Samples collected quarterly.	Gamma and neutron dose equivalent.
Stormwater	• Site Stormwater Detention Basin • UBC Storage Pad Stormwater Retention Basin • Treated Effluent Evaporative Basin	Water sample 4 liters (1.1 gallons). Sediment samples 1 to 2 kilograms (2.2 to 4.4 pounds). Samples collected quarterly.	Isotopic analysis[a].
Septic Tanks	One from each tank.	Samples collected quarterly.	Isotopic analysis[a].

[a] Isotopic Analysis for ^{234}U, ^{235}U, ^{236}U, and ^{238}U.
Source: LES, 2004a.

Table 6-7 Required Minimum Detectable Concentrations for Environmental Sample Analyses

Medium	Analysis	Minimum Detectable Concentrations becquerels per milliliter (microcuries per milliliter)
Ambient air	Gross alpha	3.7×10^{-14} (1.0×10^{-18})
Vegetation	Isotopic uranium	3.7×10^{-6} (1.0×10^{-10})
Soil/sediment	Isotopic uranium	1.1×10^{-2} (3.0×10^{-7})
Ground water	Isotopic uranium	3.7×10^{-8} (1.0×10^{-12})

Source: LES, 2004a.

Atmospheric radioactivity monitoring would be based on plant-design data, demographic and geologic data, meteorological data, and land use data. Because operational releases would be very low and subject to rapid dilution via dispersion, distinguishing plant-related uranium from background uranium already present in the site environment would be difficult. The gaseous effluent would be released from either rooftop discharge points or from the Treated Effluent Evaporative Basin as resuspended airborne particles that would result in ground-level releases. A characteristic of ground-level plumes would be that plume concentrations decrease continually as the distance from the release point increases; therefore, the impact at locations close to the release point would be greater than at more distant locations. The concentrations of radioactive material in gaseous effluents from the proposed NEF would be very low concentrations of uranium because of process and effluent controls. Air samples collected at locations close to the proposed NEF site would provide the best opportunity to detect and identify plant-related radioactivity in the ambient air; therefore, air monitoring would be performed at the plant perimeter fence or the plant property line.

Air-monitoring stations would be situated along the site boundary locations based on prevailing meteorological conditions (i.e., wind direction) and at nearby residential areas and businesses. In addition, an air-monitoring station would be located next to the Treated Effluent Evaporative Basin to measure for particulate radioactivity that would be resuspended into the air from sediment layers when the basin is dry (LES, 2004a). A control sample location would be established approximately 16 kilometers (10 miles) upwind from the proposed NEF. All environmental air samplers would operate on a continuous basis with sample retrieval for a gross alpha and beta analysis occurring on a biweekly basis (or as required by dust loads) (LES, 2004a).

Vegetation and soil samples from onsite and offsite locations would be collected on a quarterly basis beginning at least two years prior to startup to establish a baseline. During the operational years, vegetation and soil sampling would be performed semiannually in eight sectors surrounding the proposed NEF site, including three with the highest predicted atmospheric deposition in the prevailing wind direction. Vegetation samples could include vegetables and grass, depending on availability. Soil samples would be collected in the same vicinity as the vegetation samples (LES, 2004a).

Ground-water samples from onsite monitoring well(s) would be collected semiannually for radiological analysis. The background ground-water monitoring well (MW1), as shown in Figure 6-2, would be located on the northern boundary of the proposed NEF site, between the proposed NEF and Wallach

Concrete, Inc. This location would be up-gradient of the proposed NEF and cross-gradient from the Waste Control Specialists facility. The other four monitoring wells would be located within the proposed NEF site. All of the monitoring well locations would be based on the slope of the red bed surface at the base of the shallow sand and gravel layer, the ground-water gradient in the 67-meter (220-foot) ground-water zone under the proposed NEF site, and in proximity to key site structures.

The monitoring wells would monitor ground water in the sand and gravel layer at the 67-m (220-ft) zone. This ground-water zone is not considered an aquifer (it does not transmit significant quantities of water under ordinary hydraulic gradients), but it is the closest occurrence of ground water beneath the proposed NEF site. It is possible that the background monitoring well MW1 could become contaminated from operations associated with Wallach Concrete, Inc., and Sundance Services, Inc. These two facilities process "produced water" in lagoons that could infiltrate the ground to the ground water. Contaminants of concern from these two facilities would primarily be hydrocarbons. The proposed NEF would not emit hydrocarbons in quantities that would be detectable so any contamination found in the NEF ground-water wells would be readily differentiated from any offsite sources (LES, 2004a).

Sediment samples would be collected semiannually from both of the stormwater runoff retention/ detention basins onsite to look for any buildup of uranic material being deposited. With respect to the Treated Effluent Evaporative Basin, measurements of the expected accumulation of uranic material into the sediment layer would be evaluated along with nearby air-monitoring data to assess any observed resuspension of particles into the air.

Direct radiation in offsite areas from processes inside the proposed NEF building would be expected to be minimal because the low-energy radiation associated with the uranium would be shielded by the process piping, equipment, and cylinders to be used at the proposed NEF site. However, the UBCs stored on the UBC Storage Pad could more directly impact public exposures due to direct and scatter (skyshine) radiation. The conservative evaluation found in Chapter 4 of this Draft EIS showed that an annual dose equivalent of < 0.2 millisievert (20 millirem) would be expected at the highest impacted area at the proposed NEF perimeter fence. Because the offsite dose equivalent rate from stored uranium byproduct cylinders would be very low and difficult to distinguish from the variance in normal background radiation beyond the site boundary, compliance would be demonstrated by NEF by relying on a system that combines direct-dose-equivalent measurements and computer modeling to extrapolate the measurements (LES, 2004a).

Environmental thermoluminescent dosimeters placed at the plant perimeter fenceline or other location(s) close to the UBCs would provide quarterly direct-dose-equivalent information. The direct dose equivalent at offsite locations would be estimated through extrapolation of the quarterly thermoluminescent dosimeter data using the Monte Carlo N-Particle computer program or a similar computer program (ORNL, 2000).

LES would provide an annual estimate to the NRC of the maximum potential dose to the public using monitoring data that would be measured throughout the reporting year in compliance with 10 CFR § 20.1301. The proposed NEF would perform the estimate by calculating the TEDE of an individual who would be likely to receive the highest dose, as specified by 10 CFR § 20.1302(b)(1). Computer codes that have undergone validation and verification would be used. The computer codes would follow the methodology for pathway modeling described in the NRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I" (NRC, 1977). Dose-conversion factors to be used in the computer models would be those presented in Federal Guidance Reports numbers 11 and 12 (LES, 2004a).

6.1.2.2 Procedures

Monitoring procedures would employ well-known, acceptable analytical methods and instrumentation. The instrument maintenance and calibration program would comply with manufacturers recommendations. The onsite laboratory and any contractor laboratory used to analyze the NEF samples would participate in third-party laboratory intercomparison programs appropriate to the media and analyses being measured. The following are examples of these third-party programs:

- The U.S. Department of Energy (DOE) Mixed Analyte Performance Evaluation Program and DOE Quality Assurance Program.

- Analytics, Inc., Environmental Radiochemistry Cross-Check Program.

The proposed NEF would require that all radiological and nonradiological laboratory vendors are certified by the National Environmental Laboratory Accreditation Program or an equivalent State laboratory accreditation agency for the analytes being tested (LES, 2004a).

The Radiological Environmental Monitoring Program would fall under the oversight of the proposed NEF's Quality Assurance Program. Quality assurance procedures would be implemented to ensure representative sampling, proper use of appropriate sampling methods and equipment, proper locations for sampling points, and proper handling, storage, transport, and analyses of effluent samples. In addition, written procedures would ensure that sampling and measuring equipment, including ancillary equipment such as airflow meters, would be properly maintained and calibrated at regular intervals according to manufacturer recommendations. The implementing procedures would include functional testing and routine checks to demonstrate that monitoring and measuring instruments are in working condition. Audits would be periodically conducted as part of the Quality Assurance Program (LES, 2004a).

The quality control procedures used by the analytical laboratories would conform with the guidance in Regulatory Guide 4.15 (NRC, 1979). These quality control procedures would include the use of established standards such as those provided by the National Institute of Standards and Technology as well as standard analytical procedures such as those established by the National Environmental Laboratory Accreditation Conference (LES, 2004a).

6.1.2.3 Reporting

Reporting procedures would comply with the requirements of 10 CFR § 70.59 and the guidance specified in Regulatory Guide 4.16 (NRC, 1985). Each year, the proposed NEF would submit a summary report of the Environmental Sampling Program to the NRC. The report would include the types, numbers, and frequencies of environmental measurements and the identities and activity concentrations of proposed NEF-related nuclides found in environmental samples. The minimum detectable concentrations for the analyses and the error associated with each data point would also be included. Significant positive trends in activities would be noted in the report along with any adjustment to the program, unavailable samples, and deviation from the sampling program. Monitoring reports in which the quantities are estimated on the basis of methods other than direct measurement would include an explanation and justification of how the results were obtained (LES, 2004a).

6.2 Physiochemical Monitoring

The primary objective of physiochemical monitoring would be to provide verification that the operations at the proposed NEF do not result in detrimental chemical impacts on the environment. Effluent controls, which are discussed in Chapters 2 and 4 of this Draft EIS, would be in place to ensure that chemical concentrations in gaseous and liquid effluents are maintained ALARA. In addition, physiochemical monitoring would provide data to confirm the effectiveness of effluent controls.

Administrative action levels would be implemented prior to the proposed NEF operation to ensure that chemical discharges would remain below the limits specified in the proposed NEF discharge permits. The limits would be specified in the U.S. Environmental Protection Agency (EPA) Region 6 National Pollutant Discharge Elimination System (NPDES) General Discharge Permits as well as the New Mexico Environment Department/Water Quality Bureau Ground-Water Discharge Permit/Plan. Therefore, this Draft EIS does not specify administrative action levels for physiochemical constituents (LES, 2004a).

Chapters 2 and 4 of this Draft EIS provide specific information regarding the source and characteristics of all nonradiological plant effluents and wastes that would be collected and disposed of offsite or discharged in various effluent streams.

In conducting physiochemical monitoring, sampling protocols and emission/effluent monitoring would be performed for routine operations with provisions for additional evaluation in response to a potential accidental release (LES, 2004a).

The proposed NEF would use the Environmental Monitoring Laboratory, located in the Technical Services Building, to analyze solid, liquid, and gaseous effluents. This laboratory would be equipped with analytical instruments needed to ensure that the operation of the plant activities complies with Federal, State, and local environmental regulations and requirements. Compliance would be demonstrated by monitoring and sampling at various plant and process locations, analyzing the samples, and reporting the results of these analyses to the appropriate agencies. The sampling/monitoring locations would be selected by the Health, Safety and Environmental organization staff in accordance with proposed NEF permits and good sampling practices. Constituents to be monitored would be identified in environmental permits obtained for the proposed NEF operations (LES, 2004a).

The Environmental Monitoring Laboratory would be available to perform analyses on air, water, soil, flora, and fauna samples obtained from designated areas around the plant. In addition to its environmental and radiological capabilities, the Environmental Monitoring Laboratory would also be capable of performing bioassay analyses when necessary. Offsite commercial laboratories could also be contracted to perform bioassay analyses. Monitoring procedures would employ well-known acceptable analytical methods and instrumentation. The instrument maintenance and calibration program would comply with manufacturer recommendations. LES would ensure that the onsite laboratory and any contractor laboratory used to analyze proposed NEF samples participate in third-party laboratory intercomparison programs appropriate to the media and analytes being measured (LES, 2004a).

Results of process samples analyses would be used to verify that process parameters would be operating within expected performance ranges. Results of liquid effluent sample analyses would be characterized to determine if treatment would be required prior to discharge to the Treated Effluent Evaporative Basin and if corrective action would be required in proposed NEF process and/or effluent collection and treatment systems (LES, 2004a).

All waste liquids, solids, and gases from enrichment-related processes and decontamination operations would be analyzed and/or monitored for chemical contamination to determine safe disposal methods and/or further treatment requirements (LES, 2004a).

6.2.1 Effluent Monitoring

Chemical constituents discharged to the environment in proposed NEF effluents would be below concentrations that have been established by State and Federal regulatory agencies as protective of the public health and the natural environment. Under routine operating conditions, no significant quantities of contaminants would be released from the proposed NEF. LES would confirm this through monitoring and collection and analysis of environmental data (LES, 2004a). The exhaust stacks for the gaseous effluent vent systems and the exhuast filtration system for the Centrifuge Test and Postmortem Facilities would be equipped with monitors for hydrogen fluoride. Hydrogen fluoride monitors would have a range of 0.04 to 50 milligrams per cubic meter ($2x10^{-9}$ to $3x10^{-6}$ pounds per cubic foot) and a lower detection limit of 0.04 milligrams per cubic meter ($2x10^{-9}$ pounds per cubic foot).

Chapter 2 of this Draft EIS lists routine liquid effluents from the proposed NEF. The proposed NEF would not directly discharge any industrial effluents to surface waters or grounds offsite, and there would be no plant tie-in to a publicly owned treatment works. Except for discharges from the septic systems, all liquid effluents would be contained on the proposed NEF site via collection tanks and detention/retention basins. No chemical sampling of the septic systems would be planned because no plant-process-related effluents would be introduced into the septic systems (LES, 2004a).

Parameters for continuing environmental performance would be developed from the baseline data collected during pre-operational sampling. In addition, operational monitoring surveys would be conducted using sampling sites at frequencies established from baseline sampling data and based on requirements contained in EPA Region 6 NPDES General Discharge Permits as well as the Ground-Water Discharge Permit/Plan (LES, 2004a).

The frequency of some types of samples could be modified depending on baseline data for the parameters of concern. The monitoring program would be designed to use the minimum percentage of allowable limits (lower limits of detection) broken down daily, quarterly, and semiannually. As construction and operation of the enrichment plant would proceed, changing conditions (e.g., regulations, site characteristics, and technology) and new knowledge could require that the monitoring program be reviewed and updated. The monitoring program would be enhanced as appropriate to maintain the collection and reliability of environmental data. The specific location of monitoring points would be determined in the detailed design.

During implementation of the monitoring program, some samples could be collected in a different manner than specified herein. Examples of reasons for these deviations could include severe weather events, changes in the length of the growing season, and changes in the amount of vegetation. Under these circumstances, documentation would be prepared to describe how the samples were collected and the rationale for any deviations from normal monitoring program methods. If a sampling location has frequent unavailable samples or deviations from the schedule, then another location could be selected or other appropriate actions taken (LES, 2004a). Each year, the proposed NEF would submit a summary of the Environmental Sampling Program and associated data to the proper regulatory authorities, as required by each regulatory agency. This summary would include the types, numbers, and frequencies of samples collected.

Physiochemical monitoring would be conducted via sampling of stormwater, soil, sediment, vegetation, and ground water to confirm that trace, incidental chemical discharges would be below regulatory limits. Table 6-8 defines physiochemical sampling by type, location, frequency, and collections.

Table 6-8 Physiochemical Sampling

Sample Type	Sample Location	Frequency	Sampling and Collections[b]
Stormwater	Site Stormwater Detention Basin UBC Storage Pad Stormwater Retention Basin	Quarterly	Analytes as determined by baseline program
Vegetation	4 minimum[a]	Quarterly (growing seasons)	Fluoride uptake
Soil/Sediment	4 minimum[a]	Quarterly	Metals, organics, pesticides, and fluoride uptake
Ground Water	All selected ground-water wells	Semiannually	Metals, organics, and pesticides

[a] Location to be established by Health, Safety and Environmental organization staff.
[b] Analyses would meet EPA Lower Limits of Detection, as applicable, and would be based on the baseline surveys and the type of matrix (sample type).
Source: LES, 2004a.

Because no naturally occurring surface waters would be on the site, a Surface Water Monitoring Program would not be implemented; however, soil sampling would include outfall areas such as the outfall at the Site Stormwater Detention Basin. In the event of any accidental release from the proposed NEF, these sampling protocols would be initiated immediately and on a continuing basis to document the extent and impact of the release until conditions have been abated and mitigated (LES, 2004a).

6.2.2 Stormwater Monitoring

A Stormwater Monitoring Program would be initiated during construction of the proposed NEF. Data collected from the program would be used to evaluate the effectiveness of measures taken to prevent the contamination of stormwater and to retain sediments within property boundaries. A temporary detention basin would be used as a sediment control basin during construction as part of the overall sedimentation erosion control plan.

The water quality of the discharge would be typical runoff from building roofs and paved areas. Except for small amounts of oil and grease typically found in runoff from paved roadways and parking areas, the discharge would not be expected to contain contaminants.

Stormwater monitoring would continue with the same monitoring frequency upon initiation of the proposed NEF operation. During plant operation, samples would be collected from the UBC Storage Pad Stormwater Retention Basin and the Site Stormwater Detention Basin to demonstrate that runoff would not contain any contaminants.

Table 6-9 shows a list of parameters that would be monitored and monitoring frequencies. This monitoring program would be refined to reflect applicable requirements as determined during the NPDES process. Additionally, the Site Stormwater Detention Basin would adhere to the requirements of the Groundwater Discharge Permit/Plan under *New Mexico Administrative Code* 20.6.2.3104 (LES, 2004a).

Table 6-9 Stormwater Monitoring Program

Monitored Parameter	Monitoring Frequency	Sample Type	Lower Limit of Detection
Oil and Grease	Quarterly, if standing water exists.	Grab	0.5 ppm
Total Suspended Solids	Quarterly, if standing water exists.	Grab	0.5 ppm
Five-Day Biological Oxygen Demand	Quarterly, if standing water exists.	Grab	2 ppm
Chemical Oxygen Demand	Quarterly, if standing water exists.	Grab	1 ppm
Total Phosphorus	Quarterly, if standing water exists.	Grab	0.1 ppm
Total Kjeldahl Nitrogen	Quarterly, if standing water exists.	Grab	0.1 ppm
pH	Quarterly, if standing water exists.	Grab	0.01 unit
Nitrate Plus Nitrite Nitrogen	Quarterly, if standing water exists.	Grab	0.2 ppm
Metals	Quarterly, if standing water exists.	Grab	Varies by metal

ppm - parts per million; ppb - parts per billion.
Source: LES, 2004a.

Normal discharge from the Site Stormwater Detention Basin would be through evaporation and infiltration into the ground. During high precipitation runoff events, some discharge could occur from the outfall next to New Mexico Highway 234. If any discharge from this outfall would occur, the volume of water would be expected to be equal to or less than the preconstruction runoff rates from the site area. Several culverts presently exist under New Mexico Highway 234 that transmit runoff to the south side of the highway. Since flow from this outfall would be intermittent, no monitoring would be conducted because the detention basin would be monitored (LES, 2004a).

The diversion ditch would intercept surface runoff from the area upstream of the proposed NEF site around the east and west sides of the proposed NEF structures during extreme precipitation events. There would be no retention or attenuation of flow within the diversion ditch. The east side would divert surface runoff into the Site Stormwater Detention Basin, which would be monitored. The west side would divert surface runoff around the site where it would continue on as overland flow. There would be no need to monitor this overland flow because this water would not flow through the proposed NEF site (LES, 2004a).

6.2.3 Environmental Monitoring

Chemistry data collected as part of the effluent and stormwater monitoring programs would be used for environmental monitoring. The chemistry data would be used to comply with NPDES and air permit obligations. Final constituent analysis requirements, which include the hazardous constituent to be monitored, minimum detectable concentrations, emission limits, and analytical requirements, would be in accordance with the permits that would be obtained prior to construction and operation (LES, 2004a).

Sampling locations would be determined based on meteorological information and current land use. The sampling locations could be subject to change as determined from the results of any observed changes in land use.

Vegetation and soil sampling would be conducted. Vegetation samples would include grasses and, if available, vegetables. Soil would be collected in the same vicinity as the vegetation sample. The samples would be collected from both onsite and offsite locations in various sectors. Sectors would be chosen based on air modeling.

Sediment samples would be collected from discharge points into the different collection basins onsite. Ground-water samples would be obtained semiannually from wells located within the proposed NEF boundary and monitored for metals, organics, and pesticides to ensure ground water would not become contaminated from the proposed NEF operations and to identify any contaminants that could migrate from non-NEF facilities. Stormwater samples collected in the UBC Storage Pad Stormwater Retention Basin would be sampled to ensure no contaminants are present in the Uranium Byproduct Cylinder Storage Pad runoff (LES, 2004a).

6.2.4 Meteorological Monitoring

A 40-meter (132-foot) meteorological tower would be installed and operated onsite to monitor and characterize meteorological phenomena (e.g., wind speed, direction, and temperature) during plant operation and to analyze the effect of the local terrain on meteorology conditions. The data obtained from the meteorological tower would assist in evaluating the potential impacts of the proposed NEF operations on workers onsite and the community offsite due to any emissions (LES, 2004a).

The meteorological tower would be located and operated in a manner consistent with the guidance in Regulatory Guide 3.63, "Onsite Meteorological Measurement Program for Uranium Recovery Facilities—Data Acquisition and Reporting" (NRC, 1988). The meteorological tower would be located at a site approximately the same elevation as the finished facility grade and in an area where proposed NEF structures would have little or no influence on the meteorological measurements. An area approximately 10 times the obstruction height around the tower towards the prevailing wind direction would be maintained. This practice would be used to avoid spurious measurements resulting from local building-caused turbulence. The program for instrument maintenance and servicing, combined with redundant data recorders, would ensure at least 90-percent data recovery (LES, 2004a). The data this equipment provides would be recorded in the proposed NEF control room and could be used for dispersion calculations. Equipment would also measure temperature and humidity that would be recorded in the control room.

6.2.5 Local Flora and Fauna

Section 6.3, "Ecological Monitoring," details the monitoring of radiological and physiochemical impacts to local flora and fauna.

6.2.6 Quality Assurance

The proposed NEF would use a set of formalized and controlled procedures for sample collection, laboratory analysis, chain of custody, reporting of results, and corrective actions. Corrective actions would be instituted when an administrative action level is exceeded for any of the measured parameters, as described in Section 6.1.1.

The proposed NEF would ensure that the onsite laboratory and any contractor laboratory used to analyze NEF samples participates in third-party laboratory intercomparison programs appropriate to the media and constituents being measured as described in Section 6.1.1.

6.2.7 Lower Limits of Detection

Table 6-9 lists the lower limits of detection for the parameters sampled in the Stormwater Monitoring Program. Minimum detectable concentrations for the radiological parameters shown in Tables 6-3 and 6-5 would be based on the results of the baseline surveys and the sample type.

6.3 Ecological Monitoring

Cattle grazing, oil/gas pipeline right-of-ways, and access roads have impacted the existing natural habitats on the proposed NEF site and the surrounding region. These current and historic land uses have resulted in a dominant habitat type, the Plains Sand Scrub. As discussed in Chapter 4 of this Draft EIS, no significant impacts from construction and operations would be anticipated; however, the environment at the site could potentially support endangered, threatened, and candidate species and species of concern described in Chapter 3 of this Draft EIS.

6.3.1 Monitoring Program Elements

The ecological monitoring program would focus on four elements: vegetation, birds, mammals, and reptiles/amphibians. Currently, there is no action or reporting level for each specific element. Appropriate agencies (New Mexico Department of Game and Fish and the U.S. Fish and Wildlife Service) would be consulted as ecological monitoring data are collected. Agency recommendations would be considered when developing reporting levels for each element and mitigation plans, if needed (LES, 2004a).

6.3.2 Observations and Sampling Design

The proposed NEF site observations would include preconstruction, construction, and operational monitoring programs. The preconstruction monitoring program would establish the site baseline data. LES would use procedures to characterize the plant, bird, mammalian, and reptilian/amphibian communities at the proposed NEF during preconstruction monitoring. In addition, operational monitoring surveys would be conducted annually (semiannually for birds, reptiles/amphibians, and mammals) using the same sampling sites established during the preconstruction monitoring program.

These surveys would be intended to help identify gross changes in the composition of the vegetative, avian, mammalian, and reptilian/amphibian communities of the site associated with operation of the plant. Interpretation of operational monitoring results, however, would consider those changes that would be expected at the proposed NEF site as a result of natural succession processes. Plant communities at the site would continue to change as the proposed NEF site begins to regenerate and mature. Changes in the bird, small mammal, and reptile/amphibian communities would likely occur concomitantly in response to the changing habitat (LES, 2004a).

6.3.2.1 Vegetation

Collection of ground cover, frequency, woody plant density, and production data would be sampled from 16 permanent sampling locations within the proposed NEF site. Annual sampling would occur in September or October to coincide with the mature flowering stage of the dominant perennial species.

The sampling locations would be selected in areas outside of the proposed footprint of the proposed NEF site but within the site boundary. The selected sampling locations would be marked physically onsite, and the Global Positioning System coordinates would be recorded. Figure 6-2 shows the expected positions of the sampling locations. The establishment of permanent sampling locations would facilitate a long-term monitoring system to evaluate vegetation trends and characteristics.

Transects used for data collection would originate at the sampling location and radiate out 30 meters (100 feet) in a specified compass direction. Ground cover and frequency would be determined using the line-intercept method. Each 0.3-meter (1-foot) segment would be considered a discrete sampling unit. Cover measurements would be read to the nearest 0.03 meter (0.1 foot). Woody plant densities would be determined using the belt transect method. All shrub and tree species rooted within 2 meters (6 feet) of the 30-meter (100-foot) transect would be counted.

Productivity would be determined using a double-sampling technique that estimates the production within three 0.25-square-meter (2.7-square-foot) plots and harvesting one equal-sized plot for each transect. Harvesting would consist of clipping each species in a plot separately, oven drying, and weighing to the nearest 0.01 gram (0.00035 ounce). The weights would be converted to kilograms (pounds) of oven-dry forage per hectare (acre) (LES, 2004a).

6.3.2.2 Birds

Site-specific avian surveys would be conducted in both the wintering and breeding seasons to verify the presence of particular bird species at the proposed NEF site. The winter and spring surveys would be designed to identify the members of the avian community.

The winter survey would identify the distinct habitats at the site and the composition of bird species within each of the habitats described. Transects 100 meters (328 feet) in length would be established within each distinct homogenous habitat, and data would be collected along the transect. Species composition and relative abundance would be determined based on visual observations and call counts.

In addition to verifying species presence, the spring survey would determine the nesting and migratory status of the species observed and (as a measure of the nesting potential of the site) the occurrence and number of territories of singing males and/or exposed, visible posturing males. The area would be surveyed using the standard point-count method (DOA, 1993; DOA, 1995). Standard point counts would require a qualified observer to stand in a fixed position and record all the birds seen and heard over a time period of 5 minutes. Distances and time would each be subdivided. Distances would be divided into less than 50 meters (164 feet) and greater than 50 meters (164 feet) categories (estimated by the observer), and the time would be divided into two categories: 0-3 minute and 3-5 minute segments. All birds seen and heard at each station/point visited would be recorded on standard point-count forms. All surveys would be conducted from 6:15 a.m. to 10:30 a.m. to coincide with the territorial males' peak singing times. The stations/points would be recorded using a Global Positioning System that would enable the observer to make return visits. Surveys would only be conducted when fog, wind, or rain do not interfere with the observer's ability to accurately record data.

Chapter 3 of this Draft EIS describes the avian communities, and all data collected would be recorded and compared to this information. The field data collections would be performed semiannually. The initial monitoring would be effective for at least the first three years of commercial operation. Following this period, program changes could be initiated based on operational experience (LES, 2004a).

6.3.2.3 Mammals

Annual onsite surveys would monitor the mammalian communities. Chapter 3 of this Draft EIS describes the existing mammalian communities. General observations would be compiled concurrently with other wildlife monitoring data and compared to information listed in Table 3-16 of Chapter 3 of this Draft EIS. The initial monitoring would be effective for at least the first three years of commercial operation. Following this period, program changes could be initiated based on operational experience (LES, 2004a).

6.3.2.4 Reptiles and Amphibians

Approximately 13 species of lizards, 13 species of snakes, and 11 species of amphibians could occur on the site and in the area. Chapter 3 of this Draft EIS describes the reptile and amphibian communities.

A combination of pitfall drift-fence trapping and walking transects (at trap sites) could provide data in sufficient quantity to allow statistical measurements of population trends, community composition, body-size distributions, and sex ratios that would reflect environmental conditions and changes at the site over time.

The monitoring program would include at least two other replicated sample sites beyond the primary location on the proposed NEF site. Offsite locations on BLM or New Mexico State land to the south, west, or north of the proposed NEF site would be given preference for additional sampling sites. Each of these catch sites would have the same pitfall drift-fence arrays and standardized walking transects, and would be operated simultaneously.

Each sample site would be designed to maximize the total catch of reptiles and amphibians rather than data on each individual caught. Each animal caught would be identified, sexed, measured for snout-vent length, inspected for morphological anomalies, and released. There would be two sample periods at the same time each year, in May and late June/early July. These months coincide with the breeding activity for lizards, most snakes, and depending on rainfall, amphibians.

Because reptiles and amphibians are sensitive to climatic conditions, and to account for the spotty effects of rainfall, each sampling event would also record rainfall, relative humidity, and temperatures. The rainfall and temperature data would act as a covariant in the analysis. The meteorological data would be obtained from the site meteorological tower.

Additionally, the offsite sample locations would act to balance out climatic effects on populations of small animals. The comparison of proposed NEF site data and offsite location data would allow for monitoring to be a much more informative environmental indicator of conditions at the proposed NEF site.

In addition to the monitoring plan described above, general observations would be gathered and recorded concurrently with other wildlife monitoring. The data would be compared to information contained in Chapter 3 of this Draft EIS. As with the programs for birds and mammals, the initial reptile and amphibian monitoring program would be effective for at least the first three years of commercial operation. Following this period, program changes could be initiated based on operational experience (LES, 2004a).

6.3.3 Statistical Validity of Sampling Program

The proposed sampling program would include descriptive statistics. These descriptive statistics would include the mean, standard deviation, standard error, and confidence interval for the mean. In each case, the sampling size would be clearly indicated. These standard descriptive statistics would be used to show the validity of the sampling program. A significance level of 5 percent would be used for the studies, which results in a 95-percent confidence level (LES, 2004a).

6.3.4 Sampling Equipment and Methods

Due to the type of ecological monitoring planned for the proposed NEF, no specific sampling equipment or chemical analyses would be necessary.

6.3.5 Data Analysis, Documentation, and Reporting Procedures

LES or its contractor would analyze the ecological data collected on the proposed NEF site. The NEF Health, Safety and Environmental Manager or a staff member would be responsible for the data analysis. The manager would be responsible for documentation of the environmental monitoring programs. A summary report would be prepared that would include the types, numbers, and frequencies of samples collected. Data relevant to the ecological monitoring program would be recorded in paper and/or on electronic forms. These data would be kept on file for the life of the proposed NEF (LES, 2004a).

6.3.6 Agency Consultation

Consultation with applicable Federal, State, and American Indian tribal agencies would be provided when completed.

6.3.7 Established Criteria

The ecological monitoring program would be conducted in accordance with generally accepted practices and the requirements of the New Mexico Department of Game and Fish. Data would be collected, recorded, stored, and analyzed. Actions would be taken as necessary to reconcile anomalous results (LES, 2004a).

6.4 References

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(NRC, 1985) U.S. Nuclear Regulatory Commission. "Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants." Regulatory Guide 4.16. Revision 1. 1985.

(NRC, 1988) U.S. Nuclear Regulatory Commission. "Onsite Meteorological Measurement Program for Uranium Recovery Facilities—Data Acquisition and Reporting." Regulatory Guide 3.63. March 1988.

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(NRC, 1994a) U.S. Nuclear Regulatory Commission. "Final Environmental Impact Statement for the Construction and Operation of Claiborne Enrichment Center, Homer, Louisiana." NUREG-1484. Volume 1. August 1994.

(NRC, 1994b) U.S. Nuclear Regulatory Commission. "Solubility Criteria for Liquid Effluent Releases to Sanitary Sewerage Under the Revised 10 CFR Part 20." Information Notice 94-07. January 1994.

(NRC, 2002) U.S. Nuclear Regulatory Commission. Office of Nuclear Material Safety and Safeguards. "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility." NUREG-1520. March 2002.

(ORNL, 2000) Oak Ridge National Laboratory. "MCNP4C Monte Carlo N-Particle Transport Code System, CCC-700 MCNP4C2." RSICC Computer Code Collection. 2000.

7 COST BENEFIT ANALYSIS

This chapter summarizes costs and benefits associated with the proposed action and the no-action alternative. Chapter 4 of this Draft Environmental Impact Statement (Draft EIS) discusses the potential socioeconomic impacts of the construction, operation, and decommissioning of the proposed National Enrichment Facility (NEF) by the Louisiana Enrichment Services (LES).

The implementation of the proposed action would generate national, regional, and local benefits and costs. The national benefits of building the proposed NEF include a greater assurance of a stable domestic supply of low-enriched uranium. The regional benefits of building the proposed NEF are increased employment, economic activity, and tax revenues in the region around the site. Some of these regional benefits, such as tax revenues, accrue specifically to Lea County and the City of Eunice. Other benefits may extend to neighboring counties in Texas. Costs associated with the proposed NEF are, for the most part, limited to the area surrounding the site. Examples of these environmental impacts would include increased road traffic and the presence of temporarily stored wastes. However, the impact of these environmental costs on the local community are considered to be SMALL.

7.1 No-Action Alternative

Under the no-action alternative, the proposed NEF would not be constructed or operated in Lea County, New Mexico. The proposed site would remain undisturbed, and ecological, natural, and socioeconomic resources would remain unaffected. All potential local environmental impacts related to water use, land use, ground-water contamination, ecology, air emissions, human health and occupational safety, waste storage and disposal, disposition of depleted uranium hexafluoride (DUF_6), and decommissioning and decontamination would be avoided. Similarly, all socioeconomic impacts related to employment, economic activity, population, housing, community resources, and financing would be avoided.

7.2 Proposed Action

Under the proposed action, LES would construct, operate, and decommission the proposed NEF in Lea County, New Mexico. In support of this proposed action, the U.S. Nuclear Regulatory Commission (NRC) would grant a license to LES to possess and use source material, byproduct, and special nuclear material in accordance with the requirements of Title 10, "Energy," of the *U.S. Code of Federal Regulations* (10 CFR) Parts 30, 40, and 70. The proposed NEF would be constructed over an eight-year period with operations beginning during the third construction year. Production would increase as additional cascades are completed and reach full production approximately seven years after initial ground breaking. Peak enrichment operations would continue for about 13 years, and then production would gradually wind-down as decommissioning and decontamination begins. The principal socioeconomic impact or benefit from the proposed NEF would be an increase in the jobs in the region of influence. The region of influence is defined as a radius of 120 kilometers (75 miles) from the proposed NEF. Enrichment operations and decommissioning and decontamination would overlap for about five years. As production winds-down, some operations personnel would gradually migrate to decommissioning and decontamination activities.

Based on the current population of the region of influence (i.e., 82,982 people in 2000), the limited number of new people and jobs created by the construction and operation of the proposed NEF in the region of influence would not be expected to lead to a significant change in population or cause a significant change in the demand for housing and public services. The total population increase at peak construction would be estimated to be 280 residents and less during later construction stages and facility operations. With 15 percent of housing units currently unoccupied, no housing demand impact is expected during facility construction and operation. Further, any additional demand for public services would not be significant given the small change in population.

The construction and operation of the proposed NEF would provide additional tax revenues to the State of New Mexico, Lea County, and the city of Eunice. Tax revenues would accrue primarily to the State of New Mexico through an increase in gross receipts taxes and corporate income taxes. Over the 30-year operating life of the proposed NEF, estimated property taxes could range between $10 and $14 million (LES, 2004a). Table 7-1 shows a summary of the estimated tax revenue to the State and local community during the life of the proposed NEF.

Table 7-1 Summary of Estimated Tax Revenues to State and Local Communities Over 30 Year Facility Life (in 2002 dollars)

Type of Tax [a]		New Mexico	Lea County	Total
Gross Receipts Tax				
	High Estimate	$ 32,300,000	$ 1,700,000	$ 34,000,000
	Low Estimate	$ 21,850,000	$ 1,150,000	$ 23,000,000
NM Corporate Income Tax [b]				
	High Estimate	$ 140,000,000	N/A [c]	$ 140,000,000
	Low Estimate	$ 120,000,000	N/A [c]	$ 120,000,000
NM Property Tax				
	High Estimate	–	$ 14,000,000	$ 14,000,000
	Low Estimate	–	$ 10,000,000	$ 10,000,000

[a] Tax values are based on tax rates as of April 2004.
[b] Based on average earnings over the life of the proposed NEF.
[c] Allocation would be made by the State of New Mexico.
Source: LES, 2004a

7.2.1 Costs Associated with Construction Activities

The proposed NEF is estimated to cost $1.2 billion (in 2002 dollars) to construct. This excludes escalation, contingencies, and interest. About one-third of the cost of constructing the proposed NEF would be spent locally on goods, services, and wages. Construction jobs are expected to pay above average wages for the Lea County region (LES, 2004a).

Construction of the proposed NEF would provide up to 800 construction jobs during the peak construction period and an average of 397 jobs per year for the 8 years of construction. Construction of the proposed NEF would have indirect economic impacts by creating an average of 582 additional jobs in the community each year (Figure 4-4). The combined direct and indirect jobs expected to be created would provide a moderately beneficial socioeconomic impact for the communities within the region of influence. Due to the transitory nature of the construction crews, the projected influx of workers and their families during construction would have only a SMALL impact on the housing vacancy rate and demand for public services (LES, 2004a).

7.2.2 Costs Associated with the Operation of the Proposed NEF

Operation of the proposed NEF would provide a maximum of 210 full-time jobs with an average of 150 jobs per year over the life of the facility (Figure 4-4). These 210 direct jobs would generate an additional 173 indirect jobs on average in the region of influence. The combination of the direct and indirect jobs would have a MODERATE impact on the economics of the communities within the region of influence. Most of the impact would be a direct result of the $10.5 million in payroll and another $9.6 million in purchases of local goods and services LES expects to spend during peak operations (LES, 2004a). The influx of workers would have only a SMALL impact on the vacancy rates for housing in the region of influence, and purchase of local goods and services would have a similar SMALL impact on the supply and demand for the region of influence. The jobs are expected to pay above average wages for Lea County, New Mexico.

> ***The size of the socioeconomic impacts are defined as follows in this Draft EIS:***
>
> - *<u>Employment/economic activity</u> – Small is <0.1-percent increase in employment; moderate is between 0.1- and 1.0-percent increase in employment; and large is defined as >1-percent increase in employment.*
> - *<u>Population/housing impacts</u> – Small is <0.1-percent increase in population growth and/or <20-percent of vacant housing units required; moderate is between 0.1- and 1.0-percent increase in population growth and/or between 20 and 50 percent of vacant housing units required; and large impacts are defined as >1-percent increase in population growth and/or >50 percent of vacant housing units required.*
> - *<u>Public services/financing</u> – Small is <1-percent increase in local revenues; moderate is between 1- and 5-percent increase in local revenues large impacts are defined as >5- percent increase in local revenues.*
>
> *Source: NRC,1999; DOE, 1999.*

7.2.3 Costs Associated with Disposition of the DUF_6

The proposed NEF would generate two components, low-enriched uranium hexafluoride (or product), and DUF_6. The low-enriched uranium would be sold to nuclear fuel fabricators. During operation, the proposed NEF would generate approximately 7,800 metric tons (8,600 tons) of DUF_6 annually during peak operations. This would be stored in an estimated 627 uranium byproduct cylinders (UBCs) each year. These UBCs would be temporarily stored onsite on an outside storage pad. The storage pad could ultimately have a capacity of 15,727 UBCs, which would be sufficient to store the total cumulative production of DUF_6 over the 30-year expected life of the facility (LES, 2004a).

The NRC evaluated several alternatives to the LES proposed action. As part of its evaluation of the proposed action, the NRC evaluated two options for disposal of the DUF_6; (1) conversion by a privately-owned facility, and (2) conversion by a DOE facility. LES's preferred approach is transporting the material to a private conversion facility. Section 4.2.14.3 of this Draft EIS discusses the DUF_6 disposal options.

There are numerous possible pathways for the transport, conversion, and disposal of DUF_6 (LLNL, 1997). In addition, there are some potentially beneficial uses for DUF_6 (Haire and Croff, 2004). For example, DUF_6 has been used in a variety of applications ranging from munitions to counterweights, and attempts are being made to develop new uses that potentially could mitigate some or all of the costs of DUF_6 disposition (Haire and Croff, 2004). However, the current inventory of depleted uranium in the U.S. far exceeds the current and near-term future demand for the material. For each of the two disposition options, it is assumed that the most tractable disposition pathway and the one supported by the NRC is to convert the DUF_6 to a more stable oxide form (U_3O_8) and dispose of the material in a licensed disposal facility.

LES is required to put in place a financial surety bonding mechanism to assure that adequate funds would be available to dispose of all DUF_6 generated by the proposed NEF (10 CFR § 70.25). The amount of funding LES proposes to set aside for DUF_6 disposition is $5.50 per kilogram of uranium (LES, 2004a; LES, 2004b). This amount is based on LES' estimate of the cost of converting and disposing of all DUF_6 generated during operation of the proposed NEF. This is consistent with three independent cost estimates obtained by LES. The NRC will evaluate the adequacy of the proposed funding in the Safety Evaluation Report.

Under the disposition options considered in this Draft EIS, the DUF_6 would be converted to U_3O_8 at a conversion facility located either at a private facility outside the region of influence (Option 1a); at a private conversion facility within the region of influence of the proposed NEF (Option 1b); or at the DOE conversion facilities to be located at Portsmouth, Ohio, and Paducah, Kentucky (Option 2). Conversion of the maximum DUF_6 inventory which could be produced at the proposed NEF could extend the time of operation by approximately 11 years for the Paducah conversion facility or 15 years for the Portsmouth conversion facility.

> ***DUF_6 Disposition Options Considered***
>
> *<u>Option 1a: Private Conversion Facility (LES Preferred Option)</u>. Transporting the UBCs from the proposed NEF to an unidentified private conversion facility outside the region of influence. After conversion to U_3O_8, the wastes would then be transported to a licensed disposal facility for final disposition.*
>
> *<u>Option 1b: Adjacent Private Conversion Facility</u>. Transporting the UBCs from the proposed NEF to an adjacent private conversion facility. This facility is assumed to be adjacent to the site and would minimize the amount of DUF_6 onsite by allowing for ship-as-you-generate waste management of the converted U_3O_8 and associated conversion byproducts (i.e., CaF_2). The wastes would then be transported to a licensed disposal facility for final disposition.*
>
> *<u>Option 2: DOE Conversion Facility</u>. Transporting UBCs from the proposed NEF to a DOE conversion facility. For example, the UBCs could be transported to one of the DOE conversion facilities either at Paducah, Kentucky, or Portsmouth, Ohio (DOE, 2004a; DOE, 2004b). The wastes would then be transported to a licensed disposal facility for final disposition.*

The conversion facilities at Paducah and Portsmouth would have annual processing capacities of 18,000 and 13,500 metric tons DUF_6, respectively (DOE, 2004c). Assuming a completion date of 2006 for these conversion facilities, the stockpiles held at Paducah could be processed by the year 2031, and the stockpiles destined for the Portsmouth conversion facility could be converted by the year 2025. Production at the proposed NEF is scheduled to cease by the year 2034. Therefore, the Portsmouth facility could begin processing the accumulated DUF_6 in 2026 and have nearly all of the accumulated UBCs processed by 2038, which is the time decommissioning and decontamination activities are scheduled to end.

Converting the accumulated proposed NEF DUF_6 could therefore extend the socioeconomic impacts of one of these facilities. It is estimated that slightly more than 300 direct and indirect jobs would be created by each conversion facility at Portsmouth and Paducah, each with a total annual income of approximately $13 million (2002 dollars) (DOE, 2004a; DOE, 2004b). While a conversion facility within the region of influence of the proposed NEF or at another private site would be designed with a slightly smaller processing capacity, it can be assumed that the socioeconomic operational impacts would be smaller than, and therefore bounded by, the DOE facilities.

For a new conversion facility with a lower processing capacity constructed near the proposed NEF or at another location, the construction impacts would be approximately 180 total jobs created for a total annual income of $6.9 million. Construction would take place in a two-year period (DOE, 2004a and 2004b). Operating the facility would create about 185 jobs (direct and indirect) with a total annual income of $7.4 million.

The disposition costs for temporarily storing the UBCs until decontamination and decommissioning begins would be minimal for the first 21 years of operation of the proposed NEF but would increase as DUF_6 is shipped offsite. These costs, which include construction of the UBC storage pads and ongoing monitoring of the UBCs, would be small relative to costs for construction and operations. A private facility would be able to begin the conversion and disposal process immediately upon being constructed, reducing the cost of constructing additional storage pads at the proposed NEF. The DOE conversion facilities could accept DUF_6 as it is generated by the proposed NEF or DOE could wait until completion of conversion of their own materials before accepting DUF_6 from the proposed NEF. In 2002 dollars, the cumulative cost of DUF_6 disposition would be $731 million using the $5.50 per kilogram of uranium estimate (LES, 2004a).

Disposition Options 1a and 2 (using a private conversion facility outside the region of influence or using the DOE conversion facilities, respectively) are similar in terms of environmental impact. Specific offsite impacts would depend on the timing of the shipments, the location of the conversion facility, length of storage at the conversion facility prior to processing, and the location and type of final burial of the U_3O_8.

