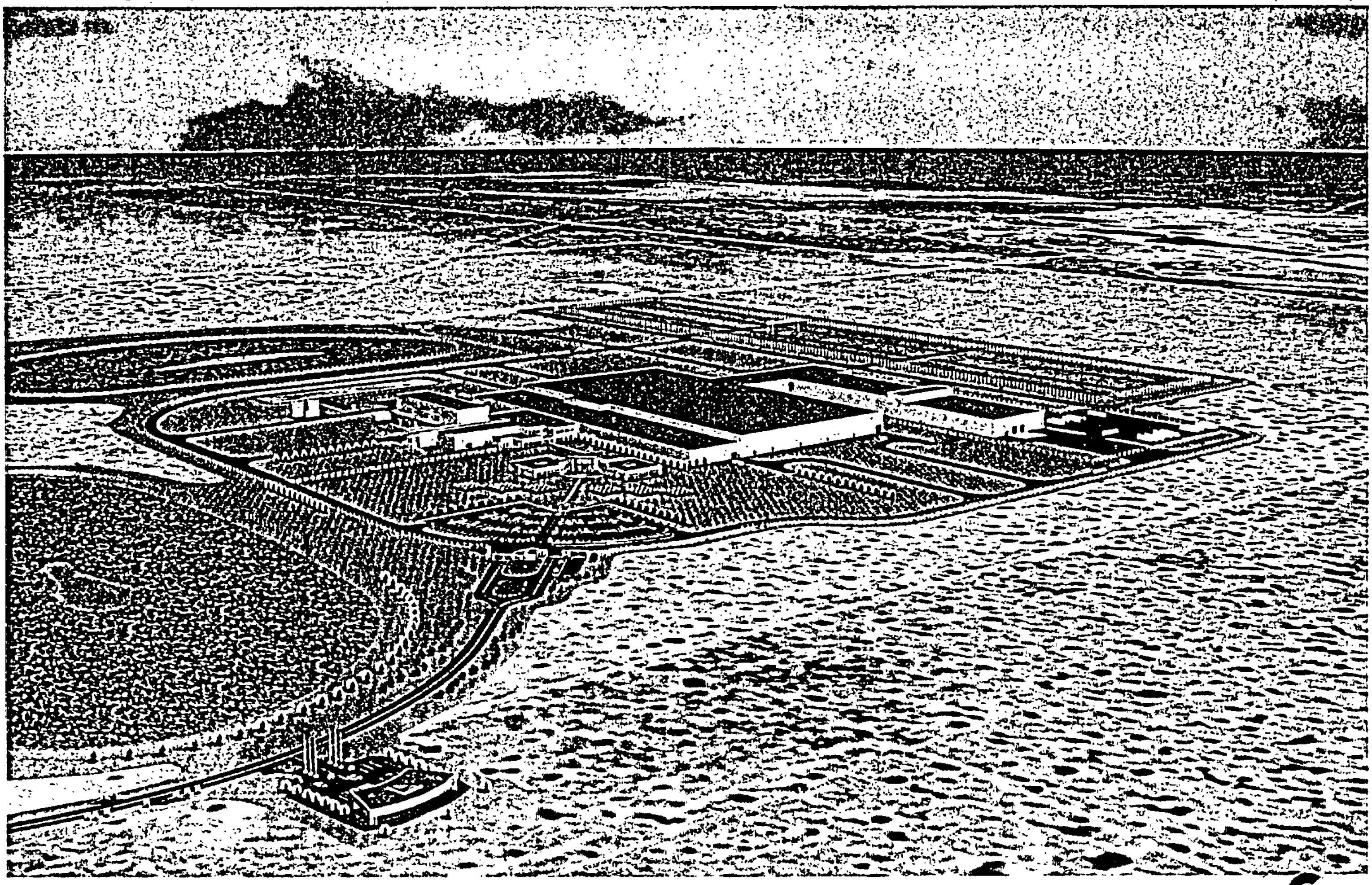
NATIONAL ENRICHMENT FACILITY

ENVIRONMENTAL REPORT



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5.0 MITIGATION MEASURES

This chapter summarizes the mitigation measures that will be in place to reduce adverse impacts that occur during construction, routine and non-routine operation of the National Enrichment Facility (NEF).

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5.1 IMPACT SUMMARY

This section summarizes the environmental impacts that may result from the construction and operation of the NEF. Complete details of these potential impacts are provided in Chapter 4 of this Environmental Report.

5.1.1 Land Use

Land use impact has been characterized in ER Section 4.1, Land Use Impacts. No substantive impacts exists as related to the following:

- Land-use impact, and impact of any related Federal action that may have cumulatively significant impacts
- Area and location of land that will be disturbed on either a long-term or short-term basis.

Minor impacts related to erosion control on the site may occur, but are short-term and limited. Mitigation measures associated with these impacts are listed in ER Section 5.2.1, Land Use.

5.1.2 Transportation

Transportation impact has been characterized in ER Section 4.2, Transportation Impacts.

With respect to construction-related transportation, no substantive impacts exist as related to the following:

- Construction of the access roads to the facility. Two construction access roads will be constructed from New Mexico Highway 234. Both roads will be converted to permanent site access roads upon completion of construction.
- Transportation route and mode for conveying construction material to the facility
- Traffic pattern impacts (e.g., from any increase in traffic from heavy haul vehicles and construction worker commuting)
- Impacts of construction transportation such as fugitive dust, scenic quality, and noise.

Minor impacts related to construction traffic such as fugitive dust, noise, and emissions are discussed in ER Section 4.2.4, Construction Transportation Impacts. Additional information on noise impacts is contained in ER Section 4.7.1, Predicted Noise Levels. Mitigation measures associated with transportation impacts are listed in ER Section 5.2.2, Transportation.

With respect to the transport of radioactive materials, no substantive impacts exist as related to the following activities:

- Transportation mode (i.e., truck), and routes from originating site to the destination
- Estimated transportation distance from the originating site to the destination
- Treatment and packaging procedure for radioactive wastes
- Radiological dose equivalents for incident-free scenarios to public and workers
- Impacts of operating transportation vehicles on the environment (e.g., fire from equipment sparking).

Impacts related to the transport of radioactive material are addressed in ER Section 4.2.7, Radioactive Material Transportation. The materials that will be transported to and from the NEF

are well within the scope of the environmental impacts previously evaluated by the Nuclear Regulatory Commission (NRC). Because these impacts have been addressed in a previous NRC environmental impact statement (NUREG/CR-0170) (NRC, 1977a), no additional mitigation measures are proposed in ER Section 5.2.2, Transportation.

5.1.3 Geology and Soils

The potential impacts to the geology and soils have been characterized in ER Section 4.3, Geology and Soils Impact. No substantive impacts exist as related to the following activities:

- Soil resuspension, erosion, and disruption of natural drainage
- Excavations to be conducted during construction.

Impacts to geology and soils will be limited to surface runoff due to routine operation. Construction activities may cause some short-term increases in soil erosion at the site. Mitigation measures associated with these impacts are listed in ER Section 5.2.3, Geology and Soils.

5.1.4 Water Resources

The potential impacts to the water resources have been characterized in ER Section 4.4, Water Resources Impacts. No substantive impacts exists as related to the following:

- Impacts on surface water and groundwater quality
- Impacts of consumptive water uses (e.g., groundwater depletion) on other water users and adverse impacts on surface-oriented water users resulting from facility activities. Site groundwater will not be utilized for any reason, and therefore, should not be impacted by routine NEF operations. The NEF water supply will be obtained from the town of Eunice, New Mexico and the city of Hobbs, New Mexico. Current capacities for the Eunice and Hobbs, New Mexico municipal water supply systems are 16,350 m^3/day (4.32 million gpd) and 75,700 m^3/day (20 million gpd), respectively and current usages are 5,600 m^3/day (1.48 million gpd) and 23,450 m^3/day (6.2 million gpd), respectively. Average and peak potable water requirements for operation of the NEF are expected to be approximately 240 m^3/day (63,423 gpd) and 85 m^3/hour (378 gpm), respectively. These usage rates are well within the capacities of both water systems. For both peak and the normal usage rates, the needs of the NEF facility should readily be met by the municipal water systems. Impacts to water resources on site and in the vicinity of NEF are expected to be negligible.
- Hydrological system alterations or impacts
- Withdrawals and returns of ground and surface water
- Cumulative effects on water resources.

The NEF will not obtain any water from onsite surface or groundwater resources. Process effluents will be discharged to the double-lined Treated Effluent Evaporative Basin with leak detection. Sanitary waste water discharges will be made through site septic systems. Stormwater from developed portions of the site will be collected in retention/detention basins, as described in ER Section 3.4, Water Resources. These include the Site Stormwater Detention Basin and the UBC Storage Pad Stormwater Retention Basin. Minor impacts to water resources are discussed in ER Section 4.4. Mitigation measures associated with these impacts are listed in ER Section 5.2.4, Water Resources.

5.1.5 Ecological Resources

The potential impacts to the ecological resources have been characterized in ER Section 4.5, Ecological Resources Impacts. No substantive impacts exists as related to the following:

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

Impacts to ecological resources will be minimal. Mitigation measures associated with these impacts are listed in ER Section 5.2.5, Ecological Resources.

5.1.6 Air Quality

The potential impacts to the air quality have been characterized in ER Section 4.6, Air Quality Impacts. No substantive impacts exist as related to the following activities:

- Gaseous effluents
- Visibility impacts.

Impacts to air quality will be minimal. Construction activities will result in interim increases in hydrocarbons and particulate matter due to vehicle emissions and dust. Impacts due to plant operation consist of cooling tower plumes, small quantities of volatile organic components (VOC) emissions and trace amounts of HF, UO_2F_2, and other uranic compound effluents remaining in treated air emissions from plant ventilation systems. These effluents are significantly below regulatory limits. Mitigation measures associated with air quality impacts are listed in ER Section 5.2.6, Air Quality.

5.1.7 Noise

The potential impacts related to noise generated by the facility have been characterized in ER Section 4.7, Noise Impacts. No substantive impacts exists as related to the following activities:

- Predicted typical noise levels at facility perimeter
- Impacts to sensitive receptors (i.e., hospitals, schools, residences, wildlife).

Noise levels will increase during construction and due to operation of the NEF, but not to a level that will cause significant impact to nearby residents. The nearest residence is 4.3 km (2.63 mi) from the site. Mitigation measures associated with noise impacts are listed in ER Section 5.2.7, Noise.

5.1.8 Historical and Cultural Resources

The potential impacts to historical and cultural resources have been characterized in ER Section 4.8, Historical and Cultural Resources Impacts. Only minor impacts exists as related to the following activities:

- Construction, operation, or decommissioning
- Impact on historic properties
- Potential for human remains to be present in the project area
- Impact on archeological resources..

Impacts to Historical and Cultural Resources will be minimal. Mitigation measures associated with these impacts, if required, are listed in ER Section 5.2.8, Historical and Cultural Resources.

5.1.9 Visual/Scenic Resources

The potential impacts to visual/scenic resources have been characterized in ER Section 4.9, Visual/Scenic Resources Impacts. No substantive negative impacts exists as related to the following:

- The aesthetic and scenic quality of the site
- Impacts from physical structures
- Impacts on historical, archaeological or cultural properties of the site
- Impacts on the character of the site setting.

Visual/scenic impacts due to the development of the NEF result from visual intrusions in the existing landscape character. Except possibly for a section of the proposed, westernmost access road, no structures are proposed that may require the removal of natural or built barriers, screens or buffers. Mitigation measures associated with these impacts are listed in ER Section 5.2.9, Visual/Scenic Resources.

5.1.10 Socioeconomic

The potential socioeconomic impacts to the community have been characterized in ER Section 4.10, Socioeconomic Impacts. No substantive negative impacts exist as related to the following:

- Impacts to population characteristics (e.g., ethnic groups, and population density)
- Impacts to housing, health and social services, or educational and transportation resources
- Impacts to area's tax structure and distribution.

The anticipated cumulative socioeconomic negative impacts of the proposed operation of NEF are expected to be insignificant. The positive socioeconomic impacts are substantial (see ER Section 7.1, Economic Cost-Benefits, Plant Construction and Operation). See ER Section 4.10, Socioeconomic Impacts, for a detailed discussion on socioeconomic impacts.

5.1.11 Environmental Justice

The potential impacts with respect to environmental justice have been characterized in ER Section 4.11, Environmental Justice. No substantive impacts exist as related to the following:

- Disproportionate impact to minority or low-income population.

Based on the data analyzed and the NUREG-1748 (NRC, 2003a) guidance by which that analysis was conducted, LES determined that no further evaluation of potential Environmental Justice concerns was necessary, as no Census Block Group within the 6.4-km (4-mi) radius, i.e., 128 km^2 (50 mi^2), of the NEF site contained a minority or low-income population exceeding the NUREG-1748 "20%" or "50%" criteria. See ER Section 4.11, Environmental Justice.

5.1.12 Public and Occupational Health

This section describes public and occupational health impacts from both nonradiological and radiological sources.

5.1.12.1 Nonradiological – Normal Operations

The potential impacts to public and occupational health for nonradiological sources have been characterized in ER Section 4.12.1, Nonradiological Impacts. No substantive impacts exist as related to the following:

- Impact to members of the public from nonradiological discharge of liquid or gaseous effluents to water or air
- Impact to facility workers as a result of occupational exposure to nonradiological chemicals, effluents, and wastes
- Cumulative impacts to public and occupational health.

Impacts to the public and workers from nonradiological gaseous and liquid effluents will be minimal. Mitigation measures associated with these impacts are listed in ER Section 5.2.12.1, Nonradiological – Normal Operations.

5.1.12.2 Radiological – Normal Operations

This subsection describes public and occupational health impacts from radiological sources. It provides a brief description of the methods used to assess the pathways for exposure and the potential impacts.

5.1.12.2.1 Pathway Assessment

The potential for exposure to radiological sources included an assessment of pathways that could convey radioactive material to members of the public. These are briefly summarized below.

Potential points or areas were characterized to identify:

- Nearest site boundary
- Nearest full time resident
- Location of average member of the critical group
- In addition, important ingestion pathways such as stored and fresh vegetables, milk and meat, assumed to be grown or raised at the nearest resident location have been analyzed. There are no offsite releases to any surface waters or Publicly Owned Treatment Works (POTW).

5.1.12.2.2 Public and Occupational Exposure

The potential impacts to public and occupational health for radiological sources have been characterized in ER Section 4.12, Public and Occupational Health Impacts. No substantive impacts exists as related to the following:

- Impacts based on the average annual concentration of radioactive and hazardous materials in gaseous and liquid effluents
- Impacts to the public (as determined by the critical group)
- Impacts to the workforce based on radiological and chemical exposures
- Impacts based on reasonably foreseeable (i.e., credible) accidents with the potential to result in environmental releases.