A private conversion facility located within the region of influence would result in the smallest onsite accumulation of DUF_6. All shipments offsite would occur shortly after generation, and the material would be quickly converted to oxide and shipped to a final disposal site. The effect of storage would be to delay conversion and shift cost curves to the future.

7.3 Costs Associated with Decommissioning Activities

Approximately 21 years after initial groundbreaking, the proposed NEF would begin the shutdown of operations and LES would initiate the decommissioning and decontamination process. As the enrichment cascades are stopped and the site decontamination starts, some of the operational jobs would be eliminated. LES estimates that 10 percent of the operations workforce would be transferred to decommissioning and decontamination activities while other operations personnel would be gradually laid off. It is also possible that private contractors could be used to decontaminate and decommission the proposed NEF.

Using current decommissioning and decontamination techniques, it is estimated that the total workforce during most of the decommissioning and decontamination effort would average 21 direct jobs per year with an additional 20 indirect jobs for part of the 9 years required to complete the decommissioning and decontamination activities. The pay scale on the decommissioning and decontamination jobs would be slightly lower than that paid during operation, but it would still be higher than the general average for the region of influence.

Implementation of decommissioning and decontamination activities would have a SMALL socioeconomic impact on the region of influence. LES estimates the total cost of decommissioning to be about $837.5 million. Completion of the decommissioning and decontamination activities would result in a shutdown facility with no employees. The site structures and some supporting equipment would remain and be available for alternative use.

7.4 Summary of Benefits of Proposed NEF

Implementation of the proposed action would have a moderate overall economic impact on the region of influence. Table 7-2 summarizes the expenditures and jobs expected during each phase of the proposed project.

Table 7-2 Summary of Expenditures and Jobs Expected to be Created

Project Phase	Expenditures (in 2003 dollars)	Number of Jobs	
		Direct	Indirect
Construction	Total - $ 1.2 billion Local - $ 390 million	397 (average) 800 (peak)	582 (average)
Operations	$ 23.2 million (annual at peak operations)	150 (average) 210 (peak)	173 (average)
Decommissioning and Decontamination	$ 837.5 million ($106.3 million excluding DUF_6 disposition)	21	20

Decommissioning of the proposed NEF would be phased in over a nine-year period. During this time, the number of jobs would slowly decrease, and the types of positions would switch from operations to decontamination and waste shipment.

Under temporary storage of UBCs during the operational life of the proposed NEF, the DUF_6 would remain onsite until the start of decommissioning. It would then be shipped to a conversion facility for processing and disposal. This would require the maximum number of jobs for surveillance and maintenance of the DUF_6 during the operating phase of the proposed NEF.

Table 7-3 shows a summary of the socioeconomic impacts of the proposed action with the various DUF_6 disposal options.

Table 7-3 Socioeconomic Benefits of the Proposed Action with DUF_6 Disposition Options

Benefit/Cost	No Action	Proposed Action with Proposed DUF_6 Disposition Option		
		Temporary Storage	Options 1a and 1b	Option 2
Need for Facility				
National Energy Security	No Local Impact	Increased Supply Security	Increased Supply Security	Increased Supply Security
Construction				
Employment/ Economic Activity	No Local Impact	Moderate Local Impact	Moderate Local Impact	Moderate Local Impact
Population/Housing	No Local Impact	Small Impact	Small Impact	Small Impact
Public Services/ Financing	No Local Impact	Small Impact	Small Impact	Small Impact
Operations				
Employment/ Economic Activity	No Local Impact	Moderate Local Impact	Moderate Local Impact	Moderate Local Impact
Population/Housing	No Local Impact	Small Impact	Small Impact	Small Impact
Public Services/ Financing	No Local Impact	Small Impact	Small Impact	Small Impact
Decontamination & Decommissioning				
Employment/ Economic Activity	No Local Impact	Small Impact	Small Impact	Small Impact
Population/Housing	No Local Impact	Small Impact	Small Impact	Small Impact
Public Services/ Financing	No Local Impact	Small Impact	Small Impact	Small Impact
Tails disposition				
Disposition Costs	No Local Impact	Requires Maximum Surveillance and Maintenance of Inventory	Surveillance and Maintenance Depends on Timing of Shipments. Option 1b – No Additional Expenditures Required to Monitor and Maintain Inventory	Surveillance and Maintenance Depends on Timing of Shipments
Employment/ Economic Activity	No Local Impact	Small Impact	Option 1a – Small Impact Option 1b– Moderate Impact to Employment with Presence of DUF_6 Conversion Facility	Small Impact

Benefit/Cost	No Action	Proposed Action with Proposed DUF_6 Disposition Option		
		Temporary Storage	Options 1a and 1b	Option 2
Population/Housing	No Local Impact	Small Impact	Option 1a – Small Impact Option 1b – Small Impact	Small Impact
Public Services/ Financing	No Local Impact	Small Impact	Option 1a –Small Impact Option 1b – Small Impact	Small Impact

Disposition options:
Option 1a – Private DUF_6 conversion facility located outside the region of influence.
Option 1b – Private DUF_6 conversion facility located inside the region of influence.
Option 2 – Transport the UBCs from the proposed NEF site to a DOE conversion facility.

7.5 References

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Alonso Chalepah, Chairman, Apache Tribe of Oklahoma

Claydean Claiborne, Mayor, City of Jal

Clay Clarke, Assistant General Counsel, New Mexico Department of Environment

Wallace Coffey, Chairman, Comanche Nation of Oklahoma

Ron Curry, Cabinet Secretary, New Mexico Environmental Department

James Curtiss, Winston & Strawn

David C. Eck, Cultural Resource Specialist, New Mexico State Land Office

Michelle M. Ensey, Staff Archaeologist, New Mexico, Department of Cultural Affairs

Stephen Farris, Assistant Attorney General, State of New Mexico

James Ferland, President, Louisiana Energy Services

William Floyd, Manager, New Mexico Environmental Department

Tannis Fox, Attorney, New Mexico Environmental Department

Glen Hackler, City Manager, City of Andrews

Troy Harris, Mayor, City of Lovington

Peter Hastings, Licensing and Safety Analysis Manager, Duke Cogema Stone & Webster

Dennis M. Holmberg, Manager, Lea County

Holly Houghten, Tribal Historic Preservation Officer, Mescalero Apache Tribe

Bobby Jay, Cultural Resources Officer, Apache Tribe of Oklahoma

Rod Krich, Vice President, Exelon Generation Company

Lindsay Lovejoy, Jr., Attorney at Law, Nuclear Information and Resource Service

Patricia Madrid, Attorney General, State of New Mexico

Melissa Mascarenas, Legal Assistant, New Mexico Environmental Department

Clifford McKenzie, Chairman, Kiowa Tribe of Oklahoma

Peter Miner, Licensing Manager, United States Enrichment Corporation

Monty Newman, Mayor, City of Hobbs

David Pato, Assistant Attorney General, State of New Mexico

Richard Ratliff, Chief, Texas Department of Health–Bureau of Radiation Control

Betty Rickman, Mayor, Town of Tatum

Arturo Sinclair, Governor, Ysleta del Sur Pueblo

Glenn Smith, Deputy Attorney General, State of New Mexico

Alan Stanfill, Senior Program Analyst, Advisory Council on Historic Preservation

George Tahboune, Vice Chairman, Kiowa Tribe of Oklahoma

Derrith Watchman-Moore, Deputy Secretary, New Mexico Environmental Department

Phillip Young, Deputy State Historic Preservation Officer, State of New Mexico Department of Cultural Affairs

APPENDIX A - SCOPING FOR THIS DRAFT ENVIRONMENTAL IMPACT STATEMENT

Docket No. 70-3103

ENVIRONMENTAL IMPACT STATEMENT SCOPING PROCESS

SCOPING SUMMARY REPORT

Proposed Louisiana Energy Services National Enrichment Facility
Lea County, New Mexico

April 2004

U.S. Nuclear Regulatory Commission
Rockville, Maryland

1. INTRODUCTION

By letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

The LES facility, if licensed, would enrich uranium for use in commercial nuclear fuel for power reactors. Feed material would be natural (not enriched) uranium in the form of uranium hexafluoride (UF_6). LES proposes to use centrifuge technology to enrich the isotope uranium-235 in the UF_6, up to 5 percent. The centrifuge would operate at below atmospheric pressure. The capacity of the plant would be up to 3 million separative work units (SWU).[1]

In accordance with NRC regulations at 10 CFR Part 51 and the National Environmental Policy Act (NEPA), the NRC staff is preparing an Environmental Impact Statement (EIS) on the proposed facility as part of its decision-making process. The EIS will examine the potential environmental impacts associated with the proposed LES facility in parallel with the review of the license application. In addition to the EIS, the NRC staff will prepare a Safety Evaluation Report (SER) on health and safety issues raised by the proposed action. The SER will document the NRC staff evaluation of the safety of the activities proposed by LES in its license application and the compliance with applicable NRC regulations.

As part of the NEPA process, the scoping process was initiated on February 4, 2004, with the publication in the *Federal Register* of a Notice of Intent to prepare an EIS and to conduct the scoping process (69 *Federal Register* 5374-5375). Scoping is an early and open process designed to help determine the range of actions, alternatives, and potential impacts to be considered in the EIS, and to identify significant issues related to the proposed action. Input from the public and other agencies is solicited so the analysis can be more clearly focused on issues of genuine concern.

On March 4, 2004, the NRC staff held a public scoping meeting in Eunice, New Mexico, to solicit both oral and written comments from interested parties. The public scoping meeting began with NRC staff providing a description of the NRC's role, responsibilities, and mission. A brief overview of the safety review process (i.e., preparation of the SER) was followed by a description of the environmental review process and a discussion on how the public can effectively participate in the process. The bulk of the meeting was allotted for attendees to make comments on the scope of the review.

This report has been prepared to summarize the determinations and conclusions reached in the scoping process. After publication of a draft EIS, the public will be invited to comment on that document. Availability of the draft EIS, the dates of the public comment period, and information about the public meeting will be announced in the *Federal Register*, on NRC's LES website (http://www.nrc.gov/materials/fuel-cycle-fac/lesfacility.html) and in the local news media when the draft EIS is distributed. After evaluating comments on the draft EIS, the NRC staff will issue a final EIS that will serve as the basis for the NRC's consideration of environmental impacts in its decision on the proposed facility.

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[1]SWU relates to a measure of the work used to enrich uranium.

Section 2 of this report summarizes the comments and concerns expressed by government officials, agencies, and the public. Section 3 identifies the issues the draft EIS will address and Section 4 identifies those issues that are not within the scope of the draft EIS. Where appropriate, Section 4 identifies other places in the decisionmaking process where issues that are outside the scope of the draft EIS may be considered.

2. ISSUES RAISED DURING THE SCOPING PROCESS

2.1 OVERVIEW

Approximately, 250 individuals attended the March 4, 2004, public scoping meeting concerning the LES National Enrichment Facility (NEF). During the meeting, 43 individuals offered comments. Of these 43 commenters, 33 individuals fully supported construction of the LES NEF. Two commenters provided petitions to the NRC staff at the meeting with over 2,080 signatures in support of the NEF licensing and construction. This petition stated that "the signers of this petition believe this facility will be safely operated, contribute to energy independence and security for the United States and provide substantial economic benefits to our communities." In addition, 127 written comments were received from various individuals during the public scoping period, which ended on March 18, 2004. Of these127 written comments, the NRC staff received approximately 60 letters expressing support for the proposed project.

This active participation by the public in the scoping process is an important component in determining the major issues that the NRC should assess in the draft EIS. Individuals providing oral and written comments addressed several subject areas related to the proposed LES facility and the draft EIS development. In addition to private citizens, the various commenters included:

- A Member of Congress.
- New Mexico State Representatives.
- Local officials from the cities of Eunice, Hobbs, Jal, Lovington and Andrews.
- Representatives of Federal agencies or organizations.
- Representatives of State of New Mexico agencies or departments.
- Representatives of other organizations including:
  - Citizens for Alternatives to Radioactive Dumping
  - Citizens Nuclear Information Center
  - Concerned Citizens for Nuclear Safety
  - Creative Commotion
  - *Eunice News*
  - Forest Guardians
  - Institute for Energy and Environmental Research
  - Hispanic Workers Council
  - National Association for the Advancement of Colored People
  - New Mexico Audubon Council
  - New Mexico Junior College
  - Nuclear Information and Resource Service
  - Nuclear Workers for Justice
  - Public Citizen
  - Southwest Research and Information Center
  - United Way of Lea County.

The following general topics categorize the comments received during the public scoping period:

- NEPA and public participation.

- Land use and site selection.
- Need.
- Alternatives.
- Ecology, geology, emissions, soil, and water resources.
- Socioeconomics.
- Environmental justice.
- Transportation.
- Waste management.
- Cumulative impacts.
- Decommissioning.
- Safety and risk.
- Nonproliferation and security.
- Terrorism.
- Credibility.

In addition to raising important issues about the potential environmental impacts of the proposed facility, some commenters offered opinions and concerns that typically would not be included in the subject matter of an EIS–these include general opinions about LES or issues that are more appropriately considered in the SER. Comments of this type are taken into consideration by the NRC staff, but they do not point to significant environmental issues to be analyzed. Other statements may be relevant to the proposed action, but they have no direct bearing on the evaluation of alternatives or on the decision-making process involving the proposed action. For instance, general statements of support for or opposition to the proposed project fall into this category. Again, comments of this type have been noted but are not used in defining the scope and content of the EIS.

Section 2.2 summarizes the comments received during the public scoping period. Most of the issues raised have a direct bearing on the NRC's analysis of potential environmental impacts.

2.2 SUMMARY OF ISSUES RAISED

As noted above, a large number of commenters expressed support for the facility. On the other hand, several individuals raised concerns regarding the construction and operation of the NEF. The following summary groups the comments received during the scoping period by technical area and issues.

2.2.1 NEPA and public participation

A commenter stated that given the level of interest in this EIS in New Mexico, a single scoping meeting in a remote location seemed inadequate. Another commenter stated that the public scoping meeting in Eunice, New Mexico, presented "no substance from LES or their supporters" but was a "really great pep rally." Another commenter stated that the local community is capable of making its own decisions and does not want non-local intervener groups interfering with decision-making. Another commenter noted that "98% of the residents of Lea County are in favor of the enrichment facility." Another commenter noted that "there are very few Nay

Sayers of the project" and most of the individuals, that the commenter has personal contact with, have "positive views" of the NEF.

Another commenter requested that the NRC include land use, transportation, geology and soils, water resources, ecology, air quality, noise, historical and cultural resources, visual and scenic resources, socioeconomics, environmental justice, public and occupational health, and waste management as topics for the EIS, and that particular attention be paid to environmental justice and waste management in the EIS and licensing process.

2.2.2 Land use and site selection

A commenter recommended that the NRC staff consult with the administrator of the Land and Water Conservation Fund (L&WCF) program in the State of New Mexico to determine any potential conflicts with existing L&WCF projects.

Several commenters suggested that the EIS should explain why LES is no longer pursuing alternative locations in Louisiana and Tennessee and the circumstances under which LES was required to withdraw their proposals in these States. Another commenter questioned why the NRC would allow LES to prey upon impoverished areas to site the NEF and noted that Eunice is the third such area that LES has approached. Another commenter noted that the United States Enrichment Corporation (USEC) was previously interested in Lea County for uranium enrichment using the Atomic Vapor Laser Isotope Separation (AVLIS) process in 1998 to 1999, but the project was canceled when AVLIS was proven to be unfeasible. The commenter felt that siting the project in Lea County would be more feasible and welcomed by the community.

2.2.3 Need

Several commenters raised concerns over the need for the facility. One commenter asked the NRC to explain (with accompanying facts and figures) where the need is for enriched uranium. Another commenter stated that the EIS must fully analyze the need for the proposed facility "in the light of the existing uranium enrichment capacity, which is meeting the domestic U.S. nuclear power plant requirements." A commenter stated that the United States needs the LES NEF to help ensure national energy security by having a strong nuclear energy program nationwide.

2.2.4 Alternatives

Several commenters stated that the EIS should address all environmental impacts of a range of reasonable alternatives, including the no-action alternative. A commenter stated that Lea County should consider alternative (i.e., safer) economic development projects other than the proposed action. Commenters stated that the no-action alternative in the EIS should consider the nonproliferation merits of using downblended low enriched uranium fuel from U.S. and Russian surplus highly enriched uranium. In addition, the EIS should add an alternative that increases the quantity and pace of downblending the surplus highly enriched uranium into reactor fuel. For the proposed action, the NRC should compare the generation of additional depleted uranium tails from the proposed action to the no-action alternative. A commenter stated that, in addition to the no-action and proposed action alternatives, another alternative of "storage of up to 15,727 uranium byproduct cylinders (UBCs) beyond the operational lifetime of the facility must be fully analyzed." The commenter emphasized that this alternative is reasonable because "LES has made no other arrangements for the materials and wastes contained in those UBCs," and no existing disposal option for the wastes exists. Another commenter suggested that windmills or other alternative power generators be considered as alternatives in the draft EIS.

2.2.5 Ecology, geology, emissions, soil and water resources

Ecology: Several commenters expressed concerns that the construction and operation of the facility may have an undue impact on birds, other wildlife, and habitat in New Mexico. A commenter stated the EIS should consider the impacts to imperiled species such as the lesser prairie chicken, sand dune lizard, black-tailed prairie dogs, black-footed ferret, mountain plover, swift fox, ferruginous hawk, burrowing owl, and northern aplomado falcon. Another commenter expressed concern over the "unintentional habitat" that would be created by effluents and process cooling water that could attract and potentially harm local wildlife. Another commenter was concerned that local dove and quail could become contaminated due to the facility. Another commenter expressed concern about the adequacy of the LES Environmental Report as it pertains to local wildlife resources like sand dune lizards and the lesser prairie chicken. Another commenter was concerned with the potential for bioaccumulation in the foodchain resulting from the proposed facility.

Geology, emissions, and soil: Several commenters expressed concern over the long-term effects of any emissions (particularly gaseous) or contaminated soil (i.e., radioactive dust) being transported offsite. A number of commenters felt that the construction and operation of the proposed facility would be hazardous to the local community due to soil contamination similar to the contamination from the Paducah and Portsmouth facilities operations. A commenter stated that the EIS must fully examine the effects of the continuous releases of small amounts of uranium and other materials in the air, including the possible large releases of these materials in the case of a significant accident. Another commenter suggested those impacts from the treated effluent basin such as fugitive dust and monitoring must be included in the EIS. Another commenter suggested that the NRC must review the geology of the site. Another commenter questioned the location of the facility in one of the largest karstland.

Several commenters requested that the NRC consider the potential impact of air emissions on the health and safety of New Mexico and Texas residents. Several commenters requested that the NRC include a thorough examination of the potential impact to human health and the environment from radioactive dust storms. A commenter stated that the EIS should evaluate the effects from air releases traveling beyond 50 miles due to the persistent winds in the region. The commenter further suggested that any environmental studies should include the high prevailing southerly winds that could quickly spread emissions.

Water resources: Several commenters expressed concern over the long-term effects of any liquids being transported offsite. A commenter noted that the facility would not have a serious impact on existing water supplies or users and submitted a letter that summarized the county's water-use audit demonstrating this conclusion. On the other hand, several commenters expressed concerns about the water volumes that are expected to be used by the proposed facility (e.g., volumes, consumptive uses, and associated water rights) and future usage with anticipated growth in the population. A commenter stated that the EIS must analyze the total water use, not just the consumption, as the total amount of water used would not be available for other domestic uses of the Hobbs and Eunice communities. According to this commenter, this analysis must include impacts of peak water use, as well as the amounts of water use based on the LES NEF design. Another commenter stated that the EIS should address all impacts on water levels in the Ogallala Aquifer, as well as for the cities of Hobbs and Eunice arising from the facility's proposed use of cooling water from municipal water supplies that draw upon the Ogallala Aquifer.

A number of commenters felt that the construction and operation of the proposed facility would be hazardous to the local community due to groundwater contamination. Commenters expressed concern about the impact of the proposed facility on the groundwater, specifically the Ogallala Aquifer over which the facility would be built. A commenter suggested that the NRC must review the hydrology of the site, as well as the relation of area aquifers to larger, regional aquifers such as the Ogallala Aquifer.

Several commenters expressed doubt that the values given on water usage from the county/local governments, water-resource boards, and LES are correct, and that the declining water level in the Ogallala Aquifer was a concern. Another commenter stated that LES has admitted to lying about the proposed facility's air and water emissions, and LES' questionable credibility puts the Ogallala Aquifer water supply in jeopardy.

A commenter stated that the EIS must consider the possibility that the containers in which LES plans to store depleted UF_6 may leak and allow contaminants to seep into groundwater. The commenter further noted that the NRC must thoroughly evaluate the LES proposed wastewater containment system and its ability to prevent the permeation of contaminated groundwater in the future. Another commenter stated the EIS must analyze all possible water discharges points and their capacity. Another commenter expressed concerns of contamination by the onsite "open contamination water pit." The commenter questioned the construction of the pit and the type of liner. Ingestion from these holding ponds should be evaluated, should pond overflow occur. Uncertainty was expressed as to the resources available to clean up any contamination.

2.2.6 Socioeconomics

Economic benefit: A number of commenters stated that the proposed facility would have a positive and beneficial economic impact on the community by bringing economic diversity and stability to the local area. A commenter stated that the project "will have a positive impact, not only on our economy in Lea County, but for the whole United States." Another commenter felt that it was necessary to bring in a variety of industries to keep jobs local for future generations and that the NEF would help stem the county's long-standing "brain-drain." Another commenter felt "this project and the many benefits that it will bring to the people of Lea County is very exciting." Commenters noted that "by supporting the construction of this facility, they were in reality, supporting the creation of 210 permanent jobs...[and] 400-800 short-term construction jobs that will provide an estimated payroll of $170 million." Another commenter noted that the additions of these employees and families "would give needed stability and growth to the area."

One U.S. Senator from New Mexico stated support for the proposed project because it would provide economic opportunity for southeastern New Mexico. Local officials from Hobbs submitted a resolution supporting efforts to locate the NEF in southeastern New Mexico, citing economic benefits that include stability, growth, job creation, and industry diversification. Other local politicians stated that they expected the LES to be a good corporate neighbor that would add to the quality of life in the area (e.g., LES donated money for the development of a safe playground).

Other commenters expressed reservations concerning the economic benefits of the proposed facility. A commenter stated concerns about the promise of jobs being used as motivation for public support of the NEF. Another commenter stated that many residents would move from Lea County before the NEF opens. Another commenter stated that the strengthened local economy as a result of the presence of the LES NEF is not enough reason to outweigh the possible cost in lives due to potential environmental contamination.

Another commenter requested the EIS to include an extensive and thorough examination of the number and quality of local jobs and to present a detailed job breakdown by number of local workers versus "imported" workers and by "worker upward mobility." Other commenters requested that the EIS specify work titles and descriptions of duties, qualifications required, salary per job title, and quantity of workers. Another commenter also suggested the need for the economic multiplier that the LES NEF would add to the local economy. Also, the same commenter requested that the EIS investigate and document the number and nature of the potential jobs that LES can realistically offer the citizens of Lea County to establish any true economic benefits. Another commenter stated that businesses would have difficulty recruiting new employees. Another commenter questioned whether the revenue and product generated by the proposed facility would be staying within the United States or would it be sent overseas.

Tax and bonds: A commenter questioned why Lea County should provide tax breaks, municipal bonds, and other public funds for this project given both the questionable world market demand for enriched uranium and the financial health of at least one of its major partners, British Nuclear Fuels, Ltd. A commenter inquired as to what would be the impact of the $1.8 billion bond agreement on Lea County if the project shuts down early or never opens. In addition, another commenter suggested that "the facility is not economical in that it can only operate if it has the $1.8 billion Industrial Revenue Bonds," and this fact must be included in the EIS. A commenter proposed a "socioeconomic alternative" (i.e., an across-the-board tax cut for the businesses and people of Lea County) that would give the people and businesses of Lea County a $435 million tax break (instead of giving LES a $180 million tax break) and would provide Lea County with "significantly more long-term jobs and free enterprise economic development."

Property value: A commenter stated concern that, as a landowner of several properties, values for property could be adversely affected by a problem at the proposed LES NEF or by unintentional contamination of land or water resources. Another commenter suggested that the EIS should discuss the effects of effluents and potential accidents on the local property values.

Foreign-Trade Zone: A commenter questioned whether LES would be utilizing the Foreign-Trade Zone and possibly applying for a sub-zone. If so, the commenter asked if this information should be included in the EIS.

Public Service: A commenter expressed doubt that the local communities could handle the increased public service demands from an increased population.

2.2.7 Environmental justice

Several commenters suggested a detailed environmental justice review including an analysis of the effects on minority and low-income populations. Any disproportionate effect of minority or low-income populations should be subject to further investigation. A commenter stated that the EIS should examine all environmental justice issues, including the racial and economic makeup, expected composition of the workforce, and whether any claim to the land is held by any Indian tribes in the area around the proposed facility.

Another commenter representing the National Association for the Advancement of Colored People stated that they "unequivocally and without reservation support the construction...[and] operation of the Louisiana Energy Services plant." Another commenter stated that the local communities of Eunice, Hobbs, and Jal are ignorant concerning the proposed facility. The commenter further noted that because over one-third of the population is Mexican-American and do not understand English, information about the plant is not often comprehended and accepted. Another commenter noted that LES and NRC staff have shown concern regarding the impact of the proposed NEF on local minority populations. The commenter noted that they would be sharing this information with the minority population.

2.2.8 Transportation

Several commenters expressed concerns regarding transportation to and from the proposed facility. A commenter stated that the EIS must consider the "wide variety of routes" and the impacts of the projected shipments of up to 16,000 UBCs. Another commenter voiced concern that all transportation routes should be evaluated to determine impacts (including environmental justice) on the public along the full length of those transport routes. A commenter expressed concern over the long-term road conditions of NM Highway 123 due to Waste Control Specialists (WCS), the landfill, and NEF traffic. The commenter noted surrounding roads are heavily used by pass-through recreational traffic (e.g., traffic to casinos and natural attractions).

Commenters stated that the EIS should include a precise, detailed analysis of the increased hazards of transporting UF_6 over great distances, especially to a site accessible only by two-lane highways. A commenter expressed concern about the deteriorating conditions of some New Mexico roadways and the resulting high incidence of accidents that represent safety-related issues and aspects that need to be addressed.

A commenter stated that LES must demonstrate that it has the full understanding and support of the Western Interstate Energy Board, which is responsible for communication and cooperation among its membership with specific regard to the development and management of nuclear energy projects. The commenter felt this was important because the LES project involves the interstate transport of nuclear waste materials.

2.2.9 Waste management

General waste management: A commenter expressed concern that it is misleading to describe the LES project only as a processing facility—in reality, it is a nuclear waste storage facility. Another commenter stated that the EIS must include a complete and thorough investigation into gaseous, liquid, and solid waste production, treatment, and disposal at the proposed facility. Another commenter asked what would happen to worn out parts, tools, solvents, chemicals, etc. that are radioactive and whether these contaminated items would be disposed onsite. The same commenter also asked how much the cleanup of the LES plant would cost and objected to any nuclear waste being disposed of in landfills. Another commenter suggested that low-level waste from the proposed LES NEF could be sent to WCS.

Depleted uranium tails disposal: While several commenters felt that the wastes are manageable, some commenters stated opposition to the approval of the LES' application because "no place has been approved to take the waste product." A commenter asked why more waste should be added to waste already existing with no means of disposal. Another commenter expressed concern about the lack of a final disposal alternative for the depleted uranium tails that could lead to environmental exposure of radioactive materials in the long term. Another commenter proposed a condition for license approval to include final disposal of all waste must be out of State. Another commenter inquired as to where the waste would be stored and how soon it would be moved out of the State. Another commenter stated that the local community should mandate an agreement with LES prior to construction that any waste would be promptly removed. Another commenter stated that LES attempted to misrepresent to the public the amount of waste that would be stored in Lea County and, for this reason, LES' application for a license should be denied. Another commenter stated the NRC should evaluate waste characteristics of depleted uranium relative to transuranic waste in the scope of the EIS. Another commenter stated that "legitimate questions have been raised regarding the safe and secure storage and ultimate removal from New Mexico of the leftover uranium hexafluoride material, or tails, from the enrichment operation over the lifetime of the plant's operation." Another commenter stated that the EIS should examine the veracity of LES' statement that waste would be shipped offsite to a licensed disposal facility. In addition, the EIS should examine all additional environmental, radiological, and chemical impacts from construction and operation of a possible additional UF_6 conversion facility for ultimate disposal nearby or even at the proposed LES site. Another commenter expressed concern about what would ultimately happen to the waste at the proposed LES NEF and what assurances exist that the waste would not be deconverted and stored at WCS. Another commenter stated the NRC must consider the effects of using the depleted uranium in warfare, a potential application. Another commenter suggested that the tails generated should be seen as a resource rather than as a waste product and should be used to entice another company to locate a deconversion facility adjacent to the LES NEF.

Commenters stated that the NRC must analyze the impacts of the two disposal options for UBCs. These options include 1) establishment of a private conversion facility for processing and disposal of the converted waste in "an exhausted uranium mine" and 2) having the UBCs taken by the U.S. Department of Energy. In addition, the commenters stated that the EIS must analyze the plausibility of these options much more extensively than was done in the LES Environmental Report. The commenters also suggested that the EIS analyze the costs of indefinite waste storage at the LES facility. Another commenter suggested the EIS must analyze the financial assurance of disposition of the wastes.

Life expectancy/safety of waste containers: Commenters inquired as to the life expectancy of waste storage containers that may be used at the proposed LES NEF and expressed concern about their safety.

2.2.10 Cumulative Impacts

Several commenters requested that the cumulative impacts of other activities such as oilfield operation be considered in the EIS and raised concern over the cumulative impacts of continued generation of depleted uranium. A commenter expressed concern that LES would not be able to contain radioactive contaminants in soil and plant life due to past and possibly ongoing contamination in southeast New Mexico. Another commenter stated that the environmental evaluation should include a consideration of long-term and cumulative environmental effects of the radioactive and hazardous waste created by the NEF, not excluding effects at any of the disposal or processing sites around the country. Commenters stated that in its EIS, the NRC should take into account past abuses and acts of malfeasance at domestic uranium enrichment facilities in determining the potential public health impact of the proposed plant. Commenters expressed concerns related to the Paducah and Portsmouth facilities' operations that involved cancer risks to workers and the public, impacts to wildlife, and adverse impacts on aquifer and groundwater, which they stated have damaged the environment and human health and safety. This damage would also occur at the proposed facility.

A commenter stated that LES must demonstrate that it has the full understanding and support of the Western Interstate Energy Board, which is responsible for communication and cooperation among its membership with specific regard to the development and management of nuclear energy projects. The commenter felt this was important because the proposed project involves potential impacts to the economies of both regional States and the Nation. Another commenter stated that the environmental analysis should include assessment of cumulative regional impacts on the sand dune lizards and the lesser prairie chicken. Commenters stated that the EIS must conduct a full investigation into the demographic makeup of the area near the proposed NEF, taking into account other nuclear facilities in the area near the proposed NEF such as the Waste Isolation Pilot Plant (WIPP) and the WCS toxic and radioactive waste repository and their cumulative effect on public health and ecological integrity. Another commenter noted two major accidents in Carlsbad and that they needed to be considered in the EIS analysis. The effects of such accidents at LES should be considered along with mitigation measures to prevent them.

2.2.11 Decommissioning

A commenter suggested that the EIS should include a detailed disposition and closure plan for the site, supported by a cost analysis.

2.2.12 Safety and Risk

Uranium hexafluoride (UF_6): A commenter asked who would regulate safety at the proposed facility. Another commenter inquired about the volatility of UF_6, how much would be onsite at any given hour of the day, and the worst-case scenario if an accident with UF_6 should occur. Another commenter proposed a condition for license approval to include limiting the amount and time of UF_6 storage onsite.

Risk and public health: Several commenters felt that the risks are manageable. One commenter stated that the uranium enrichment industry used lessons learned from past and current U.S. enrichment facilities to improve the safety and operation of the LES NEF. Another commenter stated that the local community would be safe by ensuring that LES meets the regulatory requirements. Another commenter noted that the local community demonstrated due diligence during the licensing of WCS and that this was being repeated for the LES NEF. Having worked at large-scale nuclear and industrial facilities, a commenter felt the anti-NEF groups were exaggerating the dangers. Several commenters who toured the gas centrifuge facility in Europe (Almelo, Netherlands) stated that the technology is clean and safe for workers, the public, and the environment. Another commenter stated that the NEF "would not pose a threat to their [the public] health and safety, that it would not harm the environment, and that they [the public] would not be left with the plant's wastes." Another commenter noted that the proposed enrichment facility would be "tremendous addition to our technology." Another commenter stated LES "take safety and security very seriously based on what they have heard about LES and the uranium enrichment plant."

A number of commenters felt that the construction and operation of the proposed facility would be hazardous to the local community due to possible radiation exposure. A commenter stated that the EIS should address all impacts to public health arising from the increase in routine and accidental radioactive emissions to the air and water as a result of the operation of the proposed facility. This analysis should consider work by Dr. John Gofman and numerous other scientists showing that low-level radiation is a significant contributor to deaths from heart disease and cancer. Another commenter stated that the EIS should include a complete investigation into potential worker and public exposure to toxic and radioactive materials resulting from NEF operations. Another commenter suggested that the draft EIS should address the risks from effluent releases as latent cancer fatalities per 10,000 people. Another commenter suggested that the EIS should include a plan for maintaining and updating workers' records in a secure and public location where NEF employees would be able to access their radiation records.

Accident analysis: A commenter stated that the EIS should address all impacts on public health and the environment arising from a severe accident and the impacts. Another commenter expressed concern that the accident analysis would not be properly completed and requested that the following be included: 1) risk of fire, 2) impacts beyond a 50-mile radius, 3) evaluation of impacts from all transportation paths (feed, tails, wastes) including collisions with local oil and gas transport trucks, and 4) identification of emergency response preparedness for Lea County and all transportation routes. Another commenter stated that the LES NEF would not be as safe as some individuals are saying and expressed the concern that industries want to take shortcuts in operations that may lead to accidents.

Another commenter inquired about what type of evacuation plan and procedure is in place in the case of an accident at the plant site, and how would information about these emergency evacuations be disseminated. Another commenter stated that the EIS should address the impacts of any emergency response measures such as relocation of the population. Another commenter stated that the NRC must promise to shut down the proposed facility if any effluent releases exceed regulatory limits. Another commenter suggested that an impartial (i.e., non-LES) expert be on the site at all times to provide emergency information. This commenter also stated that medical and emergency personnel should immediately start getting the necessary background training that would enable them to handle radiation situations now, not later.

2.2.13 Nonproliferation and security

Several commenters expressed concern that advanced nuclear technology used at the LES NEF could be spread to other unfriendly governments as happened at Urenco. Another commenter expressed concern that there is "massive secrecy and cover up regarding the Urenco involvement in the spread of gas centrifuge uranium enrichment technology to Iraq, Pakistan, Iran, Libya, and North Korea which extends deep, far, and wide regarding nuclear proliferation and our national security problem." For this reason, the commenter suggested that a thorough congressional investigation of Urenco and LES is desperately needed and that Congress should direct the NRC to withhold granting LES an operating license until that investigation is completed.

Several commenters stated that Urenco, Ltd. has been implicated in nonproliferation and security breaches and wondered what is going to be done to ensure this kind of security breach does not happen at the LES NEF. A commenter requested that "given the track records of both major backers of this project," the EIS should provide "a detailed review of the national security and environmental policies of all the corporate participants in this project." Another commenter expressed concern that Lea County leaders were unaware of these activities at Urenco, Ltd. Another commenter stated that the EIS should consider whether Urenco would likely adhere to U.S. national security policy that actively discourages the proliferation of nuclear technology worldwide.

Another commenter noted that local law enforcement was involved in the planning of security at the WIPP and it also intends to be involved in the planning of security at the proposed facility. Another commenter stated that the EIS should examine all impacts arising from increased security risks and tasks associated with the construction and operation of the proposed LES NEF.

2.2.14 Terrorism

A commenter stated that accident consequences and risks should include terrorist attacks like September 11, 2001, regardless of the probability of such an event. Another commenter suggested the EIS include an analysis of the amount of gas and radiation that would be released into the atmosphere in the event of a 9/11-type terrorist catastrophe. Another commenter expressed concern that the LES NEF may "open up our country for controversy and risk for terror attacks" due to the nuclear materials and activities.

2.2.15 Credibility

Several commenters stated that LES's officials have been straightforward, honest and complete in their responses with groups, the public and individuals. On the other hand, a commenter stated that LES seems to be less than truthful in their part of the licensing process. The commenter stated because LES has a record of polluting, future accountability should be an important factor in deciding whether the NEF should be constructed in a southeast New Mexico location. Another commenter suggested that LES needs to address why the operating license at the Almelo, Netherlands, facility was revoked twice and to discuss other multiple violations at the plant. Another commenter suggested that Urenco, Ltd. should open their books for audit.

Another commenter stated that LES was deceptive and misrepresented facts to local residents about air emissions, water contamination, waste disposal of tails, and planning for potential accidents. The same commenter questioned why the NRC would grant a license to a company that is both deceptive and incompetent to operate the proposed NEF.

Another commenter stated that NRC officials currently in charge of the licensing process are "ethically challenged and should be replaced" because they are not responding to LES' less than truthful statements.

3. SUMMARY AND CONCLUSIONS

3.1 SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT AND SUMMARY OF ISSUES TO BE ADDRESSED

NEPA (Public Law 91-90, as amended), and the NRC's implementing regulations for NEPA (10 CFR Part 51), specify in general terms what should be included in an EIS prepared by the NRC staff. Regulations established by the Council on Environmental Quality (40 CFR Parts 1500-1508), while not binding on the NRC staff, provide useful guidance. The NRC staff has also prepared environmental review guidance to its staff for meeting NEPA requirements associated with licensing actions ("Environmental Review Guidance for Licensing Actions Associated with Office of Nuclear Material Safety and Safeguards (NMSS) Programs", NUREG -1748).

Pursuant to 10 CFR 51.71(a), in addition to public comments received during the scoping process, the contents of the draft EIS will depend in part on the environmental report. In accordance with 10 CFR 51.71(b), the draft EIS will consider major points of view and objections concerning the environmental impacts of the proposed action raised by other Federal, State, and local agencies, by any affected Indian tribes, and by other interested persons. Pursuant to 10 CFR 51.71(c), the draft EIS will list all Federal permits, licenses, approvals, and other entitlements which must be obtained in implementing the proposed action, and will describe the status of compliance with these requirements. Any uncertainty as to the applicability of these requirements will be addressed in the draft EIS.

Pursuant to 10 CFR 51.71(d), the draft EIS will include a consideration of the economic, technical, and other benefits and costs of the proposed action and alternatives to the proposed action. In the draft analysis, due consideration will be given to compliance with environmental quality standards and regulations that have been imposed by Federal, State, regional, and local agencies having responsibilities for environmental protection. The environmental impact of the proposed action will be evaluated in the draft EIS with respect to matters covered by such standards and requirements, regardless of whether a certification or license from the appropriate authority has been obtained. Compliance with applicable environmental quality standards and requirements does not negate the requirement for NRC to weigh all environmental effects of the proposed action, including the degradation, if any, of water quality, and to consider alternatives to the proposed action that are available for reducing adverse effects. While satisfaction of NRC standards and criteria pertaining to radiological effects will be necessary to meet the licensing requirements of the Atomic Energy Act, the draft EIS will also, for the purposes of NEPA, consider the radiological and non-radiological effects of the proposed action and alternatives.

Pursuant to 10 CFR 51.71(e), the draft EIS will normally include a preliminary recommendation by the NRC staff with respect to the proposed action. Any such recommendation would be reached after considering the environmental effects of the proposed action and reasonable alternatives, and after weighing the costs and benefits of the proposed action.

The scoping process summarized in this report will help determine the scope of the draft EIS for the proposed facility. The draft EIS will contain a discussion of the cumulative impacts of the proposed action. The development of the draft EIS will be closely coordinated with the SER prepared by the NRC staff to evaluate the health and safety impacts of the proposed action.

The goal in writing the EIS is to present the impact analyses in a manner that makes it easy for the public to understand. This EIS will provide the basis for the NRC decision with regard to potential environmental impacts. Significant impacts will be discussed in greater detail in the EIS, and explanations will be provided for determining the level of detail for different impacts. This should allow readers of the EIS to focus on issues that were determined to be important in reaching the conclusions supported by the EIS. The following topical areas and issues will be analyzed in the EIS.

- *Public and worker safety and health.* The draft EIS will include a determination of potentially adverse effects on human health that result from chronic and acute exposures to ionizing radiation and hazardous chemicals as well as from physical safety hazards. These potentially adverse effects on human health might occur during facility construction and operation. Impacts associated with the implementation of the proposed action will be assessed under normal operation and credible accident scenarios.

- *Alternatives.* The draft EIS will describe and assess the no-action alternative and other reasonable alternatives to the proposed action. Other reasonable alternatives to the proposed action will be considered such as alternative sites, enrichment sources, or technological alternatives to the proposed centrifuge technology.

- *Waste management.* The draft EIS will discuss the management of wastes, including byproduct materials, generated from the construction and operation of the NEF to assess the impacts of generation, storage, and disposition. Onsite storage of wastes will also be included in this assessment.

- *Depleted uranium disposition.* The draft EIS will address concerns about the depleted uranium hexafluoride material, or tails, resulting from the enrichment operation over the lifetime of the proposed plant's operation. These concerns include the safe and secure storage and ultimate removal of this material from New Mexico, and potential conversion of UF_6 to U_3O_8 and ultimate disposition.

- *Water resources.* The draft EIS will assess the potential impacts on groundwater quality and water use due to the implementation of the proposed action.

- *Geology and seismicity.* The draft EIS will describe the geologic and seismic characteristics of the proposed NEF site. Evaluation of the potential for earthquakes, ground motion, soil stability concerns, surface rupturing, and any other major geologic or seismic considerations that would affect the suitability of the proposed site will be addressed in the SER rather than in the draft EIS.

- *Compliance with applicable regulations.* The draft EIS will present a listing of the relevant permits and regulations that are believed to apply to the proposed NEF. These would include air, water, and solid waste regulations and disposal permits.

- *Air quality.* The draft EIS will make determinations concerning the meteorological conditions of the site location, the ambient air quality, and the contribution of other sources. In addition, the draft EIS will assess the impacts of the NEF's construction and operation on the local air quality.

- *Transportation.* The draft EIS will discuss impacts associated with the transportation of construction material, centrifuges, and feed and tails during both normal transportation and transportation under credible accident scenarios. The impacts on local transportation routes due to workers, large vehicles delivering needed equipment and materials, and vehicles removing waste from the proposed facility will be evaluated in the draft EIS.

- *Accidents.* The draft EIS will analyze the potential environmental impacts resulting from credible accidents at the NEF. The SER will assess the impacts associated with credible accidents at the proposed NEF, both from natural events and human activities. Based on the analyses, the EIS will summarize the potential environmental impacts resulting from credible bounding accidents at the proposed facility.

- *Land use.* The draft EIS will discuss the potential impacts associated with the changes in land use from predominately rangeland to industrial.

- *Socioeconomic impacts.* The draft EIS will address the demography, the economic base, labor pool, housing, utilities, public services, education, recreation, and cultural resources as impacted by NEF. The hiring of new workers from outside the area could lead to impacts on regional housing, public infrastructure, and economic resources. Population changes leading to changes to the housing market and demands on the public infrastructure will be assessed in the draft EIS.

- *Cost/benefits.* The draft EIS will address the potential cost/benefits of constructing and operating the NEF, and will discuss the cost/benefits of tails disposition options.

- *Cultural resources.* The draft EIS will assess the potential impacts of the proposed NEF on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Indian tribes.

- *Resource commitments.* The draft EIS will address the unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and the relationship between local, short-term uses of the environment and the maintenance and enhancement of long-term productivity. In addition, associated mitigative measures and environmental monitoring will be presented.

- *Ecological resources.* The draft EIS will assess the potential environmental impacts of the proposed NEF on ecological resources including plant and animal species and threatened or endangered species or critical habitat that may occur in the area. As appropriate, the assessment will include an analysis of mitigation measures to address adverse impacts.

- *Need for the facility.* The draft EIS will provide a discussion of the need for the proposed NEF and the expected benefits.

- *Decommissioning.* The draft EIS will include a discussion of facility decommissioning and associated impacts.

- *Cumulative impacts.* The draft EIS will address the potential cumulative impacts from past, present, and reasonably foreseeable activities at and near the site.

4.0 ISSUES CONSIDERED OUTSIDE THE SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

The purpose of an EIS is to assess the potential environmental impacts of a proposed action as part of the decision-making process of an agency-in this case, a licensing decision. As noted in Section 2.2, some issues and concerns raised during the scoping process are not relevant to the EIS because they are not directly related to the assessment of potential impacts or to the decision-making process. The lack of in depth discussion in the EIS, however, does not mean that an issue or concern lacks value. Issues beyond the scope of the EIS either may not yet be ripe for resolution or are more appropriately discussed and decided in other venues.

Some of these issues raised during the public scoping will not be addressed in the EIS. Major categories of these issues not analyzed in detail in the EIS include nonproliferation concerns, terrorism, security and safety issues, and credibility. The Commission has held that NRC staff is not required to consider terrorism in its EISs. In *The Matter of Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), 56 NRC 340 (2002), the Commission held that NRC is not required to consider terrorism in EISs. The Commission indicated, "the possibility of a terrorist attack ... is speculative and simply too far removed from the natural or expected consequences of agency action to require a study under NEPA."

Some of these issues raised during the public scoping process for the proposed facility are outside the scope of the draft EIS, but they will be analyzed in the SER. For example, health and safety issues will be considered in detail in the SER prepared by NRC staff for the proposed action and will be summarized in the EIS. The draft EIS and the SER are related in that they may cover the same topics and may contain similar information, but the analysis in the draft EIS is limited to an assessment of potential environmental impacts. In contrast, the SER primarily deals with safety evaluations and procedural requirements or license conditions to ensure the health and safety of workers and the general public. The SER also covers other aspects of the proposed action such as demonstrating that the applicant will provide adequate funding for the proposed facility in compliance with NRC's financial assurance regulations.

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the NSF to make and promulgate a decision.

Respondents: All individuals deploying to the Antarctic and certain Arctic areas under the auspices of the United States Antarctic Program must complete these forms. There are approximately 3,000 submissions per year, with a small percentage (c.3%) under the age of 40 who provide annual submissions but with less information.

Estimated Number of Responses Per Form: Responses range from 2 to approximately 238 responses.

Estimated Total Annual Burden on Respondents: 28,728 hours.

Frequency of Responses: Individuals must complete the forms annually to be current within 12 months of their anticipated deployment dates. Depending on individual medical status some persons may require additional laboratory results to be current within two to six weeks of anticipated deployment.

Comments: Comments are invited on (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Agency, including whether the information shall have practical utility; (b) the accuracy of the Agency's estimate of the burden of the proposed collection of information; (c) ways to enhance the quality, utility, and clarity of the information on respondents, including through the use of automated collection techniques or other forms of information technology; and (d) ways to minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Dated: January 29, 2004.

Suzanne H. Plimpton,

Reports Clearance Officer, National Science Foundation.

[FR Doc. 04–2313 Filed 2–3–04; 8:45 am]

BILLING CODE 7555–01–M

NUCLEAR REGULATORY COMMISSION

[Docket No. 72–22–ISFSI; ASLBP No. 97–732–02–ISFSI]

Private Fuel Storage, L.L.C.; Notice of Reconstitution

Pursuant to 10 CFR 2.721, the Atomic Safety and Licensing Board chaired by Administrative Judge Michael C. Farrar in the above captioned *Private Fuel Storage, L.L.C.* proceeding is hereby reconstituted by appointing Administrative Judge Paul B. Abramson in place of Administrative Judge Jerry R. Kline.

In accordance with 10 CFR 2.701, henceforth all correspondence, documents, and other material relating to any matter in this proceeding over which the Licensing Board chaired by Administrative Judge Farrar has jurisdiction should be served on Administrative Judge Abramson as follows: Administrative Judge Paul B. Abramson, Atomic Safety and Licensing Board Panel, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001.

Issued at Rockville, Maryland, this 29th day of January, 2004.

G. Paul Bollwerk, III,

Chief Administrative Judge, Atomic Safety and Licensing Board Panel.

[FR Doc. E4–181 Filed 2–3–04; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

Notice of Intent To Prepare an Environmental Impact Statement for the Proposed LES Gas Centrifuge Uranium Enrichment Facility

ACTION: Notice of Intent (NOI).

SUMMARY: Louisiana Energy Services (LES) submitted a license application on December 12, 2003, that proposes the construction, operation and decommissioning of a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico. The U.S. Nuclear Regulatory Commission (NRC), in accordance with the National Environmental Policy Act (NEPA) and its regulations at 10 CFR part 51, announces its intent to prepare an Environmental Impact Statement (EIS). The EIS will examine the potential environmental impacts of the proposed LES facility.

DATES: The public scoping process required by NEPA begins with publication of this NOI and continues until March 18, 2004. Written comments submitted by mail should be postmarked by that date to ensure consideration. Comments mailed after that date will be considered to the extent practical.

The NRC will conduct a public scoping meeting to assist in defining the appropriate scope of the EIS, including the significant environmental issues to be addressed. The meeting date, times and location are listed below:

- *Meeting date:* March 4, 2004.
- *Meeting location:* Eunice Community Center, 1115 Avenue I, Eunice, NM.
- *Scoping meeting time:* 7 p.m. to 10 p.m.

ADDRESSES: Members of the public are invited and encouraged to submit comments to the Chief, Rules and Directives Branch, Mail Stop T6–D59, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001. Please note Docket No. 70–3103 when submitting comments. Due to the current mail situation in the Washington, DC area, commentors are encouraged to send comments electronically to *LES_EIS@nrc.gov* or by facsimile to (301) 415–5398, ATTN.: Melanie Wong.

FOR FURTHER INFORMATION CONTACT: For general or technical information associated with the license review of the LES application, please contact: Tim Johnson at (301) 415–7299. For general information on the NRC NEPA process, or the environmental review process related to the LES application, please contact: Melanie Wong at (301) 415–6262.

Information and documents associated with the LES project, including the LES license application (submitted on December 12, 2003), are available for public review through our electronic reading room: *http://www.nrc.gov/reading-rm/adams.html*. Documents may also be obtained from NRC's Public Document Room at U.S. Nuclear Regulatory Commission Headquarters, 11555 Rockville Pike (first floor), Rockville, Maryland.

SUPPLEMENTARY INFORMATION:

1.0 Background

LES submitted a license application and an environmental report for a gas centrifuge uranium enrichment facility to the NRC on December 12, 2003. The NRC will evaluate the potential environmental impacts associated with LES enrichment facility in parallel with the review of the license application. This environmental evaluation will be documented in draft and final Environmental Impact Statements in accordance with NEPA and NRC's implementing regulations at 10 CFR part 51.

2.0 LES Enrichment Facility

The LES facility, if licensed, would enrich uranium for use in manufacturing commercial nuclear fuel for use in power reactors. Feed material would be natural (not enriched) uranium in the form of uranium hexafluoride (UF_6). LES proposes to use centrifuge technology to enrich isotope uranium-235 in the uranium hexafluoride to up to 5 percent. The centrifuge would operate at below atmospheric pressure. The capacity of the plant would be up to 3 million separative work units (SWU) (SWU relates to a measure of the work used to enrich uranium). The enriched UF_6 would be transported to a fuel fabrication facility. The depleted UF_6 would be stored on site until it can be sold or disposed of commercially, or by the Department of Energy.

3.0 Alternatives To Be Evaluated

No-Action—The no-action alternative would be to not build the proposed LES gas centrifuge uranium enrichment facility. Under this alternative, the NRC would not approve the license application. This serves as a baseline for comparison.

Proposed action—The proposed action involves the construction, operation, and decommissioning of a gas centrifuge uranium enrichment facility located near Eunice, NM. The applicant would be issued an NRC license under the provisions of 10 CFR parts 30, 40, and 70.

Other alternatives not listed here may be identified through the scoping process.

4.0 Environmental Impact Areas To Be Analyzed

The following areas have been tentatively identified for analysis in the EIS:

- *Land Use:* Plans, policies and controls;
- *Transportation:* Transportation modes, routes, quantities, and risk estimates;
- *Geology and Soils:* Physical geography, topography, geology and soil characteristics;
- *Water Resources:* Surface and groundwater hydrology, water use and quality, and the potential for degradation;
- *Ecology:* Wetlands, aquatic, terrestrial, economically and recreationally important species, and threatened and endangered species;
- *Air Quality:* Meteorological conditions, ambient background, pollutant sources, and the potential for degradation;
- *Noise:* Ambient, sources, and sensitive receptors;
- *Historical and Cultural Resources:* Historical, archaeological, and traditional cultural resources
- *Visual and Scenic Resources:* Landscape characteristics, manmade features and viewshed;
- *Socioeconomics:* Demography, economic base, labor pool, housing, transportation, utilities, public services/facilities, education, recreation, and cultural resources;
- *Environmental Justice:* Potential disproportionately high and adverse impacts to minority and low-income populations;
- *Public and Occupational Health:* Potential public and occupational consequences from construction, routine operation, transportation, and credible accident scenarios (including natural events);
- *Waste Management:* Types of wastes expected to be generated, handled, and stored; and
- *Cumulative Effects:* Impacts from past, present and reasonably foreseeable actions at, and near the site(s).

This list is not intended to be all inclusive, nor is it a predetermination of potential environmental impacts. The list is presented to facilitate comments on the scope of the EIS. Additions to, or deletions from this list may occur as a result of the public scoping process.

5.0 Scoping Meeting

One purpose of this NOI is to encourage public involvement in the EIS process, and to solicit public comments on the proposed scope and content of the EIS. The NRC will hold a public scoping meeting in Eunice, New Mexico, to solicit both oral and written comments from interested parties.

Scoping is an early and open process designed to determine the range of actions, alternatives, and potential impacts to be considered in the EIS, and to identify the significant issues related to the proposed action. It is intended to solicit input from the public and other agencies so that the analysis can be more clearly focused on issues of genuine concern. The principal goals of the scoping process are to:

- Ensure that concerns are identified early and are properly studied;
- Identify alternatives that will be examined;
- Identify significant issues that need to be analyzed;
- Eliminate unimportant issues; and
- Identify public concerns.

The scoping meeting will begin with NRC staff providing a description of the NRC's role and mission. A brief overview of the licensing process will be followed by a brief description of the environmental review process. The bulk of the meeting will be allotted for attendees to make oral comments.

6.0 Scoping Comments

Written comments should be mailed to the address listed above in the ADDRESSES section.

The NRC staff will make the scoping summaries and project-related materials available for public review through our electronic reading room: *http://www.nrc.gov/reading-rm/adams.html*. The scoping meeting summaries and project-related materials will also be available on the NRC's LES Web page: *http://www.nrc.gov/materials/fuel-cycle-fac/lesfacility.html* (case sensitive).

7.0 The NEPA Process

The EIS for the LES facility will be prepared according to the National Environmental Policy Act of 1969 and the NRC's NEPA Regulations at 10 CFR part 51.

After the scoping process is complete, the NRC and it's contractor will prepare a draft EIS. A 45-day comment period on the draft EIS is planned, and public meetings to receive comments will be held approximately three weeks after distribution of the draft EIS. Availability of the draft EIS, the dates of the public comment period, and information about the public meetings will be announced in the Federal Register, on NRC's LES Web page, and in the local news media when the draft EIS is distributed. The final EIS will incorporate public comments received on the draft EIS.

Signed in Rockville, MD this 16th day of January, 2004.

For The Nuclear Regulatory Commission.

Lawrence E. Kokajko,

Chief, Environmental and Performance Assessment Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards.

[FR Doc. 04-179 Filed 2-3-04; 8:45 am]

BILLING CODE 7590-01-P

NUCLEAR REGULATORY COMMISSION

[Docket Nos: (Redacted), License Nos: (Redacted), EA-XX-XXXX (Redacted)]

In the Matter of all Licensees Authorized to Manufacture or Initially Transfer Items Containing Radioactive Material for Sale or Distribution and Possess Certain Radioactive Material of Concern and All Other Persons Who Obtain Safeguards Information Described Herein; Order Imposing Additional Security Measures (Effective Immediately)

I

The Licensees identified in Attachment 1[1] to this Order hold licenses issued in accordance with the Atomic Energy Act of 1954 by the U.S.

[1] Attachment 1 contains official use only sensitive information and will not be released to the public.

APPENDIX B - CONSULTATION LETTERS

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 26, 2004

Mr. Samuel Cata
Tribal Liaison
Historic Preservation Division
228 East Palace Ave.
Santa Fe, NM 87501

SUBJECT: STATUS OF SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Mr. Cata:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico. The proposed enrichment facility covers an area of approximately 543 acres.

In accordance with NRC regulations at 10 CFR Part 51 and the National Environmental Policy Act, the NRC staff is preparing an Environmental Impact Statement on the proposed facility which will assess the potential impacts of the proposed facility on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Indian tribes. In addition, the NRC staff will develop a Memorandum of Agreement (Agreement) with the New Mexico State Historic Preservation Officer (SHPO), the New Mexico State Land Office, Indian tribes and LES to ensure that the proposed action is undertaken in accordance with the requirements of the Section 106 consultation process of the National Historic Preservation Act.

On May 18, 2004, Ms. Jan Biella (Deputy SHPO) recommended contacting you as the Governor appointed Tribal Liaison to discuss the proposed project and determine which Indian tribes should be contacted. On June 4, 2004, the NRC staff provided you information related to the Section 106 consultation process including NRC letters initiating the Section 106 consultation process with the affected Indian tribes. We are currently in the process of developing the abovementioned Agreement and a Treatment Plan, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects.

We would very much appreciate your providing any comments you may have on the proposed project in a timely manner. If you have any questions or concerns, please do not hesitate to contact me at (301) 415-6262.

Sincerely,

Melanie Wong

Melanie Wong, Project Manager
Environmental and Low-Level Waste Section
Division of Waste Management
and Environmental Protection
Office of Nuclear Material Safety
and Safeguard

Docket 70-3103

cc: Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001
July 6, 2004

The Honorable Clifford McKenzie, Chairman
Kiowa Tribe of Oklahoma
P.O. Box 369
Carnegie, OK 73015

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Chairman McKenzie:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the Inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory.

On June 2, 2004, Mr. Samuel Hernandez of the NRC staff contacted Ms. Martha Perez (Secretary), to discuss the requested information. This is a follow-up letter confirming the information provided in the telephone conversation. Ms. Perez informed Mr. Hernandez that there are no properties of cultural and traditional significance to the Kiowa Tribe of Oklahoma within the APE. If your understanding of the telephone conference between Mr. Hernandez and Ms. Perez differs from the above, please notify us as soon as possible.

The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (hereafter Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects. In the telephone conversation, Ms. Perez informed Mr. Hernandez that the Kiowa Tribe of Oklahoma would like to be a concurring party to the Agreement.

Once the Agreement and the Treatment Plan have been finalized, they will be forwarded for your review and comment. If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

Scott C. Flanders
Deputy Director for the Environmental and
Performance Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103

cc: The Honorable George Tahboune, Vice-Chairman
Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2004

The Honorable Wallace Coffey, Chairman
Comanche Tribe of Oklahoma
P.O. Box 908
Lawton, OK 73502

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Chairman Coffey:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory.

On June 2, 2004, Mr. Samuel Hernandez of the NRC staff contacted Mr. Jimmy Arterberry (Director of Environment), to discuss the requested information. This is a follow-up letter confirming the information provided in the telephone conversation. Mr. Arterberry informed Mr. Hernandez that there are no properties of cultural and traditional significance to the Comanche Tribe of Oklahoma within the APE. If your understanding of the telephone conference between Mr. Hernandez and Mr. Arterberry differs from the above, please notify us as soon as possible.

The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects. In the telephone conversation, Mr. Arterberry informed Mr. Hernandez that the Comanche Tribe of Oklahoma would like to be a concurring party to the Agreement.

Once the Agreement and the Treatment Plan have been finalized, they will be forwarded for your review and comment. If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

Scott C. Flanders
Deputy Director for the Environmental and Performance Directorate
Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards

Docket: 70-3103

cc: Jimmy Arterberry, Director of Environment
Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2004

The Honorable Alonso Chalepah, Chairman
Apache Tribe of Oklahoma
P.O. Box 1220
Anadarko, OK 73005

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Chairman Chalepah:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the Inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads. The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (hereafter Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory. During the month of June 2004, Mr. Samuel Hernandez of the NRC staff attempted on several occasions to contact a representative of your organization to discuss the requested information but was unsuccessful.

The NRC staff extends an invitation to the Apache Tribe of Oklahoma to be a concurring party to the Agreement and Treatment Plan. If the Apache Tribe of Oklahoma has information regarding properties within the APE and would like to be a concurring party to the Agreement, please notify us as soon as possible. If a response is not received within 30 days of receipt of this letter, the NRC staff will assume that the Apache Tribe of Oklahoma does not wish to be a concurring party to the Agreement.

If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

Scott C. Flanders
Deputy Director for the Environmental and Performance Directorate
Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards

Docket: 70-3103

cc: Bobby Jay, Cultural Resources Officer
Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2004

Holly Houghten, Tribal Historic Preservation Officer
Mescalero Apache Tribe
P.O. Box 227
Mescalero, NM 88340

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Ms. Houghten:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads. The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (hereafter Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory. By letter dated June 10, 2004, you stated that the NEF will not affect any sites or locations important to the Mescalero Apache Tribe culture or religion.

During the month of June 2004, Mr. Samuel Hernandez of the NRC staff attempted on several occasions to contact Ms. Naida Natchez (Historic Preservation Officer), to discuss whether the Mescalero Apache Tribe would like to be a concurring party to the Agreement but was unsuccessful. If the Mescalero Apache would like to be a concurring party to the Agreement, please notify us as soon as possible. If a response is not received within 30 days of receipt of this letter, the NRC staff will assume that the Mescalero Apache Tribe does not wish to be a concurring party to the Agreement.

If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

Scott C. Flanders
Deputy Director for the Environmental and
Performance Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103

cc: Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2004

The Honorable Arturo Sinclair, Governor
Ysleta del Sur Pueblo
P.O. Box 17579
El Paso, TX 79917

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Governor Sinclair:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory.

On June 2, 2004, Mr. Samuel Hernandez of the NRC staff contacted Ms. Silvia Garcia (Secretary), to discuss the requested information. This is a follow-up letter confirming the information provided in the telephone conversation. Ms. Garcia informed Mr. Hernandez that there are no properties of cultural and traditional significance to the Ysleta del Sur Pueblo within the APE. If your understanding of the telephone conference between Mr. Hernandez and Ms. Garcia differs from the above, please notify us as soon as possible.

The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (hereafter Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects. In the telephone conversation, Ms. Garcia informed Mr. Hernandez that the Ysleta del Sur Pueblo would like to be a concurring party to the Agreement.

Once the Agreement and the Treatment Plan have been finalized, they will be forwarded for your review and comment. If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

Scott C. Flanders
Deputy Director for the Environmental and
Performance Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103

cc: Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 24, 2004

Mr. Alan Stanfill
Senior Program Analyst
Advisory Council on Historic Preservation
12136 West Bayaud Avenue, Suite 330
Lakewood, CO 80228

SUBJECT: NOTIFICATION OF INTENT TO PREPARE A MEMORANDUM OF AGREEMENT FOR THE LOUISIANA ENERGY SERVICES PROPOSED NATIONAL ENRICHMENT FACILITY

Dear Mr. Stanfill:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico. The proposed enrichment facility covers an area of approximately 543 acres. Construction activities, including permanent plant structures, temporary construction facilities, contractor parking and lay-down areas, would disturb 200 acres.

In September 2003, LES performed a cultural resource inventory of the proposed site. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the proposed site area including the permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. In addition, the undertaking is located on the land currently owned by the State of New Mexico. However, in a land exchange process, this land would be deeded to LES. This land exchange process would be considered an adverse effect to these seven sites. A copy of the cultural resources report documenting the cultural resource inventory is enclosed.

In accordance with NRC regulations at 10 CFR Part 51 and the National Environmental Policy Act, the NRC staff is preparing an Environmental Impact Statement (EIS) on the proposed facility which will assess the potential impacts of the proposed facility on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Indian tribes. The NRC staff will develop a Memorandum of Agreement (Agreement) with the New Mexico State Historic Preservation Officer, the New Mexico State Land Office and LES to ensure that the proposed action is undertaken in accordance with the requirements of Section 106 of the National Historic Preservation Act.

Pursuant to the requirements of 36 CFR 800, the NRC staff is notifying the Advisory Council on Historic Preservation (Council) of its intent to prepare the Agreement. The NRC staff recognizes that criteria exist for the Council's involvement in reviewing individual Section 106 cases. As described in Appendix A to 36 CFR 800, one of these criteria is whether the undertaking has the potential for presenting procedural problems. As discussed in the telephone conference calls on June 9, 2004 and June 22, 2004, the Agreement will address the land exchange process and its impacts on cultural resources.

Also, the NRC staff has offered Indian tribes that may be concerned with the possible effects of the proposed action on historic properties, an opportunity to participate in the Section 106 consultation process. As specified in 36 CFR 800.6, a copy of the executed Agreement will be submitted to the Council.

If you have any questions or comments, please contact Melanie Wong at (301) 415-6262.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment
Directorate
Division of Waste Management
and Environmental Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103
Enclosure: Cultural Resources Inventory
for the National Enrichment Facility (ML040930424)

cc: Service List (w/o enclosure)

MESCALERO APACHE TRIBAL HISTORIC PRESERVATION OFFICE
P.O. Box 227
Mescalero, New Mexico 88340
Phone: 505/464-4711
Fax: 505/464-4637

June 10, 2004

Mr. Scott C. Flanders
United States
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

RE: Cultural Resources Inventory Report for Louisiana Energy Services proposed Gas Centrifuge Uranium Enrichment Facility in Lea County, New Mexico

Dear Mr. Flanders:

(X) The *Mescalero Apache Tribe* has determined that the proposed Gas Centrifuge Uranium Enrichment Facility in Lea County, New Mexico **WILL NOT AFFECT** any objects sites, or locations important to our traditional culture or religion.

() The *Mescalero Apache Tribe* has determined that the proposed __________ project by ____________ **WILL AFFECT** objects, sites, or locations important to our traditional culture or religion. We request that the ____________ undertake further consultations to evaluate the effects of the project on the sites.

Thank you for providing the Mescalero Apache Tribe the opportunity to comment on this project. We look forward to reviewing and commenting on U.S. Nuclear Regulatory Commission projects.

CONCUR:

For Holly Houghten
Tribal Historic Preservation Officer

COMMENTS:____

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2004

Alonso Chalepah, Chairman
Apache Tribe of Oklahoma
PO Box 1220
Anadarko, OK 73005

SUBJECT: CULTURAL RESOURCES INVENTORY REPORT FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Chairman Chalepah:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

As described in our letter dated February 17, 2004, which requested information for the Section 106 process of the National Historic Preservation Act, LES performed a cultural resource survey of the proposed National Enrichment Facility (NEF) site in September 2003. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. A copy of the cultural resources report documenting the cultural resource inventory is enclosed. Site location information contained in the report may not be released to the general public under federal law, and it is essential that this information be protected.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe have been identified. The NRC staff is interested in knowing if you have specific knowledge of any properties within the APE that you believe have traditional religious and cultural significance. In addition, we are interested in knowing if you are aware of or are concerned for any site, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure appropriate consideration in the Section 106 process.

If you have any questions or comments regarding this request, please contact Matthew Blevins of my staff at (301) 415-7684.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment Directorate
Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Inventory for the National Enrichment Facility

cc w/o enclosure: Ms. Jan Biella
Service List

UNITED STATES

NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

April 27, 2004

Jimmy Arteberry, Director of Environment
Comanche of Oklahoma
PO Box 908
Lawton, OK 73502

SUBJECT: CULTURAL RESOURCES INVENTORY REPORT FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Mr. Arteberry:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

As described in our letter dated February 17, 2004, which requested information for the Section 106 process of the National Historic Preservation Act, LES performed a cultural resource survey of the proposed National Enrichment Facility (NEF) site in September 2003. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. A copy of the cultural resources report documenting the cultural resource inventory is enclosed. Site location information contained in the report may not be released to the general public under federal law, and it is essential that this information be protected.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe have been identified. The NRC staff is interested in knowing if you have specific knowledge of any properties within the APE that you believe have traditional religious and cultural significance. In addition, we are interested in knowing if you are aware of or are concerned for any site, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure appropriate consideration in the Section 106 process.

If you have any questions or comments regarding this request, please contact Matthew Blevins of my staff at (301) 415-7684.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment Directorate
Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Inventory for the National Enrichment Facility

cc w/o enclosure: Ms. Jan Biella
Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2004

Arturo Sinclair, Governor
Ysleta del Sur Pueblo
P.O. Box 17579 - Ysleta Station
El Paso, TX 79917

SUBJECT: CULTURAL RESOURCES INVENTORY REPORT FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Governor Sinclair:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

As described in our letter dated February 17, 2004, which requested information for the Section 106 process of the National Historic Preservation Act, LES performed a cultural resource survey of the proposed National Enrichment Facility (NEF) site in September 2003. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. A copy of the cultural resources report documenting the cultural resource inventory is enclosed. Site location information contained in the report may not be released to the general public under federal law, and it is essential that this information be protected.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe have been identified. The NRC staff is interested in knowing if you have specific knowledge of any properties within the APE that you believe have traditional religious and cultural significance. In addition, we are interested in knowing if you are aware of or are concerned for any site, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure appropriate consideration in the Section 106 process.

If you have any questions or comments regarding this request, please contact Matthew Blevins of my staff at (301) 415-7684.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment Directorate
Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Inventory for the National Enrichment Facility

cc w/o enclosure: Ms. Jan Biella
Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2004

Clifford A. McKenzie, Chairman
Kiowa Tribe of Oklahoma
PO Box 369
Carnegie, OK 73015

SUBJECT: CULTURAL RESOURCES INVENTORY REPORT FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Chairman McKenzie:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

As described in our letter dated February 17, 2004, which requested information for the Section 106 process of the National Historic Preservation Act, LES performed a cultural resource survey of the proposed National Enrichment Facility (NEF) site in September 2003. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. A *copy of the cultural resources report documenting the cultural resource inventory is enclosed.* Site location information contained in the report may not be released to the general public under federal law, and it is essential that this information be protected.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe have been identified. The NRC staff is interested in knowing if you have specific knowledge of any properties within the APE that you believe have traditional religious and cultural significance. In addition, we are interested in knowing if you are aware of or are concerned for any site, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure appropriate consideration in the Section 106 process.

If you have any questions or comments regarding this request, please contact Matthew Blevins of my staff at (301) 415-7684.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment Directorate
Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Inventory for the National Enrichment Facility

cc w/o enclosure: Ms. Jan Biella
Service List

STATE OF NEW MEXICO
DEPARTMENT OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

228 EAST PALACE AVENUE
SANTA FE, NEW MEXICO 87501
(505) 827-6320

BILL RICHARDSON
Governor

April 26, 2004

Matthew Blevins
Project Manager
Environmental and Low-Level Waste Section
U.S. Nuclear Regulatory Commission
Mail Stop T7J8
Washington D.C. 20555

Re: National Enrichment Facility Near Eunice, Lea County, New Mexico

Dear Mr. Blevins:

I am writing to follow-up the meeting held between our office, you, Melanie Wong and Paul Nickens, and David Eck from the NM State Land Office in Albuquerque on April 7, 2004. At our meeting we discussed the process for consultation under Section 106 of the National Historic Preservation Act and the archaeological survey report submitted by WCRM for archaeological survey of the National Enrichment Facility near Eunice, New Mexico.

WCRM discovered and recorded seven prehistoric archaeological sites within the project area and recommended that four of the sites (LA 140704, LA 140705, LA 140706, and LA 140707) are eligible for listing to the National Register of Historic Places. WCRM recommended that three sites (LA 140701, LA 140702, and LA 140703) are not eligible for listing to the Register. We do not concur with these recommendations of eligibility. In our opinion, all seven sites are similar site types and may contain buried cultural resources; therefore, archaeological sites LA 140701, LA 140702, and LA 140703 are of undetermined eligibility to be listed to the Register.

It appears from the site location map (Figure 4) of the survey report that three of the archeological sites (LA 140702, LA 140701, and LA 140705) are within the proposed construction footprint for the enrichment facility. Since these sites will be impacted by construction we have determined that the National Enrichment Facility will have an adverse effect on cultural resources.

In order to resolve adverse effects to cultural resources we suggest that our office and the NRC enter into a Memorandum of Agreement (MOA) that outlines agreed-upon measures that NRC will take to mitigate the adverse effects. An example of an MOA is enclosed for your reference.

NRC will need to notify the Advisory Council on Historic Preservation (ACHP) that there will be adverse effects to cultural resources and invite them to be a signatory to the MOA. The ACHP may decline to participate. The NRC must also re-contact Native American tribes, forward copies of the archaeological survey report for their review, and ask if they wish to be concurring parties to the MOA.

It is our understanding that the current land status is the NM State Land Office and that they have entered into a long-term lease agreement with Louisiana Energy Services for the project area, but that the land may be traded after the license from NRC is obtained. This trade will need to be discussed in the MOA and the Commissioner of Public Lands will also be a signatory to the MOA. An exchange from state land to private is considered an adverse effect, thus all seven sites, not just the three within the project area will have to be considered for mitigation.

As we discussed during our meeting, there are several options for mitigating the adverse effects to the archaeological sites. One option is to treat all seven sites as eligible for listing to the Register and considering them as a population of sites. A data recovery plan will be designed to treat all seven sites as a population, meaning that each site will not need full data recovery. This alternative may be the least costly since it eliminates the need for testing to determine eligibility.

A second option would be for Louisiana Energy Services to avoid and protect the sites outside of the project (LA 140703, LA 140704, LA 140706, and LA 140707) by nominating them for listing to the State Register of Cultural Properties. Enclosed are copies of the New Mexico Cultural Properties Act and Cultural Properties Protection Act. In these statutes you will find information concerning the responsibilities of state agencies (in this case the State Land Office) and the State Register of Cultural Properties.

Sincerely,

Michelle M. Ensey
Staff Archaeologist

Log: 70747
Enc. Sample MOA, Cultural Properties Act, Cultural Properties Protection Act
Cc: R.M. Krich, Vice President, licensing, Safety, and Nuclear Engineering, Louisiana Energy Services, One Sun Plaza, 100 Sun Lane NE, Suite 204, Albuquerque, NM 87109
Tim Leftwich, Principal, GL Environmental, Inc., 4200 Meadowlark Lane, Suite 1A. Rio Rancho, NM 87124
David C. Eck, Cultural Resource Specialist, NM State Land Office.
Thomas J. Lennon, Principal Investigator, WCRM, 2603 West Main St., Suite B, Farmington, NM 87401

MEMORANDUM OF AGREEMENT

AMONG

THE FEDERAL HIGHWAY ADMINISTRATION,
THE NEW MEXICO STATE HIGHWAY AND TRANSPORTATION DEPARTMENT,
AND
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICE,

REGARDING

DATA RECOVERY AT LA 740 AND LA 750 ALONG US 84/285, SANTA FE COUNTY, NEW MEXICO

WHEREAS, the Federal Highway Administration (FHWA), in cooperation with the New Mexico State Highway and Transportation Department (NMSHTD) proposes to construct an interchange and associated local access road near Cuyamungue on US 84/285 between Santa Fe and Pojoaque, on highway right of way acquired from private sources, (NMSHTD project AC-HPP-MIP-084-6(59)177, CN 2155); and

WHEREAS, the FHWA, acting as lead agency, has determined that the Project adversely affects LA 740 and LA 750, archaeological sites eligible for inclusion in the National Register of Historic Places under criterion "d", and has consulted with the Advisory Council on Historic Preservation (Council) and the New Mexico State Preservation Officer (SHPO), pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act; and has determined that data recovery is the most appropriate form of treatment to mitigate adverse effects of the Project on this site; and

WHEREAS, the Advisory Council has declined to be a signatory to this Agreement; and

WHEREAS, the Data Recovery Plan, provided in Appendix A, has been developed and prepared in a manner consistent with the *Secretary of the Interior's Standards and Guidelines for Archaeological Documentation* (48 FR 44734-37) and the Council's handbook, *Treatment of Archaeological Properties;*

NOW THEREFORE, the FHWA, NMSHTD, and the SHPO agree that the project shall be administered in accordance with the following stipulations in order to take into account the effect of the Project on historic properties and to satisfy responsibilities under Section 106 for the Project.

STIPULATIONS

I. To the extent of its legal authority and in coordination with the SHPO, the FHWA and the NMSHTD will ensure that the measures and procedures specified in the data recovery plan by the consultant are implemented; this Agreement addresses all aspects of the data recovery plan developed by the consultant.

II. The consultant will prepare a final report discussing the findings resulting from the data recovery efforts. The report will be reviewed by the NMSHTD and the SHPO and any necessary revisions will be completed by the consultant. The NMSHTD will have 30 days for review; following this time period the SHPO will have 30 days to review the report.

III. Data recovery on state lands (highway right of way acquired from private sources) will be done by a cultural resource consultant via a permit issued by the Cultural Properties Review Committee (CPRC).

IV. DISCOVERY SITUATIONS

A. In the event that unrecorded or unanticipated properties that may be eligible for inclusion on the National Register are located during data recovery, or it is recognized that such actions may effect a known historic property in an unanticipated manner, the FHWA/NMSHTD will terminate data recovery in the vicinity of the property and will take all reasonable measures to avoid or minimize harm to the property until consultation with the SHPO regarding significance and effect can be concluded. The FHWA/NMSHTD will notify the SHPO at the earliest possible time and consult to develop actions that will take the effects of the undertaking into account. The FHWA/NMSHTD will notify the SHPO of any time constraints, and the FHWA/NMSHTD and the SHPO will mutually agree upon time frames for the consultation. These procedures will be addressed in the Monitoring and Discovery Plan included as part of the data recovery plan.

V. TREATMENT OF HUMAN REMAINS

B. Since the site is on state lands, the treatment and disposition for any burial or "human remains and associated funerary object, material objects or artifacts" will be in accordance with Section 18-6-11.2 of the State's Cultural Properties Act and 4 NMAC 10.11 regulations, including consultation through HPD and the Office of Indian Affairs with the appropriate Indian tribes. All of these sensitive objects will be treated with dignity and respect and consideration for the specific cultural and religious traditions applicable until their analysis is complete and their disposition has occurred. The limited analysis of human remains and associated funeral objects will be non-destructive unless otherwise agreed to by the culturally affiliated tribe(s).

VI. CURATION

A. The FHWA/NMSHTD shall ensure that the consultant provides for all records and materials resulting from data recovery efforts to be curated in accordance with standards and guidelines generated by 36 CFR Part 79. Artifacts will be curated at the Museum of New Mexico/MIAC.

VII. DISPUTE RESOLUTION

A. Should any Signatory to this Agreement object within 30 calendar days to any action(s) provided for review pursuant to this Agreement, the FHWA/NMSHTD shall consult with the objecting party to resolve the objection. The objection must be specifically identified, and the reasons for objection documented. If the FHWA/NMSHTD determines that the objection cannot be resolved, the FHWA/NMSHTD shall forward all documentation relevant to the dispute to the Council, pursuant to 36 CFR 800.7(b), and notify SHPO as to the nature of the dispute. Within 45 calendar days of receipt of all pertinent documentation, the Council shall provide the FHWA/NMSHTD with recommendations in accordance with 36 CFR 800.7(C)(2)

B. Any Council comment provided in response to such a request will be taken into account by the FHWA/NMSHTD in accordance with 36 CFR 800.7(b)(4) with reference to the subject of the dispute. Any recommendation or comment provided by the Council will be understood to pertain only to the subject of the dispute; the FHWA/NMSHTD and the consultant responsibilities to carry out all actions under this Agreement that are not the subject of the dispute will remain unchanged.

VIII. OBJECTIONS

A. At any time during the implementation of the measures stipulated in this Agreement, should an objection be raised by a consulting party or a member of the public, the FHWA/NMSHTD shall take the objection into account, notify the SHPO of the objection, and consult as needed with the objecting party to resolve the objection. If the FHWA determines that the objection cannot be resolved, the FHWA shall forward all documentation relevant to the dispute to the Council and request that the Council comment.

B. After receipt of the pertinent documentation, the Council shall either:

1. Provide the FHWA with recommendations to take into account in reaching a final decision regarding the dispute; or
2. Notify the FHWA that the Council will comment in accordance with 36 CFR Section 800.6(b)(2) and proceed to comment.[1]

C. Any Council comment provided in response to such a request shall be taken into account by the FHWA in accordance with 36 CFR Section 800.6(c)(2) with reference only to the subject of the dispute. The FHWA responsibility to carry out all other actions and activities under this MOA that are not the subject of the dispute remain unchanged.

IX. DURATION OF AGREEMENT/TERMINATION

A. Should the proposed project be approved by the FHWA/NMSHTD and the SHPO, this MOA shall remain in effect until all construction associated with the interchange has been completed, and when all requirements of the treatment and data recovery plans and stipulations of the MOA have been met. If implementation is delayed for more than two years after the date of execution of this MOA, the FHWA/NMSHTD shall review this MOA to determine whether revisions are needed. If revisions are needed, the FHWA/NMSHTD will consult in accordance with 36 CFR Part 800 to make such revisions.

D. Any signatory to this agreement may terminate it by providing 30 days notice to the other parties, providing that the parties will consult during the period prior to the termination to seek agreements or amendments or other actions that would avoid termination. In the event of termination, the FHWA/NMSHTD will comply with 36 CFR 800.3 through 800.6.

X. AMENDMENT

A) Any Signatory to this Agreement pursuant to 36 CFR 800.6(c)(1) may request that it be amended, whereupon the Signatories will consult in accordance with 36 CFR Part 800.6(c)(7) to consider such amendment.

XI. FAILURE TO CARRY OUT THE TERMS OF THE AGREEMENT

In the event that the terms of this Agreement are not completed, the FHWA/NMSHTD shall comply with 36 CFR 800.3 through 800.6 with regard to individual actions covered by this Agreement.

XII. SCOPE OF AGREEMENT

A. This Agreement is limited in scope to the construction of the Cuyamungue interchange and the associated local access road adjacent to US 84/285, CN 2155, and is entered into solely for that purpose, should the proposed project be approved by the FHWA/NMSHTD.

B. Execution of this MOA, its subsequent filing with the Council, and implementation of its terms, evidences that the FHWA/NMSHTD has afforded the Council an opportunity to comment on the US 84/285 Cuyamungue interchange project (CN 2155) and its effects on historic properties, and has, therefore, taken into account the effects of the project, if it is approved, on historic properties and has satisfied its Section 106 responsibilities for all individual actions of this undertaking.

Memorandum of Agreement: Signatories

DATA RECOVERY PLAN FOR PORTIONS OF LA 391 ALONG U.S. 84/285, SANTA FE COUNTY, NEW MEXICO

Federal Highway Administration

By: ______________________________ Date: ______________________
J. Don Martinez
Division Administrator

New Mexico State Historic Preservation Officer

By: ______________________________ Date: ______________________
Katherine Slick
State Historic Preservation Officer

New Mexico State Highway and Transportation Department

By: ______________________________ Date: ______________________
R. Blake Roxlau
Cultural Resources Coordinator

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 29, 2004

Ms. Jan Biella
Deputy SHPO
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87503

SUBJECT: CULTURAL RESOURCE INVENTORY FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Ms. Biella:

As discussed in our February 17, 2004, letter, Louisiana Energy Services has submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct, operate, and decommission a proposed gas centrifuge uranium enrichment facility at a site in Lea County, New Mexico. The NRC staff is in the initial stages of developing an Environmental Impact Statement for the proposed facility and is in the early stages of soliciting information from potential consulting parties.

Enclosed for your review is a cultural resource survey performed in September 2003 for the proposed site. Seven prehistoric archeological sites were identified, with four of the sites potentially eligible for listing on the National Register of Historical Places. One of these potentially eligible sites is considered within the area of potential effects (APE). The APE is considered the National Enrichment Facility site area, including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. The NRC staff, in consultation with your office and any identified consulting parties, will provide a determination of eligibility after the Cultural Resources Report is reviewed.

If you have any questions or comments, or need any additional information, please contact Matthew Blevins of my staff at 301-415-7684.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment Directorate
Division of Waste Management
and Environmental Protection
Office of Nuclear Material Safety
and Safeguards

Enclosure: Cultural Resources Inventory for the National Enrichment Facility

Docket No.: 70-3103

cc: Alonso Chalepah, Chairman (w/o enclosure)
Clifford McKenizie, Chairman (w/o enclosure)
Arturo Sinclair, Governor (w/o enclosure)
Jimmy Arterberry, Director of Environment (w/o enclosure)
Holly B. E. Houghten, Tribal Historic Preservation Officer (w/o enclosure)
Service List w/o enclosure (w/o enclosure)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

March 26, 2004

Cons. # 2-22-04-I-349

Lawrence E. Kokajko, Chief
Environmental and Performance Assessment Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Kokajko:

Thank you for your March 2, 2004, letter requesting information on threatened or endangered species or important wildlife habitats that could be affected by a proposed project to construct, operate, and decommission a gas centrifuge uranium enrichment facility near Eunice, Lea County, New Mexico. The proposed facility and construction would disturb 543 acres of land located within the Louisiana Energy Services National Enrichment Facility site.

We have enclosed a current list of federally endangered, threatened, proposed, and candidate species, and species of concern that may be found in Lea County, New Mexico.[1] Under the Endangered Species Act, as amended (Act), it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with us further. If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts. Please keep in mind that the scope of federally listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects.

Candidates and species of concern have no legal protection under the Act and are included in this document for planning purposes only. We monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys.

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[1] Additional information about these species is available on the Internet at <http://nmrareplants.unm.edu>, <http://nmnhp.unm.edu/bisonm/bisonquery.php>, and <http://ifw2es.fws.gov/endangeredspecies>.

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could impact floodplains or wetlands. These habitats should be conserved through avoidance, or mitigated to ensure no net loss of wetlands function and value.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service (Service). To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

The primary concern of the Service is the protection of the Nation's fish and wildlife resources including threatened and endangered species, migratory birds, and their habitats. Under its responsibilities in the Migratory Bird Treaty Act, the Service would be concerned if an open, hazardous waste impoundment attracted migratory birds or other wildlife to their detriment. During flight, migratory birds (as well as bats) would not necessarily distinguish between an impoundment and a natural waterbody and could be attracted to drink, rest, and perhaps feed on the insects that are invariably associated with impounded wastewater. The facility lighting could attract them as well. Therefore, the Service supports that any open hazardous waste lagoon, pond, or container be constructed with appropriate exclusion technology (*e.g.*, netting, fences, enclosed tanks, *etc.*) to prevent migratory bird access, and that any exclusion technologies are regularly maintained. To minimize the likelihood of adverse impacts to nesting migratory birds during facility construction, we recommend that construction activities occur outside the general migratory bird-nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

We suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding fish, wildlife, and plants of State concern.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. In future correspondence regarding this project, please refer to consultation # 2-22-04-I-349. If you have any questions about the information in this letter, please contact Dennis Coleman at the letterhead address or at (505) 346-2525, ext. 4716.

Sincerely,

Susan MacMullin

Susan MacMullin
Field Supervisor

Enclosure

cc: (w/o enc)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

Revised: September 2003

FEDERAL ENDANGERED, THREATENED,
PROPOSED, AND CANDIDATE SPECIES
AND SPECIES OF CONCERN IN NEW MEXICO
Consultation Number 2-22-04-I-349
March 25, 2004

Lea County

ENDANGERED
- Black-footed ferret (*Mustela nigripes*)**
- Northern aplomado falcon (*Falco femoralis septentrionalis*)

THREATENED
- Bald eagle (*Haliaeetus leucocephalus*)

CANDIDATE
- Black-tailed prairie dog (*Cynomys ludovicianus*)
- Lesser prairie chicken (*Tympanuchus pallidicinctus*)
- Sand dune lizard (*Sceloporus arenicolus*)

SPECIES OF CONCERN
- Swift fox (*Vulpes velox*)
- American peregrine falcon (*Falco peregrinus anatum*)
- Arctic peregrine falcon (*Falco peregrinus tundrius*)
- Baird's sparrow (*Ammodramus bairdii*)
- Bell's vireo (*Vireo bellii*)
- Western burrowing owl (*Athene cunicularia hypugea*)
- Yellow-billed cuckoo (*Coccyzus americanus*)

Index

Endangered	=	Any species which is in danger of extinction throughout all or a significant portion of its range.
Threatened	=	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Candidate	=	Candidate Species (taxa for which the Service has sufficient information to propose that they be added to list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities).
Proposed	=	Any species of fish, wildlife or plant that is proposed in the Federal Register to be listed under section 4 of the Act.
Species of Concern	=	Taxa for which further biological research and field study are needed to resolve their conservation status <u>OR</u> are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies. Species of Concern are included for planning purposes only.
**	=	Survey should be conducted if project involves impacts to prairie dog towns or complexes of 200-acres or more for the Gunnison's prairie dog (*Cynomys gunnisoni*) and/or 80-acres or more for any subspecies of Black-tailed prairie dog (*Cynomys ludovicianus*). A complex consists of two or more neighboring prairie dog towns within 4.3 miles (7 kilometers) of each other.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 18, 2004

Mr. Lewis Robertson
Lea County Archaeological Society
1980 NE 1001
Andrews, TX 79714-9154

SUBJECT: INITIATION OF THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Mr. Robertson:

The U.S. Nuclear Regulatory Commission (NRC) has recently received an application from Louisiana Energy Services (LES) to construct, operate, and decommission the National Enrichment Facility (NEF), a gas centrifuge uranium enrichment facility. The proposed NEF would be located near Eunice, New Mexico, in Lea County and would be within a 543 acre parcel of land that LES is in the process of acquiring from the State of New Mexico. The NRC is in the initial stages of developing an Environmental Impact Statement (EIS) which will document the impacts associated with the NEF. We would like your assistance in our review of the cultural resources impacts.

In September 2003, LES performed a survey of the proposed NEF site. Seven prehistoric archeological sites were identified with several of these sites occurring in the area of potential effects (APE). One site that may be affected is potentially eligible for listing on the National Register of Historical Places. The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. Attached is information LES provided in its Environmental Report relative to cultural resources. We are currently reviewing this information. LES has indicated that it intends to submit the complete Cultural Resources Survey Report of all survey findings.