Routine operations at the NEF create the potential for radiological and nonradiological public and occupational exposure. Radiation exposure is due to the plant's use of the isotopes or uranium and the presence of associated decay products. Chemical and radiological exposures are primarily from byproducts of UF_6;UO_2F_2, hydrogen fluoride and related uranic compounds, that will form inside plant equipment and from reaction with components. These are the primary products of concern in gaseous effluents that will be released from the plant and liquid effluents that will be released to the onsite retention basin. Mitigation measures associated with these impacts are listed in ER Section 5.2.12, Public and Occupational Health.

5.1.12.3 Accidental Releases

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5.1.13 Waste Management

The potential impacts of waste generation and waste management have been characterized in ER Section 4.13, Waste Management Impacts. No substantive impacts exist as related to the following:

- Impact to the public due to the composition and disposal of solid, hazardous, radioactive and mixed wastes
- Impact to facility workers due to storage, processing, handling, and disposal of solid, hazardous, radioactive and mixed wastes
- Cumulative impacts of waste management.

Waste generated at the NEF will be comprised of industrial (nonhazardous), radioactive and mixed, and hazardous waste categories. In addition, radioactive and mixed waste will be further segregated according to the quantity of liquid that is not readily separable from the solid material. Gaseous and liquid effluent impacts are discussed in ER Section 5.1.12.2, Radiological – Normal Operations. Uranium Byproduct Cylinders (UBCs) are stored onsite at an outdoor storage area and will minimally impact the environment. (See ER Section 5.2.13, Waste Management.)

Mitigation measures associated with waste management are listed in ER Section 5.2.13, Waste Management.

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5.2 MITIGATIONS

This section summarizes the mitigation measures that are in place to reduce adverse impacts that may result from the construction and operation of the NEF. The residual and unavoidable adverse impacts, which will remain after application of the mitigation measures, are of such a small magnitude that LES considers that additional analysis is not necessary.

5.2.1 Land Use

The anticipated effects on the soil during construction activities are limited to a potential short-term increase in soil erosion. However, this impact will be mitigated by following proper construction best management practices (BMPs) including:

- Minimizing the construction footprint to the extent possible
- Limiting site slopes to a horizontal-vertical ratio of three to one or less
- Use of a sedimentation detention basin
- Protection of undisturbed areas with silt fencing and straw bales as appropriate
- Site stabilization practices such as placing crushed stone on top of disturbed soil in areas of concentrated runoff

Site stabilization practices to reduce the potential for erosion and sedimentation. Additional discussion is provided in ER Section 5.2.3, Geology and Soils.

After construction is complete, the site will be stabilized with natural, low-water maintenance landscaping and pavement.

5.2.2 Transportation

Mitigation measures will be in place to minimize potential impact of construction-related transportation activities. To control fugitive dust production, all reasonable precautions will be taken to prevent particulate matter from becoming airborne including the following actions:

- The use of water (controlled to minimize use) in the control of dust on dirt roads, in clearing and grading operations and construction activities.
- The use of adequate containment methods during excavation and/or other similar operations.
- Open bodied trucks transporting materials likely to give rise to airborne dust, shall be covered at all times when in motion.
- The prompt removal of earthen materials from paved roads, onto which, earth or other material has been transported by trucking or earth moving equipment, erosion by water, wind, or other means.
- Prompt stabilization or covering of bare areas once earth moving activities are completed.
- The operation of construction equipment and related vehicles with standard pollution control devices maintained in good working order.
- Washing of construction trucks with water only (controlled to minimize use) when required.
- Personnel will be designated to monitor dust emissions and to direct increased surface watering where necessary.

- If during the course of construction short duration activities (e.g., concrete trucks, multiple deliveries) with traffic impact are required, these will be scheduled to minimize traffic impacts.
- Work shifts will be implemented throughout the construction period to minimize impacts to traffic in the site vicinity. Car pooling will also be encouraged.

5.2.3 Geology and Soils

Mitigation measures will be in place to minimize potential impact on geology and soils. These include the following items:

- Erosional impacts due to site clearing and grading will be mitigated by utilization of construction and erosion control BMPs, some of which are further described below.
- Disturbed soils will be stabilized by acceptable means as part of construction work.
- Earthen berms, dikes and sediment fences will be utilized as necessary during all phases of construction to limit suspended solids in runoff.
- Cleared areas not covered by structures or pavement will be stabilized by acceptable means as soon as practical.
- Watering (controlled to minimize use) will be used to control fugitive construction dust.
- Surface runoff will be collected in temporary (during construction) and permanent retention/detention basins.
- Standard drilling and blasting techniques, if required, will be used to minimize impact to bedrock; reducing the potential for over-excavation thereby minimizing damage to the surrounding rock; and protecting adjacent surfaces that are intended to remain intact.
- Drainage culverts and ditches will be stabilized and lined with rock aggregate/rip-rap to reduce flow velocity and prohibit scouring.
- Soil stockpiles generated during construction will be placed in a manner to reduce erosion.
- Excavated materials will be reused when ever possible.

5.2.4 Water Resources

Mitigation measures will be in place to minimize potential impact on water resources. As discussed in ER Section 4.4.7, Control of Impacts to Water Quality, there is little potential to impact any groundwater or surface water resources. These mitigation measures also prevent soil contamination. These include employing BMPs and the control of hazardous materials and fuels. In addition, the following controls are also implemented:

- Construction equipment will be in good repair without visible leaks of oil, greases, or hydraulic fluids.
- The control of spills during construction will be in conformance with Spill Prevention Control and Countermeasures (SPCC) plan procedures.
- Use of the BMPs will assure stormwater runoff related to these activities will not release runoff into nearby sensitive areas.
- BMPs will also be used for dust control associated with excavation and fill operations during construction.

- Silt fencing and/or sediment traps.
- External vehicle washing (water only and controlled to minimize use).
- Stone construction pads will be placed at entrance/exits if unpaved construction access adjoins a state road.
- All basins are arranged to provide for the prompt, systematic sampling of runoff in the event of any special needs.
- Water quality impacts will be controlled during construction by compliance with the National Pollution Discharge Elimination System – Construction General Permit requirements and by applying BMPs as detailed in the site Stormwater Pollution Prevention Plan (SWPPP).
- A Spill Prevention Control and Countermeasure (SPCC) plan, will be implemented for the facility to identify potential spill substances, sources and responsibilities.
- All above ground diesel storage tanks will be bermed.
- Any hazardous materials will be handled by approved methods and shipped offsite to approved disposal sites. Sanitary wastes generated during site construction will be handled by portable systems, until such time that plant sanitary facilities are available for site use. An adequate number of these portables systems will be provided.
- The facility's Liquid Effluent Collection and Treatment System provides a means to control liquid waste within the plant 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 will both be below the 10 CFR 20 (CFR, 2003q) uncontrolled release limits. Both basins are included in the site environmental monitoring plan.
- Control of surface water runoff will be required for activities as covered by the National Pollutant Discharge Elimination System (NPDES) Construction General Permit. As a result, no impacts are expected to surface or groundwater bodies.

The NEF is designed to minimize the usage of natural and depletable resources as shown by the following measures:

- The use of low-water consumption landscaping versus conventional landscaping reduces water usage.
- The installation of low flow toilets, sinks and showers reduces water usage when compared to standard flow fixtures.
- Localized floor washing using mops and self-contained cleaning machines reduces water usage compared to conventional washing with a hose twice per week.
- The use of high efficiency washing machines compared to standard machines reduces water usage.
- The use of high efficiency closed cell cooling towers (water/air cooling) versus open cell design reduces water usage.
- Closed-loop cooling systems have been incorporated to reduce water usage.

The UBC Storage Pad Stormwater Retention Basin, which exclusively serves the UBC Storage Pad and cooling tower blowdown water discharges, is lined to prevent infiltration. It is designed to retain a volume slightly more than twice that for the 24-hour, 100-year frequency storm and

an allowance for the cooling tower blowdown water. Designed for sampling and radiological testing of the contained water and sediment, this basin has no flow outlet. All discharge is through evaporation.

The Site Stormwater Detention Basin is designed with an outlet structure for drainage. Local terrain serves as the receiving area for this basin.

Discharge of operations-generated potentially contaminated waste water is made exclusively to the Treated Effluent Evaporative Basin. Only liquids meeting site administrative limits (based on prescribed standards) and discharged to this basin. The basin is double-lined, open to allow evaporation, has no flow outlet and has leak detection.

5.2.5 Ecological Resources

Mitigation measures will be in place to minimize potential impact on ecological resources. These include the following items:

- Use of BMPs recommended by the State of New Mexico to minimize the construction footprint to the extent possible
- The use of detention and retention ponds
- Site stabilization practices to reduce the potential for erosion and sedimentation.
- Proposed wildlife management practices include:
- The placement of a raptor perch in an unused open area.
- The use of bird feeders at the visitor's center.
- The placement of quail feeders in the unused open areas away from the NEF buildings.
- The management of unused open areas (i.e. leave undisturbed), including areas of native grasses and shrubs for the benefit of wildlife.
- The use of native plant species (i.e., low-water consuming plants) to revegetate disturbed areas to enhance wildlife habitat.
- The use of netting, or other suitable material, to ensure migratory birds are excluded from evaporative ponds that do not meet New Mexico Water Quality Control Commission (NMWQCC, 2002) surface water standards for wildlife usage.
- The use of animal-friendly fencing around the site so that wildlife cannot be injured or entangled in the site security fence.
- Minimize the amount of open trenches at any given time and keep trenching and backfilling crews close together.
- Trench during the cooler months (when possible).
- Avoid leaving trenches open overnight. Escape ramps will be constructed at least every 90 m (295 ft). The slope of the ramps will be less than 45 degrees. Trenches that are left open overnight will be inspected and animals removed prior to backfilling.

In addition to proposed wildlife management practices above, LES will consider all recommendations of appropriate state and federal agencies, including the United States Fish and Wildlife Service and the New Mexico Department of Game and Fish.

5.2.6 Air Quality

Mitigation measures will be in place to minimize potential impact on air quality. These include the following items:

- The design of the NEF cooling towers combines adiabatic and evaporative heat transfer processes to significantly reduce visible plumes.
- The TSB and Separations Building Gaseous Effluent Vent Systems (GEVS) are designed to collect and clean potentially hazardous gases from the plant prior to release into the atmosphere. Instrumentation is provided to detect and signal via alarm, all non-routine process conditions, including the presence of radionuclides or hydrogen fluoride in the exhaust stream, that will trip the system to a safe condition, in the event of effluent detection beyond routine operational limits.
- The Centrifuge Test and Post Mortem Facilities Exhaust Filtration System is designed to collect and clean all potentially hazardous gases from the serviced areas in the CAB prior to release into the atmosphere. Instrumentation is provided to detect and signal the Control Room via alarm, all non-routine process conditions, including the presence of radionuclides or hydrogen fluoride in the exhaust stream. Operators will then take appropriate actions to mitigate the release.
- Construction BMPs will be applied as described previously to minimize fugitive dusts.
- Air concentrations of the Criteria Pollutants for vehicle emissions and fugitive dust will be below the National Ambient Air Quality Standards (NAAQS) (CFR, 2003w) and thus will not require further mitigation measures.

5.2.7 Noise

Mitigation of the operational noise sources will occur primarily from the plant design, whereby cooling systems, valves, transformers, pumps, generators, and other facility equipment, will mostly reside inside plant structures. The buildings themselves will absorb the majority of the noise located within. Natural land contours, vegetation (such as scrub brush), and site buildings and structures will mitigate the impact of other equipment located outside of structures that contribute to site noise levels.

Noise from construction activities will have the highest sound levels, but the nearest home is located 4.3 km (2.63 mi) from the site and due to distance, it is not expected that residents will perceive an increase in noise levels. However, heavy truck and earth moving equipment usage will be restricted after twilight and during early morning hours. All noise suppression systems on construction vehicles shall be kept in proper operation.

5.2.8 Historical and Cultural Resources

Mitigation measures will be in place to minimize any potential impact on historical and cultural resources. In the event that any inadvertent discovery of human remains or other item of archeological significance is made during construction, the facility will cease construction activities in the area around the discovery and notify the New Mexico State Historic Preservation Officer, to make the determination of appropriate measures to identify, evaluate, and treat these discoveries.

Mitigation of the impact to historical and cultural sites within the NEF project boundary can take a variety of forms. Avoidance and data collection are the two most common forms for sites considered eligible based on National Register of Historic Places (NRHP) (USC, 2003c) criterion (d), their data content, which is the basis for the recommended eligibility of these particular sites (USC, 2003c). When possible, avoidance is the preferred alternative because the site is preserved in place and mitigation costs are minimized. When avoidance is not possible, data collection becomes the preferred alternative. Data collection proceeds after the sites have been determined eligible. A treatment plan is submitted to the appropriate regulatory agencies. The plan describes the expected data content of the sites and how data will be collected, analyzed, and reported. A treatment/mitigation plan is being developed by LES to recover any significant information from the seven eligible archaeological sites identified on the NEF site.

Options to deal with unexpected discoveries are defined. In the case of these sites, a phased approach may be appropriate. This type of approach would define a process of data recovery that begins with the recovery of the significant information present in the site features and the surface artifact assemblage combined with some level of subsurface exploration to identify the presence of other significant data thought to be present.

The next phase is predicated upon the results of the subsurface exploration. If other significant remains are located, additional excavation is used to extract this information. Generally, some maximum amount of excavation is specified and the additional excavation does not exceed that amount unless unexpected discoveries are made.

Alternatively, a testing phase can be inserted into the process prior to data collection. In this approach, a testing plan is prepared and submitted for regulatory review. Once approved, the site (in this case, either eligible or potentially eligible) testing plan is implemented. Recovered materials and spatial data are analyzed, and a testing report and treatment plan are prepared and submitted for regulatory review. Upon approval, the treatment plan is then implemented.

The recovered materials include artifacts and samples that include bone, charcoal, sediments, etc. Samples are usually submitted to outside analytical laboratories, these include radiocarbon dates. Artifacts, bones, and perhaps some of the remaining samples are then curated. Curation is usually at the Museum of New Mexico. The museum charges a fee for curation in perpetuity.

5.2.9 Visual/Scenic Resources

Mitigation measures will be in place to minimize the impact to visual and scenic resources. These include the following items:

- The use of accepted natural, low-water consumption landscaping techniques to limit any potential visual impacts. These techniques will incorporate, but not be limited to the use of landscape plantings. As for aesthetically pleasing screening measures, planned landscape plantings will include indigenous vegetation.
- Prompt natural re-vegetation or covering of bare areas, will be used to mitigate visual impacts due to construction activities.
- Any removal of natural barriers, screens or buffers will be minimized.

5.2.10 Socioeconomic

No socioeconomic mitigation measures are anticipated.