The NRC staff is soliciting information from a number of stakeholders as the NRC begins its Section 106 consultation with the New Mexico State Historical Preservation Office, as required by the National Historic Preservation Act. We request that you provide any information that you may have relative to this proposed action or the Section 106 consultation. Please contact Matthew Blevins of my staff at (301) 415-7684 if you have any questions.

Sincerely,

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

Attachment: Cultural Resources Information for LES National Enrichment Facility, Environmental Report, December 12, 2003 (ML040500429)

cc: Ms. Jan Biella (without Enclosure)
Deputy SHPO
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87503

Service List (without Enclosure)

United States Department of the Interior

Bureau of Land Management
Carlsbad Field Office
620 E. Greene Street
Carlsbad, NM 88220
www.nm.blm.gov

IN REPLY REFER TO:
1790

MAR 16 2004

Ms. Melanie Wong
Chief, Rules and Directives Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Ms Wong:

The ~~U.S. Bureau of Land Management (BLM),~~ Carlsbad Field Office appreciates the opportunity to provide technical assistance and participate in the scoping process for the proposed Gas Centrifuge Uranium Enrichment Facility as published in the Federal Register (Vol. 69, No. 23 – Wednesday, February 4, 2004). The BLM understands that the following locations are being considered by Louisiana Energy Services for location of the proposed facility:

1) Section 32, T21S, R38E – preferred by LES;
2) Section 24, T21S, R27E; and
3) Section 8, T22S, R31E.

Following are issues regarding the preferred location and identified alternative locations:

1) While the BLM does not manage any of the resources in section 32 the BLM does manage much of the subsurface minerals in adjacent sections and would be interested in how the proposed facility would affect management of those minerals.
2) The BLM manages both the surface and subsurface resources in the W½, SW¼, Section 24 and therefore would have a strong interest in proposed facilities or management actions affecting that parcel of land as well as nearby federal land and mineral resources.
3) The BLM manages both the surface and subsurface resources in Section 8 and therefore would have a strong interest in proposed facilities or management actions affecting that parcel of land and adjacent federal land and mineral resources.

If the locations identified as alternatives (see #s 2 & 3 above) are carried forward through the National Environmental Policy Act (NEPA) analysis, the BLM is requesting formal cooperating agency status, according to the Council on Environmental Quality (CEQ) regulations for implementing NEPA. Please contact our office to establish the appropriate agreement documentation. However, if only the preferred alternative is analyzed, then the BLM role will be as an interested party and requests that the agency and Carlsbad Office, specifically, be kept informed through the process and provided NEPA documents to review as they are produced.

Please keep the Carlsbad Field Office (CFO) of the Bureau of Land Management (BLM) involved in the evaluation of this proposed action. The CFO-BLM contact for this project will be Peg Sorensen at 505-234-5983 or peg_sorensen@blm.gov. Again, thank you for the opportunity to provide comments.

Sincerely,

Maria E. Keton

Leslie Theiss
Carlsbad Field Manager

United States Department of the Interior
NATIONAL PARK SERVICE
INTERMOUNTAIN REGION
Intermountain Support Office
12795 West Alameda Parkway
PO Box 25287
Denver, Colorado 80225-0287

March 9, 2004

U.S. Nuclear Regulatory Commission
Washington DC, 20555-0001
Rules and Directives Branch
Mail Stop T6-D59, Attn: Chief

Subject: Comments on the Notice of Intent to Prepare an Environmental Impact Statement for Louisiana Energy Services Gas Centrifuge Uranium Enrichment Facility

To Whom It May Concern:

The National Park Service has reviewed the subject Notice of Intent based on the assumption that the project is near the city of Eunice in Lea County, New Mexico. We have reviewed this project in relation to any possible conflicts with the Land and Water Conservation Fund (L&WCF) and the Urban Park and Recreation Recovery programs, and find that the following L&WCF projects may be adversely affected:

35-00035, Eunice Municipal Park
35-00177, Eunice Municipal Recreation Park
35-00215, Eunice Municipal Golf Course
35-00358, Eunice Neighborhood Park
35-00527, Eunice Tennis Court Renovation
35-00770, Marshall Memorial Park
35-00970, Marshall Park Sprinklers
35-00987, Marshall Park Improvements
35-00989, Stevens Park Improvements
35-01096, Marshall Park Trail

We recommend you consult directly with the official who administers the L&WCF program in the State of New Mexico to determine any potential conflicts with Section 6(f)(3) of the L&WCF Act (Public Law 88-578, as amended). This section states: "No property acquired or developed with assistance under this section shall, without the approval of the Secretary [of the Interior], be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location."

The administrator for the L&WCF program in New Mexico is Ms. Sandra Massengill, Planner Director, Department Energy, Minerals & Natural Resources, 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505-4000. Ms. Massengill's phone number is: (505) 476-3392.

Thank you again for the opportunity to comment on this project. If you have any questions, please contact Jane Beu, Outdoor Recreation Planner, in our Midwest Regional Office at (402) 221-7270.

Sincerely,

Cheryl Eckhardt
NEPA/106 Specialist

TAKE PRIDE IN AMERICA

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 2, 2004

Ms. Joy Nicholopoulos
U.S. Fish and Wildlife Service
New Mexico Field Office
2105 Osuna Road NE
Albuquerque, NM 87113-1001

SUBJECT: REQUEST FOR INFORMATION REGARDING ENDANGERED SPECIES AND CRITICAL HABITATS FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NM

Dear Ms. Nicholopoulos:

Louisiana Energy Services (LES) has submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct, operate, and decommission a proposed gas centrifuge uranium enrichment facility. The NRC is in the initial stages of developing an Environmental Impact Statement (EIS) for the proposed facility to be located near Eunice, New Mexico, in Lea County. The proposed facility, as well as all associated construction, operation, and decommissioning activities and impacts, will be within the 220-ha (543 acre) LES National Enrichment Facility (NEF) site.

We are requesting a list of threatened or endangered species or critical habitats within the action area. The action area is defined as the NEF site which is located in Section 32 of Township 21 South, Range 38 East (New Mexico Meridian). The approximate center is at Latitude 32 degrees, 26 minutes, 1.74 seconds North and Longitude 103 degrees, 4 minutes, 43.47 seconds West. The action area is approximately 5 miles East of Eunice, New Mexico and is bordered on the South by New Mexico Highway 234.

After assessing the information provided by you, the NRC will determine what additional actions are necessary to comply with Section 7 of the Endangered Species Act. If you have any questions or comments, or need any additional information, please contact Matthew Blevins of my staff at 301-415-7684.

Sincerely,

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

After assessing the information provided by you, the NRC will determine what additional actions are necessary to comply with Section 7 of the Endangered Species Act. If you have any questions or comments, or need any additional information, please contact Matthew Blevins of my staff at 301-415-7684.

Sincerely,

/RA/

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

GOVERNOR
Bill Richardson

DIRECTOR AND SECRETARY
TO THE COMMISSION
Bruce C. Thompson

STATE OF NEW MEXICO
DEPARTMENT OF GAME & FISH

One Wildlife Way
PO Box 25112
Santa Fe, NM 87504

Visit our website at www.wildlife.state.nm.us
For basic information or to order free publications: 1-800-862-9310.

February 23, 2004

Chief, Rules and Directives Branch
Mail Stop T6-D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Docket No. 70-3103
NMGF Project No. 9200

Dear Nuclear Regulatory Commission:

The New Mexico Department of Game and Fish (Department) has received the Notice of Intent to prepare an Environmental Impact Statement (EIS) for the proposed Louisiana Energy Services (LES) gas centrifuge uranium enrichment facility, known as the National Enrichment Facility (NEF). We have reviewed the Environmental Report (ER) submitted by LES with their license application, as it pertains to wildlife resources, and offer our comments below. We also enclose for your information a copy of our September 30, 2003, scoping letter to LES contractor Framatome ANP.

The Department is concerned about the adequacy of the assessment in the ER of potential impacts to the NM State Threatened sand dune lizard (*Scleroporus arenicolus*). Section 3.5.3 states that although "(t)he NEF site contains areas of sand dunes", "(a) survey of the NEF site did not identify any sand dune lizard habitats". Section 3.5.5 characterizes the site vegetation as dense shrubs, mostly shinnery oak (*Quercus havardi*), yet Section 3.5.6 concludes the habitat is unsuitable due to "low frequency of shinnery oak dunes and large blowouts". Section 3.5.8 asserts that "the site does contain sand dune – oak shinnery communities, that could be potential sand dune lizard habitat". Finally Section 4.5.7 refers to the site having "the potential to provide habitat for the sand dune lizard" but "various factors make it unsuitable". This accumulation of seemingly contradictory statements leaves it unclear whether there is in fact suitable habitat for the species or not.

The ER also refers to a survey for sand dune lizards that took place in October 2003 and did not find any. No information is given as to the participants or methods of the survey. If there is in fact suitable habitat, the Department requests information as to the qualifications of the individual(s) conducting the survey. Sand dune lizards are extremely difficult to identify and there are only a very few people qualified to conduct a presence/absence survey. October is rather late in the year for a survey; the lizards are likely to be dormant at that time.

The Department is likewise concerned about the adequacy of assessment in the ER of potential impacts on the lesser prairie chicken (*Tympanuchus pallidicintus*), a federal Species of Concern. The document identifies the site as suitable habitat, states that the nearest known lek (breeding area) is 4 miles distant, and refers to a survey conducted in September 2003, that did not find any lesser prairie chickens. According to our prairie chicken biologist, the area around the project has not been adequately surveyed for lek sites. Surveys should be conducted in the spring (typically early to mid April, before sunrise). Lesser prairie chickens will use an area within two miles of the lek for nesting and rearing. Birds have been reported from the Eunice area. Since there is a large acreage of contiguous habitat, and a lek within four miles, it is reasonable to assume these birds may be impacted by the development.

The National Environmental Policy Act (NEPA) analysis should include assessment of cumulative regional impacts on both of these sensitive species. Other impacts include grazing and oil and gas development.

Although not directly a wildlife habitat issue, the Department would like to express our concern regarding the lack of a final disposal alternative for the depleted uranium tails. The ER presents several plausible options, however each of them faces significant problems and would require many years of feasibility analysis and development. The safeguards and procedures for short- to medium-term storage of the materials seem adequate to prevent health or environmental hazards, however the lack of a viable solution for disposal may lead to environmental exposure of radioactive materials in the long term.

LES proposes a number of favorable mitigations, including the use of native plant species for revegetation, downshielding site illumination to reduce impact on bird behavior, various habitat improvements and following the Department's recommendations regarding pipeline trenching and exclusion of migratory birds from the evaporative ponds. These mitigations should be incorporated into the license approval, if granted. The Department remains available for further consultation on development of possible mitigations.

Thank you for the opportunity to participate in the preparation of NEPA analysis and documentation for this project. If you have any questions, please contact Rachel Jankowitz at 505-476-8159 or rjankowitz@state.nm.us.

Sincerely,

Lisa Kirkpatrick

Lisa Kirkpatrick, Chief
Conservation Services Division

LK/rjj

cc: Joy Nicholopoulos, Ecological Services Field Supervisor, USFWS
Roy Hayes, SE Area Operations Chief, NMGF
Alexa Sandoval, SE Area Habitat Specialist, NMGF
Rachel Jankowitz, Habitat Specialist, NMGF

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 17, 2004

Ms. Jan Biella
Deputy SHPO
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87503

SUBJECT: INITIATION OF THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 PROCESS FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY

Dear Ms. Biella:

Louisiana Energy Services (LES) has submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct, operate, and decommission a proposed gas centrifuge uranium enrichment facility. The NRC is in the initial stages of developing an Environmental Impact Statement (EIS) for the proposed facility to be located near Eunice, New Mexico, in Lea County. The proposed facility will use gas centrifuge technology to enrich the isotope Uranium-235 in uranium hexafluoride (UF_6), up to 5 percent (assay level for practical use in nuclear reactors). This proposed facility, as well as all associated construction, operation, and decommissioning activities and impacts, will be within the 220-ha (543 acre) LES National Enrichment Facility (NEF) site. The forthcoming EIS will document the impacts associated with the construction, operation, and decommissioning of the facility.

In September 2003, LES performed a survey of the proposed NEF site. Seven prehistoric archeological sites were identified, with three of the sites found in the area of potential effects (APE) and one of these sites is potentially eligible for listing on the National Register of Historical Places. The APE is considered the NEF site area, including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. LES has indicated that the one site potentially eligible may be affected by an access road. LES has indicated that it intends to submit the complete Cultural Resources Survey Report of all survey findings. The NRC, in consultation with your office and any identified consulting parties, will provide a determination of eligibility after the Cultural Resources Report is received.

As part of the NRC licensing process, LES submitted an Environmental Report (ER) in support of the proposed NEF. In the ER, LES indicated it had contacted six Indian tribes at your request. As required by 36 CFR 800.4(a), the NRC is requesting the views of the State Historical Preservation Officer on further actions to identify historic properties that may be affected by the NRC's undertaking. As part of the EIS preparation the NRC will be hosting a public scoping meeting Thursday, March 4, 2004, at the Eunice Community Center, 1115 Avenue I, in Eunice, New Mexico from 7:00 p.m. until 10:00 p.m. The meeting will include NRC staff presentations on the safety and environmental review process, after which members of the public will be given the opportunity to present their comments on what environmental issues NRC should consider during its environmental review.

This scoping information, along with the forthcoming LES Cultural Resource Report, and any information you provide, will be used to document affects in accordance with 36 CFR Part 800.4 and 800.5. Additionally, we intend to use the EIS process for Section 106 purposes as described in 36 CFR Part 800.8.

We have attached additional background information relating to cultural resources as it appears in the LES ER. If you have any questions or comments, or need any additional information, please contact Matthew Blevins of my staff at 301-415-7684

Sincerely,
/RA/
Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Information for LES National Enrichment Facility, Environmental Report, December 12, 2003

Service list

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 17, 2004

Arturo Sinclair, Governor
Ysleta del Sur Pueblo
P.O. Box 17579 - Ysleta Station
El Paso, TX 79917

SUBJECT: INITIATION OF THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Governor Sinclair:

The U.S. Nuclear Regulatory Commission (NRC) has recently received an application from Louisiana Energy Services (LES) to construct, operate, and decommission the National Enrichment Facility (NEC), a gas centrifuge uranium enrichment facility. The proposed NEF would be located near Eunice, New Mexico, in Lea County and would be within a 543 acre parcel of land that LES is in the process of acquiring from the State of New Mexico. The NRC is in the initial stages of developing an Environmental Impact Statement (EIS) which will document the impacts associated with the NEF.

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The NRC staff is soliciting information from potential consulting parties as the NRC begins it's Section 106 consultation with the New Mexico State Historical Preservation Office. As the NRC staff intends to use the EIS process for Section 106 purposes, we would also like to invite you to attend a public meeting that we will be hosting on Thursday, March 4, 2004, at the Eunice Community Center, 1115 Avenue I, in Eunice, New Mexico, from 7:00 p.m. until 10:00 p.m. The purpose of this meeting is to solicit comments from members of the public on the scope of the EIS review.

If you are unable to attend this meeting, we would still like to hear from you. You are invited to contact Matthew Blevins of my staff at (301) 415-7684 so we may hear your comments or concerns.

Sincerely,

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

Attachment: Cultural Resources Information for LES National Enrichment Facility, Environmental Report, December 12, 2003

cc: Ms. Jan Biella
Deputy SHPO
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87503

Identical Letter sent to:

Alonso Chalepah, Chairman
Apache Tribe of Oklahoma
PO Box 1220
Anadarko, OK 73005

Clifford A. McKenzie, Chairman
Kiowa Tribe of Oklahoma
PO Box 369
Carnegie, OK 73015

Jimmy Arterberry, Director of Environment
Comanche of Oklahoma
PO Box 908
Lawton, OK 73502

Ms. Holly B. E. Houghten
Tribal Historic Preservation Officer
Mescalero Apache Tribe
P.O. Box 227
Mescalero, New Mexico 88340

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Tribal Historic Preservation Officer
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Dear Chairman McKenzie:

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Dear Mr. Arterberry:

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Dear Chairman Chalepah:

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APPENDIX C - DOSE METHODOLOGY AND IMPACTS

C.1 Introduction

This appendix presents the methodology, assumptions, data, and results for the potential impacts on individual workers and members of the public resulting from routine or normal operations and accidents from the Louisiana Energy Services (LES) proposed National Enrichment Facility (NEF), including a description of how radioactive material, such as uranium, results in radiation doses and a comparison of these doses to applicable standards.

The consequence of internal and external radiation exposure due to the deposition of energy from radioactive material in body tissues is represented as absorbed dose. Absorbed dose is quantified as energy absorbed per unit of tissue mass. The biological effect on individual tissues is estimated by multiplying the absorbed dose by a factor that accounts for the relative biological effect of differing types of radiation. This modified tissue dose is called dose equivalent. Dose equivalent can represent external radiation (i.e., radiation absorbed through the skin from a source external to the body) or internal radiation (i.e., radiation absorbed by internal tissues of the body due to inhalation or ingestion). The effect on the whole body from external and/or internal radiation is represented as a risk-weighted sum of the set of tissue dose equivalents. This dose, called the effective dose equivalent (EDE), can be integrated over a period of years to account for the accumulated effect from a single year's exposure. The time-integrated measure of effect for internal radiation is called the committed effective dose equivalent (CEDE). CEDEs are combined with dose estimates for external exposure to calculate a measure of effect for both exposure modes, called the total effective dose equivalent (TEDE) (ANL, 2004).

C.1.1 Regulatory Limits

Title 10, "Energy," of the *U.S. Code of Federal Regulations* (10 CFR) Part 20 provides the regulatory limits for occupational doses and radiation dose for individual members of the public. For occupational doses, 10 CFR § 20.1201 states that licensees must limit the occupational dose to individual adults to an annual limit, which is the more limiting of:

- The TEDE being equal to 0.05 sievert (5 rems).

- The sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 0.5 sievert (50 rems).

Additionally, the annual limits to the lens of the eye, to the skin of the whole body, and to the skin of the extremities are:

- A lens dose equivalent of 0.15 sievert (15 rems).

- A shallow-dose equivalent of 0.5 sievert (50 rem) to the skin of the whole body or to the skin of any extremity.

In addition to the annual occupational dose limits, 10 CFR § 20.1201 would limit the soluble uranium intake by an individual to 10 milligrams in a week because of chemical toxicity.

An explicit TEDE limit of 1.0 millisievert per year (100 millirem per year) from all sources is provided for individual members of the public. This limit includes both internal and external doses through all pathways (including food). External dose rates cannot exceed 0.02 millisievert (2 millirem) in any one hour. Further, LES would be subject to the generally applicable standards in 10 CFR § 20.1101 and 40 CFR Part 190. 40 CFR Part 190 requires that routine releases from uranium fuel-cycle facilities to the general environment would not result in annual doses exceeding 0.25 millisievert (25 millirem) to the whole body, 0.75 millisievert (75millirem) to the thyroid, and 0.25 millisievert (25 millirem) to any other organ.

C.2 Pathway Assessment

Exposure to uranium processed by the proposed NEF could occur from routine operations as a result of small controlled releases to the atmosphere from the uranium enrichment process lines and decontamination and maintenance of equipment, releases of radioactive liquids to surface water, and direct radiation from the uranium material. Radioactive material released to the atmosphere, surface water, and ground water is dispersed during transport through the environment and transferred to human receptors through inhalation, ingestion, and direct exposure pathways. Therefore, evaluation of impacts requires consideration of potential receptors, source terms, environmental transport, exposure pathways, and conversion of estimates of intake to dose.

Under the proposed action, the major source of occupational exposure would be expected to be from direct radiation from the uranium hexafluoride (UF_6) with the largest exposure source being the cylinders (empty and full) that hold the UF_6. These cylinders are as follows:

- Type 48Y cylinders containing either the feed material (natural UF_6) or the depleted uranium hexafluoride (DUF_6) called uranium byproduct cylinders (UBCs), or empty with residual material.

- Type 48X cylinders containing the feed material or empty with residual material.

- Type 30 product cylinders holding the enriched UF_6 for shipping to nuclear fuel manufacturers.

In addition to direct radiation, there could be the potential for serious internal exposure from long-term contact with UF_6 leaking from the process equipment and acute exposure resulting from accidents.

The major source of exposure to the general public would be expected to come from atmospheric releases. Such releases would be primarily controlled through the Technical Services Building and Separations Building gaseous effluent vent systems. The principal function of the gaseous effluent vent system is to protect both the operator during the connection/disconnection of UF_6 process equipment and the surrounding population and environment by collecting and cleaning all potentially hazardous gases from the plant prior to release to the atmosphere. In addition, the Centrifuge Test and Postmortem Facilities would have an exhaust filtration system that would serve the same purpose as the gaseous effluent vent system. The Technical Services Building heating, ventilation, and air-conditioning system would perform a confinement ventilation function for potentially contaminated areas in the building. Members of the public, if close enough, could be affected by direct radiation and skyshine (radiation reflected from the atmosphere).

The principal source for direct radiation offsite would be from the storage of UBCs filled with DUF_6 that could be stored within the site boundaries of the proposed NEF. Direct radiation and skyshine from the UF_6 within the Separations Building (i.e., the gaseous centrifuge cascades) would be undetectable because most of the direct radiation associated with this uranium would be almost completely absorbed by the heavy process lines, walls, equipment, and tanks that would be employed in the gaseous centrifuge cascades.

C.2.1 Receptors of Concern

LES determined distances to the site boundary using guidance from the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 1.145 (NRC, 1983). The distance to the nearest resident was determined using global positioning system measurements. Figure C-1 shows the locations of the release points and locations of receptors of concern. The nearest resident is located 4,233 meters (2.6 mi) west of the proposed NEF gaseous effluent vent system stacks at a permanent residence. There are four industrial sites near the proposed NEF that are also considered for their potential exposures from gaseous releases, namely Wallach Concrete, Inc., Sundance Services, Inc., the Lea County landfill, and Waste Control Specialists (WCS). The nearest resident is assumed to be present the entire year (8,766 hours), and workers are assumed to be present for an 8-hour workday, 5 days a week for 50 weeks a year (2,000 hours per year). Table C-1 presents the receptors and estimated distances.

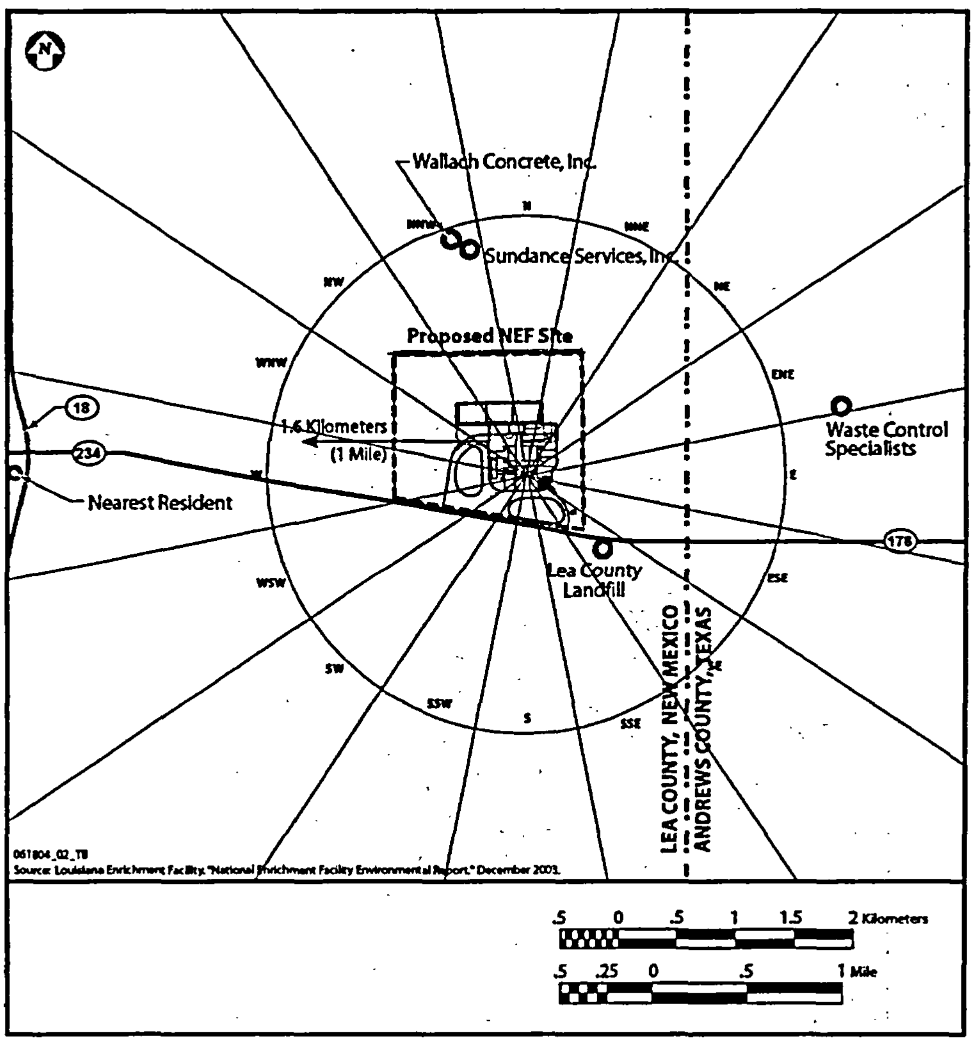

Figure C-1 Locations of Release Points and Individual Receptors (LES, 2004a)

Table C-1 Estimated Distances for Receptors of Concern

Receptor	Direction from Proposed NEF	Estimated Distance from Airborne Effluent Releases meters (miles)	Estimated Distance from UBC Storage Pad Edge to Receptor meters (miles)
Nearest Resident	West	4,233 (2.6)	—
Wallach Concrete, Inc.	North-Northwest	1,867 (1.2)	1,033 (0.6)
Sundance Specialists, Inc.	North-Northwest	1,706 (1.1)	885 (0.6)
Waste Control Specialists	East-Northeast	1,513 (0.9)	783 (0.5)
Lea County Landfill	Southeast	917 (0.6)	—

— No values given since receptor too distant or not in direct path.
Source: LES, 2004a.

The radiological assessment in this Draft Environmental Impact Statement (Draft EIS) determines impacts to a population within 80 kilometers (50 miles) and to a maximum exposed individual whose exposure would bound all foreseeable impacts related to the proposed NEF site operation. The total population within 80 kilometers (50 miles) is 94,758 people as calculated by SECPOP2000, a sector population, land fraction, and economic estimation program prepared for NRC based on Census 2000 data (Bixler, 2003). Figure C-2 presents the population distribution, and Table C-2 presents population data for each of 16 downwind sectors at 10 distance intervals.

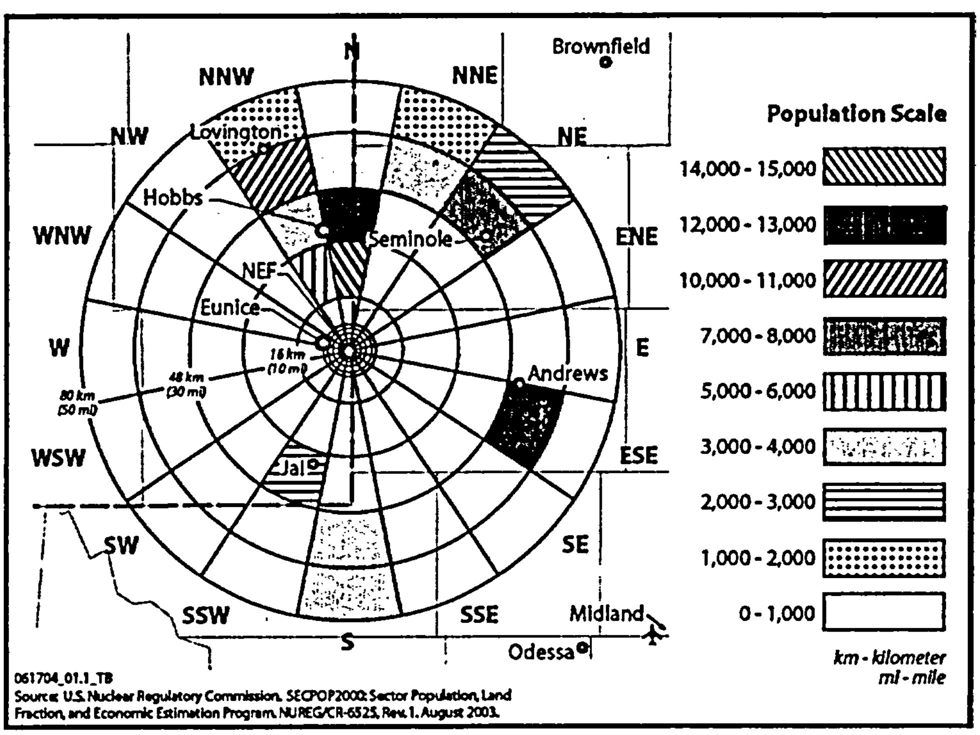

Figure C-2 Population Within 80 Kilometers (50 Miles) of the Proposed NEF (NRC, 2003b)

Table C-2 Public Population in Sectors Surrounding the Proposed NEF

Sector	0-1 mi (0-1.6 km)	1-2 mi (1.6-3.2 km)	2-3 mi (3.2-4.8 km)	3-4 mi (4.8-6.4 km)	4-5 mi (6.4-8.1 km)	5-10 mi (8.1-16.1 km)	10-20 mi (16.1-32.2 km)	20-30 mi (32.2-48.3 km)	30-40 mi (48.3-64.4 km)	40-50 mi (64.4-80.5 km)
N	0	0	0	0	0	9	14,637	12,616	273	222
NNE	0	0	0	0	0	0	69	217	4,760	1,120
NE	0	0	0	0	0	0	49	995	7,464	2,809
ENE	0	0	0	0	0	0	7	430	972	46
E	0	0	0	0	0	0	7	45	351	41
ESE	0	0	0	0	0	0	0	105	12,351	60
SE	0	0	0	0	0	0	23	18	20	848
SSE	0	0	0	0	0	0	0	19	8	18
S	0	0	0	0	0	0	4	37	3,369	3,754
SSW	0	0	0	4	0	6	4	2,033	11	12
SW	0	0	0	0	0	17	12	3	1	3
WSW	0	0	0	0	15	34	9	13	2	8
W	0	0	11	53	2,099	484	13	2	4	21
WNW	0	0	0	0	104	35	20	0	9	8
NW	0	0	0	5	2	3	223	33	43	83
NNW	0	0	0	0	0	0	5,044	4,543	10,565	1,391

mi - mile.
km - kilometer.

C.2.2 Exposure Pathways Parameters

Guidance on acceptable exposure models for the pathways of concern has been published in NRC Regulatory Guide 1.109 (NRC, 1977a) and incorporated into a variety of computer codes. GENII v. 1.485 (Napier et al., 1988) is used to estimate collective radiation doses (person-rem) to members of the public resulting from post-accident inhalation and ingestion of soluble uranium compounds. The exposure pathways analyzed include inhalation of soluble uranium carried by wind, external radiation from radioactivity deposited on the ground downwind of the proposed NEF, and ingestion of contaminated food (produce, meat, and dairy products). The ingestion parameters used to estimate radiological doses to the public are described in Table C-3. For releases of uranium compounds, the northern sectors would have the highest collective doses because Hobbs, New Mexico, is a large population center in the prevailing downwind direction.

Table C-3 Ingestion Parameters Used in GENII to Calculate Collective Radiological Dose to the Public

Parameter Values for Consumption of Terrestrial Food

Food Type	General Population: Growing Time (days)	Yield kg/m² (lbs/ft²)	Holdup Time (days)	Consumption Rate kg/yr (lbs/yr)
Leafy Vegetables	90	1.5 (0.3)	14	15 (33)
Root Vegetables	90	4 (0.8)	14	140 (309)
Fruit	90	2 (0.4)	14	64 (141)
Grains/Cereals	90	0.8 (0.2)	180	72 (159)

Parameter Values for Consumption of Animal Products

Food Type	Consumption Rate kg/yr (lbs/yr)	Holdup Time (days)	Type	Diet Fraction	Growing Time (days)	Yield kg/m² (lbs/ft²)	Storage Time (days)
Beef	70 (154)	34	Stored Feed	0.25	90	0.8 (0.2)	180
			Fresh Forage	0.75	45	2 (0.4)	100
Poultry	8.5 (19)	34	Stored Feed	1	90	0.8 (0.2)	180
			Fresh Forage	—	—	—	—
Milk	230 (507)	3	Stored Feed	0.25	45	2 (0.4)	100
			Fresh Forage	0.75	30	1.5 (0.3)	0
Eggs	20 (44)	18	Stored Feed	1	90	0.8 (0.2)	180
			Fresh Forage	—	—	—	—

kg/m² - kilograms per square meter.
lbs/ft² - pounds per square feet.
km/yr - kilometers per year.
lbs/yr - pounds per year.

C.2.3 Airborne Release Parameters

LES provided information on release parameters at the proposed NEF (LES, 2004a). Table C-4 presents design information for each of the effluent release points. The primary release pathways for radioactivity discharged from the facility would be via the Technical Services Building and Separation Building gaseous effluent vent systems. Both of these exhaust stacks, as well as the Technical Services Building Confinement Ventilation System stack, would be located on the Technical Services Building roof. For the proposed NEF, 63 percent of the uranium discharged would be released via the Technical Services Building gaseous effluent vent system, with the remaining 37 percent estimated for the Separations Building gaseous effluent vent system. Only trace amounts of uranium would be associated with the Technical Services Building Confinement Ventilation System and the Centrifuge Assembly Building

Table C-4 Effluent Release Point Design Parameters

Release Point	Stack Exit Area m^2 (ft^2)	Exit Height m (ft)	Building Height m (ft)	Adjacent Building Height m (ft)	Exit Velocity m/sec (ft/min)	Exit Temperature
TSB GEVS	0.29 (3.14)	13 (42.6)	10 (32.8)	10 (32.8)	18.3 (3,600)	Room temp.
SB GEVS	0.13 (1.40)	13 (42.6)	10 (32.8)	10 (32.8)	23.4 (4,600)	Room temp.
CAB CT&PM	0.13 (1.40)	15 (49.2)	12 (39.4)	12 (39.4)	20.3 (4,000)	Room temp.
TSB CVS	0.29 (3.14)	13 (42.6)	10 (32.8)	10 (32.8)	20.3 (4,000)	Room temp.

TSB GEVS - Technical Services Building Gaseous Effluent Vent System.
SB GEVS - Separation Building Gaseous Effluent Vent System.
CAB CT&PM - Centrifuge Assembly Building; Centrifuge Test and Postmortem Facility.
TSB CVS - Technical Services Building Confinement Ventilation System.
m -meter.
m^2 - square meter.
ft - feet.
m/sec - meters per second.
ft/min - feet per minute.
Source: LES, 2004a.

Centrifuge Test and Postmortem Facility exhausts and, as such, would not be expected to release any detectable radioactivity.

The primary component of atmospheric dispersion is mechanical mixing produced by temperature and wind velocity gradients. For projected normal operational releases, the methods of Regulatory Guide 1.111 (NRC, 1977b) are used to estimate concentrations of released material at a range of distances and directions from the release point. These methods use the Gaussian plume dispersion model that is implemented in the XOQDOQ computer code and was applied in this analysis (Sagendorf et al., 1982).

The atmospheric dispersion model XOQDOQ is intended to provide estimates of atmospheric transport and dispersion of gaseous effluents in routine releases from nuclear facilities. XOQDOQ is based on the theory that material released to the atmosphere will be normally distributed (Gaussian distribution) about the plume centerline. In predicting concentrations for longer time periods, the horizontal plume distribution is assumed to be evenly distributed within the directional sector, the so-called sector average model. A straight-line trajectory is assumed between the point of release and all receptors.

The atmospheric dispersion modeling results indicate that the maximum annual average air concentrations would occur at the north sector site boundary approximately 1,014 meters (0.6 mile) north of the Technical Services Building stack with an elevated atmospheric dispersion factor (χ/Q) of 2.3×10^{-6} seconds per cubic meter. Therefore, the individual assumed to be located at the northern sector boundary is the maximally exposed individual for the air pathway. The atmospheric dispersion modeling predicts that the annual average air concentration of releases beyond the site boundary are all less than the northern sector boundary. Concentrations per unit release quantity (i.e., χ/Q) predicted by using this model for the other receptors of concern are summarized in Table C-5.

Table C-5 Summary of Atmospheric Dispersion Factors

Receptor	Location	TSB χ/Q (s/m^3)	SB χ/Q (s/m^3)	Exposure Time (hours)
Nearest Resident	4,233 m (2.6 mi) west	1.4×10^{-7}	1.4×10^{-7}	8,766 hours
Lea County Landfill Worker	917 m (0.6 mi) southeast	1.0×10^{-6}	1.0×10^{-6}	2,000 hours
Wallach Concrete, Inc.	1,867 m (1.2 mi) north-northwest	1.1×10^{-6}	1.3×10^{-6}	2,000 hours
Sundance Services, Inc.	1,706 m (1.1 mi) north-northwest	1.3×10^{-6}	1.4×10^{-6}	2,000 hours
Waste Control Specialists	1,513 m (0.9 mi) east-northeast	4.9×10^{-7}	5.0×10^{-7}	2,000 hours

TSB - Technical Services Building.
SB - Separations Building.
s/m^3 - seconds per cubic meter.
m - meter.
mi - mile.
To convert seconds per cubic meter (s/m^3) to seconds per cubic foot (s/ft^3), multiply by 0.028.

C.3 Radiation Exposures from Normal Operation

Members of the public may be exposed to radioactive material dispersed in the environment through inhalation of air, ingestion of drinking water, ingestion of terrestrial foods and animal products, inadvertent ingestion of soil, and direct irradiation from nuclides deposited on the ground or present in surface water.

LES estimated the expected isotopic release mix resulting from the estimated annual release of 10 grams (0.022 pound) of uranium as shown in Table C-6 (LES, 2004a; LES, 2004c). These values of gaseous effluent are based on operational experience at the Urenco Capenhurst Limited enrichment facility in the United Kingdom. For purposes of the radiological impact analysis, the bounding annual releases to the atmosphere from the proposed NEF site are estimated to be 8.9×10^6 becquerels (240 microcuries). The 8.9×10^6 becquerels (240 microcuries) is a bounding annual release estimate based upon a prior NRC estimate for a 1.5 million separative work unit (SWU) plant (NRC, 1994). The proposed NEF design is based upon the prior design but with a doubling of the enrichment capacity to 3 million SWU. The expected isotopic release resulting from the bounding annual release of 8.9×10^6 becquerels (240 microcuries) of uranium from the Technical Services Building and Separations Building Gaseous Effluent Vent Systems is also shown in Table C-6. For gaseous effluents resulting from the sublimation of UF_6, no significant amount of radioactive particulate material (uranium or its radioactive decay daughters) would be expected to be introduced into the process ventilation system and released to the environment after Gaseous Effluent Vent System filtration (LES, 2004a).

Table C-6 Annual Effluent Releases

Radionuclide	Estimated Releases[a] TSB GEVS kBq/yr (µCi/yr)	Estimated Releases[a] SB GEVS kBq/yr (µCi/yr)	Bounding Releases TSB GEVS kBq/yr (µCi/yr)	Bounding Releases SB GEVS kBq/yr (µCi/yr)
Uranium-234	77.7 (2.10)	45.5 (1.23)	2,738 (74.0)	1,591 (43.0)
Uranium-235	3.59 (0.097)	2.11 (0.057)	125.8 (3.4)	74.0 (2.0)
Uranium-236	0.48 (0.013)	0.30 (0.008)	17.0 (0.46)	11.1 (0.3)
Uranium-238	77.7 (2.10)	45.5 (1.23)	2,738 (74.0)	1,591 (43.0)
Total	159.5 (4.31)	93.6 (2.53)	5,619 (151.86)	3,267 (88.3)

[a] Source: LES, 2004a. Equivalent to 10 grams (0.022 pound) uranium.
TSB GEVS - Technical Services Building Gaseous Effluent Vent System.
SB GEVS - Separation Building Gaseous Effluent Vent System.
kBq/yr - kilobecquerels per year.
µCi/yr - microcuries per year.

C.3.1 Exposure to Members of the Public

Radioactive material would be released to the atmosphere from the proposed NEF site through stack releases from the Technical Services Building Gaseous Effluent Vent System, Separations Building Gaseous Effluent Vent System, and from the potential resuspension of contaminated soil within the Treated Effluent Evaporative Basin. While a member of the public would not be expected to spend a significant amount of time at the site boundary closest to the UBC Storage Pad, this possibility is included in this impact assessment. The expected exposure pathways include inhalation of air and direct exposure from material deposited on the ground. In addition to these expected routes of exposure, members of the public may also consume food containing deposited radionuclides and inadvertently ingest resuspended soil from the ground or on local sources of food (e.g., leafy vegetables, carrots, potatoes, and beef from nearby grazing livestock). Potential effective dose equivalents for the maximally exposed adult individuals of Table C-5 and for the population are provided in Table C-7. The general population within 80 kilometers (50 miles) of the proposed NEF would receive a collective dose of 0.014 person-rem, equivalent to 8.4×10^{-6} latent cancer fatalities (LCF) from normal operations.

LES calculated the dose isopleths for the case of a 30-year stockpile of UBCs with 2,000 hours of exposure as shown in Figure C-3 (LES, 2004a). The greatest dose from direct radiation would be for a receptor on the northern site boundary at centerline of the northern edge of the UBC Storage Pad. Because the nearest resident would be 4,233 meters (2.6 miles) from the UBC Storage Pad, with a reduction in dose rates on the order of 6×10^{-8} due to distance alone, the potential impact of direct radiation from stored cylinders on the surrounding population is considered to be negligible. However, three industrial sites would be in direct line-of-sight and within 1.6 kilometers (1 mile) of the UBC Storage Pad. Using the 0.2-millisievert (20-millirem) isopleths from Figure C-3, the direct radiation for these receptors is estimated for reduction in dose versus distance for 2,000 hours per year and provided in Table C-7.

For the potential of contaminated soil at the bottom of the Treated Effluent Evaporative Basin to be resuspended by wind blowing over the basin, the health impacts based on 30 years of 0.57 kilogram (1.26 pounds) per year of uranium being placed into the Treated Effluent Evaporative Basin soil were reviewed. The resulting 30-year inventory of 7.4 microcuries of uranium, combined with a resuspension factor of 4×10^{-6} per hour, results in an additional annual effective dose of 1.7×10^{-6} millisieverts (1.7×10^{-4}

millirems) to the nearest resident with the largest offsite dose of 1.7×10^{-5} millisieverts (1.7×10^{-3} millirems) (LES, 2004a) at the southern site boundary. Variations in the resuspension factor for the outdoors absorbed on soil could only be as high as 9×10^{-5} per hour for areas that are fairly open to the prevailing winds (DOE, 1994). Since the Treated Effluent Evaporative Basin would be a sunken basin (i.e., below ground level) with a net covering the basin, the ability of prevailing winds to resuspend contaminated soils is expected to be less than that assumed by LES and the resulting impacts are considered conservative.

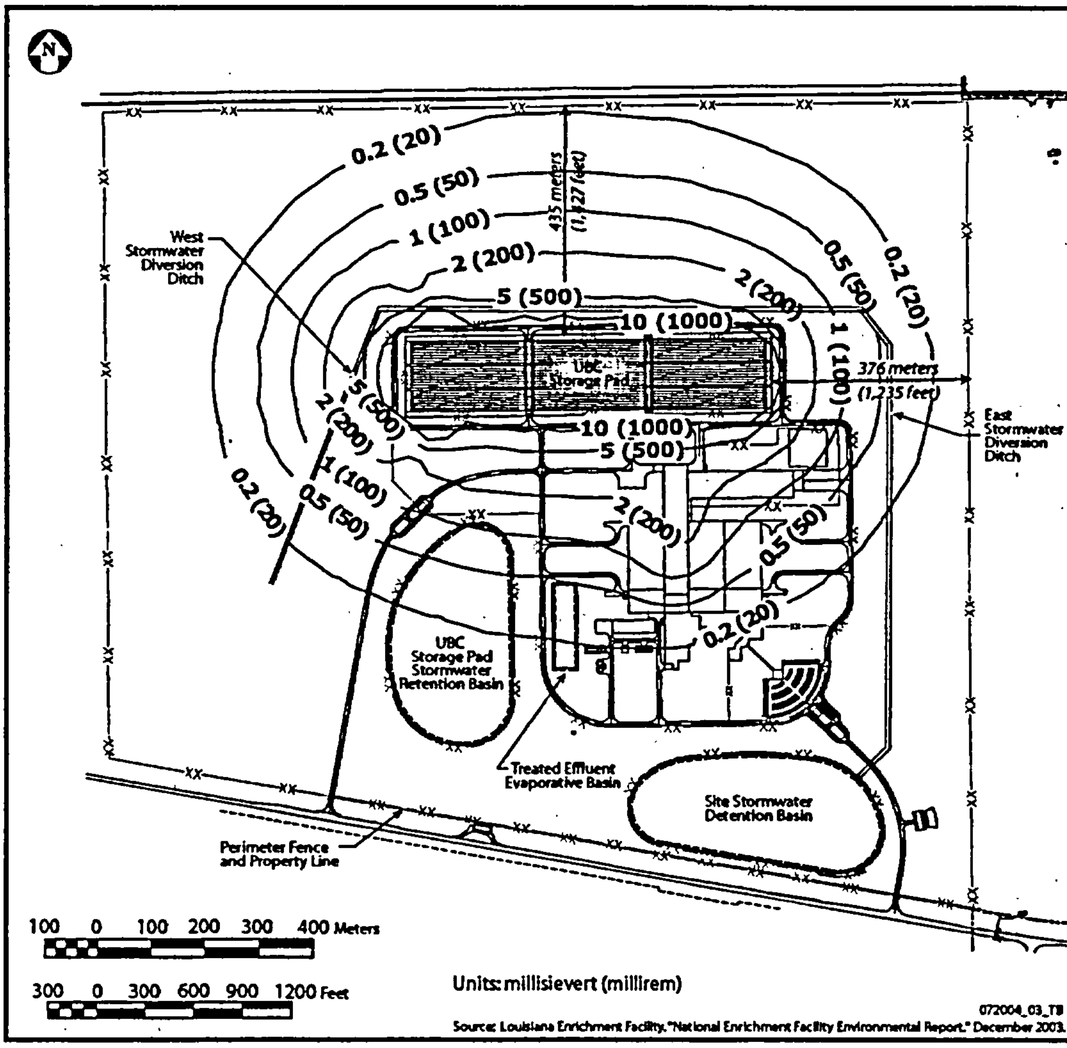

Figure C-3 2,000-Hour Dose Isopleths for a 30-Year Stockpile of Uranium Byproduct Cylinders (LES, 2004a)

Normal operations at the proposed NEF would have SMALL impacts to public health. The total annual dose from all exposure pathways would be significantly less than the regulatory requirement of 1 millisievert (0.1 rem) of 10 CFR § 20.1301. The most significant impact is from direct radiation exposure to receptors close to the UBC Storage Pad (filled and empty Type 48Y cylinders). The results are based on conservative assumptions, and it is anticipated that actual exposure levels will be less than those presented in Table C-7.

Table C-7 Radiological Impacts to Members of the Public Associated Within Operation of the Proposed NEF

Receptor	Location from Proposed NEF Stacks	Airborne Pathway CEDE	Direct Radiation[a]	Total Annual Impact
Population, Person-Sv (person-rem)	Within 80.5 km (50 mi) of Proposed NEF	1.4×10^{-4} (1.4×10^{-2})	N/A	1.4×10^{-4} (1.4×10^{-2})
Highest Boundary (Stack Releases), mSv (mrem)	Northern Boundary 1,010 m (0.6 mi)	5.3×10^{-5} (5.3×10^{-3})	0.189 (18.9)	0.189 (18.9)
Nearest Resident[b], mSv (mrem)	4,233 m (2.6 mi) west	1.3×10^{-5} (1.3×10^{-3})	N/A	1.3×10^{-5} (1.3×10^{-3})
Lea County Landfill Worker, mSv (mrem)	917 m (0.57 mi) southeast	1.9×10^{-5} (1.9×10^{-3})	N/A	1.9×10^{-5} (1.9×10^{-3})
Wallach Concrete, Inc. mSv (mrem)	1,867 m (1.16 mi) north-northwest	2.2×10^{-5} (2.2×10^{-3})	0.021 (2.1)	0.021 (2.1)
Sundance Services, Inc., mSv (mrem)	1,706 m (1.06 mi) north-northwest	2.6×10^{-5} (2.6×10^{-3})	0.026 (2.6)	0.026 (2.6)
Waste Control Specialists, mSv (mrem)	1,513 m (0.94 mi) east-northeast	9.3×10^{-6} (9.3×10^{-4})	0.021 (2.1)	0.017 (1.7)

[a] Direct radiation from the maximum number of UBCs over the lifetime of the proposed NEF.
[b] Includes airborne contamination from the Treated Effluent Evaporative Basin.
Sv - sievert.
mSv - millisievert.
mrem - millirem.
km - kilometer.
mi - mile.

For comparison to the effects from a similar facility, the Urenco enrichment facility in Capenhurst, United Kingdom (total capacity of 2.96 million SWU), can be considered. The Ministry of Agriculture, Fisheries and Food of the Scottish Environment Protection Agency monitors gaseous and liquid emissions from the Capenhurst facility and annually estimates radiological impacts. According to available reports from 1998 through 2002, a radiation dose to the maximum exposed individual was estimated to be less than 0.005 millisievert (0.5 millirem) per year for ingestion of terrestrial food contaminated via gaseous effluents (LES, 2004a). The highest radiation dose to the maximum exposed individual was estimated to be less than 0.011 millisievert (1.1 millirem) per year for ingestion of liquids being released from the Capenhurst site, assuming children played near the brook along the site and ingested water and sediment (LES, 2004c). Therefore, the proposed NEF will have less of an impact to the public than the Capenhurst facility because, unlike at Capenhurst, members of the public would not be directly exposed to liquid discharges or by the site boundary for extended periods of time. More importantly, both sets of annual doses are significantly below the U.S. regulatory requirement of 1 millisievert (100 millirem) (10 CFR Part 20) or 0.25 millisievert (25 millirem) for uranium fuel-cycle facilities (40 CFR Part 190).

C.3.2 Occupational Exposure Due to Normal Operation

The regulations of 10 CFR Part 20 not only require an NRC licensee to have an effective radiation protection program (10 CFR § 20.1101) but also require annual reports on the facility's occupational exposures (10 CFR § 20.2206) that the NRC gathers, evaluates, and presents in new volumes of NUREG-0713. By analyzing the sources of radiation and having an effective and efficient radiation protection program to determine the potential occupational dose rates, a licensee can determine whether any special administrative controls need to be applied to a specific individual or site-wide to maintain workers below the regulatory and company-set exposure limits. In addition to estimates of the occupational exposure, a comparison to the historical exposure data from similar facilities can demonstrate the effectiveness of the administrative controls (i.e., the radiation protection program) and/or the level of impacts that would be expected from a similar facility. In addition to the occupational exposure data from NUREG-0713 for the current U.S. enrichment facilities, the historical data from the Urenco Almelo and Capenhurst facilities would also be used for a comparison of impacts.

Tables C-8 and C-9 present the estimated occupational dose rates and annual exposures for various locations or buildings within the proposed NEF site and representative workers, respectively. Sections 4.7.6 and 4.8.1 of the Safety Analysis Report (LES, 2004b) describe the personnel-monitoring program for internal exposure from intake of soluble uranium. An annual administrative limit of 10 millisieverts (1,000 millirems) that includes external radiation sources and internal exposure from no more than 10 milligrams of soluble uranium in a week would be applied for comparison with the LES occupational exposure results, the historical data for past occupational exposures at U.S. enrichment facilities are shown in Table C-10, while comparisons to historical data for European and U.S. enrichment facilities are shown in Tables C-11 and C-12.

Table C-8 Estimated Occupational Dose Rates for Various Locations or Buildings Within the Proposed NEF

Location	Dose Rate, mSv/hr (mrem/hr)
Plant General Area (Excluding Separations Building Modules)	< 0.0001 (< 0.01)
Separations Building Module - Cascade Halls	0.0005 (0.05)
Separations Building Module - UF_6 Handling Area and Process Services Area	0.001 (0.1)
Empty Used UF_6 Shipping Cylinder	0.1 (10.0) on contact 0.010 (1.0) at 1 meter (3.3 feet)
Full UF_6 Shipping Cylinder	0.05 (5.0) on contact 0.002 (0.2) at 1 meter (3.3 feet)

mSv/hr - millisieverts per hour; mrem/hr - millirems per hour.
Source: LES, 2004a.

Table C-9 Estimated Occupational Annual Exposures for Various Occupations Within the Proposed NEF

Position	Annual Dose Equivalent[a] mSv (mrem)
General Office Staff	< 0.05 (< 5.0)
Typical Operations and Maintenance Technician	1 (100)
Typical Cylinder Handler	3 (300)

[a] The average worker exposure at the Urenco Capenhurst facility during the years 1998 through 2002 was approximately 0.2 mSv (20 mrem) (LES, 2004a).
mSV - millisievert; mrem - millirem.
Source: LES, 2004a.

Table C-10 Annual CEDE and TEDE for Uranium Enrichment Plants Within the United States for 1997 - 2002

Year	Number with Meas. CEDE	Collective CEDE (person-rem)	Avg. Meas. CEDE (rem)	Number Meas. Exposure	Total Number Monitored	Number with Meas. Dose	Total Collective TEDE (person-rem)	Avg. Meas. TEDE (rems)
1997	36	0.314	0.01	5,705	6,296	591	30.003	0.051
1998	58	0.242	0	5,713	6,150	437	23.621	0.054
1999	22	0.445	0.02	5,119	5,559	440	20.124	0.046
2000	69	0.587	0.01	4,015	5,016	1002	28.356	0.028
2001	53	0.108	0	3,670	4,015	345	10.325	0.030
2002	40	0.208	0.01	3,190	3,683	493	20.601	0.042

To convert rem to sievert, multiply by 0.01.
Source: NRC, 1998a; NRC, 1999; NRC, 2000; NRC, 2001a; NRC, 2002; NRC, 2003a.

Table C-11 Comparison of Annual Maximum TEDE for Capenhurst and U.S. Enrichment Facilities

Year	Capenhurst Maximum TEDE Sv (rem)	Highest Whole Body Doses at U.S. Enrichment Facilities Sv (rem)[a]
1998	0.0031 (0.31)	0.0025-0.005 (0.25-0.5)
1999	0.0022 (0.22)	0.0025-0.005 (0.25-0.5)
2000	0.0028 (0.28)	0.001-0.0025 (0.1-0.25)
2001	0.0027 (0.27)	0.001-0.0025 (0.1-0.25)
2002	0.0023 (0.23)	0.0025-0.005 (0.25-0.5)

[a] NUREG-0713 provides 12 dose ranges and the respective number of workers with whole body doses in that range. The value given in this column is the highest whole body dose range for that year.
[b] Five-year average (1998-2002) using the average TEDE from Table 4.13.2.2-1 o f the Safety Analysis Report.
Sv - Seivert.
Source: LES, 2004a; LES, 2004b; NRC, 1999; NRC, 2000; NRC, 2001a; NRC, 2002; NRC, 2003a.

Table C-12 Comparison of Annual Average TEDE for Almelo, Capenhurst, and U.S. Enrichment Facilities

Almelo TEDE Sv (rem)	Capenhurst TEDE Sv (rem)	U.S. Enrichment Facilities Sv (rem)
0.0004 (0.04)	0.0002 (0.02)	0.0004 (0.04)[a]

[a] Five-year average (1998-2002) using the average TEDE from Table 4.13.2.2-1 of the Safety Analysis Report.
Sv - Seivert.
Sources: LES, 2004a; LES, 2004b, NRC, 1999; NRC, 2000; NRC, 2001a; NRC, 2002; NRC, 2003a.

The LES occupational exposure analysis, as collaborated by the historical exposure data, demonstrates that a properly administered radiation protection program at the proposed NEF should maintain the radiological occupational impacts well below the regulatory limits of 10 CFR § 20.1201. Therefore, the impacts from occupational exposure at the proposed NEF would be considered SMALL.

C.4 Public and Occupational Health Impacts from Accidents During Operations

The operation of the proposed NEF would involve risks to workers, the public, and the environment from potential accidents. The regulations in 10 CFR Part 70, Subpart H, "Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material," require that each applicant or licensee evaluate, in an Integrated Safety Analysis, its compliance with certain performance requirements. The purpose of this section of this Draft EIS is to summarize the methods and results used to independently evaluate the consequences of potential accidents identified in LES's Integrated Safety Analysis. The accidents evaluated are a representative selection of the types of accidents that are possible at the proposed NEF.

C.4.1 Accident Analysis Methodology

The analytical methods used in this consequence assessment are based on NRC guidance for analysis of nuclear fuel-cycle facility accidents (NRC, 1990; NRC, 1991; NRC, 1998b; NRC, 2001b). With the exception of the criticality accident, the hazards evaluated involve the release of UF_6 vapor from process systems that are designed to confine UF_6 during normal operations. As described below, UF_6 vapor poses a chemical and radiological risk to workers, the public, and the environment.

C.4.1.1 Selection of Representative Accident Scenarios

The Safety Analysis Report and Emergency Plan (LES, 2004a; LES, 2004b) describe potential accidents that could occur at the proposed NEF. Accident descriptions are provided for two groups according to the severity of the accident consequences: high-consequence events and intermediate-consequence events. The accident types are summarized in the Emergency Plan as follows:

High-Consequence Events

- Earthquake.
- Tornado.
- Flood.
- Inadvertent Nuclear Criticality.
- Fires Propagating Between Areas.
- Fires Involving Transient Combustibles.
- Heater Controller Failure.
- Overfilled Cylinder Heated to Ambient Temperature.
- Product Liquid Sampling Autoclave Heater Failure Followed by Reheat.
- Open Sample Manifold Purge Valve and Blind Flange.
- Pump Exhaust Plugged.
- UF_6 Subsampling Unit Hot Box Heater Controller Failure.

Intermediate-Consequence Events

- Carbon Trap Failure.
- Chemical Dump Trap Failure.
- Pump Exhaust Plugged.
- Spill of Failed Centrifuge Parts.
- Dropped Contaminated Centrifuge.
- Empty UF_6 Cold Trap (UF_6 Release).
- Fire in Ventilated Room.

A subset of the potential accident scenarios was selected for detailed evaluation to encompass the range of possible accidents. The accident sequences selected vary in severity from high to low consequence events and include accidents initiated by natural phenomena, operator error, and equipment failure. The accident sequences evaluated are as follows:

- Generic Inadvertent Nuclear Criticality.
- Hydraulic Rupture of a UF_6 Cylinder in the Blending and Liquid Sampling Area.
- Natural Phenomena Hazard–Earthquake.
- Fire in a UF_6 Handling Area.
- Process Line Rupture in a Product Low-Temperature Takeoff Station.

C.4.1.2 Source-Term Methodology

For most accidents, the UF_6 vapor is assumed to escape its primary confinement system and enter an occupied room at the proposed NEF. It is assumed that UF_6 would mix instantaneously with the air in the room.

For a constant release rate of UF_6, the time-dependent concentration, C(t), of UF_6 in a room or workshop at the proposed NEF would be (NRC, 1990):

$$\frac{dC(t)}{dt} = \frac{R}{V'} - \frac{Q_v f_v C(t)}{V'} \qquad \text{Eq. C-1}$$

where R = constant UF_6 release rate, grams/second
V′ = k×f×V, the effective room volume, cubic meters
V = actual room volume, cubic meters
k = mixing efficiency (from National Fire Protection Association 69 [NFPA, 2002], Appendix D), unitless
f = room free air fraction, unitless
Q_v = room ventilation rate, cubic meters per second

f_v = the fraction of Q_v exhausted to the atmosphere
(1-f_v is recycled back into the room)
t = time elapsed since start of release, seconds

The values of mixing efficiency, k, and room free-air fraction, f, are assumed to be 0.3 and 0.8, respectively. The mixing efficiency is conservatively based on Table D-1 of National Fire Protection Association 69 (NFPA, 2002), and is for ventilation systems with forced-air supplies and single exhaust openings comprised of grills and registers. The value of 0.8 is assumed to account for the volume of equipment that replaces free air inside the facility. Room volumes and ventilation flow rates were provided by LES (LES, 2004d). The fraction of air exhaust is 10 percent, which is consistent with the heating, ventilation, and air-conditioning descriptions in Chapters 3 and 4 of the Safety Analysis Report (LES, 2004a).

A solution to Equation C-1 is:

$$C_1(t) = \frac{R}{Q_v f_v}\left[1 - e^{-\frac{Q_v f_v}{V'}t}\right] \qquad \text{Eq. C-2}$$

Equation C-2 defines the concentration, $C_1(t)$, during the period that UF_6 is released at a steady-state rate, R, into a room. After T_1 = 30 minutes, it is assumed that either the entire material at risk would be released or the release would be stopped when operators intervene. The assumption that operators or affected individuals downwind would respond within 30 minutes is consistent with conservative self-protective criteria used by NRC to evaluate emergency preparedness (NRC, 1988). After T_1 = 30 minutes, the room would be ventilated until UF_6 is cleared from the room and exhausted to the environment. The room concentration, $C_2(t)$, after all the material escapes to the room, or the release is stopped is:

$$C_2(t) = \frac{R}{Q_v f_v}\left[1 - e^{-\frac{Q_v f_v T_1}{V'}}\right] e^{-\frac{Q_v f_v}{V'}t} \qquad \text{Eq. C-3}$$

For the seismic event, LES has proposed safety-related equipment (i.e., Items Relied on for Safety) that shut down the heating, ventilation, and air-conditioning systems in certain process areas. With no forced ventilation, the primary means by which UF_6, compound uranyl fluoride (UO_2F_2) particulate matter, and hydrogen fluoride vapor enters the environment would be from small cracks and openings in the building.

The volumetric leak rate from small cracks and openings in a building is calculated by evaluating Poiseuille's Law (Baker, 1987):

$$Q_L = -\left(\frac{12\eta d L_S}{C\rho W}\right) + \sqrt{\left(\frac{12\eta d L_S}{C\rho W}\right)^2 + \frac{C_{p,a} v^2 W^2 L_S^2}{C}} \qquad \text{Eq. C-4}$$

where Q_L = volumetric leak rate, cubic meters per second
L_s = perimeter length of all exterior doors, meters
W = width of the opening between door and frame, meters
η = coefficient of viscosity of air = 1.81×10^{-5} N-seconds per square meter at T = 20°C (68°F)
d = thickness of doors, meters
C = 1.5
ρ = density of air = 1.183 kilograms per cubic meter at T = 25°C (77°F)
v = wind speed, meters per second

The value of $C_{p,a}$ depend on the location of the door or opening relative to the direction of the wind (Blevins, 2003):

where $C_{p,a}$ = 0.9 for windward side of the building
$C_{p,a}$ = -0.3 for leeward side of the building
$C_{p,a}$ = -0.4 for building sides orthogonal to the wind direction

For this assessment, each exterior door in affected process areas of the building is assumed to have a W = 0.2 centimeter (.06 inch) opening around both sides and the top, and a W = 0.3 centimeter (.13 inch) opening at the bottom. The thickness of all doors, d, is estimated to be 5 centimeters (2 inches). The perimeter length of doors is estimated from drawings in the Safety Analysis Report (LES, 2004a).

The wind speed, v, assumed for the building leakage calculations was chosen with consideration of the wind speed and stability class assumed in the derivation of the maximum atmospheric dispersion factor, χ/S. The highest χ/S calculated for the controlled area boundary is 5.4×10^{-5} seconds per cubic meter. With corrections for building wake and low wind speed plume meander, the wind speed for F class stability conditions for which a $\chi/S = 5.4\times10^{-5}$ seconds per cubic meter would be derived is 1.75 meters per second (5.7 feet per second). Therefore, a bounding value of v = 2 meters per second (6.6 feet per second) is used to estimate building leakage.

Solid UO_2F_2 produced by the reaction of UF_6 with water vapor (i.e., humidity) forms a fine powder that will settle by gravity. Therefore, in addition to removal by exfiltration through door cracks to the environment, solid UO_2F_2 will also be removed from the air by settling on the floor and equipment of the affected process area. The concentration in the building is calculated as:

$$C_L(t) = C_{L,O}e^{-\frac{1}{V'}(Q_L+v_dA)t} \qquad \text{Eq. C-5}$$

where v_d = settling velocity of UO_2F_2 particles in air, meters per second
A = floor area of the affected process area, square meters

From Table 12.4 of DOE/TIC-27601 (DOE, 1984), the settling velocity of fine uranium compounds estimated to be approximately 0.0001 centimeter per second (0.0002 feet per minute). The floor areas of the affected process areas are estimated from drawings in the Safety Analysis Report (LES, 2004a).

C.4.1.3 NRC Performance Requirements

The performance requirements in 10 CFR Part 70, Subpart H, define acceptable levels of risk of accidents at nuclear fuel-cycle facilities, such as the proposed NEF. The regulations in Subpart H require that LES reduce the risks of credible high-consequence and intermediate-consequence events. Threshold consequence values that define the high- and intermediate-consequence events for the proposed NEF are described in Table C-13(LES, 2004a).

Table C-13 Definition of High- and Intermediate-Consequence Events at the Proposed NEF

Receptor	Intermediate Consequence	High Consequence
Worker - Radiological	> 25 rem (0.25 Sv)	> 100 rem (1 Sv)
Worker - Chemical (5-minute exposure)	> 2.4 mg U intake > 98 mg HF/m^3	> 30 mg U intake > 175 mg HF/m^3
Environment at the Restricted Area Boundary	> 5.4 mg U/m^3 or 24-hour average release greater than 5,000 times the values in Tables 2 of Appendix B of 10 CFR Part 20	N/A
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)	> 1.4 mg U intake > 0.8 mg HF/m^3	> 7.8 mg U intake > 28 mg HF/m^3

Sv - sievert; HF - hydrogen fluoride; U - uranium.
mg - milligram.
m^3 - cubic meters.

C.4.1.4 Consequence Assessment Methodology for Acute Health Effects

Accident consequences were evaluated for the proposed NEF facility worker, the environment outside the restricted area boundary, an individual at the controlled area boundary, and the public beyond the controlled area boundary. As stated above, the analytical methods used in this consequence assessment are based on NRC guidance for analysis of nuclear fuel-cycle facility accidents (NRC, 1990; NRC, 1991; NRC, 1998b; NRC, 2001b).

Facility Worker Uranium Intake and Exposure to Hydrogen Fluoride

The accident consequences to a facility worker include the risks of toxicological effects of uranium intake, radiation dose from uranium intake, and exposure to hydrogen fluoride concentration in air. The amount of uranium a facility worker could inhale (uranium intake) is calculated by assuming the worker is exposed to $C_1(t)$ until $T_1 = 5$ minutes after the start of the release (LES, 2004a). By $T_1 = 5$ minutes, a worker is assumed to successfully escape the affected room. The uranium intake is calculated by assuming the worker inhales at a constant breathing rate of 3.33×10^{-4} cubic meters per second (20 liters per minute), which is consistent with the breathing rate used by NRC in 10 CFR Part 20, Appendix B, for Reference Man performing "light work." Similarly, the hydrogen fluoride concentration to which a facility worker could be exposed is calculated by evaluating the time-averaged hydrogen fluoride concentration during the first $T_1 = 5$ minutes.

For the uranium intake and hydrogen fluoride exposure calculations, it is assumed that sufficient moisture (i.e., humidity) is present in the room to completely convert released UF_6 gas to UO_2F_2 particulate matter and hydrogen fluoride vapor. This assumption results in a conservative estimate of the concentration of hydrogen fluoride vapor that would be present in both the affected room of the proposed NEF and downwind.

Restricted Area Boundary 24-Hour Average Uranium Concentration

In accordance with 10 CFR Part 70, Subpart H, LES must reduce the environmental risks of accidents. The environmental consequences of accidents are evaluated at the restricted area boundary. At the proposed NEF, the restricted area boundary would be a fenced area inside the controlled area that would include the process buildings and the UBC Storage Pad (LES, 2004d). To evaluate whether accidents would exceed the environmental performance requirement, the 24-hour average uranium concentration is calculated at the restricted area boundary. It is assumed that the points of release are the stacks on the roof of the Technical Services Building.

The total source term for the first phase of the event (before the release is stopped) is S_1. The residual source term from the time that the release is stopped, T_1, until the source is either depleted, or until 24 hours has elapsed, is S_2.

$$S_1 = \int_0^{T_1} S_1(t)dt = \int_0^{T_1} C_1(t)dt \times Q_v \times f_v = R\left[T_1 - \frac{V'}{Q_v f_v}\left\{1 - e^{-\frac{Q_v f_v T_1}{V'}}\right\}\right],\ for\ 0 < t \le T_1$$

Eqs. C-6, C-7

$$S_2 = \int_{T_1}^{T_2} S_2(t)dt = \int_{T_1}^{T_2} C_2(t)dt \times Q_v \times f_v = R\left[1 - e^{-\frac{Q_v f_v T_1}{V'}}\right]\left[\frac{V'}{Q_v f_v}\left\{1 - e^{-\frac{Q_v f_v (T_2 - T_1)}{V'}}\right\}\right],\ for\ T_1 < t \le T_2$$

To compare downwind concentrations with the applicable performance requirement, the uranium concentration downwind is calculated as a 24-hour average. For the restricted area boundary and the controlled area boundary, the atmospheric dispersion factor (χ/S) for various distances from the proposed NEF process buildings to the boundary in each downwind sector is calculated using ARCON96 (NRC, 1997). The distance to the restricted area boundary and controlled area boundary in each compass sector, the persistence of the wind in each direction, and χ/S values calculated using ARCON96 are presented in Table C-14. The highest χ/S at the restricted area boundary, which would result in the highest downwind concentration, occurs directly east of the Technical Services Building. Therefore, the concentration at the restricted area boundary is calculated for wind blowing to the east.
The downwind concentration at the restricted area boundary is calculated for the downwind sector with the highest atmospheric dispersion factor ($\chi/S|_{RAB}$) using Equation C-8.

$$U, \frac{mg}{m^3}\bigg|_{RAB} = \frac{\left[\int_0^{T_1} S_1(t)dt + \int_{T_1}^{T_1+24hr} S_2(t)dt\right]}{\int_0^{T_1+24hr} dt}, \frac{g}{s} \times \frac{X}{S}\bigg|_{RAB}, \frac{s}{m^3} \times 10^3 \frac{mg}{g} \times 0.68 \frac{mg\,U}{mg\,UF_6}$$

Eq. C-8

Table C-14 Accident Values of Atmospheric Dispersion Factors for the Proposed NEF Boundaries

Direction from Facility	Distance from Proposed NEF		Frequency of Wind (percent)	RAB χ/S (s/m^3)	CAB χ/S (s/m^3)
	RAB meters (feet)	CAB meters (feet)			
S	160 (524)	417 (1,368)	5.66	2.64×10^{-4}	4.84×10^{-5}
SSW	168 (552)	417 (1,368)	3.98	2.40×10^{-4}	4.80×10^{-5}
SW	210 (690)	422 (1,384)	4.91	1.69×10^{-4}	5.37×10^{-5}
WSW	261 (856)	503 (1,650)	4.87	1.14×10^{-4}	4.08×10^{-5}
W	261 (856)	769 (2,522)	6.29	1.14×10^{-4}	2.37×10^{-5}
WNW	278 (911)	1,071 (3,513)	5.52	9.96×10^{-5}	1.46×10^{-5}
NW	757 (2,484)	1,072 (3,516)	7.52	2.12×10^{-5}	1.34×10^{-5}
NNW	639 (2,098)	995 (3,264)	10.80	2.35×10^{-5}	1.13×10^{-5}
N	589 (1,932)	995 (3,264)	20.40	2.67×10^{-5}	1.18×10^{-5}
NNE	530 (1739)	754 (2473)	7.35	3.08×10^{-5}	1.77×10^{-5}
NE	463 (1,518)	581 (1,906)	5.46	3.78×10^{-5}	2.61×10^{-5}
ENE	362 (1,187)	540 (1,771)	4.68	4.96×10^{-5}	2.61×10^{-5}
E	109 (359)	540 (1,771)	4.45	4.49×10^{-4}	2.68×10^{-5}
ESE	101 (331)	540 (1,771)	2.42	4.26×10^{-4}	2.54×10^{-5}
SE	143 (469)	487 (1,597)	2.69	2.76×10^{-4}	3.10×10^{-5}
SSE	185 (607)	417 (1,368)	3.04	1.70×10^{-4}	3.95×10^{-5}

RAB - restricted area boundary.
CAB - controlled area boundary.
s/m^3 - seconds per cubic meter.
To convert seconds per cubic meter (s/m^3) to seconds per cubic foot (s/ft^3), multiply by 0.028.

Controlled Area Boundary Uranium Intake and Hydrogen Fluoride Exposure

The accident consequences to an individual at the controlled area boundary include the risks of toxicological effects of uranium intake, radiation dose from uranium intake, and exposure to hydrogen fluoride concentration in air. The uranium intake at the controlled area boundary is calculated for the downwind sector with the highest atmospheric dispersion factor ($\chi/S|_{CAB}$). The highest χ/S at the controlled area boundary, which would result in the highest downwind concentration, occurs southwest of the Technical Services Building. Therefore, the accident consequences at the controlled area boundary are calculated for wind blowing to the southwest.

The uranium intake at the controlled area boundary is calculated for the first 24 hours of the event using Equation C-9.

$$[HF]_{one\ hour} = \frac{\left[\int_{0}^{T_1} S_1(t)dt + \int_{T_1}^{T_2=1hr} S_2(t)dt\right], g}{1{,}800\, s}, \frac{g}{s} \times \left.\frac{X}{S}\right|_{CAB}, \frac{s}{m^3} \times 10^3 \frac{mg}{g} \times 0.23 \frac{mg\ HF}{mg\ UF_6} \quad \text{Eq. C-9}$$

Similarly, the unmitigated 30-minute average hydrogen fluoride concentration is:

$$U\ intake, mg = \left[\int_{0}^{T_1} S_1(t)dt + \int_{T_1}^{T_2=24hr} S_2(t)dt\right], g \times \left.\frac{X}{S}\right|_{CAB}, \frac{s}{m^3} \times 10^3 \frac{mg}{g} \times B.R., \frac{m^3}{s} \times 0.68 \frac{mg\ U}{mg\ UF_6} \quad \text{Eq. C-10}$$

C.4.1.5 Consequence Assessment Methodology for Chronic Health Effects

Earlier studies have indicated that if fatality from suffocation caused by edema (swelling) in the lungs does not occur, the swelling resulting from hydrogen fluoride exposure will subside and recovery should be complete. Thus, acute sublethal inhalation of hydrogen fluoride is not expected to have long-term effects (NRC, 1991). Therefore, the post-accident chronic health effects evaluated are limited to the toxicological and radiological health effects to members of the public offsite resulting from exposure to uranium compounds.

Human toxicological effects of exposure to soluble uranium compounds have also been previously reviewed by the NRC (NRC, 1991). It was concluded that a single acute intake of 10 milligrams of soluble uranium would produce in humans either minimal or nondetectable effects, either short-term or long-term. Therefore, if an accident could not result in acute intakes above 10 milligrams of soluble uranium in any individual at or just beyond the site (controlled area) boundary, then no long-term health effects would be expected among the exposed population further downwind. At the proposed NEF, only one type of event is capable of causing toxicological effects among the offsite public from exposure to soluble uranium—the rupture of a large UF_6 cylinder from inadvertent overheating or overfilling. The protective measures proposed by LES to prevent this type of event are described in Section 4.2.13.2 of Chapter 4 of this Draft EIS.

GENII v. 1.485 (Napier et al., 1988) is used to estimate collective radiation doses (person-rem) to members of the public resulting from post-accident inhalation and ingestion of soluble uranium compounds. The same exposure pathways, ingestion parameters, and demographic information used for Section 4.2.12 of Chapter 4 of this Draft EIS are applied to estimate radiological doses to the public from accidents. The meteorological data is taken from the nearby Midland-Odessa National Weather Station.

For dose calculations to the public, it is assumed that individuals downwind spend 100 percent of the time inside the passing plume (i.e., not sheltered). For releases of uranium compounds, it is found that the north sector would have the highest collective doses because Hobbs, New Mexico, is a large population center in the prevailing downwind direction.

C.4.2 Accident Analyses

C.4.2.1 Inadvertent Nuclear Criticality

An inadvertent nuclear criticality at the proposed NEF would result from the unintended accumulation of enriched uranium, leading ultimately to a self-sustaining or runaway nuclear chain reaction. A criticality accident could release large amounts of heat and radiation. A criticality accident could also produce radioactive fission products, such as isotopes of noble gases like xenon and krypton, radioiodine, and radiocesium. At the proposed NEF, one process area for which this accident is postulated is the Decontamination Workshop.

Specifically, the accumulation of uranium in the citric acid tank could cause a criticality accident. For this to occur, the operator would have to fail to control the uranium mass in the tank. A criticality in the solution in the tank could produce an initial burst of $1.0\times10^{+18}$ fissions, followed by 47 bursts of $1.92\times10^{+17}$ fissions per burst, for a total of $1.0\times10^{+19}$ fissions in 8 hours (NRC, 1998b).

The source term (ST) for the inadvertent nuclear criticality was determined using the five-factor formula:

$$ST = MAR \times DR \times ARF \times RF \times LPF \qquad \text{Eq. C-11}$$

where MAR = material at risk
DR = damage ratio
ARF = airborne release fraction
RF = respirable fraction
LPF = leak path factor

For the criticality accident, the material at risk (MAR) is the amount of fission product radioactivity that would accumulate during the event (NRC, 1998b). The damage ratio (DR) is 1, since all of the solution in the tank would be involved in the event. The atmospheric release fraction (ARF) for noble gases is 100 percent. The ARF for radioiodine is 0.25, and the ARF for other fission products is 5×10^{-4} (NRC, 1998b). The respirable fraction is assumed to be 100 percent. A leak path factor (LPF) of 0.001 is used for radioiodine and fission products other than noble gases, since the Technical Services Building gaseous effluent vent system is equipped with high efficiency particulate airand charcoal filters (LES, 2004a).

The results of the consequence assessment are presented in Table C-15. Industry experience with this type of criticality accident indicates that a worker located in the immediate vicinity of the reaction is not likely survive the accident. However, with increasing distance from the accident, the radiation doses would be lower, and the probability that a worker could survive increases. At the proposed NEF, workers would have direct access to vessels and other process equipment in which criticality events would be possible. Therefore, the accident has been qualitatively evaluated as a high consequence event for the worker.

The environmental consequence is evaluated using the sum-of-the-fractions rule. The concentration at the restricted area boundary of each fission product radionuclide generated during a hypothetical uranium solution criticality event (NRC, 1998b) is compared to 5,000 times the corresponding values in Appendix B to 10 CFR Part 20. The fractions thus generated (i.e., calculated fission product concentrations divided by their Appendix B limits) are added to yield one value. If that value is less than 1, the accident consequences to the environment are low. Since the sum presented in Table C-14 is less than 1, the postulated criticality event is estimated to be a low consequence to the environment.

Table C-15 Health Effects Resulting from Inadvertent Nuclear Criticality

Worker (egress after 5 min.)	Environment at RAB (Ratio)	Individual at CAB, SW Direction	Collective Dose, West Direction	
			person-rem	LCFs
High	0.66[a]	0.14 rem[b] (.0014 Sv)	44	0.03

[a] Pursuant to 10 CFR § 70.61(c)(3), this value is the sum of the fractions of individual fission product radionuclide concentrations over 5,000 times the concentration limits that appear in 10 CFR Part 20, Appendix B, Table 2.
[b] The dose to the individual at the controlled area boundary is the sum of internal and external doses from fission products released from the Technical Service Buildings Gaseous Effluent Vent System stack.
RAB - restricted area boundary.
CAB - controlled area boundary.
LCF - latent cancer fatalities.
Sv - sievert.
To convert rem to sievert, multiply by 0.01.

A maximally exposed individual at the controlled area boundary in the southwest direction would receive a TEDE of 0.14 rem (.0014 sievert). This is a low consequence to this individual. Similarly, the low collective dose to the offsite population in the west sector (Eunice) means that the risk of health effects to the offsite public (latent cancer) from this accident is low. The west sector would have the highest radiation doses following a criticality accident, because the city of Eunice, New Mexico, lies in closer proximity to the proposed NEF than other population centers, and short-lived radionuclides formed during the criticality accident would not have completely decayed before reaching Eunice. Larger population centers in the north sector, such as the city of Hobbs, New Mexico, would receive lower collective doses because the short-lived fission products would decay during the time the plume travels from the proposed NEF.

In accordance with the performance requirements of 10 CFR Part 70, Subpart H, LES has identified Items Relied on for Safety to reduce the risk to the proposed NEF worker from all criticality accidents. These controls include passive engineered controls (e.g., safe geometry equipment that prevents the configuration of a critical mass), active controls (e.g., safe storage arrays for bottles and containers), and administrative controls (e.g., procedures to limit the mass of special nuclear material or to exclude the presence of moderators). For the postulated event in the citric acid tank, LES proposes to use administrative controls for mass control in the tank including tank sampling, visual inspection of the tank, safety margins for double batching, and operator training.

C.4.2.2 Hydraulic Rupture of a UF_6 Cylinder in the Blending and Liquid Sampling Area

At the Product Blending System in the Blending and Liquid Sampling Area of the Separations Building, Type 30B (2.5-ton [2.3-metric ton]) cylinders would be filled with product to customer specifications. The transfer of product to Type 30B cylinders would begin by heating a 14-ton (13-metric ton) Type 48Y cylinder containing product UF_6 inside a Blending Donor Station to no more than 61°C (142°F). The heated UF_6 gas would be transferred by piping from the heated Type 48Y cylinder to a Blending Receiver Station containing a Type 30B cylinder. The Blending Receiver Station would be cooled, which would allow the UF_6 gas to desublime to a solid inside the Type 30B cylinder, completing the transfer.

An accident is postulated wherein the Blending Donor Station heater controller fails, causing the blending donor heater within the station to remain on. Were this to occur, the product cylinder could overheat and the cylinder could hydraulically rupture due to the expansion of the liquid UF_6. Upon cylinder rupture, the entire contents of the Type 48Y product cylinder (12,500 kilograms [27,560 pounds] of UF_6) would be released within the Blending Donor Station. Since the station enclosure is not airtight, the UF_6 would be released to the Blending and Liquid Sampling Area. The UF_6, when in contact with air, would produce hydrogen fluoride gas and UO_2F_2. The release into the building would then be released to the environment. The heating, ventilation, and air-conditioning is conservatively assumed to be operating at the maximum ventilation flow rate. Significant quantities of hydrogen fluoride and UO_2F_2 would be carried by the prevailing wind beyond the controlled area boundary.

The results of the consequence assessment are presented in Table C-16 and show the health and environmental consequences of this accident would be high.

Table C-16 Health Effects Resulting from Hydraulic Rupture of a UF_6 Cylinder

Worker (egress after 5 minutes)		Environment at RAB	Individual at CAB, SW Direction		Collective Dose, North Direction	
U intake, mg	[HF], mg-m^{-3}	mg U-m^{-3}	U intake, mg	[HF], mg-m^{-3}	person-rem	LCFs
High		44	150 (0.97 rem)	86	12,000	7

RAB - restricted area boundary.
CAB -controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meters.
To convert rem to sievert, multiply by 0.01.

A worker in the vicinity of the Blending Donor Station would be exposed within seconds to lethal UF_6, UO_2F_2, and hydrogen fluoride concentrations. The environmental consequences are higher than the 5.4 milligrams uranium per cubic meter threshold for an intermediate consequence. An individual located on the controlled area boundary in the southwest sector would suffer high consequences from both uranium and hydrogen fluoride exposure. The collective dose to the offsite population in the north sector indicates a risk of several LCFs in the population in the years following the accident.

In accordance with the performance requirements of 10 CFR Part 70, Subpart H, LES has identified Items Relied on for Safety to reduce the risk to the proposed NEF workers, the public, and the environment from the effects of this accident. To prevent this accident, LES would rely on fail-safe, hard-wired, high-temperature heater trips and redundant, independent, fail-safe, capillary high temperature heater trips. Each control would be tested annually to ensure its availability and reliability to serve its intended safety function on demand. The purpose of these controls would be to ensure that the accident is highly unlikely to occur. In addition, there have been no similar heater control failures at the Urenco facilities in Europe in over 30 years of operation.

In addition to Items Relied on for Safety, LES has committed to an Emergency Plan that includes certain mitigating actions to reduce the consequences of the event. For example, in response to an alarm that indicates the release of UF_6, a control-room operator could secure the heating, ventilation, and air conditioning systems for the affected area. The action to secure the heating, ventilation, and air-conditioning within minutes of the accident would considerably reduce the risk to the public and the environment.

C.4.2.3 Natural Phenomena Hazard—Earthquake

An earthquake is postulated to breach all UF_6 piping systems and lead to a release of approximately 860 kilograms (1,896 pounds) of UF_6 (LES, 2004a). This accident was evaluated for the Blending and Liquid Sampling Area, UF_6 Handling Areas, and the Cascade Halls. LES has committed to ensure the affected process buildings can withstand the design-basis earthquake. Therefore, for this evaluation, it is assumed that the buildings would remain intact. LES would also install and maintain an electrical trip system for select heating, ventilation, and air-conditioning systems in process areas with large inventories of gaseous UF_6. The trip system would detect earthquakes and secure the heating, ventilation, and air-conditioning units. Therefore, for this evaluation, it is also assumed that the heating, ventilation, and air-conditioning in affected process buildings is shut down.

The results of the consequence assessment are presented in Table C-17 for a worker located in one of the Cascade Halls during the earthquake. Depending on the location of the worker when the event occurs, the large quantity of UF_6 which could be released would result in a high consequence to this individual before he or she could escape the room. The consequences to the environment would be low. The maximally exposed individual at the controlled area boundary in the southwest direction would not be expected to suffer any observable health effects. Similarly, the low collective dose to the offsite population in the north sector means that the risk of health effects to the offsite public (latent cancer) from this accident would be low.

Table C-17 Health Effects Resulting from an Earthquake

Worker (egress after 5 minutes)		Environment at RAB	Individual at CAB, SW Direction		Collective Dose, North Direction	
U intake, mg	[HF], mg-m^{-3}	mg U-m^{-3}	U intake, mg	[HF], mg-m^{-3}	person-rem	LCFs
High		0.11	0.39 (0.00099 rem)	0.13	14	0.008

RAB - restricted area boundary.
CAB - controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meter.
To convert rem to sievert, multiply by 0.01.

C.4.2.4 Fire in a UF_6 Handling Area

A fire involving transient combustible material is postulated to breach a UF_6 transfer manifold containing feed vapor from five feed stations in a single UF_6 Handling Area. The release would involve approximately 3.4 kilograms (7.5 pounds) of UF_6 vapor.

The results of the consequence assessment are presented in Table C-18 and show that the consequences of this accident are low for the proposed NEF worker, the environment, the individual at the controlled area boundary, and the public offsite.

Table C-18 Health Effects Resulting from Fire in a UF_6 Handling Area[a]

Worker (egress after 5 minutes)		Environment at RAB	Individual at CAB, SW Direction		Collective Dose, North Direction	
U intake, mg	[HF], mg-m^{-3}	mg U-m^{-3}	U intake, mg	[HF], mg-m^{-3}	person-rem	LCFs
3.2 (0.0055 rem)	11	0.012	0.042 (0.000072 rem)	0.024	0.92	0.0006

RAB - restricted area boundary.
CAB - controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meter.
To convert rem to sievert, multiply by 0.01.

In accordance with the performance requirements of 10 CFR Part 70, Subpart H, LES has identified Items Relied on for Safety to ensure the risk of this type of accident remains low. To reduce the magnitude of fires resulting from the presence of transient combustible material, LES would rely on administrative controls. The purpose of these controls is to prevent large fires that could result in the release of large inventories of UF_6.

C.4.2.5 Process Line Rupture in a Product Low-Temperature Takeoff Station

Cold traps and chemical traps would be used at the proposed NEF to remove residual UF_6 and hydrogen fluoride from process lines prior to discharging exhaust gases from these lines to the gaseous effluent vent system. An accident could occur if a product vent subsystem carbon trap became saturated with UF_6 caused by a small UF_6 leak through a product cold trap valve. Were this to occur, a UF_6 plug could form on the discharge of the vacuum pump, causing high pressure in the vacuum pump and thus failing seals leading to a release of approximately 1.0 kilogram (2 pounds) of UF_6 vapor to the UF_6 Handling Area.

The results of the consequence assessment are presented in Table C-19 and show that the consequences of this accident are low for the proposed NEF worker, the environment, the individual at the controlled area boundary, and the public offsite.

Table C-19 Acute Health Effects Resulting from Process Line Rupture in a Product Low-Temperature Takeoff Station

Worker (egress after 5 minutes)		Environment at RAB	Individual at CAB, SW Direction		Collective Dose, NNW Direction	
U intake, mg	[HF], $mg\text{-}m^{-3}$	$mg\ U\text{-}m^{-3}$	U intake, mg	[HF], $mg\text{-}m^{-3}$	person-rem	LCFs
0.92 (0.0059 rem)	3.1	0.0035	0.012 (0.000078 rem)	0.0069	0.97	0.0006

RAB - restricted area boundary.
CAB - controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meter.
To convert rem to sievert, multiply by 0.01.

In accordance with the performance requirements of 10 CFR Part 70, Subpart H, LES has identified Items Relied on for Safety to ensure the risk of this type of accident remains low. For this accident, a preventive measure is a fail-safe, hard-wired, high-carbon trap weight trip of the vacuum pump. This equipment would be tested annually to ensure its availability and reliability to serve its intended safety function.

C.4.3 Consequence Assessment for Land and Biota Effects

The hydraulic rupture of a UF_6 cylinder is used to demonstrate the potential impacts that an accident at the proposed NEF would have on the surrounding land and biota. This accident releases the maximum quantity of UF_6 and thus bounds the impacts of all of the accidents described in this appendix.

As described in Section C.4.2, the postulated rupture could release up to 12,500 kilograms (27,600 pounds) of UF_6 into the Blending Donor Station and then to the Sampling Area. The release into the building would then be released into the atmosphere. The consequences of such a release on the surrounding land and biota are considered by analogy with the consequences from a similar accident that occurred at the Sequoyah Fuels Corporation in January 1986 (NRC, 1986). A rupture of a cylinder containing 13,380 kilograms (29,500 pounds) was caused by a supervisor taking actions contrary to operating procedures. The rupture resulted in the release of UF_6 outside of the building. The release formed a cloud consisting of the chemical products of UF_6 reacting with the moisture in the air, UO_2F_2 and hydrogen fluoride. It was estimated that 75 percent of the release occurred over 5 minutes with the remaining 25 percent of the release occurring over the subsequent 40 minutes. The plume was transported along with the wind which was blowing at 8 meters per second (18 miles per hour) with atmospheric stability class D.