5.2.11 Environmental Justice

No environmental justice mitigation measures are anticipated.

5.2.12 Public and Occupational Health

This section describes the mitigation measures to minimize public and occupational health impacts, from both nonradiological and radiological sources.

5.2.12.1 Nonradiological – Normal Operations

Mitigation measures will be in place to minimize the impact of nonradiological gaseous and liquid effluents to well below regulatory limits. The plant design incorporates numerous features to minimize potential gaseous and liquid effluent impacts including:

- Process systems that handle UF_6 operate at sub-atmospheric pressure minimizes outward leakage of UF_6.
- UF_6 cylinders are moved only when cool and when UF_6 is in solid form minimizing the risk of inadvertent release due to mishandling.
- Process off-gas from UF_6 purification and other operations passes through cold traps to solidify and reclaim as much UF_6 as possible. Remaining gases pass through high-efficiency filters and chemical absorbers removing HF and uranic compounds.
- Waste generated by decontamination of equipment and systems are subjected to processes that separate uranic compounds and various other heavy metals in the waste material.
- Liquid and solid waste handling systems and techniques are used to control wastes and effluent concentrations.
- Gaseous effluent passes through pre-filters, high efficiency particulate air (HEPA) filters, and activated carbon filters, all of which reduce the radioactivity in the final discharged effluent to very low concentrations.
- Liquid waste is routed to collection tanks, and treated through a combination of precipitation, evaporation, and ion exchange to remove most of the radioactive material prior to release of waste water to the onsite Treated Effluent Evaporative Basin (double-lined with leak detection).
- Liquid effluent pathways are monitored and sampled to assure compliance with regulatory discharge limits.
- All UF_6 process systems are monitored by instrumentation, which will activate alarms in the Control Room and will either automatically shut down the plant to a safe condition or alert operators to take the appropriate action (i.e., to prevent release) in the event of operational problems.
- LES will investigate alternative solvents or will apply control technologies for methylene chloride solvent use.

Administrative controls, practices, and procedures are used to assure compliance with the NEFs' Health, Safety, and Environmental Program. This program is designed to ensure safe storage, use, and handling of chemicals to minimize the potential for worker exposure.

5.2.12.2 Radiological – Normal Operations

Mitigation measures to minimize the impact of radiological gaseous and liquid effluents are the same as those listed in ER Section 5.2.12.1, Nonradiological – Normal Operations. Additional measures to minimize radiological exposure and release are listed below.

Radiological practices and procedures are in place to ensure compliance with the NEFs' Radiation Protection Program. This program is designed to achieve and maintain radiological exposure to levels that are "As Low as Reasonably Achievable" (ALARA). These measures include:

- Routine plant radiation and radiological surveys to characterize and minimize potential radiological dose/exposure.
- Monitoring of all radiation workers via the use of dosimeters and area air sampling to ensure that radiological doses remain within regulatory limits and are ALARA.
- Radiation monitors are provided in the gaseous effluent stacks to detect and alarm, and affect 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.

5.2.12.3 Accidental Releases

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5.2.13 Waste Management

Mitigation measures will be in place to minimize both the generation and impact of facility wastes. Solid and liquid wastes and liquid and gaseous effluents will be controlled in accordance with regulatory limits. Mitigation measures include:

- System design features are in place to minimize the generation of solid waste, liquid waste, liquid effluents, and gaseous effluent. Liquid and gaseous effluent design features were previously described in ER Section 5.2.12, Public and Occupational Health.

- There will be no onsite disposal of waste at the NEF. Waste will be stored in designated areas of the plant, until an administrative limit is reached. When the administrative limit is reached, the waste will then be shipped offsite to a licensed disposal facility.
- All radioactive and mixed wastes will be disposed of at offsite, licensed facilities.
- Mitigation measures associated with UBC storage are as follows:
- LES will maintain a cylinder management program to monitor storage conditions on the UBC Storage Pad to monitor cylinder integrity by conducting routine inspections for breaches, and to perform cylinder maintenance and repairs as needed.
- All UBCs filled with depleted uranium hexafluoride (UF_6) will be stored on concrete (or other material) saddles that do not cause corrosion of the cylinders. These saddles shall be placed on a concrete pad.
- The storage pad areas shall be segregated from the rest of the enrichment facility by barriers (e.g., vehicle guard rails).
- UBCs shall be double stacked on the storage pad. The storage array shall permit easy visual inspection of all cylinders.
- UBCs shall be surveyed for external contamination (wipe tested), prior to being placed on the UBC Storage Pad or transported offsite.
- UBC valves shall be fitted with valve guards to protect the cylinder valve during transfer and storage.
- Provisions are in place 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, 2003e) installed.
- All UF_6 cylinders are abrasive blasted and coated with anti-corrosion primer/paint when manufactured (as required by specification). Touch-up application of coating will be performed on UBCs if coating damage is discovered during inspection.
- Only designated vehicles with less than 0.3 m^3 (74 gal) of fuel shall be allowed on the UBC Storage Pad.

UBCs shall be inspected for damage prior to placing a filled cylinder on the storage pad. UBCs shall be re-inspected annually for damage or surface coating defects. These inspections shall verify that:

- 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.
- Cylinders are inspected to confirm that the valve is 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 good condition cylinder and the defective cylinder shall be discarded. The root cause of any significant deterioration shall be determined, and if necessary, additional inspections of cylinders shall be made.

- Proper documentation on the status of each UBC shall be available onsite, including content and inspection dates.
- The UBC Storage Pad Stormwater Retention Basin is used to capture stormwater runoff from the UBC Storage Pad.

Other waste mitigation measures will include:

- Power usage will be minimized by efficient design of lighting systems, selection of high-efficiency motors, and use of proper insulation materials.
- Processes used to clean up wastes and effluent create their own wastes and effluent as well. Control of these process effluents is accomplished by liquid and solid waste handling systems and techniques as described below.
- Careful applications of basic principles for waste handling are followed in all of the systems and processes.
- Different waste types are collected in separate containers to minimize contamination of one waste type with another. Materials that can cause airborne contamination are carefully packaged, and; ventilation and filtration of the air in the area are provided as necessary. Liquid wastes are confined to piping, tanks, and other containers; curbing, pits, and sumps are used to collect and contain leaks and spills.
- Hazardous wastes are stored in designated areas in carefully labeled containers. Mixed wastes are also contained and stored separately.
- Strong acids and caustics are neutralized before entering an effluent stream.
- Radioactively contaminated wastes, are decontaminated and/or re-used in so far as possible to reduce waste volume.
- Fomblin Oil will be recovered and none will be routinely released as waste or effluent.
- Collected waste such as trash, compressible dry waste, scrap metals, and other candidate wastes, will be volume reduced at a centralized waste processing facility.
- Waste management systems will include administrative procedures, and practices that provide for the collection, temporary storage, processing, and disposal of categorized solid waste in accordance with regulatory requirements.
- Handling and treatment process are designed to limit wastes and effluent. Sampling and monitoring is performed to assure plant administrative and regulatory limits, are not exceeded in discharges to the Treated Effluent Evaporative Basin.
- Gaseous effluent is monitored for HF and for radioactive contamination before release.
- Liquid effluent is sampled and/or monitored in liquid waste treatment systems.
- Solid wastes are sampled and/or monitored prior to offsite treatment and disposal.
- Process system samples are returned to their source, where feasible, to minimize input to waste streams.

The NEF will implement a spill control program for accidental oil spills. A Spill Prevention Control and Countermeasure (SPCC) Plan will be prepared prior to the start of operation of the facility or prior to the storage of oil onsite in excess of de minimis quantities and will contain the following information:

- Identification of potential significant sources of spills and a prediction of the direction and quantity of flow that would result from a spill from each source.
- Identification of the use of containment or diversionary structures such as dikes, berms, culverts, booms, sumps, and diversion ponds used at the facility to prevent discharged oil from reaching the surrounding environment.
- Procedures for inspection of potential sources of spills and spill containment/diversion structures.
- Assigned responsibilities for implementing the plan, inspections, and reporting.
- As part of the SPCC Plan, other measures will include control of drainage of rain water from diked areas, containment of oil and diesel fuel in bulk storage tanks, above ground tank integrity testing, and oil and diesel fuel transfer operational safeguards.

Currently, the NEF construction plan has not been developed enough to determine how much of the construction debris would be recycled. As such, there is no plan in place at this time to recycle construction materials. A construction phase recycling program will be developed as the construction plan progresses to final design.

The NEF will implement a non-hazardous materials waste recycling plan during operation. The recycling effort will start with the performance of a waste assessment to identify waste reduction opportunities and to determine which materials will be recycled. Once the decision has been made of which waste materials to recycle, brokers and haulers will be contacted to find an end-market for the materials. Employee training on the recycling program will be performed so that employees will know which materials are to be recycled. Recycling bins and containers will be purchased and shall be clearly labeled. Periodically, the recycling program will be evaluated (i.e., waste management expenses and savings, recycling and disposal quantities) and the results reported to the employees.

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6.0 ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

6.1 RADIOLOGICAL MONITORING

6.1.1 Effluent Monitoring Program

The Nuclear Regulatory Commission (NRC) requires, pursuant to 10 CFR 20 (CFR, 2003q) that licensees conduct surveys necessary to demonstrate compliance with these regulations and to demonstrate that the amount of radioactive material present in effluent from the facility has been kept as low as reasonably achievable (ALARA). In addition, the NRC requires pursuant to 10 CFR 70 (CFR, 2003b), that licensees submit semiannual reports, specifying the quantities of the principal radionuclides released to unrestricted areas and other information needed to estimate the annual radiation dose to the public from effluent discharges. The NRC has also issued Regulatory Guide 4.15 – Quality Assurance for Radiological Monitoring Programs (Normal Operations) – Effluent Streams and the Environment (NRC, 1979) and Regulatory Guide 4.16 – Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluent from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants (NRC, 1985) that reiterate that concentrations of hazardous materials in effluent must be controlled and that licensees must adhere to the ALARA principal such that there is no undue risk to the public health and safety at or beyond the site boundary.

Refer to Figure 6.1-1, Effluent Release Points and Meteorological Tower, and Figure 6.1-2, Modified Site Features With Proposed Sampling Stations and Monitoring Locations. Effluents are sampled as shown in Table 6.1-1, Effluent Sampling Program. For gaseous effluents, continuous air sampler filters are analyzed for gross alpha and beta each week. The filters are composited quarterly and an isotopic analysis is performed. For liquids, a grab sample is taken for isotopic analysis post-treatment prior to discharge to the Treated Effluent Evaporative Basin.

Public exposure to radiation from routine operations at the National Enrichment Facility (NEF) may occur as the result of discharge of liquid and gaseous effluents, including controlled releases from the uranium enrichment process lines during decontamination and maintenance of equipment. In addition, radiation exposure to the public may result from the transportation and storage of uranium hexafluoride (UF_6) feed cylinders, product cylinders, and Uranium Byproduct Cylinders (UBCs). Of these potential pathways, discharge of gaseous effluent has the highest possibility of introducing facility-related uranium into the environment. The plant's procedures and facilities for solid waste and liquid effluent handling, storage and monitoring result in safe storage and timely disposition of the material. ER Section 1.3, Applicable Regulatory Requirements and Required Consultations, accurately describes all applicable Federal and New Mexico State standards for discharges, as well as required permits issued by local, New Mexico and Federal governments.

Compliance with 10 CFR 20.1301 (CFR, 2003q) is demonstrated using a calculation of the total effective dose equivalent (TEDE) to the individual who is likely to receive the highest dose in accordance with 10 CFR 20.1302(b)(1) (CFR, 2003q). The determination of the TEDE by pathway analysis is supported by appropriate models, codes, and assumptions that accurately represent the facility, site, and the surrounding area. The assumptions are reasonably

conservative, input data is accurate, and all applicable pathways are considered. ER Section 4.12, Public and Occupational Health Impacts, presents the details of these determinations.

The computer codes used to calculate dose associated with potential gaseous and liquid effluent from the plant follow the methodology, for pathway modeling, described in Regulatory Guide 1.109 (NRC, 1977c), and have undergone validation and verification. The dose conversion factors used are those presented in Federal Guidance Reports Numbers 11 (EPA, 1988) and 12 (EPA, 1993a).

Administrative action levels are established for effluent samples and monitoring instrumentation as an additional step in the effluent control process. All action levels are sufficiently low so as to permit implementation of corrective actions before regulatory limits are exceeded. Effluent samples that exceed the action level are cause for an investigation into the source of elevated radioactivity. Radiological analyses will be performed more frequently on ventilation air filters if there is a significant increase in gross radioactivity or when a process change or other circumstances cause significant changes in radioactivity concentrations. Additional corrective actions will be implemented based on the level, automatic shutdown programming, and operating procedures to be developed in the detailed alarm design. Under routine operating conditions, radioactive material in effluent discharged from the facility complies with regulatory release criteria.

Compliance is demonstrated through effluent and environmental sampling data. If an accidental release of uranium should occur, then routine operational effluent data and environmental data will be used to assess the extent of the release. Processes are designed to include, when practical, provision for automatic shutdown in the event action levels are exceeded. Appropriate action levels and actions to be taken are specified for liquid effluents and gaseous releases. Data analysis methods and criteria used in evaluating and reporting environmental sample results are appropriate and will indicate when an action level is being approached in time to take corrective actions.

The effluent monitoring program falls under the oversight of the NEF Quality Assurance (QA) program. Therefore, it is subject to periodic audits conducted by the facility QA personnel. Written procedures will be in place to ensure the collection of representative samples, use of appropriate sampling methods and equipment, proper locations for sampling points, and proper handling, storage, transport, and analyses of effluent samples. In addition, the plant's written procedures also ensure that sampling and measuring equipment, including ancillary equipment such as airflow meters, are properly maintained and calibrated at regular intervals. Moreover, the effluent monitoring program procedures include functional testing and routine checks to demonstrate that monitoring and measuring instruments are in working condition. Employees involved in implementation of this program are trained in the program procedures.

The NEF will ensure that isokinetic sampling conditions are maintained in all instances where pitot probes are used to sample for particulates within ducts with moving air streams. This will be accomplished by implementing the following criteria, where practical: 1) calibrating air sampling equipment so that the air velocity in the sampling probe is made equivalent to the air stream velocity in the duct being sampled; 2) maintaining the axis of the sampling probe head parallel to the air stream flow lines in the ductwork; 3) sampling (if possible) at least ten duct diameters downstream from a bend or obstruction in the duct; and 4) using shrouded-head air sampling probes when they are available in the size appropriate to the air sampling situation. Particle size distributions will be determined from process knowledge or measured to estimate and compensate for sample line losses and momentary non-isokinetic conditions.

The NEF will ensure that sampling equipment (pumps, pressure gages and air flow calibrators) are calibrated by qualified individuals. All air flow and pressure drop calibration devices (e.g., rotometers) will be calibrated periodically using primary or secondary air flow calibrators (wet test meters, dry gas meters or displacement bellows). Secondary air flow calibrators will be calibrated annually by the manufacturer(s). Air sampling train flow rates will be verified and/or calibrated with tertiary air flow calibrators (rotometers) each time a filter is replaced or a sampling train component is replaced or modified. Sampling equipment and lines will be inspected for defects, obstructions and cleanliness. Calibration intervals will be developed based on manufacturer's recommendations and nuclear industry operating experience.

6.1.1.1 Gaseous Effluent Monitoring

As a matter of compliance with regulatory requirements, all potentially radioactive effluent from the facility is discharged only through monitored pathways. See ER Section 4.12.2.1, Routine Gaseous Effluent, for a discussion of pathway assessment. The effluent sampling program for the NEF is designed to determine the quantities and concentrations of radionuclides discharged to the environment. The uranium isotopes ^{238}U, ^{236}U, ^{235}U and ^{234}U are expected to be the prominent radionuclides in the gaseous effluent. The annual uranium source term for routine gaseous effluent releases from the plant has been conservatively assumed to be 8.9 MBq (240 µCi) per year, which is equal to twice the source term applied to the 1.5 million SWU plant described in NUREG-1484 (NRC, 1994a). This is a very conservative annual release estimate used for bounding analyses. Additional details regarding source term are provided in ER Section 4.12, Public and Occupational Health Impacts. Representative samples are collected from each release point of the facility. Because uranium in gaseous effluent may exist in a variety of compounds (e.g., depleted hexavalent uranium, triuranium octoxide, and uranyl fluoride), effluent data will be maintained, reviewed, and assessed by the facility's Radiation Protection Manager, to assure that gaseous effluent discharges comply with regulatory release criteria for uranium. Table 6.1-1, Effluent Sampling Program, presents an overview of the effluent sampling program.

The gaseous effluent monitoring program for the NEF is designed to determine the quantities and concentrations of gaseous discharges to the environment.

Gaseous effluent from the NEF, which has the potential for airborne radioactivity (albeit in very low concentrations) will be discharged through the Separations Building Gaseous Effluent Vent System (GEVS), the Technical Services Building (TSB) GEVS, the Centrifuge Test and Post Mortem Facilities Exhaust Filtration System, and portions of the TSB Heating Ventilating and Air Conditioning (HVAC) System that provide the confinement ventilation function for areas of the TSB with the potential for contamination (Decontamination Workshop, Cylinder Preparation Room and the Ventilated Room). Monitoring for each of these systems is as follows:

- Separations Building GEVS: This system discharges to a stack on the TSB roof. The Separations Building GEVS provides for continuous monitoring and periodic sampling of the gaseous effluent in the exhaust stack in accordance with the guidance in NRC Regulatory Guide 4.16 (NRC, 1985). The GEVS stack sampling system provides the required samples. The exhaust stack is equipped with monitors for alpha radiation and HF.

- TSB GEVS: This system discharges to an exhaust stack on the TSB roof. The TSB GEVS provides for continuous monitoring and periodic sampling of the gaseous effluent in the exhaust stack in accordance with the guidance in NRC Regulatory Guide 4.16 (NRC, 1985). The TSB GEVS stack sampling system provides the required samples. The exhaust stack contains monitors for alpha radiation and HF.
- The Centrifuge Test and Post Mortem Facilities Exhaust Filtration System: This system discharges through a stack on the Centrifuge Assembly Building (CAB). The Centrifuge Test and Post Mortem Facilities Exhaust Filtration stack sampling system provides for continuous monitoring and periodic sampling of the gaseous effluent in the exhaust stack in accordance with the guidance in NRC Regulatory Guide 4.16 (NRC, 1985). The exhaust stack is provided with an alpha radiation monitor and an HF monitor.
- TSB HVAC System (confinement ventilation function portions): This system maintains the room temperature in various areas of the TSB, including some potentially contaminated areas. For the potentially contaminated areas (Ventilated Room, Decontamination Workshop and Cylinder Preparation Room), the confinement ventilation function of the TSB HVAC system maintains a negative pressure in these rooms and discharges the gaseous effluent to an exhaust stack on the TSB roof. The stack sampling system provides for continuous monitoring and periodic sampling of the gaseous effluent from the rooms served by the TSB HVAC confinement ventilation function in accordance with the guidance in NRC Regulatory Guide 4.16 (NRC, 1985).

The gaseous effluent sampling program supports the determination of quantity and concentration of radionuclides discharged from the facility and supports the collection of other information required in reports to be submitted to the NRC. A minimum detectable concentration (MDC) of at least 3.7×10^{-11} Bq/ml (1.0×10^{-15} μCi/ml) is a program requirement (NRC, 2002b) for all gross alpha analyses performed on gaseous effluent samples. That MDC value represents <2% of the limit for any uranium isotope. Table 6.1-2, Required Lower Level of Detection for Effluent Sample Analyses, summarizes detection requirements for effluent sample analyses.

6.1.1.2 Liquid Effluent Monitoring

Liquid effluents containing low concentrations of radioactive material, consisting mainly of spent decontamination solutions, floor washings, liquid from the laundry, and evaporator flushes, is expected to be generated by the NEF. Table 6.1-3, Estimated Uranium in Pre-Treated Liquid Waste from Various Sources, provides estimates of the annual volume and radioactive material content in liquid effluent by source prior to processing. Uranium is the only radioactive material expected in these wastes. Potentially contaminated liquid effluent is routed to the Liquid Effluent Collection and Treatment System for treatment. Most of the radioactive material is removed from waste water in the Liquid Effluent Collection and Treatment System through a combination of clean-up processes that includes precipitation, evaporation, and ion exchange. Post-treatment liquid waste water is sampled and undergoes isotopic analysis prior to discharge to assure that the released concentrations are well below the concentration limits established in Table 3 of Appendix B to 10 CFR 20 (CFR, 2003q).

After treatment, the effluent is released to the double-lined Treated Effluent Evaporative Basin, which includes leak detection monitoring. Concentrated radioactive solids generated by the liquid treatment processes at the facility are handled and disposed of as low-level radioactive waste.

The design basis uranium source term for routine liquid effluent discharge to the Treated Effluent Evaporative Basin has been conservatively estimated to be 14.4 MBq (390 µCi) per year. There is no offsite release of liquid effluents to unrestricted areas. ER Section 4.12, Public and Occupational Health Impacts, provides additional details regarding effluent source terms.

Representative sampling is required for all batch liquid effluent releases. Liquid samples are collected from each liquid batch and analyzed prior to any transfer. Isotopic analysis is performed prior to discharge. The MDC for analysis of liquid effluent are presented in Table 6.1-2, Required Lower Level of Detection for Effluent Sample Analyses. The liquid effluent sampling program supports the determination of quantities and concentrations of radionuclides discharged to the Treated Effluent Evaporative Basin and supports the collection of other information required in reports submitted to the NRC.

Periodic sampling of liquid effluent is required since these effluents are treated in batches. Representative sampling is assured through the use of tank agitators and recirculation lines. All collection tanks are sampled before the contents are sent through any treatment process. Treated water is collected in Monitor Tanks, which are sampled before discharge to the Treated Effluent Evaporative Basin.

NRC Information Notice 94-07 (NRC, 1994b) describes the method for determining solubility of discharged radioactive materials. Note that liquid effluents at the NEF are treated such that insoluble uranium is removed as part of the treatment process. Releases are in accordance with the ALARA principle.

General site stormwater runoff is routed to the Site Stormwater Detention Basin. The UBC Storage Pad Stormwater Retention Basin collects rainwater from the UBC Storage Pad as well as cooling tower blowdown water. Approximately 174,100 m^3 (46 million gal) of stormwater are expected to be collected each year by the two basins. Both of these basins will be included in the site Radiological Environmental Monitoring Program. See ER Section 6.1.2.

6.1.2 Radiological Environmental Monitoring Program

The Radiological Environmental Monitoring Program (REMP) at the NEF is a major part of the effluent compliance program. It provides a supplementary check of containment and effluent controls, establishes a process for collecting data for assessing radiological impacts on the environs and estimating the potential impacts on the public, and supports the demonstration of compliance with applicable radiation protection standards and guidelines.

The primary objective of the REMP is to provide verification that the operations at the facility do not result in detrimental radiological impacts on the environment. Through its implementation, the REMP provides data to confirm the effectiveness of effluent controls and the effluent monitoring program. In order to meet program objectives, representative samples from various

environmental media are collected and analyzed for the presence of plant-related radioactivity. The types and frequency of sampling and analyses are summarized in Table 6.1-4, Radiological Environmental Monitoring Program. Environmental media identified for sampling consist of ambient air, groundwater, soil/sediment, and vegetation. All environmental samples will be analyzed onsite. However, samples may also be shipped to a qualified independent laboratory for analyses. The MDCs for gross alpha (assumed to be uranium) in various environmental media are shown in Table 6.1-5, Required MDC for Environmental Sample Analyses. Monitoring and sampling activities, laboratory analyses, and reporting of facility-related radioactivity in the environment will be conducted in accordance with industry-accepted and regulatory-approved methodologies.

The Quality Control (QC) procedures used by the laboratories performing the plant's REMP will be adequate to validate the analytical results and will conform with the guidance in Regulatory Guide 4.15 (NRC, 1979). These QC procedures include the use of established standards such as those provided by the National Institute of Standards and Technology (NIST), as well as standard analytical procedures such as those established by the National Environmental Laboratory Accreditation Conference (NELAC).

Monitoring procedures will employ well-known acceptable analytical methods and instrumentation. The instrument maintenance and calibration program will be appropriate to the given instrumentation, in accordance with manufacturers' recommendations.

The NEF will 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 analytes being measured. Examples of these third-party programs are: 1) Mixed Analyte Performance Evaluation Program (MAPEP) and the DOE Quality Assurance Program (DOEQAP) that are administered by the Department of Energy; and 2) Analytics Inc, Environmental Radiochemistry Cross-Check Program. The NEF will require that all radiological and non-radiological laboratory vendors are certified by the National Environmental Laboratory Accreditation Program (NELAP) or an equivalent state laboratory accreditation agency for the analytes being tested.

Reporting procedures will comply with the requirements of 10 CFR 70.59 (CFR, 2003b) and the guidance specified in Regulatory Guide 4.16 (NRC, 1985). Reports of the concentrations of principal radionuclides released to unrestricted areas in effluents will be provided and will include the Minimum Detectable Concentration (MDC) for the analysis and the error for each data point.

The REMP includes the collection of data during pre-operational years in order to establish baseline radiological information that will be used in determining and evaluating impacts from operations at the plant on the local environment. The REMP will be initiated at least 2 years prior to plant operations in order to develop a sufficient database. The early initiation of the REMP provides assurance that a sufficient environmental baseline has been established for the plant before the arrival of the first uranium hexafluoride shipment. Radionuclides in environmental media will be identified using technically appropriate, accurate, and sensitive analytical instruments. Data collected during the operational years will be compared to the baseline generated by the pre-operational data. Such comparisons provide a means of assessing the magnitude of potential radiological impacts on members of the public and in demonstrating compliance with applicable radiation protection standards.

During the course of facility operations, revisions to the REMP may be necessary and appropriate to assure reliable sampling and collection of environmental data. The rationale and actions behind such revisions to the program will be documented and reported to the appropriate regulatory agency, as required. REMP sampling focuses on locations within 4.8 km (3 mi) of the facility, but may also include distant locations as control sites. REMP sampling locations have been determined based on NRC guidance found in the document, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors" (NRC, 1991), meteorological information, and current land use. The sampling locations may be subject to change as determined from the results of periodic review of land use.

Atmospheric radioactivity monitoring is based on plant design data, demographic and geologic data, meteorological data, and land use data. Because operational releases are anticipated to be very low and subject to rapid dilution via dispersion, distinguishing plant-related uranium from background uranium already present in the site environment is a major challenge of the REMP. The gaseous effluent is released from roof-top discharge points, or resuspension of particles from the Treated Effluent Evaporative Basin, which will result in ground-level releases. A characteristic of ground-level plumes is that plume concentrations decrease continually as the distance from the release point increases. It logically follows that the impact at locations close to the release point is greater than at more distant locations. The concentrations of radioactive material in gaseous effluent from the NEF are expected to be very low concentrations of uranium because of process and effluent controls. Consequently, air samples collected at locations that are close to the plant would provide the best opportunity to detect and identify plant-related radioactivity in the ambient air. Therefore, air-monitoring activities will concentrate on collection of data from locations that are relatively close to the plant, such as the plant perimeter fence or the plant property line. Air monitoring stations will be situated along the site boundary locations of highest predicted atmospheric deposition, and at special interest locations, such as a nearby residential area and business. In addition, an air monitoring station will be located next to the Treated Effluent Evaporative Basin in order to measure for particulate radioactivity that may be being resuspended into the air from sediment layers when the basin is dry.

A control sample location will be established beyond 8 km (5 mi) in an upwind sector (the sector with least prevalent wind direction). Refer to ER Sections 3.6, Meteorology, Climatology and Air Quality and 4.6, Air Quality Impacts, for information on meteorology and atmospheric dispersion. All environmental air samplers 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).

Vegetation and soil samples, both from on and offsite locations will be collected on a quarterly basis in each sector during the pre-operational REMP. This is to assure the development of a sound baseline. During the operational years, vegetation and soil sampling will be performed semiannually in eight sectors, including three with the highest predicted atmospheric deposition. Vegetation samples may include vegetables and grass, depending on availability. Soil samples will be collected in the same vicinity as the vegetation samples.

Groundwater samples from onsite monitoring well(s) will be collected semiannually for radiological analysis. The locations of the groundwater sampling (monitoring) wells are shown on Figure 6.1-2, Modified Site Features with Proposed Sampling Stations and Monitoring Locations. The rationale for the locations is based on the slope of the red bed surface at the base of the shallow sand and gravel layer and the groundwater gradient in the 70 m (230 ft)

groundwater zone to the south under the NEF site and proximity to key site structures. Two monitoring wells will be located down-gradient of the site basins, two will be located down-gradient of the UBC Storage Pad and one will be located up-gradient of the UBC Storage Pad and all site facilities.

The background monitoring well, located in the NNW sector of the NEF site, is also shown on Figure 6.1-2. This background monitoring well is located up-gradient of the NEF and cross-gradient from the WCS facility. This location is intended to avoid potential contamination from both facilities, i.e., NEF and/or WCS. Monitoring at this location will occur in both the shallow sand and gravel layer on top of the red bed and in the 70-m (230-ft) groundwater zone. Groundwater in the sand and gravel layer was not encountered at the NEF site during groundwater investigations. Although not an aquifer, it will be monitored since it is the shallowest layer under the NEF site. The 70-m (230 ft) zone contains the first occurrence of groundwater beneath the NEF. Although not strictly meeting the definition of an aquifer, which requires that the unit be able to transit "significant quantities of water under ordinary hydraulic gradients," this layer will also be monitored.