Areas over which the release products from this accident at Sequoyah Fuels Corporation were deposited were estimated in NUREG-1189 (NRC, 1986). Uranium deposition of 13,600 milligrams per square meter (0.045 ounces per square foot) was found onsite while an area of 7.68 square kilometers (2.97 square miles) was found to encompass uranium depositions of 1.36 milligrams per square meter (4.5×10^{-6} ounces per square foot). Soil concentration action levels of 40 micrograms per gram for uranium and 350 micrograms per gram for fluoride were established based on health considerations.

Deposition rates were converted to soil concentration by assuming that the deposited material mixes with the upper centimeter (inch) of soil having a typical density of 2 grams per cubic centimeter (about 125 pounds per cubic foot). Uranium soil concentrations were then found to exceed the action level within an area of approximately 0.32 square kilometers (0.20 square miles). This area extended approximately 1 kilometer (0.6 miles) from the release location. The fluoride soil concentration action level was found to not extend offsite.

Cattle located onsite were examined by veterinarians and showed no ill effects from the release. Their urine samples did indicate elevated levels of fluoride and uranium. Animals on farms beyond Sequoyah Fuels Corporation were considered free to move to slaughter in the normal manner. The highest levels of uranium and fluoride were contained onsite. The effects on vegetation of the lower levels found offsite were expected to be insignificant.

These effects at Sequoyah Fuels Corporation are expected to be somewhat greater than the effects that would result if a similar (bounding) accident were to occur at the proposed NEF. The quantity of UF_6 subject to release at the proposed NEF would be approximately 93 percent of that at Sequoyah Fuels Corporation. The release rates from the proposed NEF would be less than those at Sequoyah Fuels Corporation because the former release would be from building ventilation rather than directly outside. At the proposed NEF, somewhat less than half of the released material would enter the environment outside of the building in the first 30 minutes after the rupture. This lower release rate to the environment would result in lower environmental concentrations in the site vicinity. Winds at the proposed NEF could be expected to result in at least as much dispersion as the winds at Sequoyah Fuels Corporation did during the accident. The wind speed at the proposed NEF would be greater than 7 meters per second (15.7 miles per hour) 72.2 percent of the time (see Section 3.5.2.4, Winds and Atmospheric Stability, of this Draft EIS); the atmospheric stability would be class D or less stable 65.8 percent of the time. Lesser wind speeds or more stable atmospheric conditions would result in less dispersion and elevated soil concentrations extending further, although not spreading as much laterally.

C.4.4 Accident Analysis Summary

A representative subset of the potential accidents that could occur at the proposed NEF was selected and evaluated with the summary of the five potential accidents given in Table C-20. The accident consequences vary in magnitude and include accidents initiated by natural phenomena, operator error, and equipment failure. Analytical results indicate that accidents at the proposed NEF pose acceptably low risks. The most significant accident consequences are those associated with the release of UF_6 caused by rupturing an overfilled and/or overheated cylinder. The proposed NEF design would reduce the risk (likelihood) of this event by using redundant heater controller trips. In addition, the proposed NEF Emergency Plan addresses this type of event and all other lower-risk, high-consequence, and intermediate-consequence events. It is concluded that through the combination of plant design, passive and active engineered controls (Items Relied on for Safety), and administrative controls, accidents at the proposed NEF would pose an acceptably low risk to workers, the environment, and the public.

Table C-20 Summary of Health Effects Resulting from Accidents at the Proposed NEF

	Worker[a]		Environment at RAB	Individual at CAB, SW Direction		Collective Dose		
Accident	U intake, mg (rem)	[HF], mg/m^3	mg U/m^3	U intake mg (rem)	[HF], mg/m^3	Direction	person-rem	LCFs
Inadvertent Nuclear Criticality	High[b]		0.66[c]	(0.14[d])	---	West	44	0.03
Hydraulic Rupture of a UF_6 Cylinder	High[b]		44	150 (0.97)	86	North	12,000	7[e]
Earthquake	High[b]		0.11	0.39 (0.00099)	0.13	North	19	0.008
Fire in a UF_6 Handling Area	3.2 (0.0055)	11	0.012	0.042 (0.000072)	0.024	North	0.92	0.0006
Process Line Rupture	0.92 (0.0059)	3.1	0.0035	0.012 (0.000078)	0.0069	North	0.97	0.0006

[a] Worker exits after 5 minutes.
[b] High consequence could lead to a fatality.
[c] Pursuant to 10 CFR § 70.61(c)(3), this value is the sum of the fractions of individual fission product radionuclide concentrations over 5,000 times the concentration limits that appear in 10 CFR Part 20, Appendix B, Table 2.
[d] The dose to the individual at the controlled area boundary is the sum of internal and external doses from fission products released from the Technical Services Buildings Gaseous Effluent Vent System stack.
[e] Though the consequences of the rupture of a liquid-filled UF_6 cylinder would be high, redundant heater controller trips would make this event highly unlikely.
RAB - restricted area boundary.
CAB - controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meter.
To convert rem to sievert, multiply by 0.01.

C.5 References

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APPENDIX D - TRANSPORTATION METHODOLOGY, ASSUMPTION, AND IMPACTS

D.1 Introduction

This appendix presents the methodology, assumptions, and results for the transportation of radioactive materials to and from the proposed National Enrichment Facility (NEF). Also included is the transportation of the converted triuranium octaoxide (U_3O_8) and calcium fluoride (CaF_2) (if necessary) resulting from the conversion of the depleted uranium hexafluoride (DUF_6). The CaF_2 is generated during the conversion process from the neutralization of hydrofluoric acid. However, if the conversion process is performed at a potential facility at Metropolis, Illinois, the hydrogen fluoride acid would be reused at that facility. Louisiana Energy Services (LES) has proposed to use only trucks for the transport of radioactive shipments; however, this appendix also assumes that rail transport would be a viable option.

Briefly, the impact assessment needs to determine the following: the origin and destination of each type of radioactive material, the amount of material in each shipment, the mode of shipment (truck or rail), the route to be used, and finally the impact assessment. In this process, the WebTragis and RADTRAN 5 computer codes were used extensively and are discussed in more detail later (ORNL, 2003; Neuhauser and Kanipe, 2003). The appendix is organized into separate sections that describe the radioactive materials, the shipping routes, the dose assessments, and the results.

D.2 Radioactive Material Description

The radioactive materials transported to and from the proposed NEF are subject to both NRC (10 CFR Part 71) and DOT (49 CFR Parts 171-173) shipping regulations. With the exception of the product material, all shipments can be transported in Type A shipping containers without additional requirements. The product material can be shipped in Type A containers but is considered as fissile material and would require additional fissile controls. An overpack surrounding the shipping container would be required. However, in this assessment of the radiological impacts, any reduction in exposures due to the present of an overpack is ignored.

Several different types of radioactive materials are proposed for shipment. Table D-1 presents the composition of three different types of containers proposed for the shipment of feed, product, depleted uranium, and waste. Figures D-1 through D-3 are diagrams and Tables D-2 through D-4 are the specifications for the Type 30B, 48X, and 48Y cylinders, respectively. One year of decay was included as a conservative assumption to account for a decay in shipping between the generation of the natural UF_6 and any radioactive shipments.

Two other radioactive materials requiring transportation that result from the conversion of DUF_6 are depleted U_3O_8 and CaF_2. Assuming no change in isotopic concentration of the four uranium isotopes, the U_3O_8 material would have the same curie content as the DUF_6. The CaF_2 could have about 55 becquerels (1.5 picocuries) per gram of depleted uranium as a radioactive contaminate (DOE, 2004a; DOE 2004b). Based on a 11,340-kilogram (25,000-pound) amount of processed material, Table D-5 presents the curie inventory of the converted U_3O_8 and CaF_2. This amount of material presents the approximate net load that a truck could reasonably haul without obtaining special permits.

The radionuclide data and shipping container characteristics for input into RADTRAN 5 were obtained from the U.S. Department of Energy's (DOE's) *A Resource Handbook on DOE Transportation Risk*

Assessment (DOE, 2002) and the U.S. Nuclear Regulatory Commission's (NRC's) NUREG-0170 (NRC, 1977).

Table D-1 Curie Inventory in Selected Shipping Containers for Truck Transportation[a]

Radionuclide	Feed Material (Natural Uranium as UF_6)		Product (Enriched Uranium as UF_6)	Depleted Uranium (DUF_6)	Residue (Heels)	Solid Waste
	Type 48Y Cylinder	Type 48X Cylinder	Type 30B Cylinder	Type 48Y Cylinder	Type 48Y Cylinder	55-Gallon Drum
Tl-207	4.28×10^{-8}	3.29×10^{-8}	5.74×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.84×10^{-12}
Tl-208	1.75×10^{-15}	1.35×10^{-15}	2.35×10^{-15}	8.35×10^{-16}	1.25×10^{-15}	2.80×10^{-19}
Pb-210	5.52×10^{-11}	4.25×10^{-11}	8.71×10^{-11}	2.48×10^{-11}	4.49×10^{-11}	8.82×10^{-15}
Pb-211	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Pb-212	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Pb-214	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.72×10^{-13}
Bi-210	5.52×10^{-11}	4.25×10^{-11}	8.71×10^{-11}	2.48×10^{-11}	4.38×10^{-11}	8.82×10^{-15}
Bi-211	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Bi-212	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Bi-214	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.72×10^{-13}
Po-210	1.79×10^{-11}	1.38×10^{-11}	2.82×10^{-11}	8.04×10^{-12}	2.32×10^{-11}	2.86×10^{-15}
Po-211	1.20×10^{-10}	9.25×10^{-11}	1.61×10^{-10}	5.75×10^{-11}	3.90×10^{-11}	1.92×10^{-14}
Po-212	3.12×10^{-15}	2.40×10^{-15}	4.18×10^{-15}	1.49×10^{-15}	2.22×10^{-15}	4.99×10^{-19}
Po-214	5.45×10^{-9}	4.20×10^{-9}	8.60×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.71×10^{-13}
Po-215	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Po-216	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Po-218	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.72×10^{-13}
Rn-219	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Rn-220	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Rn-222	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.72×10^{-13}
Fr-223	5.92×10^{-10}	4.56×10^{-10}	7.94×10^{-10}	2.83×10^{-10}	2.09×10^{-10}	9.47×10^{-14}
Ra-223	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Ra-224	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Ra-226	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.93×10^{-9}	8.72×10^{-13}
Ra-228	4.37×10^{-14}	3.37×10^{-14}	5.86×10^{-14}	2.09×10^{-14}	1.48×10^{-14}	6.99×10^{-18}
Ac-227	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.51×10^{-8}	6.86×10^{-12}
Ac-228	4.37×10^{-14}	3.37×10^{-14}	5.86×10^{-14}	2.09×10^{-14}	1.48×10^{-14}	6.99×10^{-18}

Radionuclide	Feed Material (Natural Uranium as UF_6)		Product (Enriched Uranium as UF_6)	Depleted Uranium (DUF_6)	Residue (Heels)	Solid Waste
	Type 48Y Cylinder	Type 48X Cylinder	Type 30B Cylinder	Type 48Y Cylinder	Type 48Y Cylinder	55-Gallon Drum
Th-227	4.23×10^{-8}	3.26×10^{-8}	5.67×10^{-8}	2.02×10^{-8}	1.42×10^{-8}	6.77×10^{-12}
Th-228	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.53×10^{-15}	7.79×10^{-19}
Th-230	2.52×10^{-5}	1.94×10^{-5}	3.97×10^{-5}	1.13×10^{-5}	3.01×10^{-6}	4.03×10^{-9}
Th-231	1.29×10^{-1}	9.91×10^{-2}	1.73×10^{-1}	6.16×10^{-2}	0	2.06×10^{-5}
Th-232	8.74×10^{-13}	6.73×10^{-13}	1.17×10^{-12}	4.17×10^{-13}	1.04×10^{-13}	1.40×10^{-16}
Th-234	2.8	2.15	5.10×10^{-1}	2.81	1.06×10^{-5}	4.47×10^{-4}
Pa-231	2.72×10^{-6}	2.10×10^{-6}	3.65×10^{-6}	1.30×10^{-6}	3.28×10^{-7}	4.36×10^{-10}
Pa-234m	2.8	2.15	5.10×10^{-1}	2.81	1.06×10^{-5}	4.47×10^{-4}
Pa-234	3.64×10^{-3}	2.80×10^{-3}	6.63×10^{-4}	3.65×10^{-3}	1.38×10^{-8}	5.82×10^{-7}
U-234	2.8	2.15	4.42	1.26	9.01×10^{-8}	4.47×10^{-4}
U-235	1.29×10^{-1}	9.91×10^{-2}	1.73×10^{-1}	6.16×10^{-2}	0	2.06×10^{-5}
U-236	1.77×10^{-2}	1.36×10^{-2}	2.38×10^{-2}	8.46×10^{-3}	0	2.83×10^{-6}
U-238	2.8	2.15	5.10×10^{-1}	2.81	0	4.47×10^{-4}

[a] Includes 1-year decay and in-growth.
To convert from curies to becquerels multiply by 3.7×10^{10}
Source: LES, 2004b.

Table D-2 Type 30B Cylinder Specifications

Parameter	Value
Nominal Diameter	76 centimeters (30 inches)
Nominal Length	206 centimeters (81 inches)
Wall Thickness	1.27 centimeters (0.5 inch)
Nominal Tare Weight	635 kilograms (1,400 pounds)
Maximum Net Weight	2,300 kilograms (5,000 pounds)
Nominal Gross Weight	2,900 kilograms (6,400 pounds)
Minimum Volume	736 liters (26 cubic feet)
Basic Material of Construction	Steel: ASTM A-516
Service Pressure	1,380 kiloPascals gage (200 pounds per square inch gage)
Hydrostatic Test Pressure	2,760 kiloPascals gage (400 pounds per square inch gage)
Isotopic Content Limit	5.0 percent uranium-235 (^{235}U) (maximum with moderation control)
Valve Used	2.54-centimeter valve (1-inch valve)

Source: USEC, 1995.

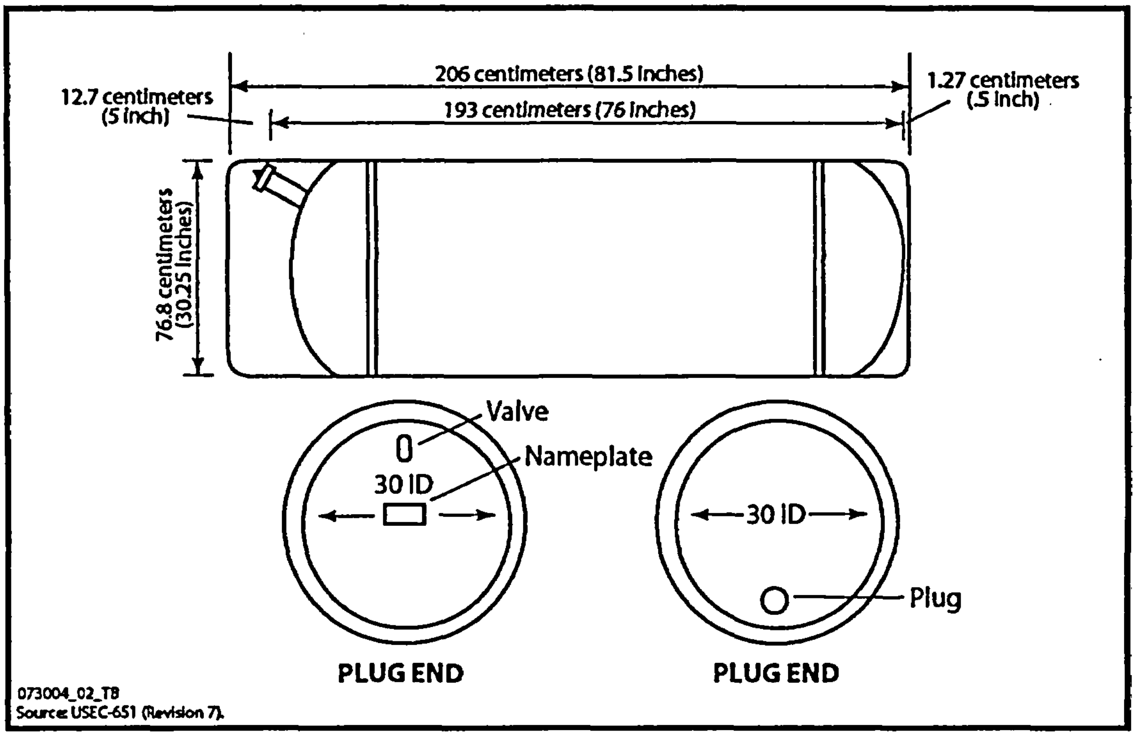

Figure D-1 Schematic of a Type 30B Cylinder (USEC, 1995)

Table D-3 Type 48X Cylinder Specifications

Parameter	Value
Nominal Diameter	122 centimeters (48 inches)
Nominal Length	302 centimeters (119 inches)
Wall Thickness	1.6 centimeters (0.625 inch)
Nominal Tare Weight	2,000 kilograms (4,500 pounds)
Maximum Net Weight	9,540 kilograms (21,000 pounds)
Nominal Gross Weight	11,600 kilograms (25,500 pounds)
Minimum Volume	3.048 cubic meters (108.9 cubic feet)
Basic Material of Construction	Steel: ASTM A-516
Service Pressure	1,380 kiloPascals gage (200 pounds per square inch gage)
Hydrostatic Test Pressure	2,760 kiloPascals gage (400 pounds per square inch gage)
Isotopic Content Limit	4.5 percent ^{235}U (maximum with moderation control for transport, 5.0% for in-plant use)
Valve Used	2.54-centimeter valve (1-inch valve)

Source: USEC, 1995.

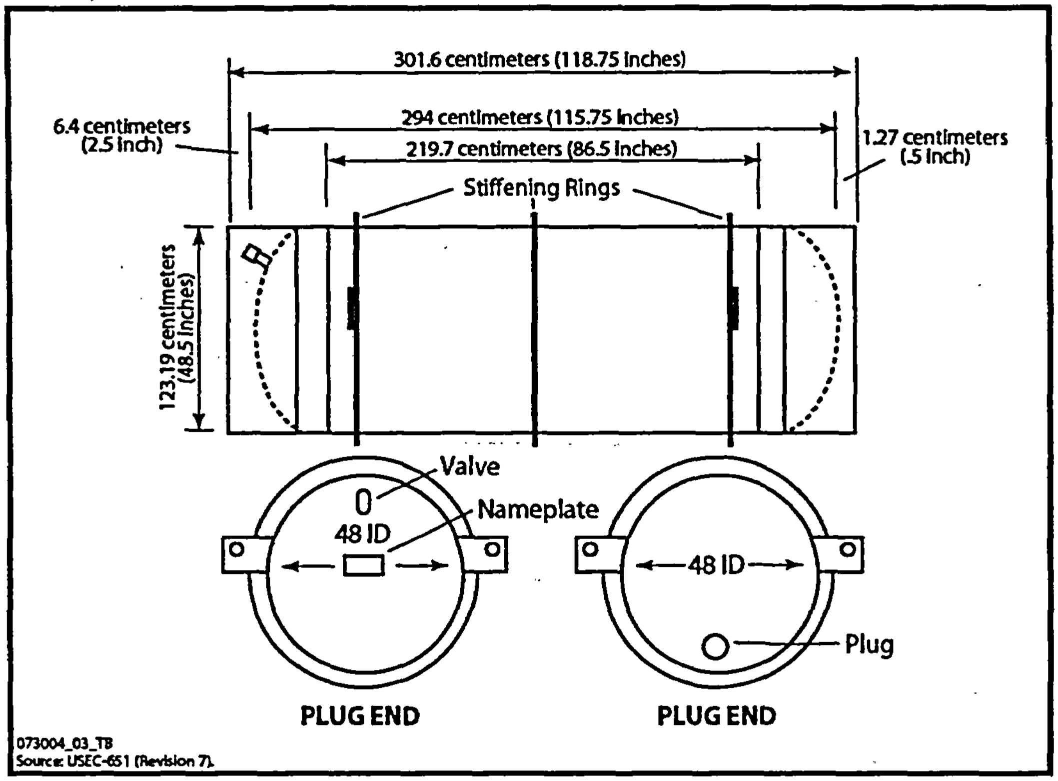

Figure D-2 Schematic of a Type 48X Cylinder (USEC, 1995)

Table D-4 Type 48Y Cylinder Specifications

Parameter	Value
Nominal Diameter	122 centimeters (48 inches)
Nominal Length	380 centimeters (150 inches)
Wall Thickness	1.6 centimeters (0.625 inches)
Nominal Tare Weight	2,359 kilograms (5,200 pounds)
Maximum Net Weight	12,500 kilograms (27,560 pounds)
Nominal Gross Weight	14,860 kilograms (32,760 pounds)
Minimum Volume	4.04 cubic meters (142.7 cubic feet)
Basic Material of Construction	Steel: ASTM A-516
Service Pressure	1,380 kiloPascals gage (200 pounds per square inch gage)
Hydrostatic Test Pressure	2,760 kiloPascals gage (400 pounds per square inch gage)
Isotopic Content Limit	4.5 percent ^{235}U (maximum with moderation control)
Valve Used	2.54-centimeter valve (1-inch valve)

Source: USEC, 1995.

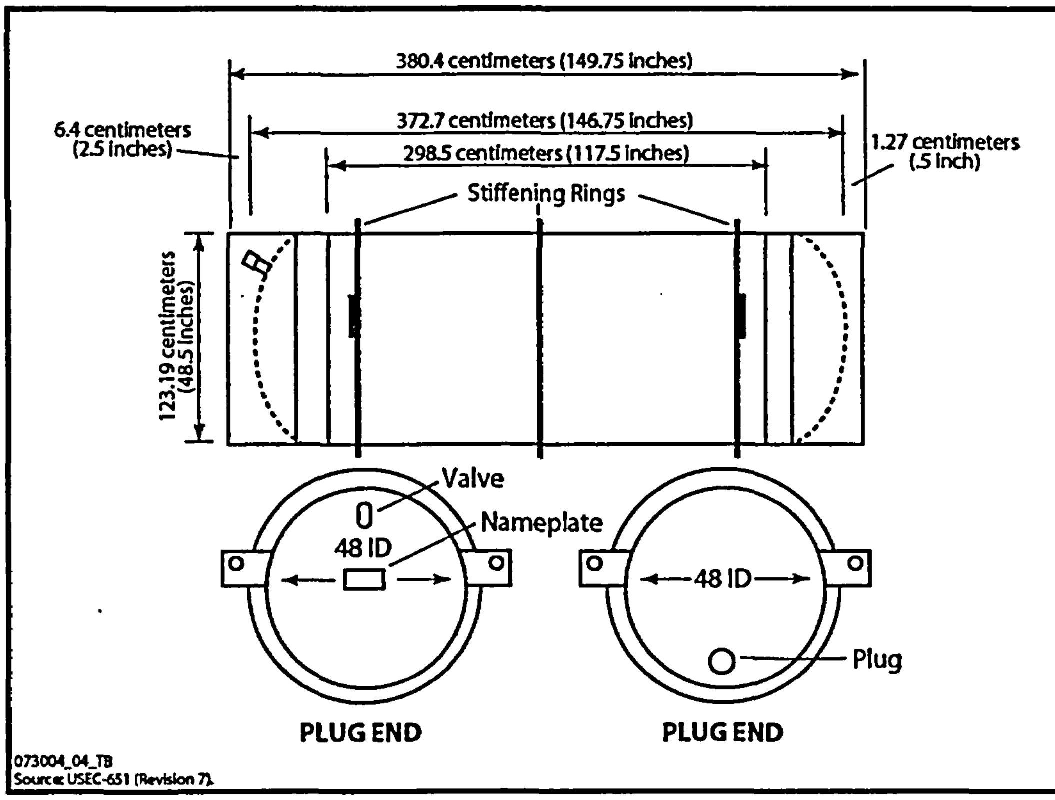

Figure D-3 Schematic of a Type 48Y Cylinder (USEC, 1995)

Table D-5 Curie Content of U_3O_8 and CaF_2 Based on 11,340-Kilogram (25,000-Pound) Amounts

	Curie Content	
Radionuclide	**U_3O_8 [a,b]**	**CaF_2 [a,c]**
Uranium-234	4.47	1.70×10^{-5}
Uranium-235	0.218	5.82×10^{-9}
Uranium-236	0.03	1.72×10^{-7}
Uranium-238	9.94	9.05×10^{-10}

[a] Based on the DUF_6 radionuclide concentration.
[b] Based on a material conversion of 1.18 pounds of U_3O_8 per pound of uranium in UF_6.
[c] Based on the material conversion of 2.05 pound of CaF_2 per pound of F in UF_6 and 1.5 picocurie contamination of depleted uranium per gram of CaF_2.
To convert from curies to becquerels, multiply by 3.7×10^{10}.

The NRC staff reviewed the number of shipments and the number of packages per truck based on the amount of materials being shipped to or from the proposed NEF. The NRC staff assumed that the contents of a railcar have the equivalent content of four trucks. Table D-6 presents the number of packages and number of trucks or railcars that would be required for the transport.

Table D-6 Number of Packages and Number of Trucks or Railcars Required for the Transport

Material	Type of Container	Number of Containers	Number of Trucks	Number of Railcars
Natural UF_6	Type 48X[a]	890[a]	890[a]	223
	Type 48Y[a]	690[a]	690[a]	173
Enriched UF_6	Type 30B[a]	350[a]	117[a]	30
DUF_6	Type 48Y[a]	627[a]	627[a]	157
Depleted U_3O_8	11,340-kg (25,000-lb) bulk bags[b]	547	547	137
CaF_2	11,340-kg (25,000-lb) bulk bags[b]	461	461	116
Solid Waste	55 gallon drums[a]	480[a]	8[a]	2

kg - kilogram.; lb - pound.
Source: [a] LES, 2004a; [b] DOE, 2004a; DOE, 2004b.

Table D-7 provides a summary of information regarding estimates of the direct radiation near each type of shipping container (LES, 2004).

Table D-7 Direct Radiation Surrounding Shipping Containers

Item	Feed Material in Type 48X Cylinder	Feed Material in Type 48Y Cylinder	Product in Type 30B Cylinder	DUF_6 in Type 48Y Cylinder	Solid Waste in 55-gallon drum
Direct Radiation at 1 meter (mrem/hr)	0.29	0.29	0.19	0.28	0.0042
Direct Radiation at 2 meters (mrem/hr)	0.0722	0.0722	0.032	0.072	0.0013

mrem/hr - millirems per hour.
To convert from millirems to millisieverts, multiply by 1×10^{-2}
Source: LES, 2004b.

The direct radiation from the DUF_6 cylinder was assumed to be representative of the direct radiation from the shipments of U_3O_8 and CaF_2 via truck. The U_3O_8 and CaF_2 were assumed to be shipped in bulk bags on a truck in 11,340-kilogram (25,000-pound) amounts.

For shipments by railroad, a railcar could transport four times the amount that is proposed to be transported by truck. The direct radiation per cylinder was assumed to remain the same.

In addition to the radioactive materials released from containers of UF_6 (either natural, enriched, or depleted) during an accident, toxic chemicals could be released, as discussed in Section D.5. The impacts are also discussed in Section D.5.

D.3 Transportation Routes

This section presents the various shipping routes for the radioactive material to and from the sites and from the U_3O_8 conversion facility. WebTragis (ORNL, 2003) was used to generate the routing information for both the truck and railroad routes. WebTragis is a web-based version of Tragis (Transport Routing Analysis Geographic Information System) and is used to calculate highway, rail, or waterway routes within the United States. Table D-8 presents a matrix of the shipping origins and destinations for the various radioactive materials.

Table D-8 Shipping Origins and Destinations

Route	Feed Material (Natural UF_6)	Product (Enriched UF_6)	DUF_6	Depleted U_3O_8	CaF_2	Solid Waste
Port Hope, ON, to NEF [a]	X					
Metropolis, IL, to NEF [a]	X					
NEF to Columbia, SC [a]		X				
NEF to Wilmington, NC [a]		X				
NEF to Richland, WA [a]		X				
NEF to Paducah, KY			X			
NEF to Portsmouth, OH			X			
NEF to Metropolis, IL [a]			X			
NEF to Clive, UT [a]				X[b]	X[b]	X
NEF to Hanford, WA [a]				X[b]	X[b]	X
NEF to Barnwell, SC [a]						X
NEF to Oak Ridge, TN [a]						X
Metropolis, IL, to Clive, UT				X		
Paducah, KY, to Clive, UT				X		
Portsmouth, OH, to Clive, UT				X		
Paducah, KY, to NTS, NV				X		
Portsmouth, OH, to NTS, NV				X		

[a] LES, 2004a.

ON - Ontario, Canada. NEF - proposed NEF. IL - Illinois. SC - South Carolina.
NC - North Carolina. WA - Washington. KY - Kentucky. OH - Ohio.
UT - Utah. TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

[b] As discussed in Section2.1.9, Option 1b, it was assumed that the conversion facility could be located within 6.4 kilometers (4.0 miles) of the proposed NEF).

For this Draft Environmental Impact Statement (Draft EIS), both truck and rail shipments were assumed to be valid modes of transport for each route. For some routes, the destination is not directly served by rail and it is assumed that the radioactive materials would be transferred to truck for delivery to the final destination. WebTragis generates routing distance, population density within 800 meters (0.5 mile), and for the truck routes, the number of rest stops and stops for State inspections. Tables D-9 and D-10 present the output from WebTragis to be used in the transportation assessment for truck and rail transport, respectively. For Port Hope, Ontario, an additional 241 kilometers (150 miles) of route distance and an inspection stop was added to the WebTragis output to account for that portion of the route located in Canada.

Even though transportation regulations by truck do not require restricted routing for the shipment of natural uranium, low-enriched uranium, or depleted uranium, routing restrictions were applied as follows:

- Highway Route Controlled Quantity preferred route with two drivers.
- Prohibit use of links prohibiting truck use.
- Prohibit use of ferry crossing; prohibit use of roads with hazardous materials prohibition.
- Prohibit use of roads with radioactive materials prohibition.

Table D-9 Distance, Density, and Stop Information Generated by WebTragis for Truck Routes

Facility	Number of Stops		Link Type	Distance Per Trip (km [mile])		Population Density (people/km² [mile²])	
	Inspection	Rest					
UF_6 Conversion Facility, Port Hope, Ontario, Canada	7	9	Rural	2,026.6	(1,259.3)	15.5	(6.0)
			Suburban	1,053.0	(654.3)	333.1	(128.6)
			Urban	129.9	(80.7)	2,276.8	(879.1)
UF_6 Conversion Facility, Metropolis, IL	3	4	Rural	1,329.1	(825.9)	12.6	(4.9)
			Suburban	414.8	(257.7)	320.9	(123.9)
			Urban	44.0	(27.3)	2,255.3	(870.8)
Fuel Fabrication Facility, Columbia, SC	5	6	Rural	1,557.8	(968.0)	24.5	(9.5)
			Suburban	689.5	(428.4)	318.2	(122.9)
			Urban	65.8	(40.9)	2,193.6	(847.0)
Fuel Fabrication Facility, Wilmington, NC	6	7	Rural	1,850.5	(1,149.8)	14.8	(5.7)
			Suburban	836.3	(519.7)	309.1	(119.3)
			Urban	69.4	(43.1)	2,191.9	(846.3)
Fuel Fabrication Facility, Richland, WA	7	9	Rural	2,950.9	(1,833.6)	7.6	(2.9)
			Suburban	501.8	(311.8)	342.3	(132.2)
			Urban	85.2	(52.9)	2,318.5	(895.2)
Barnwell, SC	5	6	Rural	1,549.8	(963.0)	14.1	(5.4)
			Suburban	644.2	(400.3)	321.6	(124.2)
			Urban	65.8	(40.9)	2,170.6	(838.1)
Hanford, WA	7	9	Rural	2,986.4	(1,855.7)	7.6	(2.9)
			Suburban	501.2	(311.4)	342.5	(132.2)
			Urban	85.0	(52.8)	2,316.6	(894.4)

Facility	Number of Stops: Inspection	Number of Stops: Rest	Link Type	Distance Per Trip (km [mile])		Population Density (people/km^2 [mile^2])	
Clive, UT	4	7	Rural	2,265.7	(1,407.8)	6.8	(2.6)
			Suburban	369.3	(229.5)	375.2	(144.9)
			Urban	84.5	(52.5)	2,359.3	(910.9)
Oak Ridge, TN	2	5	Rural	1,432.9	(890.4)	13.6	(5.3)
			Suburban	512.2	(318.3)	336.0	(129.7)
			Urban	69.7	(43.3)	2,264.6	(874.4)
DUF_6 Conversion Facility, Paducah, KY	4	5	Rural	1,348.0	(837.6)	12.6	(4.9)
			Suburban	418.4	(260.0)	319.2	(123.2)
			Urban	42.8	(26.6)	2,269.3	(876.2)
DUF_6 Conversion Facility, Portsmouth, OH	4	6	Rural	1,660.0	(1,031.5)	14.9	(5.8)
			Suburban	671.1	(417.0)	326.9	(126.2)
			Urban	78.8	(49.0)	2,249.1	(868.4)
Depleted U_3O_8 from Metropolis, IL, to Clive, UT	8	8	Rural	2,615.2	(1,625.0)	11.3	(4.4)
			Suburban	562.3	(349.4)	315.2	(121.7)
			Urban	69.1	(42.9)	2,293.8	(885.6)
Depleted U_3O_8 from Paducah, KY, to NTS, NV	8	8	Rural	2,731.3	(1,697.2)	9.9	(3.8)
			Suburban	532.2	(330.7)	328.0	(126.6)
			Urban	85.5	(53.1)	2,377.6	(918.0)
Depleted U_3O_8 from Portsmouth, OH, to NTS, NV	10	9	Rural	3,106.3	(1,930.2)	10.9	(4.2)
			Suburban	659.2	(409.6)	319.9	(123.5)
			Urban	99.4	(61.8)	2,396.6	(925.3)
Depleted U_3O_8 from Paducah, KY, to Clive, UT	6	7	Rural	2,240.2	(1,392.0)	10.1	(3.9)
			Suburban	435.3	(270.5)	323.8	(125.0)
			Urban	55.1	(34.2)	2,238.4	(864.3)
Depleted U_3O_8 from Portsmouth, OH, to Clive, UT	8	8	Rural	2,615.2	(1,625.0)	11.3	(4.4)
			Suburban	562.3	(349.4)	315.2	(121.7)
			Urban	69.1	(42.9)	2,293.8	(885.6)

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.
Source: Calculations using WebTragis (ORNL, 2003).

Table D-10 Distance, Density Information Generated by WebTragis for Rail Routes

Facility	Link Type	Distance Per Trip (km [mi])		Population Density (people/km² [mile²])	
UF_6 Conversion Facility Port Hope, Ontario, Canada	Rural	2,361.0	(1,467.1)	11.3	(4.4)
	Suburban	769.3	(478.0)	436.3	(168.5)
	Urban	164.2	(102.0)	2,358.8	(910.7)
UF_6 Conversion Facility, Metropolis, IL	Rural	1,637.6	(1,017.6)	9.7	(3.7)
	Suburban	411.0	(255.4)	427.6	(165.1)
	Urban	56.4	(35.0)	2,148.4	(829.5)
Fuel Fabrication Facility, Columbia, SC	Rural	1,919.5	(1,192.7)	11.8	(4.6)
	Suburban	801.5	(498.0)	427.1	(164.9)
	Urban	122.1	(75.9)	2,169.1	(837.5)
Fuel Fabrication Facility, Wilmington, NC	Rural	2,150.7	(1,336.4)	12.0	(4.6)
	Suburban	878.0	(545.6)	424.0	(163.7)
	Urban	125.3	(77.9)	2,162.2	(834.8)
Fuel Fabrication Facility, Richland, WA	Rural	3,027.6	(1,881.3)	6.8	(2.6)
	Suburban	550.1	(341.8)	379.3	(146.4)
	Urban	168.2	(104.5)	2,567.5	(991.3)
Barnwell, SC	Rural	1,937.1	(1,203.7)	11.6	(4.5)
	Suburban	728.8	(452.9)	436.2	(168.4)
	Urban	129.5	(80.5)	2,210.2	(853.4)
Hanford, WA	Rural	3,035.5	(1,886.2)	6.8	(2.6)
	Suburban	554.1	(344.3)	380.5	(146.9)
	Urban	171.0	(106.3)	2,560.2	(988.5)
Clive, UT	Rural	2,668.2	(1,657.9)	5.4	(2.1)
	Suburban	327.1	(203.3)	362.9	(140.1)
	Urban	82.2	(51.1)	2,496.7	(964.0)
Oak Ridge, TN	Rural	1,734.2	(1,077.6)	11.4	4.4)
	Suburban	634.6	(394.3)	429.6	(165.9)
	Urban	97.5	(60.6)	2,158.5	(833.4)
DUF_6 Conversion Facility, Paducah, KY	Rural	1,441.2	(895.5)	10.2	(3.9)
	Suburban	425.4	(264.3)	440.0	(169.9)
	Urban	65.4	(40.6)	2,174.9	(839.7)
DUF_6 Conversion Facility, Portsmouth, OH	Rural	1,944.0	(1,207.9)	12.2	(4.7)
	Suburban	643.0	(399.5)	423.2	(163.4)
	Urban	117.7	(73.1)	2,269.2	(876.1)
Depleted U_3O_8 from Metropolis, IL, to Clive, UT	Rural	2,489.1	(1,546.7)	7.1	(2.7)
	Suburban	343.2	(213.3)	363.9	(140.5)
	Urban	54.2	(33.7)	2,309.7	(891.8)

Facility	Link Type	Distance Per Trip (km [mi])		Population Density (people/km² [mile²])	
Depleted U_3O_8 from Paducah, KY, to NTS, NV	Rural	2,935.8	(1,842.2)	6.3	(2.4)
	Suburban	360.2	(223.8)	430.7	(166.3)
	Urban	76.3	(47.4)	2,196.4	(848.0)
Depleted U_3O_8 from Portsmouth, OH, to NTS, NV	Rural	3,191.9	(1,983.4)	7.8	(3.0)
	Suburban	494.3	(307.1)	365.1	(141.0)
	Urban	141.4	(87.9)	2,597.9	(1,003.1)
Depleted U_3O_8 from Paducah, KY, to Clive, UT	Rural	2,513.3	(1,561.7)	7.2	(2.8)
	Suburban	360.5	(224.0)	371.3	(143.4)
	Urban	56.3	(35.0)	2,293.0	(885.3)
Depleted U_3O_8 from Portsmouth, OH, to Clive, UT	Rural	2,669.1	(1,658.5)	8.4	(3.2)
	Suburban	503.0	(312.5)	392.1	(151.4)
	Urban	126.8	(78.8)	2,374.7	(916.9)

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.
km - kilometer; km² - square kilometer.
Source: Calculations using WebTragis (ORNL, 2003).

D.4 RADTRAN 5

The RADTRAN 5 computer code was used to estimate the impacts of the radioactive material shipments (Neuhauser and Kanipe, 2003). The potential impacts include health effects from the exposure to pollution from trucks or railroads, fatalities from truck or rail accidents, health effects from incident-free direct radiation to crew and surrounding populations along the transportation routes, and health effects from the release of radioactive material in transportation accidents. In addition to the WebTragis information, additional input parameters for RADTRAN 5 are required as discussed below.

D.4.1 Accident Parameters

The amount of radioactive material released from a transportation accident depends on the packaging of the material and the severity of the accident. A method widely used to characterize the potential severity of transportation accidents is described in NUREG-0170 (NRC, 1977) and is also presented in DOE's *A Resource Handbook on DOE Transportation Risk Assessment* (DOE, 2002). The NRC method divided the spectrum of accident severities into eight categories with each category being subdivided into rural, suburban, and urban zones containing the fraction of occurrence of the severity class within each zone. Table D-11 presents the fractional occurrences for accidents.

Table D-11 Fractional Occurrences for Accidents by Severity Category and Population Density Zone

Accident Severity Category	Fractional Occurrences of Severity Category	Fractional Occurrence by Population Zone		
		Low (Rural)	Medium (Suburban)	High (Urban)
Truck				
I	0.55	0.1	0.1	0.8
II	0.36	0.1	0.1	0.8
III	0.07	0.3	0.4	0.3
IV	0.016	0.3	0.4	0.3
V	0.0028	0.5	0.3	0.2
VI	0.0011	0.7	0.2	0.1
VII	8.50×10^{-5}	0.8	0.1	0.1
VIII	1.50×10^{-5}	0.9	0.05	0.05
Rail				
I	0.5	0.1	0.1	0.8
II	0.3	0.1	0.1	0.8
III	0.18	0.3	0.4	0.3
IV	0.018	0.3	0.4	0.3
V	0.0018	0.5	0.3	0.2
VI	1.30×10^{-4}	0.7	0.2	0.1
VII	6.00×10^{-5}	0.8	0.1	0.1
VIII	1.00×10^{-5}	0.9	0.05	0.05

Source: DOE, 2002.

Once the frequencies of the accidents are generated, the fractions controlling the amount that is airborne and respirable are required. These fractions are comprised of three additional fractions: the package-release fraction, the fraction of material released that becomes airborne, and the fraction that is airborne which is respirable. These fractions were extracted from DOE Handbook (DOE, 2002). The Type A package fractions are given in Table D-12. These values are conservative because of the lack of data on package failure under severe conditions (DOE, 2002).

Table D-12 Fraction of Package Released, Aerosolized, and Respirable

Accident Severity Category	Release Fraction	Respirable Fraction [a]	Aerosolized Fraction [a]
Truck			
I	0	1	1
II	0.01	1	1
III	0.1	1	1
IV	1	1	1
V	1	1	1
VI	1	1	1
VII	1	1	1
VIII	1	1	1
Rail			
I	0	1	1
II	0.01	1	1
III	0.1	1	1
IV	1	1	1
V	1	1	1
VI	1	1	1
VII	1	1	1
VIII	1	1	1

[a] Assumed very conservative assumption of volatile solid.

Source: DOE, 2002, Tables 6.24 and 6.25.

To evaluate incident-free impacts, other input parameters that affect the exposure duration to the public and crew are required. Table D-13 presents the speed of the vehicle, size of crew, amount of time the package is stopped for driver rest, State inspections, population on adjacent traffic lanes or rail tracks, and other input parameters. The RADTRAN 5 input parameters not described in this appendix were set to the default values in RADTRAN 5.

Table D-13 RADTRAN 5 Input Parameters

Item	Link Type	Truck Transport	Rail Transport
Traffic Volume (vehicle)	Rural	2,400	1
	Suburban	760	1
	Urban	530	1
Vehicle Speed (mph)	Rural	55	40
	Suburban	25	25
	Urban	15	15
Number of People in Adjacent Vehicle		2	4
Size of Crew		2	5
Number People Exposed at Rest Stop		25	N.A.
Exposure Distance at Rest Stop (meters)		20	N.A.
Vehicle Emission Rate (fatalities/km per 1 person/km^2)		8.36×10^{-10}	1.2×10^{-10}
Vehicle Accident		1.42×10^{-8} (fatalities/kilometer)	7.82×10^{-8} (fatalities/ railcar-kilometer)

mph - miles per hour; km - kilometer; km^2 - square kilometer.
To convert from mph to km per hour, multiply by 1.61.
To convert from meters to feet, multiply by 3.28.
To convert from miles to kilometers, multiply by 1.61.
N.A. - not applicable.
Source: DOE, 2002.

D.4.2 RADTRAN 5 Results

This section provides the detailed results of the RADTRAN 5 analyses. Tables D-14 through D-16 present the results by route and type of material being transported for one year by truck. Tables D-17 through D-19 present the results by route and type of material being transported for one year by rail. Tables D-14 and D-17 present the nonradiological impacts from the shipment of radioactive material. They present the estimated potential impact in terms of latent cancer fatalities (LCFs) from the vehicle emissions and fatalities resulting from traffic accidents. Tables D-15 and D-18 present the radiological impacts in terms of LCFs from incident-free transport. Incident-free transport represents the transport of the radioactive shipment without a release from the shipment. Tables D-16 and D-19 present the radiological impacts from accidents during these shipments. Accident results include the impact (risk per year) from various accident scenarios that potentially could occur during the transport of the radioactive material. The results are presented in terms of risk, which means weighting the impact, of the various accident scenarios by the frequency that the accident scenario occurs.

Results are presented in terms of a range of values for each type of shipment. The range represents the impacts from the lowest to highest impact for the various proposed shipping routes. For example, for the feed material, the values represent one year of shipments from both Metropolis, Illinois, and Port Hope, Ontario, Canada. If some feed materials were provided from Metropolis and the remaining amounts from Port Hope, the impacts would be somewhere between the low and high values (impacts could be evaluated by taking the fraction of material from Metropolis times the impacts from Metropolis plus the fraction of material from Port Hope times the impacts from Port Hope).