Other surrounding industrial activities, the Wallach Quarry and the Sundance Services "produced water" lagoons north of the NEF site have some potential to introduce contaminants that could reach the background monitoring well. The contaminants of concern for those facilities should be readily differentiated from potential contaminants from the NEF.

Sediment samples will 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 will be evaluated along with nearby air monitoring data to assess any observed resuspension of particles into the air.

The site septic systems will receive only typical sanitary wastes. No plant process related effluents will be introduced into the septic systems. Each septic tank will, however, be periodically sampled (prior to pumping) and analyzed for isotopic Uranium. The septic tanks are upstream of the leach fields. Any Uranium that is in the system that could reach the leach fields would be detected in the septic tanks. Therefore, no sampling will be performed at the leach fields.

Direct radiation in offsite areas from processes inside the facility building is expected to be minimal because the low-energy radiation associated with the uranium will be shielded by the process piping, equipment, and cylinders to be used at the NEF. However, the Uranium Byproduct Cylinders (UBCs) stored on the UBC Storage Pad may have an impact in some offsite locations due to direct and scatter (skyshine) radiation. The offsite impact from the UBC storage has been evaluated and is discussed in ER Section 4.12, Public and Occupational Health Impacts.

The conservative evaluation showed that an annual dose equivalent of < 0.2 mSv (20 mrem) is expected at the highest impacted area at the plant perimeter fence.

Because the offsite dose equivalent rate from stored UBCs is expected to be very low and difficult to distinguish from the variance in normal background radiation beyond the site boundary, demonstration of compliance will rely on a system that combines direct dose equivalent measurements and computer modeling to extrapolate the measurements. Environmental thermoluminescent dosimeters (TLDs) placed at the plant perimeter fence line or other location(s) close to the UBCs will provide quarterly direct dose equivalent information.

The direct dose equivalent at offsite locations will be estimated through extrapolation of the quarterly TLD data using the Monte Carlo N-Particle (MCNP) computer program (ORNL, 2000a) or a similar computer program.

Figure 6.1-2, Modified Site Features With Proposed Sampling Stations and Monitoring Stations, indicates the location of REMP sampling locations.

The REMP may be enhanced during the operation of the facility as necessary to maintain the collection and reliability of environmental data based on changes to regulatory requirements or facility operations. The REMP includes administrative action levels (requiring further analysis) and reporting levels for radioactivity in environmental samples.

The REMP falls under the oversight of the facility's Quality Assurance (QA) program. Therefore, written procedures 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 will be a key part of the program. In addition, written procedures ensure that sampling and measuring equipment, including ancillary equipment such as airflow meters, are properly maintained and calibrated at regular intervals. Moreover, the REMP implementing procedures will include functional testing and routine checks to demonstrate that monitoring and measuring instruments are in working condition.

The design status of leak detection (and mitigation procedures) for ponds and tanks has not yet progressed to final design. The NEF will conform with leak detection recommendations required in NUREG-1520 (NRC, 2002b).

Each year, the NEF will submit a summary report of the environmental sampling program to the NRC, including all associated data as required by 10 CFR 70 (CFR, 2003b). The report will include the types, numbers, and frequencies of environmental measurements and the identities and activity concentrations of facility-related nuclides found in environmental samples, in addition to the MDC for the analyses and the error associated with each data point. Significant positive trends in activities will also be noted in the report, along with any adjustment to the program, unavailable samples, and deviation to the sampling program.

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TABLES

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Table 6.1-1 Effluent Sampling Program
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Effluent	Sample Location	Sample Type	Analysis Frequency
Gaseous	Separative Building GEVS Stack TSB GEVS Stack TSB HVAC Stack Centrifuge Test and Post Mortem Facilities Exhaust Filtration System Stack	Continuous Air Particulate Filter	Gross Alpha/Beta-Weekly Isotopic Analysis[a] - Quarterly
	Process Areas	Continuous Air Particulate Filter*	Gross Alpha/Beta - Weekly Isotopic Analysis[a] - Quarterly
	Non-Process Areas	Continuous Air Particulate Filter*	Gross Alpha/Beta-Quarterly
Liquid	Monitor Tank	Representative Grab Sample	Isotopic Analysis[a] Post-Treatment - Prior to Discharge.

[a] Isotopic analysis for ^{234}U ,^{235}U, ^{236}U, and ^{238}U.
*As required to complement bioassay program.

Table 6.1-2 Required Lower Level Of Detection For Effluent Sample Analyses

Effluent Type	Nuclide	MDC[a] in Bq/ml (µCi/ml)
Gaseous	^{234}U	$3.7x10^{-13}$ ($1.0x10^{-17}$)
	^{235}U	$3.7x10^{-13}$ ($1.0x10^{-17}$)
	^{236}U	$3.7x10^{-13}$ ($1.0x10^{-17}$)
	^{238}U	$3.7x10^{-11}$ ($1.0x10^{-17}$)
	Gross Alpha	$3.7x10^{-11}$ ($1.0x10^{-15}$)
Liquid	^{234}U	$1.4x10^{-4}$ ($3.0x10^{-9}$)
	^{235}U	$1.4x10^{-4}$ ($3.0x10^{-9}$)
	^{236}U	$1.4x10^{-4}$ ($3.0x10^{-9}$)
	^{238}U	$1.4x10^{-4}$ ($3.0x10^{-9}$)

[a] These MDCs are less than 2% of the limits in 10 CFR 20 Appendix B, Table 2 Effluent Concentrations

Table 6.1-3 Estimated Uranium In Pre-Treated Liquid Waste From Various Sources

Source	Typical Annual Quantities, m^3 (gals)	Typical Annual Uranic Content, kg (lbs)*
Laboratory/floor washings/miscellaneous condensates	23.14 (6112)	16 (35)
Degreaser water	3.71 (980)	18.5 (41)
Citric acid	2.72 (719)	22 (49)
Laundry effluent water	405.80 (107,213)	0.2 (0.44)
Hand wash & shower water	2100 (554,820)	None
TOTAL	2,355 (669,844)	56.7 (125)

*Uranic quantity is before treatment. After treatment, approximately 1% of 0.57 kg (1.26 lb) of uranic material is expected to be discharged into the Treated Effluent Evaporative Basin.

Table 6.1-4 Radiological Environmental Monitoring Program

Sample Type	Minimum Number of Sample Locations	Sampling and Collection Frequency	Type of Analysis
Continuous Airborne Particulate	7	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	8	1 to 2-kg (2.2 to 4.4-lb) samples collected semiannually	Isotopic analysis[a]
Groundwater	2	4-L (1.06-gal) samples collected semiannually	Isotopic analysis[a]
Basins	1 from each of 3 basins[b]	4-L (1.06-gal) water sample/1 to 2-kg (2.2 to 4.4-lb) sediment sample collected quarterly	Isotopic analysis[a]
Soil	8	1 to 2-kg (2.2 to 4.4-lb) samples collected semiannually	Isotopic analysis[a]
Septic Tank(s)	1 from each affected tank	1 to 2-kg (2.2 to 4.4-lb) sludge sample from the affected tank(s) prior to pumping	Isotopic analysis[a]
TLD	16	Quarterly	Gamma and neutron dose equivalent

[a] Isotopic analysis for ^{234}U, ^{235}U, ^{236}U, and ^{238}U.

[b] Site Stormwater Detention Basin, UBC Storage Pad Stormwater Retention Basin and Treated Effluent Evaporative Basin.

Note:
Physiochemical monitoring parameters are addressed separately in ER Section 6.2, Physiochemical Monitoring.

Table 6.1-5 Required MDC For Environmental Sample Analyses

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Medium	Analysis	MDC[a] in Bq/ml or g (μCi/ml or g)
Ambient Air	Gross Alpha	3.7×10^{-14} (1.0×10^{-18})
Vegetation	Isotopic U	3.7×10^{-6} (1.0×10^{-10})
Soil/Sediment	Isotopic U	1.1×10^{-2} (3.0×10^{-7})
Groundwater[b]	Isotopic U	3.7×10^{-8} (1.0×10^{-12})

[a]The NRC has concluded these MDCs are acceptable for sampling programs at a uranium enrichment facility.

[b]For analyses of groundwater samples, the MDC will be at least 3.7×10^{-8} Bq/ml (1.0×10^{-12} μCi/ml), which represents <0.0004% of the concentration limits listed in Table 2 of Appendix B to 10 CFR 20.

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FIGURES

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FIGURE REMOVED UNDER 10 CFR 2.390

REFERENCE NUMBER
FIGURE 6.1-1.dwg

FIGURE 6.1-1
EFFLUENT RELEASE POINTS
AND METEOROLOGICAL TOWER
ENVIRONMENTAL REPORT
REVISION 2 DATE: JULY 2004

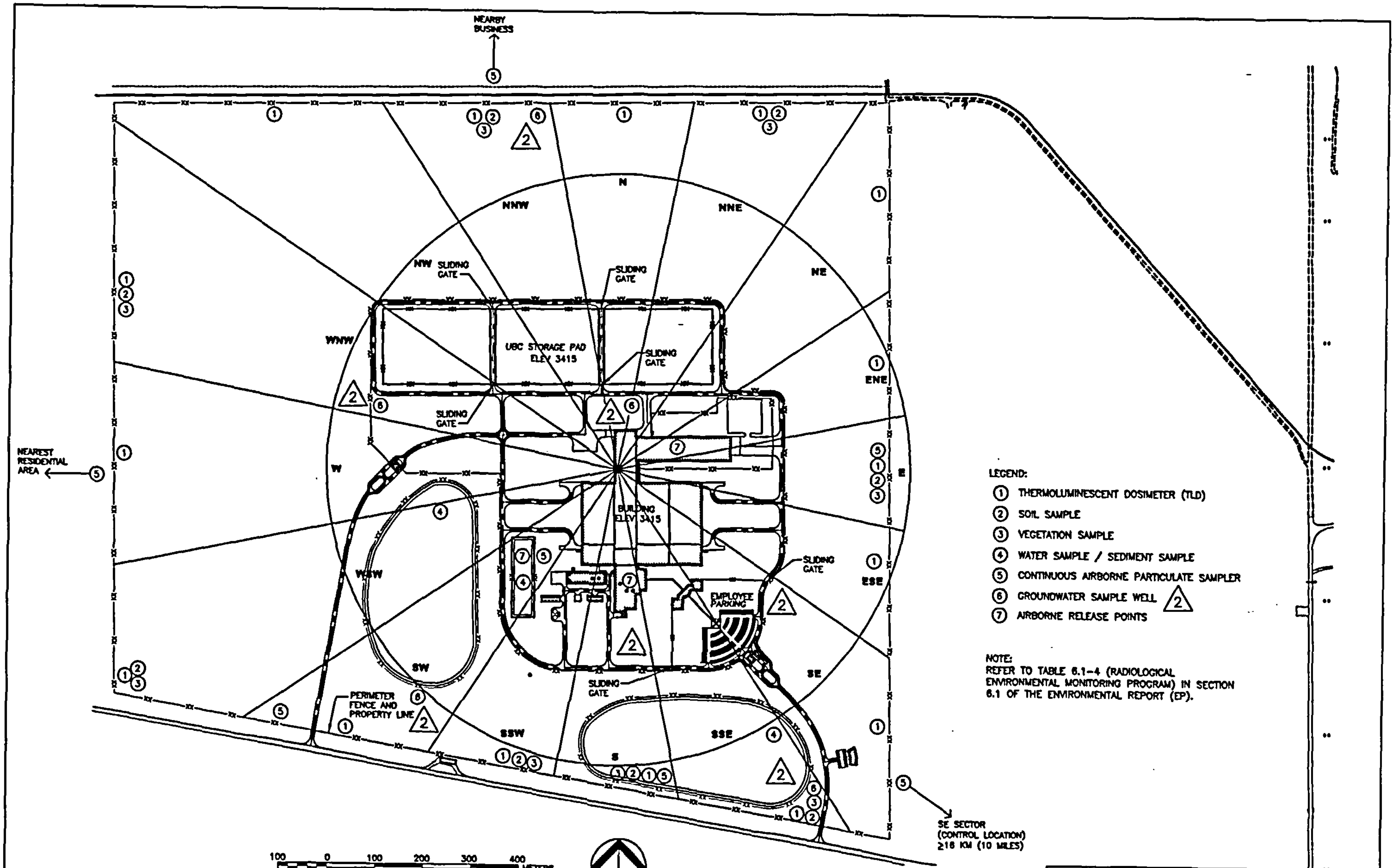

FIGURE 6.1-2

MODIFIED SITE FEATURES WITH PROPOSED SAMPLING STATIONS AND MONITORING LOCATIONS
ENVIRONMENTAL REPORT
REVISION 2 DATE: JULY 2004

6.2 PHYSIOCHEMICAL MONITORING

6.2.1 Introduction

The primary objective of physiochemical monitoring is to provide verification that the operations at the NEF do not result in detrimental chemical impacts on the environment. Effluent controls which are discussed in ER Sections 3.12, Waste Management and 4.13, Waste Management Impacts, are in place to assure that chemical concentrations in gaseous and liquid effluents are maintained as low as reasonably achievable (ALARA). In addition, physiochemical monitoring provides data to confirm the effectiveness of effluent controls.

Administrative action levels will be implemented prior to facility operation to ensure that chemical discharges will remain below the limits specified in the facility discharge permits. The limits are specified in the EPA Region 6 NPDES General Discharge Permits as well as the New Mexico Water Quality Bureau (NMWQB) Groundwater Discharge Permit/Plan.

Specific information regarding the source and characteristics of all non-radiological plant effluents and wastes that will be collected and disposed of offsite, or discharged in various effluent streams is provided in ER Sections 3.12 and 4.13.

In conducting physiochemical monitoring, sampling protocols and emission/effluent monitoring will be performed for routine operations with provisions for additional evaluation in response to potential accidental release.

The facility will have an Environmental Monitoring Laboratory, which will 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 will be demonstrated by monitoring/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 will be selected by the Health, Safety and Environmental (HS&E) organization staff in accordance with facility permits and good sampling practices.

The Environmental Monitoring Laboratory is located in the Technical Services Building (TSB) and is used to perform analyses that include the following:

- Hazardous material presence in waste samples
- pH, oil and other contaminants in liquid effluents

The Environmental Monitoring Laboratory will 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 is also capable of performing bioassay analyses when necessary. Commercial, offsite laboratories may also be contracted to perform bioassay analyses.

All waste liquids, solids and gases from enrichment-related processes and decontamination operations will be analyzed and/or monitored for chemical and radiological contamination to determine safe disposal methods and/or further treatment requirements. A description of the radiological monitoring program at the NEF is provided in ER Section 6.1, Radiological Monitoring.

6.2.2 Evaluation and Analysis of Samples

Samples of liquid effluents, solids and gaseous effluents from plant processes will be analyzed in the Technical Services Building (TSB) Environmental Monitoring Laboratory. Results of process samples analyses are used to verify that process parameters are operating within expected performance ranges. Results of liquid effluent sample analyses will be characterized to determine if treatment is required prior to discharge to the Treated Effluent Evaporative Basin and to determine if corrective action is required in facility process and/or effluent collection and treatment systems.

6.2.3 Effluent Monitoring

Chemical constituents that may be discharged to the environment in facility effluents will 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 will be released from the facility as discussed in ER Sections 3.12 and 4.13. This will be confirmed through monitoring and collection and analysis of environmental data. Routine liquid effluents are listed in Table 3.12-4, Estimated Annual Liquid Effluent. The facility does not directly discharge any industrial effluents to surface waters or grounds offsite, and there is no plant tie-in to a Publicly Owned Treatment Works (POTW). Except for discharges from the Septic System, all liquid effluents are contained on the NEF site via collection tanks and retention basins. See ER Figure 6.1-1, Effluent Release Points and Meteorological Tower, Figure 6.1-2, Modified Site Features with Proposed Sampling Stations and Monitoring Locations, and Section 2.1.2, Proposed Action, for further discussion of the Liquid Effluent Treatment System.

Parameters for continuing environmental performance will be developed from the baseline data in this Environmental Report and additional preoperational sampling. Operational monitoring surveys will also be conducted using sampling sites and at frequencies established from baseline sampling data and as determined based on requirements. Operational monitoring surveys are determined based on requirements contained in EPA Region 6 NPDES General Discharge Permits as well as the NMWQB Groundwater Discharge Permit/Plan.

The frequency of some types of samples may be modified depending on baseline data for the parameters of concern. The monitoring program is 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 proceeds, changing conditions (e.g., regulations, site characteristics, and technology) and new knowledge may require that the monitoring program be reviewed and updated. The monitoring program will be enhanced as appropriate to maintain the collection and reliability of environmental data. The specific location of monitoring points will be determined in detailed design.

During implementation of the monitoring program, some samples may be collected in a different manner/method than specified herein. Examples of reasons for these deviations include severe weather events, changes in the length of the growing season, and changes in the number of plantings. Under these circumstances, documentation shall 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 may be selected or other appropriate actions taken.

Each year, LES will submit a summary of the environmental sampling program and associated data to the proper regulatory authorities, as required. This summary will include the types, numbers and frequencies of samples collected.

Physiochemical monitoring will be conducted via sampling of stormwater, soil, sediment, vegetation, and groundwater as defined in Table 6.2-1, Physiochemical Sampling, to confirm that trace, incidental chemical discharges are below regulatory limits. There are no surface waters on the site, therefore no Surface Water Monitoring Program will be implemented; however soil sampling will include outfall areas such as the outfall at the Site Stormwater Detention Basin. In the event of any accidental release from the facility, these sampling protocols will be initiated immediately and on a continuing basis to document the extent/impact of the release until conditions have been abated and mitigated.

The site septic systems will receive only typical sanitary wastes. No chemical sampling is planned because no plant process related effluents will be introduced into the septic systems.

6.2.4 Stormwater Monitoring Program

A stormwater monitoring program will be initiated during construction of the facility. Data collected from the program will 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 will be used as a sediment control basin during construction as part of the overall sedimentation erosion control plan.

Stormwater monitoring will continue with the same monitoring frequency upon initiation of facility operation. During plant operation, samples will be collected from the Uranium Byproduct Cylinders (UBC) Storage Pad Stormwater Retention Basin and the Site Stormwater Detention Basin in order to demonstrate that runoff does not contain any contaminants. A list of parameters to be monitored and monitoring frequencies is presented in Table 6.2-1, Physiochemical Sampling. Table 6.2-2, Stormwater Monitoring Program shows the parameters to be monitored with respect to stormwater. This monitoring program will be refined to reflect applicable requirements as determined during the National Pollutant Discharge Elimination System (NPDES) process (see ER Section 4.4, Water Resources Impacts, for the construction and operational permits). Additionally, the Site Stormwater Detention Basin will adhere to the requirements of the Groundwater Discharge Permit/Plan from the NMWQB, as discussed in ER Sections 1.3, Applicable Regulatory Requirements, Permits and Required Consultations and Section 4.4, Water Resources Impacts.

6.2.5 Environmental Monitoring

The purpose of this section is to describe the surveillance-monitoring program, which will be implemented to measure non-radiological chemical impacts upon the natural environment.

The ability to detect and contain any potentially adverse chemical releases from the facility to the environment will depend on chemistry data to be collected as part of the effluent and stormwater monitoring programs described in the preceding sections. Data acquisition from these programs encompasses both onsite and offsite sample collection locations and chemical element/compound analyses. Final constituent analysis requirements will be in accordance with permit mandates.

Sampling locations will be determined based on meteorological information and current land use. The sampling locations may be subject to change as determined from the results of any observed changes in land use.

The range of chemical surveillance incorporated into all the planned effluent monitoring programs for the facility are designed to be sufficient to predict any relevant chemical interactions in the environment related to plant operations.

Vegetation and soil sampling will be conducted. Vegetation samples will include grasses, and if available, vegetables. Soil will be collected in the same vicinity as the vegetation sample. The samples are collected from both onsite and offsite locations in various sectors. Sectors are chosen based on air modeling. Sediment samples will be collected from discharge points to the different collection basins onsite. At this time, groundwater samples will be collected from a series of wells that will be installed around the plant. The locations of the groundwater sampling (monitoring) wells are as described in Section 6.1.2 and are shown in Figure 6.1-2.

Stormwater samples collected in the UBC Storage Pad Stormwater Retention Basin will be sampled to ensure no contaminants are present in the UBC Storage Pad runoff.

6.2.6 Meteorological Monitoring

In order to monitor and characterize meteorological phenomena (e.g., wind speed, direction, and temperature) during plant operation as well as consider interaction of meteorology and local terrain, conditions will be monitored with a 40-m (132-ft) tower located onsite. This data will assist in evaluating the potential locales on and off property that could be influenced by any emissions. The instrument tower will be located at a site approximately the same elevation as the finished facility grade and in an area where facility structures will have little or no influence on the meteorological measurements. An area approximately ten times the obstruction height around the tower towards the prevailing wind direction will be maintained in accordance with established standards for meteorological measurements. This practice will be used to avoid spurious measurements resulting from local building-caused turbulence. The program for instrument maintenance and servicing, combined with redundant data recorders, assures at least 90% data recovery.

The data this equipment provides is recorded in the Control Room and can be used for dispersion calculations. Equipment will also measure temperature and humidity, which will be recorded in the Control Room.

6.2.7 Biota

The monitoring of radiological and physiochemical impacts to biota are detailed in ER Section 6.3, Ecological Monitoring of this report.

6.2.8 Quality Assurance

Quality assurance will be achieved by following a set of formalized and controlled procedures that Louisiana Energy Services (LES) will create, implement and periodically review for sample collection, lab analysis, chain of custody, reporting of results, and corrective actions. Corrective actions will be instituted when an action level is exceeded for any of the measured parameters. Action levels will be divided into three priorities: 1) if the sample parameter is three times the normal background level; 2) if the sample parameter exceeds any existing administrative limits,

or; 3) if the sample parameter exceeds any regulatory limit. The third scenario represents the worst case, which will be prepared for but is not expected. Corrective actions will be implemented to ensure that the cause for the action level exceedance can be identified and immediately corrected, applicable regulatory agencies are notified, if required, communications to address lessons learned are dispersed to appropriate personnel, and applicable procedures are revised accordingly if needed. All action plans will be commensurate to the severity of the exceedance.

The NEF will 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 analytes being measured. Examples of these third-party programs are the Mixed Analyte Performance Evaluation Program (MAPEP) and the DOE Quality Assurance Program (DOEQAP) that are administered by the Department of Energy. The NEF will require all radiological and non-radiological laboratory vendors to be certified by the National Environmental Laboratory Accreditation Conference (NELAC) or an equivalent state laboratory accreditation agency for the analytes being tested.

6.2.9 Lower Limits of Detection

Lower limits of detection for the parameters sampled for in the Stormwater Monitoring Program are listed in Table 6.2-2, Stormwater Monitoring Program. Lower limits of detection (LLD) for the nonradiological parameters shown in Table 6.2-1, Physiochemical Sampling, will be based on the results of the baseline surveys and the type of matrix (sample type).

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TABLES

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Table 6.2-1 Physiochemical Sampling
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Sample Type	Sample Location	Frequency	Sampling and Collections[2]
Stormwater	Site Stormwater Detention Basin UBC Storage Pad Stormwater Retention Basin	Quarterly	Analytes as determined by baseline program – see Table 6.2-2
Vegetation	4 minimum[1]	Quarterly (growing seasons)	Fluoride uptake
Soil/Sediment	4 minimum[1]	Quarterly	Metals, organics, pesticides, and fluoride uptake
Groundwater	All selected groundwater wells	Semiannually	Metals, organics and pesticides

[1] Location to be established by Health, Safety and Environmental (HS&E) organization staff.

[2] Analyses will meet EPA Lower Limits of Detection (LLD), as applicable, and will be based on the baseline surveys and the type of matrix (sample type).

Table 6.2-2 Stormwater Monitoring Program

Stormwater Monitoring Program for Detention and Retention Basins* (See Figure 4.4-1)

Monitored Parameter	Monitoring Frequency	Sample Type	LLD
Oil & Grease	Quarterly, if standing water exists	Grab	0.5 ppm
Total Suspended Solids	Quarterly, if standing water exists	Grab	0.5 ppm
5-Day Biological Oxygen Demand (BOD)	Quarterly, if standing water exists	Grab	2 ppm
Chemical Oxygen Demand (COD)	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 units
Nitrate plus Nitrite Nitrogen	Quarterly, if standing water exists	Grab	0.2 ppm
Metals	Quarterly, if standing water exists	Grab	Varies**

* Site Stormwater Detention Basin, UBC Storage Pad, Stormwater Detention Basin and any temporary basins used during construction.

** Analyses will meet EPA Lower Limits of Detection (LLD), as applicable, and will be based on the baseline surveys and the type of matrix (sample type).

Note:
Radiological monitoring parameters are addressed separately in ER Section 6.1, Radiological Monitoring.

6.3 ECOLOGICAL MONITORING

6.3.1 Maps

See Figure 6.1-2, Modified Site Features with Sampling Stations and Monitoring Locations.

6.3.2 Affected Important Ecological Resources

The existing natural habitats on the NEF site and the region surrounding the site have been impacted by domestic livestock grazing, oil/gas pipeline right-of-ways and access roads. These current and historic land uses have resulted in a dominant habitat type, the Plains Sand Scrub. Hundreds of square kilometers (miles) of this habitat type occur in the area of the NEF. The habitat type at the NEF site does not support any rare, threatened, or endangered animal or plant species. The Plains Sand Scrub vegetation type is characterized by shinnery oak shrub, mesquite shrub, and short to mid-grass prairie with little or no overhead cover.

Based on ecological surveys that have been performed onsite, LES has concluded that there are no important ecological systems onsite that are especially vulnerable to change or that contain important species habitats, such as breeding areas, nursery, feeding, resting, and wintering areas, or other areas of seasonally high concentrations of individuals of important species. The species selected as important (the mule deer and scaled quail) are both highly mobile, generalist species and can be found throughout the site area. Wildlife species on the site typically occur at average population concentrations for the Plains Sand Scrub habitat type.

The nearest suitable habitat for species of concern are several kilometers (miles) from the NEF site. The closest known populations of the Sand Dune Lizard occur approximately 4.8 km (3 mi) north of the site. A population of Lesser Prairie Chickens has been observed approximately 6.4 km (4 mi) north of the NEF site. No Black-Tailed Prairie Dogs are present at the NEF site.

6.3.3 Monitoring Program Elements

Several elements have been chosen for the ecological monitoring program. These elements include vegetation, birds, mammals, and reptiles/amphibians. Currently there is no action or reporting level for each specific element. However, additional consultation with all appropriate agencies (New Mexico Department of Game & Fish, US Fish & Wildlife Service USFWS) will continue. Agency recommendations, based on future consultation and monitoring program data, will be considered when developing action and/or reporting levels for each element.

6.3.4 Observations and Sampling Design

The NEF site observations will include preconstruction, construction, and operations monitoring programs. The preconstruction monitoring program will establish the site baseline data. The procedures used to characterize the plant, bird, mammalian, and reptilian/amphibian communities at the NEF site during pre-construction monitoring are considered appropriate and will be used for both the construction and operations monitoring programs. Operational monitoring surveys will also be conducted annually (except semiannually for birds and reptiles/amphibians and mammals) using the same sampling sites established during the preconstruction monitoring program.

These surveys are intended to be sufficient to characterize 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, must consider those changes that would be expected at the NEF site as a result of natural succession processes. Plant communities at the site will continue to change as the site begins to regenerate and mature. Changes in the bird, small mammal, and reptile/amphibian communities are likely to occur concomitantly in response to the changing habitat.

Vegetation

Collection of ground cover, frequency, woody plant density, and production data will be sampled from sixteen permanent sampling locations within the NEF Site. Sampling will occur annually in September or October. Annual sampling is scheduled to coincide with the mature flowering stage of the dominant perennial species.

The sampling locations are selected in areas outside of the proposed footprint of the NEF facility. The selected sampling locations will be marked physically onsite and the Global Positioning System (GPS) coordinates will be recorded. The expected positions of the sampling locations are plotted on a site schematic (See Figure 6.1-2, Modified Site Features With Proposed Sampling Stations and Monitoring Locations). The establishment of permanent sampling locations will facilitate a long-term monitoring system to evaluate vegetation trends and characteristics.

Transects used for data collection will originate at the sampling location and radiate out 30 m (100 ft) in a specified compass direction. Ground cover and frequency will be determined utilizing the line intercept method. Each 0.3 m (1 ft) segment is considered a discrete sampling unit. Cover measurements will be read to the nearest 0.03 m (0.1 ft). Woody plant densities will be determined using the belt transect method. All shrub and tree species rooted within 2 m (6 ft) of the 30 m (100 ft) transect will be counted. Productivity will be determined using a double sampling technique. The double sampling technique consists of estimating the production within three 0.25 m^2 (2.7 ft^2) plots and harvesting one equal sized plot for each transect. Harvesting consists of clipping each species in a plot separately, oven drying, and weighing to the nearest 0.01 g. The weights will be converted to kg (lbs) of oven dry forage per ha (acre).

Birds

Site-specific avian surveys will be conducted in both the wintering and breeding seasons to verify the presence of particular bird species at the NEF site. The winter and spring surveys will be designed to identify the members of the avian community.