To evaluate the impact from transportation of radioactive materials, a scenario first has to be selected. Then the impacts from the various materials and routes should be summed. For example, the proposed NEF would receive feed material from Metropolis, Illinois, in Type 48Y cylinders. The product material would be shipped from the proposed NEF to Wilmington, North Carolina. The solid waste would be shipped from the proposed NEF to Clive, Utah, while the DUF_6 would be shipped to Metropolis, Illinois. The converted U_3O_8 would then be shipped to Clive, Utah, for disposal. The impacts from all these material routes should be summed to determine the impact for this scenario. The results that are labeled as "Total Impacts" contain the results of the impacts summed over each of the four types of material. Therefore, these impacts represent the range from the low to high impacts.

For both truck and rail transport, the nonradiological impacts (fatalities from either traffic and train accidents and LCFs) dominate the impacts for each material-route combination.

Table D-14 Nonradiological Fatalities from Truck Transportation of Radioactive Materials

Material	Route	Occupational Normal (LCFs)	Occupational Accident (Fatalities)	Nonoccupational Normal (LCFs)	Nonoccupational Accident (Fatalities)
Feed Material in Type 48X Cylinder	Port Hope, ON	9.7×10^{-3}	6.2×10^{-2}	1.01	2.4×10^{-1}
Feed Material in Type 48Y Cylinder	Port Hope, ON	7.5×10^{-3}	4.8×10^{-2}	7.8×10^{-1}	1.8×10^{-1}
Feed Material in Type 48X Cylinder	Metropolis, IL	5.4×10^{-3}	3.8×10^{-2}	3.7×10^{-1}	1.5×10^{-1}
Feed Material in Type 48Y Cylinder	Metropolis, IL	4.2×10^{-3}	3.0×10^{-2}	2.9×10^{-1}	1.1×10^{-1}
Product in Type 30B Cylinder	Columbia, SC	9.2×10^{-4}	6.1×10^{-3}	7.9×10^{-2}	2.3×10^{-2}
Product in Type 30B Cylinder	Wilmington, NC	1.1×10^{-3}	7.3×10^{-3}	8.4×10^{-2}	2.8×10^{-2}
Product in Type 30B Cylinder	Richland, WA	1.4×10^{-3}	1.1×10^{-2}	7.6×10^{-2}	4.2×10^{-2}
DUF_6 in Type 48Y Cylinder	Paducah, KY	3.9×10^{-3}	2.7×10^{-2}	2.6×10^{-1}	1.1×10^{-1}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	5.1×10^{-3}	3.5×10^{-2}	4.4×10^{-1}	1.3×10^{-1}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	3.8×10^{-3}	2.7×10^{-2}	2.6×10^{-1}	1.0×10^{-1}

Material	Route	Occupational		Nonoccupational	
		Normal (LCFs)	Accident (Fatalities)	Normal (LCFs)	Accident (Fatalities)
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	6.2×10^{-3}	4.7×10^{-2}	5.3×10^{-2}	1.8×10^{-1}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	5.1×10^{-3}	3.9×10^{-2}	3.8×10^{-2}	1.5×10^{-1}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH to NTS	7.2×10^{-3}	5.4×10^{-2}	6.3×10^{-2}	2.1×10^{-1}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	6.0×10^{-3}	4.5×10^{-2}	4.8×10^{-2}	1.8×10^{-1}
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	2.6×10^{-3}	2.0×10^{-2}	1.4×10^{-1}	7.6×10^{-2}
Depleted U_3O_8 in Bulk Bags	Clive, UT	5.1×10^{-3}	3.9×10^{-2}	3.2×10^{-1}	1.5×10^{-1}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	6.6×10^{-3}	5.1×10^{-2}	3.5×10^{-1}	2.0×10^{-1}
CaF_2 in Bulk Bags	Clive, UT	4.3×10^{-3}	3.3×10^{-2}	2.7×10^{-1}	1.3×10^{-1}
CaF_2 in Bulk Bags	Hanford, WA	5.6×10^{-3}	4.3×10^{-2}	2.9×10^{-1}	1.7×10^{-1}
Solid Waste in 55-Gallon Drums	Barnwell, SC	6.2×10^{-5}	4.1×10^{-4}	5.0×10^{-3}	1.6×10^{-3}
Solid Waste in 55-Gallon Drums	Clive, UT	7.4×10^{-5}	5.7×10^{-4}	4.7×10^{-3}	2.2×10^{-3}
Solid Waste in 55-gallon drums	Hanford, WA	9.7×10^{-5}	7.5×10^{-4}	5.1×10^{-3}	2.9×10^{-3}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	5.5×10^{-5}	3.8×10^{-4}	4.7×10^{-3}	1.4×10^{-3}
		Range			
Feed Material	Low	4.2×10^{-3}	3.0×10^{-2}	2.9×10^{-1}	1.1×10^{-1}
	High	9.7×10^{-3}	6.2×10^{-2}	1.01	2.4×10^{-1}
Product	Low	9.2×10^{-4}	6.1×10^{-3}	7.6×10^{-2}	2.3×10^{-2}
	High	1.4×10^{-3}	1.1×10^{-2}	8.4×10^{-2}	4.2×10^{-2}
Disposition of Depleted Uranium	Low	6.4×10^{-3}	4.7×10^{-2}	3.0×10^{-1}	1.8×10^{-1}
	High	1.2×10^{-2}	9.4×10^{-2}	6.4×10^{-1}	3.6×10^{-1}
Waste	Low	5.5×10^{-5}	3.8×10^{-4}	4.7×10^{-3}	1.4×10^{-3}
	High	9.7×10^{-5}	7.5×10^{-4}	5.1×10^{-3}	2.9×10^{-3}
Total Impacts	Low	1.2×10^{-2}	8.3×10^{-2}	6.7×10^{-1}	3.2×10^{-1}
	High	2.4×10^{-2}	1.7×10^{-1}	1.7	6.4×10^{-1}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-15 Radiological LCFs from Incident-Free Truck Transportation of Radioactive Materials

Material	Route	Maximum Individual	In-Transit				Crew	
			Crew	Public Off-Link	Public On-Link	Public Stop	Loading	State Inspection
Feed Material in Type 48X Cylinder	Port Hope, ON	6.7×10^{-9}	1.1×10^{-3}	3.0×10^{-4}	1.5×10^{-3}	1.5×10^{-3}	9.0×10^{-4}	0.0074
Feed Material in Type 48Y Cylinder	Port Hope, ON	5.2×10^{-8}	8.5×10^{-4}	2.3×10^{-4}	1.1×10^{-3}	1.1×10^{-3}	5.4×10^{-4}	4.5×10^{-3}
Feed Material in Type 48X Cylinder	Metropolis, IL	6.7×10^{-9}	5.6×10^{-4}	1.1×10^{-4}	6.2×10^{-4}	6.5×10^{-4}	9.0×10^{-4}	2.0×10^{-3}
Feed Material in Type 48Y Cylinder	Metropolis, IL	5.2×10^{-8}	4.3×10^{-4}	8.9×10^{-5}	4.8×10^{-4}	5.0×10^{-4}	5.4×10^{-4}	1.2×10^{-3}
Product in Type 30B Cylinder	Columbia, SC	3.9×10^{-10}	3.3×10^{-5}	1.1×10^{-5}	5.5×10^{-5}	5.7×10^{-5}	1.6×10^{-4}	6.1×10^{-4}
Product in Type 30B Cylinder	Wilmington, NC	3.9×10^{-10}	3.9×10^{-5}	1.3×10^{-5}	6.4×10^{-5}	6.6×10^{-5}	1.6×10^{-4}	7.3×10^{-4}
Product in Type 30B Cylinder	Richland, WA	3.9×10^{-10}	4.3×10^{-5}	8.7×10^{-6}	5.8×10^{-5}	8.5×10^{-5}	1.6×10^{-4}	8.5×10^{-4}
DUF_6 in Type 48Y Cylinder	Paducah, KY	4.7×10^{-9}	4.0×10^{-4}	8.3×10^{-5}	4.4×10^{-4}	5.7×10^{-4}	6.1×10^{-4}	1.8×10^{-3}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	4.7×10^{-9}	5.5×10^{-4}	1.3×10^{-4}	6.8×10^{-4}	6.9×10^{-4}	6.1×10^{-4}	1.8×10^{-3}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	4.7×10^{-9}	3.9×10^{-4}	8.1×10^{-5}	4.4×10^{-4}	4.6×10^{-4}	6.1×10^{-4}	1.4×10^{-3}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	4.1×10^{-9}	6.0×10^{-4}	9.3×10^{-5}	6.1×10^{-4}	8.0×10^{-4}	1.4×10^{-4}	8.2×10^{-4}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	4.1×10^{-9}	4.8×10^{-4}	7.6×10^{-5}	4.7×10^{-4}	8.0×10^{-4}	1.4×10^{-4}	8.2×10^{-4}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS	4.1×10^{-9}	7.0×10^{-4}	1.1×10^{-4}	7.2×10^{-4}	9.0×10^{-4}	1.4×10^{-4}	1.2×10^{-3}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	4.1×10^{-9}	5.8×10^{-4}	9.6×10^{-5}	5.9×10^{-4}	9.0×10^{-4}	1.4×10^{-4}	1.0×10^{-3}

Material	Route	Maximum Individual	Crew	In-Transit Public Off-Link	In-Transit Public On-Link	In-Transit Public Stop	Crew Loading	Crew State Inspection
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	2.1×10^{-9}	2.5×10^{-4}	3.9×10^{-5}	2.4×10^{-4}	3.1×10^{-4}	7.0×10^{-5}	2.6×10^{-4}
Depleted U_3O_8 in Bulk Bags	Clive, UT	4.1×10^{-9}	4.8×10^{-4}	7.4×10^{-5}	4.9×10^{-4}	6.0×10^{-4}	1.4×10^{-4}	4.1×10^{-4}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	4.1×10^{-9}	6.2×10^{-4}	9.2×10^{-5}	6.1×10^{-4}	9.5×10^{-4}	1.4×10^{-4}	7.2×10^{-4}
CaF_2 in Bulk Bags	Clive, UT	3.5×10^{-9}	4.0×10^{-4}	6.2×10^{-5}	4.1×10^{-4}	5.1×10^{-4}	2.1×10^{-6}	6.3×10^{-6}
CaF_2 in Bulk Bags	Hanford, WA	3.5×10^{-9}	5.3×10^{-4}	7.7×10^{-5}	5.1×10^{-4}	7.6×10^{-4}	2.1×10^{-6}	1.1×10^{-5}
Solid Waste in 55-Gallon Drums	Barnwell, SC	1.1×10^{-12}	2.7×10^{-7}	3.0×10^{-8}	1.5×10^{-7}	1.6×10^{-7}	3.5×10^{-6}	1.3×10^{-4}
Solid Waste in 55-Gallon Drums	Clive, UT	1.1×10^{-12}	2.8×10^{-7}	1.9×10^{-8}	1.3×10^{-7}	1.6×10^{-7}	3.5×10^{-6}	1.0×10^{-5}
Solid Waste in 55-Gallon Drums	Hanford, WA	1.1×10^{-12}	3.7×10^{-7}	2.4×10^{-8}	1.6×10^{-7}	2.4×10^{-7}	3.5×10^{-6}	1.8×10^{-5}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	1.1×10^{-12}	2.3×10^{-7}	2.3×10^{-8}	1.3×10^{-7}	1.6×10^{-7}	3.5×10^{-6}	1.0×10^{-5}
				Range				
Feed	Low	6.7×10^{-9}	4.3×10^{-4}	8.9×10^{-5}	4.8×10^{-4}	5.0×10^{-4}	5.4×10^{-4}	1.2×10^{-3}
	High	6.7×10^{-9}	1.1×10^{-3}	3.0×10^{-4}	1.5×10^{-3}	1.5×10^{-3}	9.0×10^{-4}	7.4×10^{-3}
Product	Low	3.9×10^{-10}	3.3×10^{-5}	8.7×10^{-6}	5.5×10^{-5}	5.7×10^{-5}	1.6×10^{-4}	6.1×10^{-4}
	High	3.9×10^{-10}	4.3×10^{-5}	1.3×10^{-5}	6.4×10^{-5}	8.5×10^{-5}	1.6×10^{-4}	8.5×10^{-4}
Disposition of Depleted Uranium	Low	6.9×10^{-9}	6.4×10^{-4}	1.2×10^{-4}	6.8×10^{-4}	7.7×10^{-4}	1.4×10^{-4}	4.2×10^{-4}
	High	8.9×10^{-9}	1.3×10^{-3}	2.5×10^{-4}	1.4×10^{-3}	1.7×10^{-3}	7.5×10^{-4}	3.0×10^{-3}
Waste	Low	1.1×10^{-12}	2.3×10^{-7}	1.9×10^{-8}	1.3×10^{-7}	1.6×10^{-7}	3.5×10^{-6}	1.0×10^{-5}
	High	1.1×10^{-12}	3.7×10^{-7}	3.0×10^{-8}	1.6×10^{-7}	2.4×10^{-7}	3.5×10^{-6}	1.3×10^{-4}
Total Impacts	Low	1.5×10^{-8}	1.1×10^{-3}	2.2×10^{-3}	1.2×10^{-3}	1.3×10^{-3}	8.4×10^{-4}	2.3×10^{-3}
	High	1.6×10^{-8}	2.4×10^{-3}	5.6×10^{-3}	2.9×10^{-3}	3.3×10^{-3}	1.8×10^{-3}	1.1×10^{-2}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-16 Risk of LCFs from Accidents During Truck Transportation of Radioactive Materials

Material	Route	Ground	Inhaled	Resuspended Soil	Cloud Shine
Feed Material in Type 48X Cylinder	Port Hope, ON	2.4×10^{-7}	1.6×10^{-1}	7.1×10^{-2}	2.2×10^{-11}
Feed Material in Type 48Y Cylinder	Port Hope, ON	2.4×10^{-7}	1.6×10^{-1}	6.8×10^{-2}	2.2×10^{-11}
Feed Material in Type 48X Cylinder	Metropolis, IL	9.0×10^{-8}	5.8×10^{-2}	2.5×10^{-2}	8.1×10^{-12}
Feed Material in Type 48Y Cylinder	Metropolis, IL	8.9×10^{-8}	5.9×10^{-2}	2.4×10^{-2}	8.1×10^{-12}
Product in Type 30B Cylinder	Columbia, SC	8.9×10^{-8}	6.5×10^{-2}	1.3×10^{-2}	3.1×10^{-12}
Product in Type 30B Cylinder	Wilmington, NC	9.6×10^{-8}	7.1×10^{-2}	1.3×10^{-2}	3.3×10^{-12}
Product in Type 30B Cylinder	Richland, WA	8.3×10^{-8}	6.0×10^{-2}	1.4×10^{-2}	2.8×10^{-12}
DUF_6 in Type 48Y Cylinder	Paducah, KY	4.2×10^{-8}	2.6×10^{-2}	1.0×10^{-2}	6.6×10^{-12}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	7.0×10^{-8}	4.3×10^{-2}	1.8×10^{-2}	1.1×10^{-11}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	4.2×10^{-8}	2.5×10^{-2}	1.1×10^{-2}	6.5×10^{-12}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	6.9×10^{-8}	1.2×10^{-4}	8.6×10^{-5}	1.2×10^{-12}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	5.0×10^{-8}	8.6×10^{-5}	5.8×10^{-5}	8.9×10^{-13}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS, NV	8.3×10^{-8}	1.4×10^{-4}	1.0×10^{-4}	1.5×10^{-12}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	6.4×10^{-8}	1.1×10^{-4}	7.4×10^{-5}	1.1×10^{-12}
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	2.6×10^{-8}	4.4×10^{-5}	3.0×10^{-5}	4.6×10^{-12}
Depleted U_3O_8 in Bulk Bags	Clive, UT	5.9×10^{-8}	1.0×10^{-4}	7.7×10^{-5}	1.0×10^{-12}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	6.7×10^{-8}	1.1×10^{-4}	8.3×10^{-5}	1.2×10^{-12}
CaF_2 in Bulk Bags	Clive, UT	4.5×10^{-13}	1.6×10^{-9}	7.3×10^{-9}	1.4×10^{-18}
CaF_2 in Bulk Bags	Hanford, WA	5.1×10^{-13}	1.8×10^{-9}	8.3×10^{-9}	1.6×10^{-18}
Solid Waste in 55-Gallon Drums	Barnwell, SC	2.3×10^{-11}	1.0×10^{-5}	3.5×10^{-5}	1.4×10^{-15}
Solid Waste in 55-Gallon Drums	Clive, UT	1.9×10^{-11}	8.6×10^{-6}	3.0×10^{-5}	1.2×10^{-15}
Solid Waste in 55-Gallon Drums	Hanford, WA	2.2×10^{-11}	9.8×10^{-6}	3.4×10^{-5}	1.4×10^{-15}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	1.9×10^{-11}	8.7×10^{-6}	3.0×10^{-5}	1.2×10^{-15}
		Range			
Feed	Low	8.9×10^{-8}	5.8×10^{-2}	2.4×10^{-2}	8.1×10^{-12}
	High	2.4×10^{-7}	1.6×10^{-1}	7.1×10^{-2}	2.2×10^{-11}

Material	Route	Ground	Inhaled	Resuspended Soil	Cloud Shine
Product	Low	8.3×10^{-8}	6.0×10^{-2}	1.3×10^{-2}	2.8×10^{-12}
	High	9.6×10^{-8}	7.1×10^{-2}	1.4×10^{-2}	3.3×10^{-12}
Disposition of Depleted uranium	Low	5.9×10^{-8}	1.0×10^{-4}	7.7×10^{-5}	1.0×10^{-12}
	High	1.5×10^{-7}	4.3×10^{-2}	1.8×10^{-2}	1.2×10^{-11}
Waste	Low	1.9×10^{-11}	8.6×10^{-6}	3.0×10^{-5}	1.2×10^{-15}
	High	2.3×10^{-11}	1.0×10^{-5}	3.5×10^{-5}	1.4×10^{-15}
Total Impact	Low	2.3×10^{-7}	1.2×10^{-1}	3.7×10^{-2}	1.2×10^{-11}
	High	4.9×10^{-7}	2.7×10^{-1}	1.0×10^{-1}	3.8×10^{-1}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
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TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-17 Nonradiological Fatalities from Rail Transportation of Radioactive Materials

Material	Route	Occupational Normal (LCFs)	Occupational Accident (Fatalities)	Nonoccupational Normal (LCFs)	Nonoccupational Accident (Fatalities)
Feed Material in Type 48X Cylinder	Port Hope, ON	7.1×10^{-4}	1.2×10^{-1}	4.0×10^{-2}	1.2×10^{-1}
Feed Material in Type 48Y Cylinder	Port Hope, ON	5.5×10^{-4}	8.9×10^{-2}	3.1×10^{-2}	8.9×10^{-2}
Feed Material in Type 48X Cylinder	Metropolis, IL	4.5×10^{-4}	7.3×10^{-2}	1.6×10^{-2}	7.3×10^{-2}
Feed Material in Type 48Y Cylinder	Metropolis, IL	3.5×10^{-4}	5.7×10^{-2}	1.3×10^{-2}	5.7×10^{-2}
Product in Type 30B Cylinder	Columbia, SC	8.2×10^{-5}	1.3×10^{-2}	4.5×10^{-3}	1.3×10^{-2}
Product in Type 30B Cylinder	Wilmington, NC	9.1×10^{-5}	1.5×10^{-2}	4.8×10^{-3}	1.5×10^{-2}
Product in Type 30B Cylinder	Richland, WA	1.1×10^{-4}	1.8×10^{-2}	4.8×10^{-3}	1.8×10^{-2}
DUF_6 in Type 48Y Cylinder	Paducah, KY	2.9×10^{-4}	4.7×10^{-2}	1.3×10^{-2}	4.7×10^{-2}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	4.1×10^{-4}	6.6×10^{-2}	2.1×10^{-2}	6.6×10^{-2}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	3.2×10^{-4}	5.2×10^{-2}	1.2×10^{-2}	5.2×10^{-2}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	2.3×10^{-4}	3.7×10^{-2}	5.7×10^{-3}	3.7×10^{-2}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	2.0×10^{-4}	3.2×10^{-2}	4.7×10^{-3}	3.2×10^{-2}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS	2.6×10^{-4}	4.2×10^{-2}	9.6×10^{-3}	4.2×10^{-2}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	2.2×10^{-4}	3.6×10^{-2}	8.8×10^{-3}	3.6×10^{-2}
Depleted U_3O_8 in bulk bags	Metropolis, IL, to Clive, UT	1.9×10^{-4}	3.2×10^{-2}	4.5×10^{-3}	3.2×10^{-2}
Depleted U_3O_8 in Bulk Bags	Clive, UT	2.0×10^{-4}	3.3×10^{-2}	6.1×10^{-3}	3.3×10^{-2}

Material	Route	Occupational Normal (LCFs)	Occupational Accident (Fatalities)	Nonoccupational Normal (LCFs)	Nonoccupational Accident (Fatalities)
Depleted U_3O_8 in Bulk Bags	Hanford, WA	2.5×10^{-4}	4.1×10^{-2}	1.1×10^{-2}	4.1×10^{-2}
CaF_2 in Bulk Bags	Clive, UT	3.8×10^{-4}	6.2×10^{-2}	1.1×10^{-2}	6.2×10^{-2}
CaF_2 in Bulk Bags	Hanford, WA	4.7×10^{-4}	7.7×10^{-2}	2.1×10^{-2}	7.7×10^{-2}
Solid Waste in 55-Gallon Drums	Barnwell, SC	5.4×10^{-6}	8.7×10^{-4}	3.0×10^{-4}	8.7×10^{-4}
Solid Waste in 55-Gallon Drums	Clive, UT	5.8×10^{-6}	9.4×10^{-4}	1.7×10^{-4}	9.4×10^{-4}
Solid Waste in 55-Gallon Drums	Hanford, WA	7.2×10^{-6}	1.2×10^{-3}	3.2×10^{-4}	1.2×10^{-3}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	4.7×10^{-6}	7.7×10^{-4}	2.4×10^{-4}	7.7×10^{-4}
		Range			
Feed	Low	3.5×10^{-4}	5.7×10^{-2}	1.3×10^{-2}	5.7×10^{-2}
	High	7.1×10^{-4}	1.2×10^{-1}	4.0×10^{-2}	1.2×10^{-1}
Product	Low	8.2×10^{-5}	1.3×10^{-2}	4.5×10^{-3}	1.3×10^{-2}
	High	1.1×10^{-4}	1.8×10^{-2}	4.8×10^{-3}	1.8×10^{-2}
Disposition of Depleted Uranium	Low	4.9×10^{-4}	8.0×10^{-2}	1.6×10^{-2}	8.0×10^{-2}
	High	7.3×10^{-4}	1.2×10^{-1}	3.3×10^{-2}	1.2×10^{-1}
Waste	Low	4.7×10^{-6}	7.7×10^{-4}	1.7×10^{-4}	7.7×10^{-4}
	High	7.2×10^{-6}	1.2×10^{-3}	3.2×10^{-4}	1.2×10^{-3}
Total Impact	Low	9.2×10^{-4}	1.5×10^{-1}	3.4×10^{-2}	1.5×10^{-1}
	High	1.5×10^{-3}	2.5×10^{-1}	7.7×10^{-2}	2.5×10^{-1}

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WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-18 Radiological LCFs from Incident-Free Rail Transportation of Radioactive Materials

Material	Route	Maximum Individual	In-Transit Crew	In-Transit Public Off-Link	In-Transit Public On-Link	Public Stop	Crew Loading
Feed Material in Type 48X Cylinder	Port Hope, ON	6.8×10^{-9}	3.5×10^{-4}	3.0×10^{-4}	2.4×10^{-5}	7.9×10^{-2}	9.0×10^{-4}
Feed Material in Type 48Y Cylinder	Port Hope, ON	5.3×10^{-9}	6.9×10^{-5}	2.3×10^{-4}	1.9×10^{-5}	6.1×10^{-2}	5.4×10^{-4}
Feed Material in Type 48X Cylinder	Metropolis, IL	6.8×10^{-9}	4.5×10^{-6}	3.4×10^{-6}	2.7×10^{-6}	7.9×10^{-2}	9.0×10^{-4}
Feed Material in Type 48Y Cylinder	Metropolis, IL	5.3×10^{-9}	2.0×10^{-4}	1.2×10^{-4}	9.4×10^{-6}	6.1×10^{-2}	5.4×10^{-4}
Product in Type 30B Cylinder	Columbia, SC	9.1×10^{-10}	4.3×10^{-5}	4.0×10^{-5}	3.0×10^{-6}	1.1×10^{-2}	1.7×10^{-4}
Product in Type 30B Cylinder	Wilmington, NC	9.1×10^{-10}	4.6×10^{-5}	4.3×10^{-5}	3.3×10^{-6}	1.1×10^{-2}	1.7×10^{-4}
Product in Type 30B Cylinder	Richland, WA	9.1×10^{-10}	5.2×10^{-5}	2.6×10^{-5}	2.9×10^{-6}	1.1×10^{-2}	1.7×10^{-4}
DUF_6 in Type 48Y Cylinder	Paducah, KY	1.2×10^{-9}	4.3×10^{-5}	2.8×10^{-5}	2.2×10^{-6}	1.4×10^{-2}	3.1×10^{-3}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	1.2×10^{-9}	5.4×10^{-5}	4.2×10^{-5}	3.4×10^{-6}	1.4×10^{-2}	3.1×10^{-3}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	1.2×10^{-9}	4.5×10^{-5}	2.7×10^{-5}	2.1×10^{-6}	1.4×10^{-2}	3.1×10^{-3}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	5.3×10^{-10}	2.8×10^{-5}	1.1×10^{-5}	1.1×10^{-6}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	5.3×10^{-10}	2.5×10^{-5}	9.5×10^{-6}	9.7×10^{-7}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS, NV	5.3×10^{-10}	3.1×10^{-5}	1.3×10^{-5}	1.5×10^{-6}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	5.3×10^{-10}	2.8×10^{-5}	1.4×10^{-5}	1.4×10^{-6}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	5.3×10^{-10}	2.5×10^{-5}	8.9×10^{-6}	9.3×10^{-7}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Clive, UT	5.3×10^{-10}	2.6×10^{-5}	9.9×10^{-6}	1.1×10^{-6}	6.1×10^{-3}	1.8×10^{-8}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	5.3×10^{-10}	3.1×10^{-5}	1.5×10^{-5}	1.7×10^{-6}	6.1×10^{-3}	7.0×10^{-5}
CaF_2 in Bulk Bags	Clive, UT	9.9×10^{-10}	4.8×10^{-5}	1.8×10^{-5}	2.0×10^{-6}	1.1×10^{-2}	2.4×10^{-6}
CaF_2 in Bulk Bags	Hanford, WA	9.9×10^{-10}	5.7×10^{-5}	2.8×10^{-5}	3.2×10^{-6}	1.1×10^{-2}	2.4×10^{-6}

Material	Route	Maximum Individual	Crew	In-Transit Public Off-Link	Public On-Link	Public Stop	Crew Loading
Solid Waste in 55-Gallon Drums	Barnwell, SC	1.5×10^{-11}	7.0×10^{-7}	6.2×10^{-7}	4.8×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
Solid Waste in 55-Gallon Drums	Clive, UT	1.5×10^{-11}	7.4×10^{-7}	2.8×10^{-7}	3.1×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
Solid Waste in 55-Gallon Drums	Hanford, WA	1.5×10^{-11}	8.7×10^{-7}	4.3×10^{-7}	4.9×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	1.5×10^{-11}	6.4×10^{-7}	6.0×10^{-7}	4.0×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
			Range				
Feed	Low	5.3×10^{-9}	4.5×10^{-6}	3.4×10^{-6}	2.7×10^{-6}	6.1×10^{-2}	5.4×10^{-4}
	High	6.8×10^{-9}	3.5×10^{-4}	3.0×10^{-4}	2.4×10^{-5}	7.9×10^{-2}	9.0×10^{-4}
Product	Low	2.7×10^{-10}	1.3×10^{-5}	7.7×10^{-6}	8.8×10^{-7}	3.2×10^{-3}	8.3×10^{-5}
	High	2.7×10^{-10}	1.6×10^{-5}	1.3×10^{-5}	9.8×10^{-7}	3.2×10^{-3}	8.3×10^{-5}
Disposition of Depleted Uranium	Low	1.5×10^{-9}	6.8×10^{-5}	2.8×10^{-5}	3.0×10^{-6}	1.8×10^{-2}	2.4×10^{-6}
	High	1.7×10^{-9}	8.8×10^{-5}	5.6×10^{-5}	4.9×10^{-6}	2.0×10^{-2}	3.1×10^{-3}
Waste	Low	1.5×10^{-11}	6.4×10^{-7}	2.8×10^{-7}	3.1×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
	High	1.5×10^{-11}	8.7×10^{-7}	6.2×10^{-7}	4.9×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
Total Impact	Low	7.7×10^{-9}	1.2×10^{-4}	5.8×10^{-5}	8.7×10^{-6}	8.9×10^{-2}	7.1×10^{-4}
	High	9.4×10^{-9}	5.0×10^{-4}	3.9×10^{-4}	3.3×10^{-5}	1.1×10^{-1}	4.2×10^{-3}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-19 Radiological LCFs from Accidents During Rail Transportation of Radioactive Materials

Material	Route	Ground	Inhaled	Resuspended Soil	Cloud Shine
Feed Material in Type 48X Cylinder	Port Hope, ON	3.2×10^{-7}	2.3×10^{-1}	3.4×10^{-2}	3.2×10^{-11}
Feed Material in Type 48Y Cylinder	Port Hope, ON	3.1×10^{-7}	2.3×10^{-1}	3.3×10^{-2}	3.2×10^{-11}
Feed Material in Type 48X Cylinder	Metropolis, IL	1.4×10^{-7}	1.0×10^{-1}	1.3×10^{-2}	1.4×10^{-11}
Feed Material in Type 48Y Cylinder	Metropolis, IL	1.4×10^{-7}	1.0×10^{-1}	1.3×10^{-2}	1.4×10^{-11}
Product in Type 30B Cylinder	Columbia, SC	1.7×10^{-7}	1.4×10^{-1}	8.1×10^{-3}	6.7×10^{-12}
Product in Type 30B Cylinder	Wilmington, NC	1.8×10^{-7}	1.5×10^{-1}	8.5×10^{-3}	7.2×10^{-12}
Product in Type 30B Cylinder	Richland, WA	1.6×10^{-7}	1.3×10^{-1}	9.2×10^{-3}	6.2×10^{-12}
DUF_6 in Type 48Y Cylinder	Paducah, KY	2.8×10^{-7}	2.4×10^{-1}	5.9×10^{-3}	6.2×10^{-11}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	4.5×10^{-7}	3.9×10^{-1}	9.9×10^{-3}	9.9×10^{-11}

Material	Route	Ground	Inhaled	Resuspended Soil	Cloud Shine
DUF_6 in Type 48Y Cylinder	Metropolis, IL	2.6×10^{-7}	2.2×10^{-1}	5.3×10^{-3}	5.7×10^{-11}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	3.7×10^{-8}	7.1×10^{-5}	1.4×10^{-5}	7.3×10^{-13}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	3.1×10^{-8}	5.9×10^{-5}	1.1×10^{-5}	6.1×10^{-13}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS, NV	5.7×10^{-5}	1.1×10^{-4}	2.4×10^{-5}	1.1×10^{-12}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	5.4×10^{-8}	1.0×10^{-4}	2.2×10^{-5}	1.1×10^{-12}
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	7.9×10^{-8}	3.0×10^{-4}	1.7×10^{-5}	1.8×10^{-13}
Depleted U_3O_8 in Bulk Bags	Clive, UT	3.7×10^{-8}	7.1×10^{-5}	1.5×10^{-5}	7.3×10^{-13}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	6.7×10^{-8}	1.3×10^{-4}	2.9×10^{-5}	1.3×10^{-12}
CaF_2 in Bulk Bags	Clive, UT	7.0×10^{-13}	2.5×10^{-9}	1.1×10^{-8}	2.1×10^{-18}
CaF_2 in Bulk Bags	Hanford, WA	1.2×10^{-12}	4.5×10^{-9}	2.1×10^{-8}	3.9×10^{-18}
Solid Waste in 55-Gallon Drums	Barnwell, SC	4.5×10^{-11}	2.2×10^{-5}	5.4×10^{-5}	3.1×10^{-15}
Solid Waste in 55-Gallon Drums	Clive, UT	2.4×10^{-11}	1.2×10^{-5}	2.9×10^{-5}	1.6×10^{-15}
Solid Waste in 55-Gallon Drums	Hanford, WA	4.3×10^{-11}	2.1×10^{-5}	5.4×10^{-5}	2.9×10^{-15}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	4.0×10^{-11}	2.0×10^{-5}	4.8×10^{-5}	2.8×10^{-15}
	Range				
Feed	Low	1.4×10^{-7}	1.0×10^{-1}	1.3×10^{-2}	1.4×10^{-11}
	High	3.2×10^{-7}	2.3×10^{-1}	3.4×10^{-2}	3.2×10^{-11}
Product	Low	1.6×10^{-7}	1.3×10^{-1}	8.1×10^{-3}	6.2×10^{-12}
	High	1.8×10^{-7}	1.5×10^{-1}	9.2×10^{-3}	7.2×10^{-12}
Disposition of Depleted Uranium	Low	3.7×10^{-8}	7.1×10^{-5}	1.5×10^{-5}	7.3×10^{-13}
	High	5.8×10^{-5}	3.9×10^{-1}	1.0×10^{-2}	1.0×10^{-10}
Waste	Low	2.4×10^{-11}	1.2×10^{-5}	2.9×10^{-5}	1.6×10^{-15}
	High	4.5×10^{-11}	2.2×10^{-5}	5.4×10^{-5}	3.1×10^{-15}
Total Impact	Low	3.3×10^{-7}	2.3×10^{-1}	2.1×10^{-2}	2.1×10^{-11}
	High	5.8×10^{-5}	7.7×10^{-1}	5.3×10^{-2}	1.4×10^{-10}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

D.5 Chemical Impact Analysis Resulting from Accidents with UF_6 Cylinders

If UF_6 is released to the atmosphere, it reacts with water vapor in the air to form hydrofluoric acid and uranyl fluoride (UO_2F_2) and is independent of the enrichment of the UF_6 (i.e., natural, enriched, or depleted). The products are chemically toxic to humans. Hydrofluoric acid is extremely corrosive and can damage the lungs and cause death if inhaled at high enough concentrations. In addition, uranium is a heavy metal that, in addition to being radioactive, can have toxic chemical effects (primarily on the kidneys) if it enters by way of ingestion and/or inhalation (DOE, 2004a).

DOE analyzed the chemical impacts from the transportation of DUF_6 from the East Tennessee Technology Park to the Portsmouth and Paducah Gaseous Diffusion Plants (DOE, 2004a; DOE, 2004b). These results were used to estimate the chemical impacts associated with the proposed NEF. Their results are applicable because the chemical impacts would not vary with: (1) the shipping route, (2) the amount of enrichment, and (3) similar shipping containers. Since DOE postulated a hypothetical accident that could occur at any location, the results are not route dependent. DOE evaluated chemical impacts to rural (6 persons per square kilometer [15 persons per square mile]), suburban (719 persons per square kilometer [1,798 persons per square mile]), and urban (1,600 persons per square kilometer [4,000 persons per square mile]) areas. In addition, the proposed NEF would use the same containers (Type 48Y cylinders) that DOE evaluated. Chemical impacts are not dependent on enrichment of the uranium only on the amount if uranium in the container.

The toxic effects, or chemical impacts, can be categorized as adverse health effects or irreversible adverse health effects. An adverse health effect includes respiratory irritation or skin rash associated with lower chemical concentrations. An irreversible adverse health effect generally occur at higher chemical concentrations and are permanent in nature. Irreversible adverse health effects include death, impaired organ function (such as central nervous system or lung damage), and other effects that may impair daily functions. Of those individuals receiving an irreversible adverse health effect, approximately 1 percent or less would die from it (LES, 2004a).

Acute effects evaluated were assumed to exhibit a threshold nonlinear relationship with exposures; that is, some low level of exposure can be tolerated without inducing a health effect. Chemical-specific threshold concentrations were developed for potential adverse effects and potential irreversible adverse effects. To address maximally exposed individuals, the locations of maximum chemical concentration were identified for shipments with the largest potential releases. Estimates of exposure duration at those locations were obtained from modeling output and were used to assess whether maximally exposed individual exposure to uranium and hydrofluoric acid would exceed the criteria for potential irreversible adverse effects. The primary exposure pathway would be inhalation as it results in the highest exposure for the chemicals. Acute effects from ingestion and absorption through the skin would be less than for inhalation (DOE 2004a; DOE 2004b).

DOE used the FIREPLUME model to simulate the dispersion of toxic gases and particulates from transportation accidents involving UF_6 fires. The model can simulate three phases that UF_6 fires may undergo. These include (1) the instantaneous puff that is released in a hydraulic rupture, (2) the emissions from the continuous fire that occurs afterwards, and (3) the emissions from the cool-down phase in which releases decline to zero as the temperature of the fire declines. The location of the maximally exposed individual is assumed to be 30 meters (100 feet) or farther from the release point (DOE, 2004a, DOE 2004b).

DOE evaluated chemical impacts for both neutral and stable meteorological conditions. Neutral meteorological conditions are defined as Pasquill stability class D conditions (wind speed of 4 meters per second [9 miles per hour]) while stable meteorological conditions are defined as Pasquill stability class F (wind speed of 1 meter per second [2 miles per hour]) (DOE 2004a, DOE 2004b). Results for stable meteorological conditions are presented in this appendix because the impacts are greater than for neutral conditions and are therefore bounding.

The potential transportation chemical consequences of an accident involving UF_6 are shown in Table D-20 for both truck and rail. This table also shows the potential chemical consequences of a severe transportation accident assumed to have occurred involving the transportation of depleted U_3O_8 from a DUF_6 conversion facility to a disposal facility. The probability that this accident could occur is very remote. The results show that while adverse chemical impacts would be high, few individuals would experience irreversible adverse health effects and less than one death would be expected.

Table D-20 Potential Chemical Consequences to the Population from Severe Transportation Accidents

Source	Mode	Rural	Suburban	Urban
Number of Persons with the Potential for Adverse Health Effects				
DUF_6	Truck	6	760	1,700
	Rail	110	13,000	28,000
Depleted U_3O_8 (in bulk bags)	Truck	0	12	28
	Rail	0	47	103
Number of Persons with the Potential for Irreversible Adverse Health Effects[a]				
DUF_6	Truck	0	1	3
	Rail	0	2	4
Depleted U_3O_8 (in bulk bags)	Truck	0	5	10
	Rail	0	17	38

[a] Exposure to hydrofluoric acid or uranium compounds is estimated to result in fatality to approximately 1 percent or less of those persons experiencing irreversible adverse effects.
Source: DOE, 2004a; DOE, 2004 b.

D.6 Uncertainty in Transportation Risk Assessment

There are many sources of uncertainty in assessing the risks of transporting radioactive materials to and from the proposed NEF. Several factors that can be quantified are: routing of the material, the shipping container characteristics, mode of transport, and source or destination of the material. Each of these sources of uncertainty are discussed below.

D.6.1 Routing of Radioactive Material

There are many varying routes for the shipments of the radioactive materials to and from the proposed NEF. The WebTragis computer code simplifies the routing choices by allowing the analyst to select various routing restrictions. These can range from no restrictions to Highway Route Controlled Quantity restrictions. Choices can be made between shortest route, fastest route, block various routes, etc. For this Draft EIS, the NRC staff examined two different types of routing: the shortest with commercial, hazardous, and radioactive restrictions and Highway Route Controlled Quantity restrictions one of the most restrictive route specifications. For shipments in the eastern part of the US, the two different routes did not vary to any significant amount. For shipments to Clive, Utah; Richland and Hanford, Washington; and the Nevada Test Site, Nevada, the two different routes could vary significantly.

A comparison of the RADTRAN 5 results for comparable shipments indicated that for all but one route, Highway Route Controlled Quantity routing yields the greater impacts. For this one route, the variation impacts were less than 1 percent. Therefore, the NRC staff used the Highway Route Controlled Quantity routing.

D.6.2 Shipping Container Characteristics

The characteristics of the shipping container are important in the assessment of both the incident-free and the accident impacts. The incident-free impact is determined by the direct radiation along the side of the shipping container and the length of the container. The accident impacts are determined by the release fraction for each accident severity class. Historically, NUREG-0170 (NRC, 1977) was developed to provide background material for a review by the NRC of regulations dealing with the transportation of radioactive materials. In 2002, DOE prepared a resource handbook for transportation risk assessment (DOE, 2002). That document presented a review of the historical assessments, transportation models, and a compilation of supporting data parameters and generally accepted assumptions. DOE/EA-1290 also evaluated the shipments of DUF_6 in Type 48Y containers; however, the release fractions were about one quarter of the DOE handbook values (DOE, 1999).

The NRC staff chose to use the release fractions from the DOE handbook for Type A containers as being more conservative than those presented in DOE/EA-1290.

D.6.3 Mode of Transport

The use of truck or rail can affect the impact analysis in several different ways. First the number of trips can be reduced greatly by the use of railroads rather than trucks. Therefore, the impact from vehicle emissions and accidents involving trains is reduced with the use of railroads. However, since a railcar can transport more material, the impacts from the release of radioactive material during an accident would be greater. The capacity of trucks can also affect the impact analysis. In a similar way, the larger the truck, the more material can be transported, resulting in fewer trips but higher impacts from the release of radioactive material during an accident.

The NRC staff evaluated the transportation impacts from the use of both trucks and rail.

D.6.4 Source or Destination of Radioactive Material

The source or destination of the radioactive material can also affect the transportation impact analysis. For example, as discussed in Section D.4.2, it is not expected that all of the feed material would come exclusively from Port Hope, Ontario, Canada, or from Metropolis, Illinois. It is a reasonable assumption that some feed would come from Port Hope and some would come from Metropolis. Therefore, the impact from the transportation of feed material would be somewhere between the impacts evaluated for Port Hope and Metropolis.

D.7 References

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(LES, 2004a) Louisiana Energy Services. "National Enrichment Facility Environment Report." Revision 2. NRC Docket No. 70-3103. July 2004.

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APPENDIX E - AIR-QUALITY ANALYSIS

This appendix presents the analysis for determining the visibility impacts from operation of the Louisiana Energy Services (LES) proposed National Enrichment Facility (NEF) site and an assessment of the potential impacts due to high wind speed conditions.

E.1 Analysis for the Potential for Fog from the Proposed NEF

There is the potential for visual impacts in the local area from fog that could be generated by the cooling towers during operation under the proper weather conditions. Conditions are considered to be favorable for fog formation when humidity is high, wind speed is low, and atmosphere is stable. One concern is that under low wind speed conditions (less than 3 meters per second [9.8 feet per second]) and high relative humidity (greater than 95 percent), the cooling towers might significantly reduce visibility due to the generation of fog. To investigate potential visual impact from the cooling towers, meteorological data were analyzed for these conditions. Hourly surface observations at Midland-Odessa, Texas, for the five most recent years of data were used in this analysis as recommended by the U.S. Environmental Protection Agency (EPA) (NCDC, 1998). These meteorological data were used as input in the air-quality modeling.

Hourly observations of wind speed and relative humidity for Midland-Odessa, Texas, from the International Surface Weather Observations database for the five-year period from 1987 through 1991. were examined. From all observations within that period, relative humidity was higher than 95 percent in 527 cases (or 1.2 percent per year). Figure E-1 shows the wind speed for such conditions. From 527 observations when relative humidity was higher than 95 percent, only 193 cases were observed when wind speed was below 3 meters per second (9.8 feet per second) and stability was neutral (D), stable (E), or very stable (F). This corresponds to less than 0.5 percent of total number of hours per year.

To determine time of day and seasonality for atmospheric conditions favorable for fog formation, frequency distributions were generated for all observations when relative humidity is greater than 95 percent, wind speed is less than 3 meters per second (9.8 feet per second), and stability is D, E, or F. Figure E-2 shows a histogram of hour of day and Figure E-3 shows a histogram of month of year for such conditions for all hours in the years 1987 through 1991. The figures show that such atmospheric conditions occur mostly early in the morning or late in the evening.