For the winter survey, the distinct habitats at the site will be identified and the bird species composition within each of the habitats described. Transects 100 m (328 ft) in length will be established within each distinct homogenous habitat and data will be collected along the transect. Species composition and relative abundance will be determined based on visual observations and call counts.

In addition to verifying species presence, the spring survey will be designed to 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 will be censused using the standard point count method (DOA, 1993; DOA, 1995). Standard point counts require a qualified observer to stand in a fixed position and record all the birds seen and heard over a time period of five minutes. Distances

and time are each subdivided. Distances are divided into less than 50 m (164 ft) and greater than 50 m (164 ft) categories (estimated by the observer), and the time is divided into two categories, 0-3 minute and 3-5 minute segments. All birds seen and heard at each station/point visited will be recorded on standard point count forms. All surveys will be conducted from 0615 to 1030 hours to coincide with the territorial males' peak singing times. The stations/points will be recorded using the GPS enabling the observer to make return visits. Surveys will only be conducted at time when fog, wind, or rain does not interfere with the observer's ability to accurately record data.

The avian communities are described in ER Section 3.5.2. All data collected will be recorded and compared to information listed in Table 3.5-2, Birds Potentially Using the NEF Site. The field data collections will be done semiannually. The initial monitoring will be effective for at least the first 3 years of commercial operation. Following this period, program changes may be initiated based on operational experience.

Mammals

Annual onsite surveys will monitor the mammalian communities. The existing mammalian communities are described in ER Section 3.5.2. General observations will be compiled concurrently with other wildlife monitoring data and compared to information listed in Table 3.5-1, Mammals Potentially Using the NEF Site. The initial monitoring will be effective for at least the first 3 years of commercial operation. Following this period, program changes may be initiated based on operational experience.

Reptiles and Amphibians

There are several groups of reptile and amphibian species (lizards, snakes, amphibians) that provide the biological characteristics (demographics, life history characteristics, site specificity, environmental sensitivity) for an informative environmental monitoring program. Approximately 13 species of lizards, 13 species of snakes and 11 species of amphibians may occur on the site and in the area.

A combination of pitfall drift-fence trapping and walking transects (at trap sites) can provide data in sufficient quantity to allow statistical measurements of population trends, community composition, body size distributions and sex ratios that will reflect environmental conditions and changes at the site over time.

As practical, the monitoring program will include at least two other replicated sample sites beyond the primary location on the NEF property. Offsite, locations on Bureau of Land Management (BLM) or New Mexico state land to the south, west or north of NEF will be given preference for additional sampling sites. Each of these catch sites will have the same pitfall drift-fence arrays and standardized walking transects and will be operated simultaneously. Each sample site will be designed to maximize the total catch of reptiles and amphibians, rather than data on each individual caught. Each animal caught will be identified, sexed, snout-vent length measured, inspected for morphological anomalies and released (sample with replacement design). There will be two sample periods, at the same time each year, in May and late June/early July. These coincide with 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 will also record rainfall, relative humidity and temperatures. The rainfall and temperature data will act as a covariate in the analysis.

Additionally, the offsite sample locations act to balance out climatic effects on populations of small animals. The comparison of NEF site data and offsite location data allows for monitoring to be a much more informative environmental indicator of conditions at the NEF site.

The reptile and amphibian communities are described in ER Section 3.5.2, General Ecological Conditions of the Site. In addition to the monitoring plan described above, general observations will be gathered and recorded concurrently with other wildlife monitoring. The data will be compared to information listed in Table 3.5-3, Amphibians/Reptiles Potentially Using the NEF Site. As with the programs for birds and mammals, the initial reptile and amphibian monitoring program will be effective for at least the first three years of commercial operation. Following this period, program changes may be initiated based on operational experience.

6.3.5 Statistical Validity of Sampling Program

The proposed sampling program will include descriptive statistics. These descriptive statistics will include the mean, standard deviation, standard error, and confidence interval for the mean. In each case the sampling size will be clearly indicated. The use of these standard descriptive statistics will be used to show the validity of the sampling program. A significance level of 5% will be used for the studies, which results in a 95% confidence level.

6.3.6 Sampling Equipment

Due to the type of ecological monitoring proposed for the NEF no specific sampling equipment is necessary.

6.3.7 Method of Chemical Analysis

Due to the type of monitoring proposed for the NEF, no chemical analysis is proposed for ecological monitoring.

6.3.8 Data Analysis And Reporting Procedures

LES or its contractor will analyze the ecological data collected on the NEF site. The Health, Safety & Environmental (HS&E) Manager or a staff member reporting to the HS&E manager will be responsible for the data analysis.

A summary report will be prepared which will include the types, numbers and frequencies of samples collected.

6.3.9 Agency Consultation

Consultation was initiated with all appropriate federal and state agencies and affected Native American Tribes. Refer to Appendix A, Consultation Documents, for a complete list of consultation documents and comments.

6.3.10 Organizational Unit Responsible for Reviewing the Monitoring Program on an Ongoing Basis

As policy directives are developed, documentation of the environmental monitoring programs will occur. The person or organizational unit responsible for reviewing the program on an ongoing basis will be the HS&E Manager.

6.3.11 Established Criteria

The ecological monitoring program is conducted in accordance with generally accepted practices and the requirements of the New Mexico Department of Game and Fish. Data will be collected, recorded, stored and analyzed. Actions will be taken as necessary to reconcile anomalous results.

6.3.11.1 Data Recording and Storage

Data relevant to the ecological monitoring program will be recorded in paper and/or electronic forms. These data will be kept on file for the life of the facility.

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7.0 COST BENEFIT ANALYSIS

This chapter describes the costs and benefits for the proposed action, quantitatively and qualitatively. Environmental Report (ER) Section 7.1, Economic Cost-Benefits, Plant Construction and Operation, describes the quantitative direct and indirect economic impacts from plant construction and operation. ER Section 7.2 describes the qualitative socioeconomic and environmental impacts from plant construction and operation. ER Section 7.3, No-Action Alternative Cost-Benefit, describes the impacts of the no-action alternative of not building the proposed NEF.

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7.1 ECONOMIC COST-BENEFITS, PLANT CONSTRUCTION AND OPERATION

This analysis traces the economic impact of the proposed National Enrichment Facility (NEF) in Lea County, New Mexico, identifying the direct impacts of the plant on revenues of local businesses, on incomes accruing to households, on employment, and on the revenues of state and local government. Further, it explores the indirect impacts of the NEF on local entities using a model showing the interaction of economic sectors in Lea County.

7.1.1 Introduction

The purpose of ER Section 7.1, Economic Cost-Benefits, Plant Construction and Operation, is to assess the economic impact that the construction and operation of the NEF would have on the surrounding area, including Lea and Eddy Counties in New Mexico. The analysis estimates the economic impact upon a contiguous eight-county region, comprised of the two previously identified New Mexico Counties, as well as six directly affected Texas Counties falling within a 80-km (50-mi) radius of the proposed site. These include Andrews, Ector, Gaines, Loving, Winkler, and Yoakum Counties. (See Figure 7.1-1, Eight-County Economic Impact Area.)

For the purpose of assessing the economic impact of the NEF, the analysis is divided into two distinct phases: Construction and Operations. For each of these two time periods, both the direct and indirect impacts are assessed.

ER Section 7.1.3, Regional Economic Outlook, discusses current economic conditions and existing economic structure of the eight-county region. ER Section 7.1.4, Direct Economic Impact, is a discussion of the direct impacts associated with the NEF, which includes earnings, employment, and tax-related revenues. ER Section 7.1.5, Total Economic Impact Using RIMS II, utilizes the Regional Input-Output Modeling System (RIMS) II framework to assess the total (both direct and indirect) economic impact of the NEF on the regional economy. The origin, general operation, and specific application of the RIMS II framework to the proposed action are discussed below.

7.1.2 The Economic Model

The RMIS II multipliers presented in this report reflect input-output (I-O) data for the 1999 annual I-O table for the nation and 2000 regional data, which shows the input and output structure for approximately 500 industries (BEA, 2003a).

The RIMS II method for estimating regional I-O multipliers can be viewed as a three-step process. In the first step, the producer portion of the national I-O table is made region-specific by using four-digit Standard Industrial Classification (SIC) location quotients (LQ's). The LQ's estimate the extent to which input requirements are supplied by firms within the region. RIMS II uses LQ's based on two types of data: The Bureau of Economic Analysis' (BEA's) personal income data (by place of residence) are used to calculate LQ's in the service industries; and BEA's wage-and-salary data (by place of work) are used to calculate LQ's in the nonservice industries.

In the second step, the household row and the household column from the national I-O table are made region-specific. The household row coefficients, which are derived from the value-added row of the national I-O table, are adjusted to reflect regional earnings leakages resulting from

individuals working in the region but residing outside the region. The household column coefficients, which are based on the personal consumption expenditure column of the national I-O table, are adjusted to account for regional consumption leakages stemming from personal taxes and savings.

In the last step, the Leontief inversion approach is used to estimate multipliers. This inversion approach produces output, earnings, and employment multipliers, which can be used to trace the impacts of changes in final demand on directly and indirectly affected industries (BEA 2003b).

7.1.2.1 RIMS II Multipliers

A RIMS II model provides "multipliers" for approximately 500 industries showing the industry outputs stimulated by new activity, the associated household earnings, and the jobs generated.

The RIMS II model of Lea County, New Mexico is based on the National Input-Output table, employment statistics from the Bureau of Labor Statistics, and the Regional Economic Information System (REIS). The National table is regionalized using location quotients, which compare the local proportion of industry employment to total employment to a similar proportion for the Nation. The model is solved to generate a very large table of multipliers for the entire set of industries existing in the county.

Since the 1970s, the Bureau of Economic Analysis (BEA) has provided models designated as RIMS (Regional Industrial Multiplier System). RIMS II is the latest version of this system. The following comments are based on *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)* (BEA, 1997).

RIMS II is based on an accounting framework called an input-output (I-O) table. For each industry, an I-O table shows the distribution of the inputs purchased and the outputs sold. A typical I-O table in RIMS II is derived mainly from two data sources: BEA's national I-O table, which shows the input and output structure of nearly 500 US Industries, and BEA's regional economic accounts, which are used to adjust the national I-O table in order to reflect a region's industrial structure and trading patterns.

The RIMS II model and its multipliers are prepared in three major steps. First, an adjusted national industry-by-industry direct requirements table is prepared. Second, the adjusted national table is used to prepare a regional industry-by-industry direct requirements table. Third, a regional industry-by-industry total requirements table is prepared, and the multipliers are derived from this table.

Unlike the national I-O accounts, RIMS II includes households as both suppliers of labor inputs to regional industries and as purchasers of regional output, because it is customary in regional impact analysis to account for the effects of changes in household earnings and expenditures. Thus, both a household row and a household column are added to the national direct requirements table before the table is regionalized.

The regional industry-by-industry direct requirements table is derived from the adjusted national industry-by-industry direct requirements table. Location quotients (LQ's) are used to "regionalize" the national data. The LQ based on wages and salaries is the ratio of the industry's share of regional wages and salaries to that industry's share of national wages and salaries. The LQ is used as a measure of the extent to which regional supply of an industry's output is sufficient to meet regional demand. If the LQ for a row industry in the regional direct

requirements table is greater than, or equal to, one, it is assumed that the region's demand for the output of the row industry is met entirely from regional production. In this instance, all row entries for the industry in the regional direct requirements table are set equal to the corresponding entries in the adjusted national direct requirements table.

Conversely, if the LQ is less than one, it is assumed that the regional supply of the industry's output is not sufficient to meet regional demand. In this instance, all row entries for the industry in the regional direct requirements table are set equal to the product of the corresponding entries in the adjusted national direct requirements table and the LQ for the industry.

The household row and the household column that were added to the national direct requirements table are also adjusted regionally. The household-row entries are adjusted downward, on the basis of commuting data from the Census of Population, in order to account for the purchases made outside the region by commuters working in the region. The household-column entries are adjusted downward, on the basis of tax data from the Internal Revenue Service, in order to account for the dampening effect of State and local taxes on household expenditures.

After the regional direct-requirements table is constructed it is converted into a model using a mathematical process known as "inversion." The resulting model, summarized in a 490-by-490 matrix called the "total requirements" table, now shows the impact of changes in outside sales by each industry on the outputs of every industry in the region. This data can now be manipulated to yield "multipliers."

The output multiplier for an industry measures the total dollar change in output in all industries that results from a $1 change in output delivered to final demand by the industry in question.

The earnings multiplier for an industry measures the total dollar change in earnings of households employed by all industries that results from a $1 change in output delivered to final demand by the industry in question.

7.1.3 Regional Economic Outlook

A socioeconomic profile of the eight-county region surrounding the NEF provides a baseline from which to understand and measure the economic impacts expected to be derived from the NEF. This section includes a discussion of recent regional trends in output and employment, income and other socioeconomic measures and concludes with a brief discussion on the industry structure of the region.

7.1.3.1 Recent Trends in Economic Growth and Employment

The eight-county region has a total current estimated population of 270,000 with 40% of the region's population residents of New Mexico and the remaining 60% residents of Texas.

After rising through the late 1990s, economic growth in New Mexico and Texas slowed in 2001 along with the slowdown in growth of the US economy. Statewide, the Texas economy was hit especially hard from the fallout in the technology sector and weakness in the air transportation sector after the terrorist attacks of September 11, 2001 (Yücek, 2003). The Texas gross state product growth rate declined sharply from 8.8% per annum in 2000 to 3.5% per annum in 2001. Total employment fell 1.4% in 2001 - a greater decline than the 1.1% decrease in employment nationwide - and fell another 0.1% in 2002. The Texas unemployment rate reached an eight-year high of 6.4% in 2002. While the employment situation is beginning to show some signs of

recovery (with annual job growth rising 0.8% through May 2003) the recovery is said to be slow and inconsistent across industries (Yücek, 2003). The employment situation for the six Texas Counties included in the analyzed region was worse, with a weighted average unemployment rate of 6.9% in 2002 (that was notably higher than the Texas statewide rate of 6.4%).

In contrast to Texas, New Mexico economic growth slowed during this period, but the annual growth rate in gross state product remained above 5.0% in 2001. According to data published by the BEA, the relative resilience of the New Mexico economy appears to have been related to high government spending and strong manufacturing activity during this unfavorable economic period. Additionally, the unemployment rate in New Mexico rose to 5.5% in 2002, but remained below the national average. In 2002, the two New Mexico Counties analyzed had a 5.5% weighted average unemployment rate, which was consistent with the statewide unemployment rate.