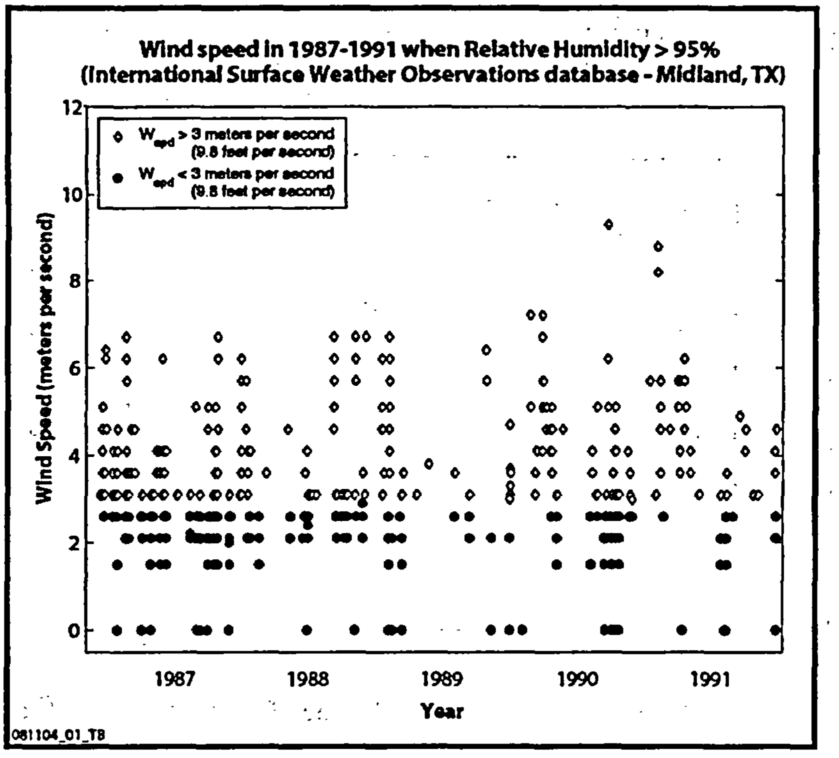
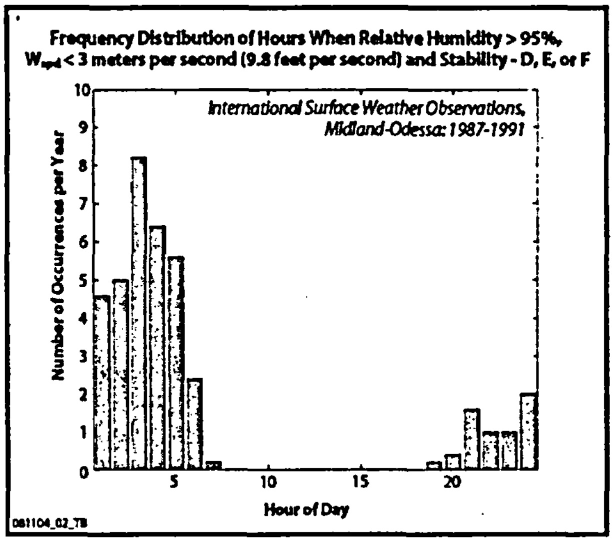


Figure E-1 Wind Speed in High Relative Humidity Conditions for Midland-Odessa, Texas (NCDC, 1998)



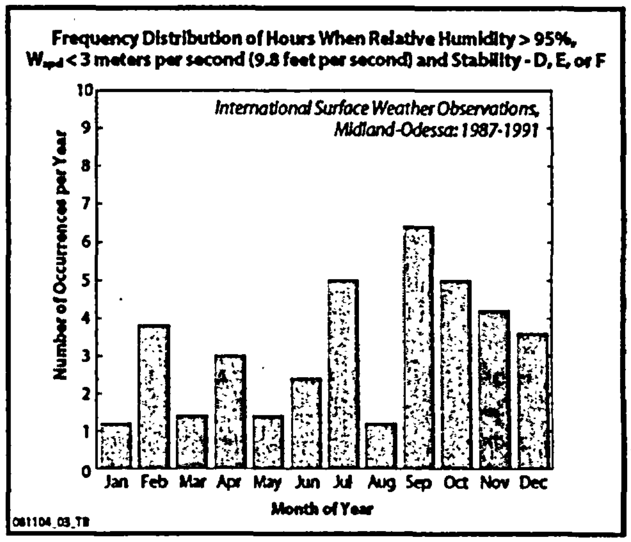
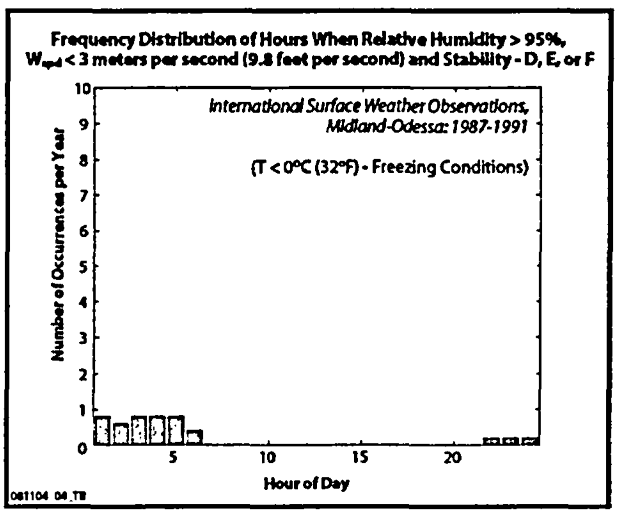


Figure E-2 Histogram of Hour of Day (1987-1991) for Favorable Conditions for Fog (NCDC, 1998)

Figure E-3 Histogram of Month of Year (1987-1991) for Favorable Conditions for Fog (NCDC, 1998)

Another concern is that the cooling towers may increase the probability of freezing and icing on the ground. To determine time of day and seasonality for atmospheric conditions favorable to such conditions, frequency distributions were generated for all observations when relative humidity was greater than 95 percent, wind speed was less than 3 meters per second (9.8 feet per second); stability was D, E, or F; and temperature was below 0°C (32°F). Figure E-4 shows a histogram of hour of day and Figure E-5 shows a histogram of month of year for such conditions for all hours in the years 1987 through 1991. The figures show that such atmospheric conditions occur mostly early in the morning or late in the evening in late fall and winter (November through February).



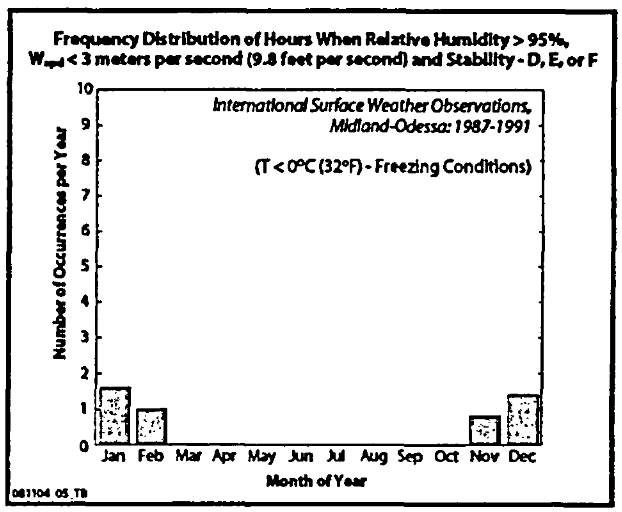


Figure E-4 Histogram of Hour of Day for Favorable Conditions for Icing on the Ground (NCDC, 1998)

Figure E-5 Histogram of Month of Year for Favorable Conditions for Icing on the Ground (NCDC, 1998)

E.2 Analysis of the Potential Effects of High Winds

The analysis of meteorological observations indicates the presence of high prevailing southerly winds in this area. There is a concern that emissions from the proposed NEF plant could be carried by these strong southerly winds over Hobbs, New Mexico, in less than 1 hour. Five years of hourly meteorological observations at the Midland-Odessa National Weather Station were analyzed to determine frequency of occurrence of strong southerly winds. Figure E-6 shows frequency distribution of wind direction for all hours in 1987-1991 (upper panel), winds greater than 8 meters per second (26.2 feet per second) but less than 14 meters per second (45.9 feet per second) (middle panel), and only for those hours when wind speed exceeds 14 meters per second (45.9 feet per second) (lower panel). These strong winds fall into a category "gale" (greater than 15 meters per second [49.2 feet per second]) or "storm" (greater than 25 meters per second [82.0 feet per second]) type of winds. Wind speed of 14 meters per second (45.9 feet per second) corresponds to 1 hour of travel time, so the trajectory can reach a 50-kilometer (31.1-mile) distance.

When wind speed is less than 14 meters per second (45.9 feet per second) but greater than 8 meters per second (26.2 feet per second), the trajectory can reach a 25-kilometer (15.5-mile) distance or more (and possibly reach Hobbs in 1 hour). As shown in Figure E-6, the histogram of wind direction for all hours (all wind speeds) has a maximum at 180 degrees (southerly winds), whereas the histogram of wind direction for hours when wind speeds exceed 14 meters per second (45.9 feet per second) has a maximum at 270 degrees (westerly winds). This indicates that strong winds (category "gale" or "storm") in the study area are predominately from the west.

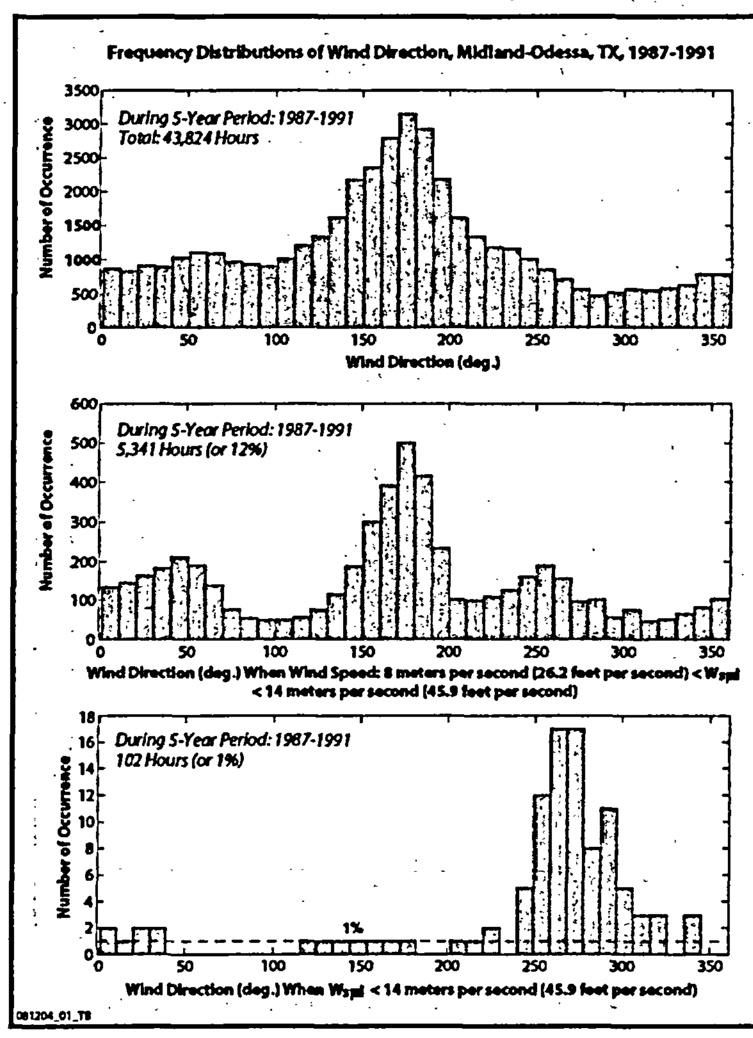


Figure E-6 Frequency Distribution of Wind Direction for All Hours (1987-1991)

However, these are relatively rare events—statistical analysis shows that only for 1 percent of the time in a 5-year period (102 hours total) are winds greater than 14 meters per second (45.9 feet per second) (i.e., category "gale" or "storm"). To determine atmospheric conditions associated with these strong westerly winds in the area, histograms of other related parameters were created. Figures E-7a and E-7b show histograms of hour, day, month of year, and stability class for all hours in 1987-1991 when (a) winds are greater than 8 meters per second (26.2 feet per second) but less than 14 meters per second, and (b) winds are stronger than 14 meters per second (45.9 feet per second). As can be seen from these figures, the very strong westerly winds occur mostly in the afternoon in spring under neutral stability conditions. Strong, but not extreme wind speeds between 8 meters per second (26.2 feet per second) and 14 meters per second (45.9 feet per second) (i.e., below category "gale") are mostly from the south. Total number of hours when winds are strong, but still below the "gale" category, is approximately 12 percent of all hours in 1987-1991.

To estimate spatial gradient in potential pollutant concentration from the proposed NEF, a sensitivity test was conducted. This sensitivity test helps to visualize possible transport of material from the proposed NEF during the strong wind episodes. A surface release was simulated using the Industrial Source Complex Short-Term (ISCST3) dispersion model (EPA, 1995) using data from March 1, 1991. This was a typical "high wind case", when winds were above 14 meters per second (45.9 feet per second) from 11 a.m. until 6 p.m., mostly from the west-southwest, and stability was neutral. The results from this simulation are shown in Figure E-8. Average 24-hour concentrations are shown as a shaded image overlaid on a schematic map of the study area. This figure shows that a narrow plume would extend to the west from the proposed NEF source.

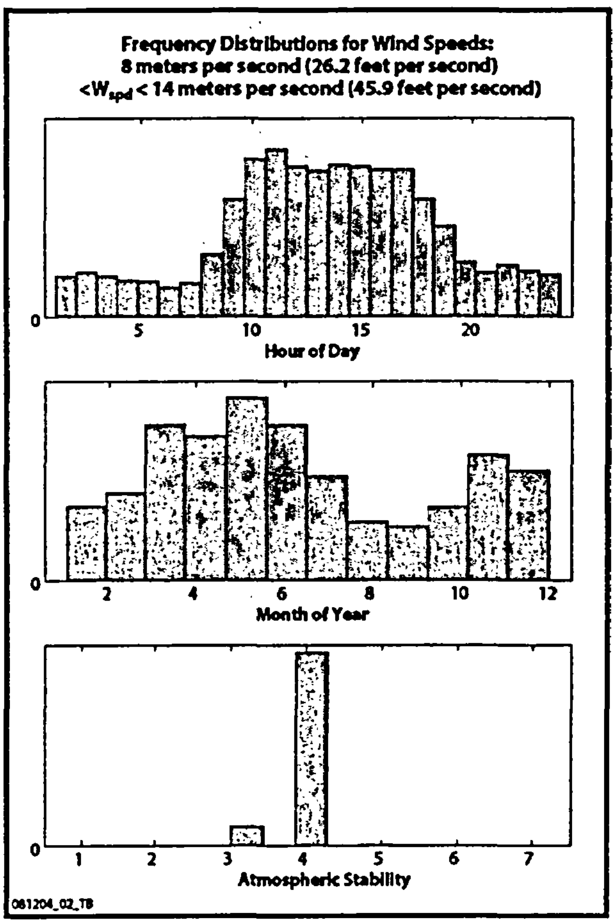


Figure E-7a Histogram of Occurrences of Strong Winds

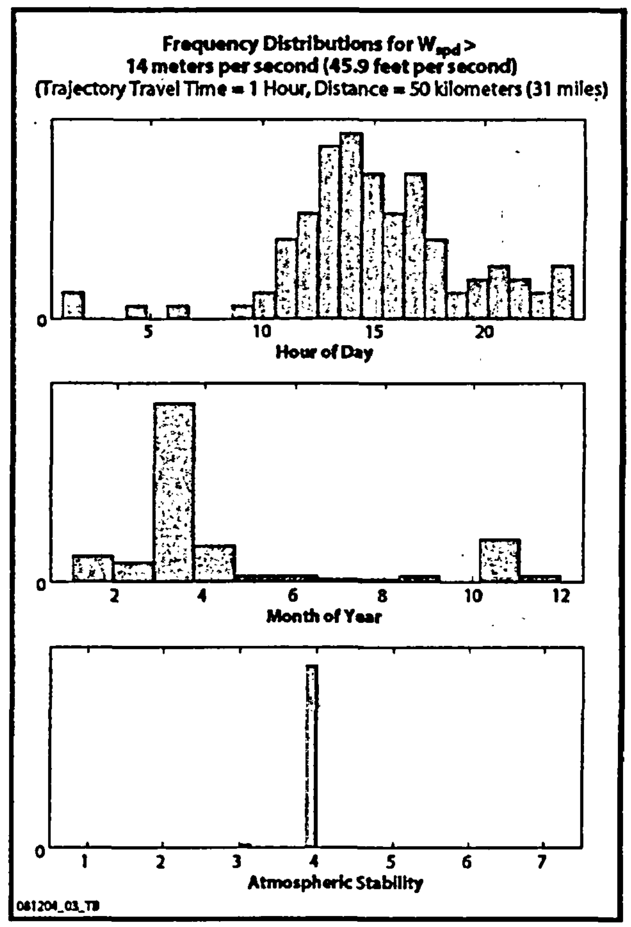


Figure E-7b Histogram of Occurrences of Extreme Winds

Another sensitivity test was conducted to investigate possible effects of strong southerly but not extreme winds (again between 8 meters per second [26.2 feet per second] and 14 meters per second [45.9 feet per second]) on pollutant concentrations, when pollutants may possibly reach Hobbs. March 10, 1991, was selected for this simulation and 24-hour average concentrations were estimated. The wind speed was approximately 10 meters per second (32.8 feet per second) from 9 a.m. until 10 p.m., mostly from the south, and stability was neutral. Figure E-9 shows the results from this simulation. Average 24-hour concentrations are shown as a shaded image overlaid on a schematic map of the study area. The figure shows a narrow plume extending to the north from the source.

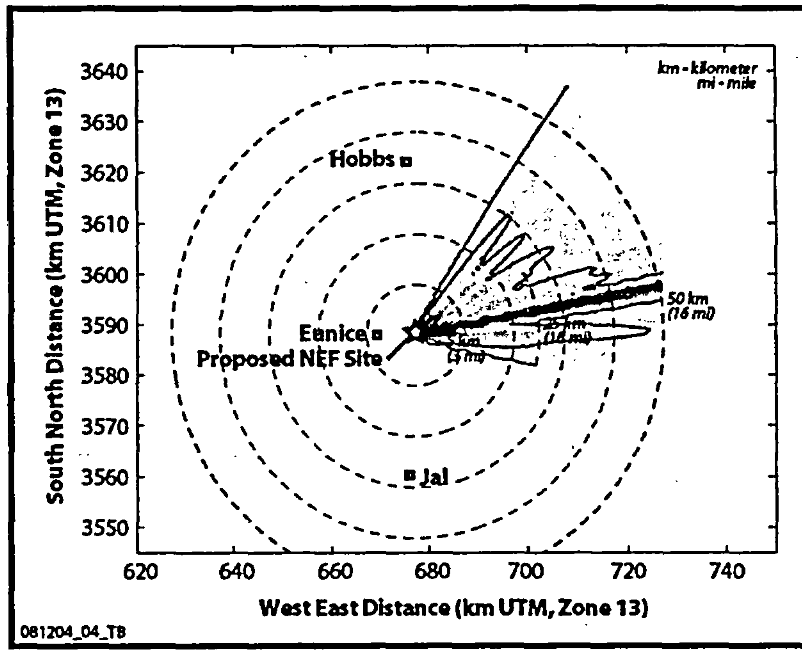


Figure E-8 Average 24-Hour Concentrations of Pollutants in Extreme Winds from the West-Southwest

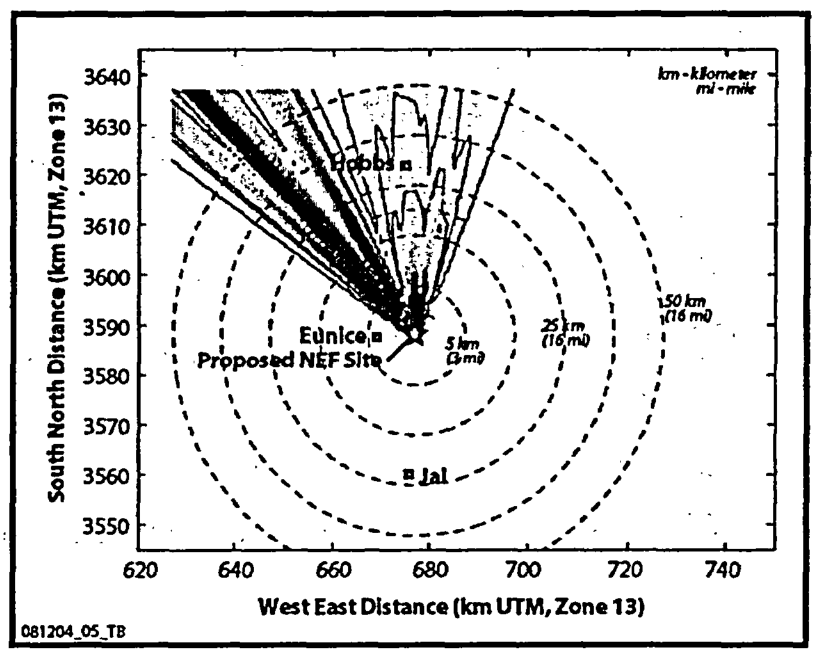


Figure E-9 Average 24-Hour Concentrations of Pollutants in Strong Southerly Winds

These sensitivity tests indicate that pollutants may possibly reach Hobbs during strong wind episodes. However, atmospheric conditions when winds can be characterized as "gale" or "storm" are rare, and levels of concentrations are expected to be significantly lower at distances greater than 25 kilometers (15.5 miles). Spatial gradients in modeled pollutant concentrations were also estimated. A sensitivity test was conducted for the same day (March 10, 1991), with winds from the south, so the plume extends to the north from the proposed NEF source. The results from this simulation are shown in Figure E-10. The figure shows the decrease in concentrations at the plume centerline due to dispersion processes as a function of distance from the source. As can be seen from the figure, the concentration decreases by a factor of 1,000 when the possible plume from the proposed NEF reaches Hobbs.

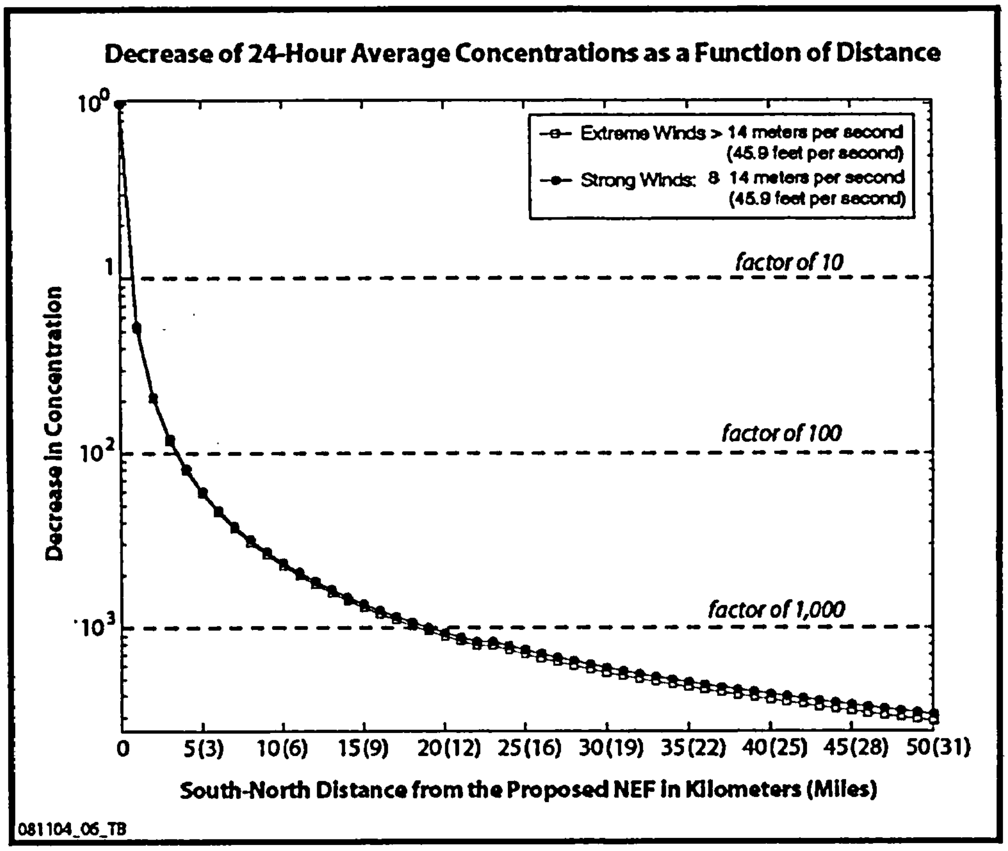


Figure E-10 Pollutant Concentrations at the Plume Centerline as a Function of Distance from the Proposed NEF

E.3 References

(EPA, 1995) U.S. Environmental Protection Agency. *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models.* Volume I. EPA-454/B-95-003a. Research Triangle Park, North Carolina. September 1995.

(NCDC, 1998) National Climate Data Center. "International Surface Weather Observations 1982-1997." CDROM. September 1998. <http://nndc.noaa.gov/?http://ols.nndc.noaa.gov/plolstore/plsql/olstore.prodspecif?prodnum=C0042-CDR-A0001> (Accessed 6/02/04).

APPENDIX F - SOCIOECONOMICS

F.1 Impacts

This appendix presents the potential socioeconomic impacts of the Louisiana Energy Services (LES) proposed National Enrichment Facility (NEF) using cost data for local construction and operations (LES, 2004). These data and Regional Input-Output Modeling System (RIMS II) final demand multipliers, specifically developed for the 120-kilometer (75-mile) region of influence, were used to estimate impacts on output, earnings, and jobs (BEA, 1997). These final demand multipliers and results are shown in Table F-1 for construction and Table F-2 for operations. For the output and earnings multipliers, each multiplier indicates the change in output or earnings for each $1 change in final demand. The jobs multiplier indicates the additional jobs created for each $1 million dollars in local spending.

Table F-1 Total Estimated Average Annual Impact of the Proposed NEF Construction

Good/Service	Local Purchases	Final Demand Multipliers			Total Impact		
		Output ($000)	Earnings	Jobs	Output ($000)	Earnings ($000)	Jobs
Concrete	$625	1.7112	0.5087	16.4	$1,070	$318	10
Reinforcing Steel	$63	1	0	0	$63	$0	0
Structural Steel	$250	1	0	0	$250	$0	0
Lumber	$31	1	0	0	$31	$0	0
Site Preparation	$2,500	1.6002	0.4459	13.7	$4,001	$1,115	34
Transportation	$250	1.7782	0.5066	17.7	$445	$127	4
Subcontracts							
Precast Concrete	$2,500	1.6002	0.4459	13.7	$4,001	$1,115	34
Architectural - Building	$5,000	1.6002	0.4459	13.7	$8,001	$2,230	69
Equipment	$3,125	1.6002	0.4459	13.7	$5,001	$1,393	43
Mechanical/Piping/ Heating Ventilation and Air Conditioning	$9,375	1.6002	0.4459	13.7	$15,002	$4,180	129
Electrical Controls	$9,375	1.6002	0.4459	13.7	$15,002	$4,180	129
Payroll	$15,521	0.8182	0.2216	8.4	$12,699	$3,440	130
Total	**$48,615**				**$65,564**	**$18,097**	**582**

Source: LES, 2004; BEA, 2004.

Table F-2 Total Estimated Average Annual Impact of the Proposed NEF Operations

Good/Service	Local Purchases ($000)	Final Demand Multipliers			Total Impact		
		Output	Earnings	Jobs	Output ($000)	Earnings ($000)	Jobs
Landscaping	$75	1.6154	0.7509	38.2	$121	$56	3
Protective Clothing	$30	1.4698	0.3211	13.4	$44	$10	0
Lab Chemicals	$50	1.7137	0.3411	6.5	$86	$17	0
Plant Spare Equipment	$170	1.4774	0.3783	10.7	$251	$64	2
Office Equipment	$160	1	0	0	$160	$0	0
Engineered Parts	$150	1.6005	0.5761	16.6	$240	$86	2
Electrical Parts	$220	1.5052	0.4576	14.9	$331	$101	3
Natural Gas	$56	2.8977	0.3734	7.3	$162	$21	0
Waste Water	$93	1.7537	0.4507	12.0	$163	$42	1
Solid Waste Disposal	$3	1.7537	0.4507	12.0	$5	$1	0
Insurance	$0	1.5546	0.5486	17.7	$0	$0	0
Catering	$50	1.5453	0.4801	30.2	$77	$24	2
Building Maintenance	$370	1.5772	0.4727	14.8	$584	$175	5
Custodial Services	$250	1.7909	0.7261	41.7	$448	$182	10
Professional Services	$180	1.6377	0.6922	18.8	$295	$125	3
Security Services	$500	1.4976	0.6315	28.9	$749	$316	14
Mail & Document Services	$100	1.6370	0.7074	19.5	$164	$71	2
Office Supplies	$140	1	0	0	$140	$0	0
Electric Services	$7,000	1.5129	0.2892	5.5	$10,590	$2,024	38
Payroll	$10,520	0.8182	0.2216	8.4	$8,608	$2,331	88
Total	**$20,117**				**$23,218**	**$5,646**	**173**

Source: LES, 2004; BEA, 2004.

F.2 References

(BEA, 1997) Bureau of Economic Analysis. *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II).* U.S. Department of Commerce. Washington, D.C. March 1997.

(BEA, 2004) Bureau of Economic Analysis. *RIMS II Multipliers for the Hobbs, New Mexico, and Odessa-Midland, Texas, Region.* U.S. Department of Commerce. Washington, D.C. March 2004.

(LES, 2004) Louisiana Energy Services. "National Enrichment Facility Environmental Report." Revision 2. NRC Docket No. 70-3103. July 2004.

APPENDIX G - ENVIRONMENTAL JUSTICE

G.1 Introduction

This appendix provides additional material for the assessment of the potential for disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from the proposed construction, operation, and decommissioning of the Louisiana Energy Services (LES) proposed National Enrichment Facility (NEF).

Table G-1 presents the detailed census data for the environmental justice review and provides the minority and low-income population data for each census block group within 80 kilometers (50 miles) of the proposed NEF site (USCB, 2002a; USCB, 2002b). Minority and low-income block groups that are shown in bold meet the U.S. Nuclear Regulatory Commission criteria in NUREG-1748 (NRC, 2003); therefore, environmental justice should be considered in greater detail. These criteria are defined as (1) the minority and/or low-income populations exceed 50 percent in a block group or (2) the minority and/or low-income population in the block group is significantly greater than the State or relevant county percentage. This information was used in the environmental justice analysis described in Chapter 3 of this Draft Environmental Impact Statement (Draft EIS).

Table G-1 Census Block Groups Within 80 Kilometers (50 Miles) of the Proposed NEF Site[a]

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
State of New Mexico		1,819,046	18.4	66.8	2.1	10.2	1.4	19.0	0.6	42.1	55.3
Threshold for Environmental Justice Concerns			38.4	—	22.1	30.2	21.4	39.0	20.6	50.0/42.1	50.0
Eddy County											
000700	1	759	15.1	75.8	0.8	1.3	0.1	21.5	0.5	39.3	41.7
000800	1	654	20.5	65.2	0.3	1.8	0.2	32.3	0.2	66.8	68.6
000900	1	136	13.9	77.4	0.8	2.7	0.1	18.5	0.6	34.1	37.0
Lea County											
000100	1	935	21.9	52.5	5.2	1.4	1.2	39.5	0.2	65.0	72.6
000100	2	829	28.1	57.2	5.3	2.4	0.5	34.0	0.6	52.4	60.9
000100	3	682	54.8	42.1	3.1	1.0	0.2	53.1	0.6	73.9	77.4
000200	1	677	30.7	64.0	0.7	2.1	0.2	32.3	0.7	58.5	60.7
000200	2	592	32.9	47.8	6.4	1.9	0.0	43.1	0.8	62.8	69.6
000200	3	585	24.9	67.4	0.5	1.2	0.7	30.3	0.0	47.7	50.4
000200	4	563	32.9	61.6	2.5	2.0	0.7	32.5	0.7	55.2	59.7
000200	5	565	52.1	42.7	4.3	1.6	0.0	51.3	0.2	71.2	75.9
000300	1	686	30.3	24.8	39.8	1.9	0.0	32.8	0.7	52.9	92.3
000300	2	810	46.7	42.2	7.8	2.1	0.0	47.0	0.9	69.0	78.8
000300	3	820	41.6	43.7	11.0	1.2	0.4	43.3	0.5	70.1	81.8
000300	4	985	56.9	52.8	4.9	0.2	0.4	41.4	0.3	63.4	68.9
000400	1	775	57.0	27.5	21.3	1.3	0.3	48.6	1.0	68.0	91.0

	County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
1	000400	2	1,053	25.9	56.1	10.0	1.8	0.8	30.7	0.7	50.5	62.9
2	000400	3	661	42.8	31.0	21.0	1.1	0.8	44.8	1.4	68.8	90.8
3	000501	1	781	2.9	86.6	2.1	0.5	1.3	9.1	0.5	12.7	16.9
4	000501	2	848	7.2	84.3	1.7	3.1	0.1	10.7	0.1	22.8	27.5
5	000501	3	533	39.6	75.1	5.6	2.6	0.8	15.8	0.2	26.1	34.0
6	000501	4	1,063	16.7	80.1	3.5	1.8	0.9	13.0	0.9	20.9	26.6
7	000501	5	775	9.8	89.9	1.6	0.9	0.9	6.6	0.1	9.7	13.8
8	000501	6	718	7.2	83.6	3.5	1.5	0.1	11.0	0.3	18.2	24.0
9	000501	7	1,381	5.2	87.8	2.6	0.8	1.1	7.2	0.4	12.2	16.6
10	000502	1	920	25.4	69.0	4.6	1.2	0.0	24.6	0.7	35.9	42.4
11	000502	2	968	28.2	65.4	4.8	0.8	0.7	28.0	0.3	41.4	47.1
12	000502	3	1,002	16.9	71.6	6.4	1.4	0.0	20.4	0.3	31.1	38.5
13	000502	4	810	3.7	86.2	2.6	1.7	2.4	6.4	0.7	11.4	17.9
14	000502	5	1,052	15.3	77.3	2.5	1.1	0.9	18.1	0.3	25.2	29.6
15	000502	6	786	31.4	59.3	14.6	0.8	0.1	24.0	1.2	34.5	50.5
16	000600	1	805	4.8	89.7	2.4	1.2	1.4	5.3	0.0	10.8	15.9
17	000600	2	734	4.3	90.7	1.1	0.8	0.4	6.7	0.3	10.6	12.9
18	000600	3	901	4.7	76.1	2.1	1.6	0.0	20.0	0.2	30.7	34.2
19	000600	4	756	22.2	74.2	3.0	0.8	0.7	21.2	0.1	31.0	35.7
20	000600	5	811	23.0	38.7	14.2	1.0	0.0	45.4	0.7	66.1	81.3
21	000600	6	957	17.5	48.5	13.4	2.1	0.1	35.3	0.6	63.3	76.9
22	000600	7	906	11.4	59.3	7.5	2.8	1.4	28.5	0.6	41.8	52.8
23	000700	1	1,052	7.7	83.2	0.8	1.1	0.7	14.2	0.1	21.5	24.1

	County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
1	000700	2	1,899	1.7	68.6	9.1	3.7	0.7	17.8	0.1	40.7	**54.2**
2	000700	3	882	13.2	83.8	0.6	1.1	0.6	13.8	0.1	22.3	24.5
3	000700	4	812	13.8	83.1	0.9	1.6	0.1	14.2	0.1	18.2	20.7
4	000700	5	1,331	19.0	84.8	1.0	2.0	0.3	11.9	0.0	23.4	26.7
5	000700	6	1,930	13.7	85.6	1.0	1.3	1.2	10.5	0.4	16.4	19.9
6	000800	1	850	10.2	75.7	0.5	0.7	0.0	23.2	0.0	32.1	33.6
7	000800	2	618	3.6	82.0	0.5	1.5	0.2	15.5	0.3	24.8	26.9
8	000800	3	773	24.1	67.9	2.6	1.7	0.5	27.2	0.1	*48.6*	**52.8**
9	000800	4	655	25.6	66.3	0.9	0.8	0.5	31.6	0.0	41.2	44.3
10	000900	1	562	17.8	79.5	0.2	1.1	0.2	18.9	0.2	28.6	30.1
11	000900	2	726	24.1	57.3	1.4	2.6	0.0	38.3	0.4	**51.1**	**53.9**
12	000900	3	830	12.5	68.0	0.1	2.3	0.0	28.9	0.7	39.2	41.2
13	001002	1	819	24.4	53.7	2.0	2.0	0.5	**41.8**	0.1	**55.3**	**58.6**
14	001002	2	1,357	19.3	64.2	2.5	1.4	0.2	31.6	0.2	*45.8*	49.8
15	001002	3	975	22.6	60.3	2.1	0.8	1.4	35.4	0.0	**51.7**	**54.6**
16	001002	4	713	25.3	51.5	3.1	1.7	0.3	**43.3**	0.1	**65.1**	**69.0**
17	001002	5	945	28.4	53.3	10.5	1.3	0.1	34.8	0.0	**56.9**	**68.9**
18	001002	6	592	20.2	51.9	3.2	0.5	0.2	**43.9**	0.3	**62.0**	**66.6**
19	001002	7	853	31.3	68.8	0.1	2.0	0.6	28.3	0.2	*47.4*	49.4
20	001003	1	870	25.7	53.2	4.3	0.2	1.3	**41.0**	0.0	**59.0**	**64.0**
21	001003	2	1,080	20.4	53.2	1.9	1.4	0.1	**42.9**	0.6	**64.5**	**67.8**
22	001003	3	873	17.7	79.0	0.0	1.0	0.7	19.1	0.1	29.2	30.2
23	001003	4	813	8.4	77.5	3.9	1.1	0.4	16.6	0.5	27.1	32.7

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
001100	1	6	26.8	71.1	0.3	1.4	0.2	27.1	0.0	30.6	32.3
001100	3	980	21.6	71.4	1.1	0.2	1.1	26.1	0.0	35.0	37.2
001100	4	822	14.1	75.5	1.1	1.8	0.1	20.7	0.8	30.9	32.7
001100	5	612	11.3	82.0	1.4	2.0	0.3	14.0	0.5	21.9	25.0
Total N. Mexico Block Groups			66								
State of Texas		20,851,820	15.4	71.0	11.7	0.9	3.0	13.0	0.4	32.0	47.6
Threshold for Environmental Justice Concerns			35.4	—	31.7	20.9	23.0	33.0	20.4	50.0/32.0	50.0
Andrews County											
950100	3	896	9.6	85.4	1.1	1.3	1.3	10.9	0.0	24.7	28.2
950100	4	591	9.9	84.3	0.5	1.9	2.9	10.5	0.0	19.8	25.9
950200	1	1,289	17.2	73.9	6.0	1.9	0.3	17.6	0.3	*37.5*	46.2
950200	2	923	19.8	68.8	2.7	0.9	1.1	26.4	0.1	*49.8*	**54.9**
950200	3	1,176	22.7	76.0	2.1	1.3	0.8	19.3	0.5	*37.6*	41.4
950200	6	692	7.2	75.4	2.2	1.0	0.3	21.1	0.0	*41.2*	43.5
950200	7	775	14.7	88.4	1.2	1.0	0.0	8.8	0.7	21.8	23.7
950200	8	752	0.0	94.7	0.4	0.7	2.0	2.1	0.1	5.1	8.8
950300	1	642	19.2	60.1	1.1	0.3	1.4	**37.1**	0.0	**70.6**	**72.7**
950300	2	593	22.4	72.2	3.7	1.0	0.0	22.9	0.2	**55.3**	**59.5**
950300	3	514	27.6	69.8	0.4	3.1	1.2	25.5	0.0	*48.6*	**53.1**
950300	4	914	15.7	69.4	2.0	2.2	0.3	25.7	0.4	**54.2**	**57.3**
950300	5	856	25.7	74.2	0.2	1.2	1.2	23.0	0.2	**61.1**	**63.7**
950400	6	420	9.8	86.9	0.5	0.2	1.7	10.7	0.0	*35.0*	37.9
950400	7	1,523	18.6	78.6	0.5	1.2	0.1	17.1	0.1	*40.4*	41.6

	County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
1	*Ector County*											
2	002200	1	622	10.0	82.3	0.2	1.2	0.0	16.1	0.3	*37.8*	39.3
3	002700	2	0	15.7	76.5	0.8	0.8	0.3	21.5	0.2	*40.1*	41.7
4	002700	4	690	17.1	64.4	1.8	1.3	0.2	31.7	0.6	**59.1**	**61.9**
5	003000	1	586	3.8	92.7	0.7	0.9	0.4	5.4	0.0	9.7	11.4
6	003000	2	38	2.8	88.8	0.3	1.7	0.3	8.9	0.0	14.8	16.7
7	*Gaines County*											
8	950100	1	246	25.2	80.6	0.5	1.4	0.0	16.8	0.7	*35.2*	36.5
9	950100	2	770	20.1	76.9	1.2	1.8	0.0	20.1	0.0	*42.5*	45.1
10	950100	3	778	21.3	68.1	7.5	0.1	0.1	23.5	0.6	**56.9**	**65.6**
11	950100	4	836	33.9	54.8	8.4	2.3	0.0	34.3	0.2	**69.6**	**79.4**
12	950100	5	584	20.6	78.3	2.4	0.0	0.0	18.7	0.7	*37.5*	41.4
13	950200	1	1,455	20.6	84.7	0.9	1.2	0.3	12.8	0.1	*32.1*	33.9
14	950200	2	2,470	17.7	83.4	1.2	1.1	0.0	14.0	0.3	23.4	24.9
15	950200	3	1,759	29.7	90.0	1.6	0.7	0.3	7.4	0.1	14.6	17.2
16	950300	1	818	24.5	70.8	5.5	1.7	0.7	21.1	0.1	**57.2**	**62.6**
17	950300	2	797	14.6	77.2	0.8	0.5	0.5	21.1	0.0	*45.7*	47.7
18	950300	3	1,243	16.2	91.1	1.5	0.5	0.6	6.4	0.1	18.7	21.8
19	950300	4	921	19.5	81.8	0.9	0.1	0.5	16.5	0.2	*40.8*	42.7
20	950300	5	1,281	21.1	78.0	3.1	2.7	1.1	15.1	0.0	*49.3*	**53.9**
21	*Loving County*											
22	950100	1	28	0.0	89.6	0.0	0.0	0.0	10.4	0.0	10.4	10.4
23	*Terry County*											
24	950100	3	41	15.8	82.1	0.0	2.2	0.0	15.8	0.0	*36.0*	36.2

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
Winkler County											
950200	1	720	17.0	80.4	1.3	0.3	0.0	17.2	0.8	*36.5*	38.1
950200	2	644	37.4	74.2	0.2	0.8	0.0	24.7	0.2	*41.1*	42.4
950200	3	846	11.8	69.4	5.1	1.1	0.0	24.3	0.1	*45.6*	**51.3**
950300	1	372	31.1	61.6	1.9	0.0	0.0	34.9	1.6	**75.8**	**79.0**
950300	2	673	14.0	76.2	2.8	0.5	0.9	19.2	0.5	*44.6*	48.7
950300	3	674	13.5	80.1	1.5	0.3	0.0	26.3	0.2	*41.8*	43.3
950300	4	994	15.5	71.9	3.0	1.3	0.1	23.6	0.0	*44.8*	49.2
950300	5	785	27.7	66.0	0.8	0.6	1.0	31.6	0.0	**62.7**	**64.3**
950400	1	589	9.5	78.5	1.1	0.6	0.0	19.1	0.7	*36.6*	38.0
950400	2	749	16.9	86.1	0.8	0.4	0.0	12.7	0.0	*23.9*	25.0
Yoakum County											
950100	1	128	14.4	84.2	1.7	0.0	0.0	14.1	0.0	*34.4*	36.1
950200	1	1,019	22.3	69.8	2.9	0.5	0.1	26.3	0.4	*41.7*	44.9
950200	2	1,138	20.6	67.0	1.1	1.3	0.4	30.0	0.2	**52.9**	**55.2**
950200	3	767	22.2	76.3	0.9	0.5	0.0	22.2	0.1	*40.7*	42.2
950200	4	1,220	19.1	59.3	1.1	1.3	0.2	38.1	0.1	**54.8**	**56.2**
950200	5	967	16.1	77.4	2.7	1.1	0.0	18.9	0.0	*34.2*	38.1
Total Texas Block Groups			51								
Grand Total			117								

[a] Minority block groups meeting standard Office of Nuclear Material Safety and Safeguards criteria are shown in bold. Additional block groups meeting special Hispanic/Latino criteria are shown in italics. Threshold criteria are shown in the table. Special Hispanic/Latino criteria are 42.1 percent for New Mexico, 32.0 percent for Texas.
Source: USCB, 2002a; USCB, 2002b.

G.2 References

(EPA, 1999) U.S. Environmental Protection Agency. "Consideration of Cumulative Impacts in EPA Review of NEPA Documents." EPA 315-R-99-002. Office of Federal Activities (2252A). May 1999.

(NRC, 2003) U.S. Nuclear Regulatory Commission. "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." NUREG-1748. Office of Nuclear Material Safety and Safeguards. Washington, D.C. August 2003.

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(See instructions on the reverse)

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Draft Report for Comment

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10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

Louisiana Energy Services (LES) has submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct, operate, and decommission a gas centrifuge uranium enrichment facility near Eunice, New Mexico, in Lea County. The proposed facility, referred to as the National Enrichment Facility (NEF), would produce enriched uranium-235 (235U) up to 5 weight percent by the gas centrifuge process with a production of 3 million separative work units per year. The enriched uranium would be used in commercial nuclear power plants. The proposed NEF would be licensed in accordance with the provisions of the Atomic Energy Act. Specifically, an NRC license under Title 10, "Energy," of the U.S. Code of Federal Regulations (10 CFR) Parts 30, 40, and 70 would be required to authorize LES to possess and use special nuclear material, source material, and byproduct material at the proposed NEF site.

This Draft Environmental Impact Statement (Draft EIS) was prepared in compliance with the National Environmental Policy Act (NEPA) and the NRC regulations for implementing NEPA. This Draft EIS evaluates the potential environmental impacts of the proposed action and its reasonable alternatives. This Draft EIS also describes the environment potentially affected by LES's proposal, presents and compares the potential environmental impacts resulting from the proposed action and its alternatives, and describes mitigation measures.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

National Enrichment Facility
Gas Centrifuge
Uranium
Environmental Impact Statement
Louisiana Energy Services

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