7.1.3.2 Trends in Income

While per capita income in both New Mexico and Texas is below the national average of $22,000, standing at $17,000 and $20,000 respectively, per capita income is notably lower in the eight-county region. For this region as a whole, per capita income was $15,794. This amount is only 73% of the national per capita income. Lea and Eddy Counties in New Mexico had an average per capita income of $15,004, and the six Texas Counties had an average per capita income of $16,058 (DOC, 2002).

While total personal income has increased steadily in the two New Mexico Counties through the 1990s, those counties' total income as a percent of statewide income has declined slightly from 3.2% in 1990, to 2.8% in 2001, reflecting the relatively weak economic performance of the region during the past decade. Additionally, the poverty rate in the eight-county area is significantly higher than the state and national level. Within this region, reported poverty rates range from 16 to 22% of residents, versus the national rate of 12.4%. The Census Bureau defines poverty as those living under specified income thresholds (defined by the Office of Management and Budget) that vary by size of family and composition).

According to LES estimates, the specific jobs created by the NEF will pay wages significantly higher than the regional average income (LES, 2003a). The BEA data reports the 2001 average wage per job in the New Mexico and Texas Counties as $28,013 and $29,799, respectively. In contrast, LES expects to pay an average salary of $39,124 to its construction employees, which is over 1.3 times the average wage per job in the affected Counties. Similarly, LES expects to pay an average salary of $50,000 to its plant operation employees (see Table 7.1-1, Operating Plant Payroll Estimates). (Unless otherwise stated, all fiscal impacts are stated in 2002 real dollars based on the estimated costs and wages/benefits data provided, and are not adjusted for anticipated price or wage inflation over the period analyzed).

7.1.3.3 Regional Industry Analysis

Mining (primarily oil, natural gas, and potash production activities) has been one of the largest and most important industries in the eight-county region throughout the most recent economic history (see Figure 7.1-2, Private Employment in Eight-County Region). According to the BEA, the mining sector directly accounted for 18.6% of total private employment in Lea and Eddy Counties in 2000 and approximately 14% in the eight-county region (BEA, 2003a). More importantly, the dominance of the oil and gas industry in the regional economy is significantly

greater when indirect income and employment are considered. (Relying on the RIMS II Multipliers for the eight-county region, the total income and employment generated from the mining sector accounts for nearly 50% of the private sector income and employment). (See Figure 7.1-2, Private Employment in Eight-County Region.)

Unfortunately, mining sector employment in the eight-county region has been declining in recent years, falling 27% from 1990 to 2000 amid increased domestic and foreign competition and consolidation in (primarily) the potash industry. The mining sector was the only major sector in the eight-county region to decline over the past decade. (See Figure 7.1-3, Mining as a Share of Private Employment in Eight-County Region.)

Other important regional industries include agriculture, forestry, and services in education and healthcare. Although accounting for only 2% of employment in the eight-county region, agricultural employment was the fastest growing private sector during 1990s, increasing 43% to 2,233 jobs. While oil and gas continues to have a significant impact, agriculture has underlying influences on the region's development through an active dairy industry, farming, and ranching (EDCLC, 2000). During the last decade, the construction and service industries were also among the fastest growing employment sectors in the eight-county regional economy, enjoying double-digit growth rates.

Although growth in manufacturing employment became a source of strength for central New Mexico in the mid-1990s, it was one of the slower growing employment sectors in the eight-county region, growing only 5% over the 1990s, and currently making up 6.3% of private employment for the region. Additionally, growth in manufacturing employment was somewhat sporadic in Lea and Eddy Counties, declining in 1998 through 2000, and comprising only 3.3% of private employment in these counties by the end of the century.

In the operations phase, the proposed NEF will produce a 14% increase in manufacturing employment in Lea and Eddy Counties. More importantly, however, the introduction of the NEF should work to diversify and stabilize the regional economy as it reduces the dependence on the mining sectors. The development of non-mining industries in this region is especially important as many of the petroleum producing formations in the Permian Basin have reached secondary and tertiary stages of production, and are in normal production decline associated with mature oil and gas production properties. Importantly, revenue and employment volatility associated with petroleum production increases as the production techniques become more expensive in mature fields.

7.1.4 Direct Economic Impact

7.1.4.1 Introduction

In building and operating the NEF, LES direct expenditures are expected to create a total economic impact calculated to provide a discounted present value benefit of $469 million accruing to local employees, businesses, and the government over the eight-year construction period and anticipated 30-year license period for the facility. (The present value is calculated by discounting the annual construction expenditures over a 8-year period and the annual operation expenditures over a 30-year period (NEF license period) using an 8% discount rate. All figures in this analysis are expressed in 2002 dollars, and are not adjusted for inflation over the referenced time period. It should be noted that expenditures occurring beyond a twenty-year time horizon contribute little to the discounted present value economic benefits, as the

discounting of those expenditures provide nominal contributions to the assessed present value). Of this amount, 44%, or approximately $204 million, will go to households in the form of salaries, employment, and benefits. Approximately $261 million, or 56% will go to local business in the form of goods and services purchased and the remaining one percent will be paid to the government in the form of state and local taxes and fees. (See Figure 7.1-4, Total Present Value of Expected LES Expenditures.)

LES has estimated the economic impacts to the local economy during the 8-year construction period and 30-year license period of the NEF. This includes a five and one-half year period when both construction and operation and ongoing simultaneously. The analysis traces the economic impact of the proposed NEF, identifying the direct impacts of the plant on revenues of local businesses, on incomes accruing to households, on employment, and on the revenues of state and local government. The analysis also explores the indirect impacts of the NEF within a 80-km (50-mi) radius of the NEF. Details of the analysis are provided below.

7.1.4.2 Construction Expenditures

LES estimates that it will spend $397 million locally on construction expenditures over an 8-year period. Approximately 31% of the total construction costs will be spent on payroll, totaling $122.2 million. This amount is augmented with the inclusion of the $21.4 million in benefits paid to construction employees. (See Figure 7.1-5, Total Construction Expenditures: $397 Million Over Eight Years.)

LES estimates that the construction phase will create an annual average of 397 new jobs over this period, with peak construction employment estimated at 800 jobs in 2009 (see Table 7.1-2, Annual Impact of Construction Payroll). A majority of these jobs will exist in the first four years of construction, and will be at salary levels ranging between $34,000 and $49,000 annually. Figure 7.1-6, Estimated Construction Jobs by Annual Pay, depicts direct employment during the eight-year construction period, grouping jobs by salary range.

The regional construction work force appears to be large enough to support the employment needs for the construction of the NEF. According to 2000 data published by the Bureau of the Census, the construction labor force in Lea County is made up of about 1,200 workers. The construction labor force in the New Mexico Counties (Lea and Eddy Counties) totals more than 3,000 employees, and totals approximately 9,000 construction sector employees for the entire 8-county region. The estimated 397 new construction jobs would represent employment of 13% of the existing construction labor force in the two-New Mexico County region, and 4.5% of the existing eight-county region construction labor force. LES estimates that most construction employees will come from the local labor pool, however, a few positions that require specialized skills may be filled by non-local residents.

The remainder of the construction expenditures will be spent locally on construction goods and services, benefiting local businesses. (See Table 7.1-3, Total Impact of Local Spending for Construction Goods and Services, for additional details of local construction expenditures.)

7.1.4.3 Operation Expenditures

During the operation period, LES estimates that it will spend $10.5 million on operating payroll annually and an additional $3.2 million in benefits. The operation of the plant is expected to generate approximately 210 permanent, full-time jobs. LES will pay a weighted average annual salary of $50,000, which is 1.7 times greater than the average wage per job for the eight-county

region. Additionally, as shown in Table 7.1-1, Operating Plant Payroll Estimates, 90% of the jobs will have an annual pay of $42,000 or higher. According to LES, employment opportunities will range from plant operations, maintenance and health physics positions to clerical and security-related jobs. LES plans to provide extensive training for employees, and approximately 20% of employment opportunities will involve an advanced understanding of the NEF. (See Table 7.1-4 for information on the annual impact of operations payroll.)

The local labor force appears to be well positioned for these types of jobs. The total Lea County labor force stands at approximately 25,604 and the Eddy County labor force is an additional 23,957. The total eight-county labor force totals approximately 129,000. Within the eight-county region, between 6% and 14% of the individual county residents have at least a bachelors degree and between 56% and 86% of the individual county residents have graduated from high school (DOC, 2002).

Approximately $9.6 million per year will be spent locally on goods and services, benefiting local businesses. (See Table 7.1-5, Annual Impact of NEF Purchases, below for additional details of local NEF purchases.)

7.1.4.4 Other Expenditures

LES anticipates annual payroll to be $10.5 million with additional $3.2 million expenditure in employee benefits once the plant is operational. Approximately $9.6 million will be spent annually on local goods and services required for operation of the NEF.

The tax revenue to the State of New Mexico and Lea County resulting from the construction and operation of the NEF is estimated to range from $177 million up to $212 million. Refer to Tables 4.10-2, Estimated Tax Revenue, and 4.10-3, Estimated Tax Revenue Allocations, for further details.

Using the New Mexico and Lea County income tax rates and the estimated household income generated (directly and indirectly) from the NEF, it is estimated that income taxes could total as much as $4 million each year during the 8-year construction period and $2 million each year during the anticipated 30-year license period. Additionally, using the estimated total (direct and indirect) new business activity associated with the NEF, gross receipts taxes from local business could total as much as $3 million per year during the 8-year construction period and $928,000 per year during the anticipated 20-year operation period.

Of course, not all of the economic benefits from construction and operations of the NEF can be quantified. For example, due to the relatively small size of the manufacturing sector in this eight-county region, the opening of the NEF should have positive spillover effects throughout the region, such as increasing the skill level of the local labor force and potentially attracting other manufacturing firms. In addition to increasing the role of the manufacturing sector within the region, the NEF will help to diversify the regional economy and provide some additional insulation from the volatility of the oil and gas dependent economy of the region. Additionally, housing values have the potential to increase from current levels as income and relatively high-paying job opportunities in the area grow, potentially attracting new residents. In 2000, the median housing value in the eight-county region was $40,313, which is less than half of New Mexico, Texas, and U.S. levels (DOC, 2002).

7.1.5 Total Economic Impact Using RIMS II

7.1.5.1 Introduction

The RIMS II Methodology, first created by the BEA in the 1970s, is based on an accounting framework called an Input-Output (I-O) table. For each industry, an I-O table shows the distribution of the inputs purchased and the outputs sold among individual sectors of a national or regional economy. Using RIMS II for impact analysis has several advantages. RIMS II multipliers can be estimated for any region composed of one or more counties and for any industry or group of industries characterized in the national I-O table. According to empirical tests, the estimates based on RIMS II are similar in magnitude to the estimates based on relatively expensive surveys. This analysis utilized the RIMS II regional I-O Multipliers for the eight-county, Hobbs-Odessa-Midland, New Mexico-Texas Region based on data obtained from the BEA (BEA 2003a).

7.1.5.2 Construction Impacts

LES estimates that it will spend $122.2 million on payroll over the 8-year construction period. It is possible to compute the total annual impact by converting this amount into an average annual number and using RIMS II Multipliers. An annual payroll of approximately $15 million is expected to generate a total impact on earnings equal to $24 million (i.e., $15 million direct impact, and $8 million indirect impacts) within the 8-county region. The initial annual average 397 direct jobs created during the 8-year construction period are expected to produce a total employment increase of 650 jobs through the construction period. This total direct and indirect economic impact would result in a 1.0% and 0.7% increase (respectively) in total non-mining, private sector personal income and employment, respectively, for the eight-county region.

LES estimates that it will spend between $265 and $462 million on goods and services in the local economy over the 8-year construction period. Using the minimum amount of expected purchases and RIMS II Final Demand Multipliers, these expenditures are expected to generate a total annual output amounting to $53 million and total annual earnings of $15 million. Additionally, these expenditures are expected to produce a total of 452 new jobs per year.

To summarize, the construction phase of the project is expected to generate a total impact of $53 million in output for local businesses, $38 million in household earnings, and 1,102 new jobs. The total impact figures from the construction period are derived from adding the total impacts from construction payroll and employment and local construction expenditures. The output figure comes directly from Table 7.1-3, Total Impact of Local Spending for Construction Goods and Services, and the household earnings figures come from adding the total annual impact on earnings from Table 7.1-2, Annual Impact of Construction Payroll and Table 7.1-3, Total Impact of Local Spending for Construction Goods and Services, as does the total new jobs figure. (See Figure 7.1-7, Annual Flow of Direct and Indirect Economic Benefits Associated with NEF Construction below for the annual flow of benefits associated with the NEF construction period.)

7.1.5.3 Operations Impact

Upon completion of the NEF's construction, LES estimates that it will spend $10.5 million on plant operations payroll and an additional $3.2 million in benefits annually. Using the RIMS II

Multipliers, total additional earnings of $20 million will be produced, which would result in a 0.8% increase in total non-mining, private sector income in the eight-county region. Additionally, a total employment impact is estimated at 694 additional jobs, which would result in a 0.7% increase in the 8-county region non-mining, private sector employment.

Lastly, the estimated $9.6 million in annual purchases by LES of goods and services associated with the plant operation are expected to have a total annual impact on local business revenues equal to $14.6 million, $3.3 million for household income, and an increase in employment of 88 jobs.

To summarize, the operations phase of this project is expected to generate a total annual impact of $14.6 million in output for local businesses, $23 million in household earnings, and 782 new jobs. The total impact figures from the operations period are derived from adding the total impacts from operations payroll and local expenditures. The output figure comes directly from Table 7.1-5, Annual Impact of NEF Purchases, the household earnings figure comes from adding the total annual impact on earnings from Table 7.1-4, Annual Impact of Operations Payroll and Table 7.1-5, Annual Impact of NEF Purchases as does the total new jobs figure. (See Figure 7.1-8, Annual Flow of Direct and Indirect Economic Benefits Associated with NEF Operations for annual flows of economic benefits associated with the NEF operation period.)

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figure. (See Figure 7.1-7, Annual Flow of Direct and Indirect Economic Benefits Associated with NEF Construction below for the annual flow of benefits associated with the NEF construction period.)

7.1.5.3 Operations Impact

Upon completion of the NEF's construction, LES estimates that it will spend $10.5 million on plant operations payroll and an additional $3.2 million in benefits annually. Using the RIMS II Multipliers, total additional earnings of $20 million will be produced, which would result in a 0.8% increase in total non-mining, private sector income in the eight-county region. Additionally, a total employment impact is estimated at 694 additional jobs, which would result in a 0.7% increase in the 8-county region non-mining, private sector employment.

Lastly, the estimated $9.5 million in annual purchases by LES of goods and services associated with the plant operation are expected to have a total annual impact on local business revenues equal to $14.6 million, $3.3 million for household income, and an increase in employment of 88 jobs.

To summarize, the operations phase of this project is expected to generate a total annual impact of $14.6 million in output for local businesses, $23 million in household earnings, and 782 new jobs. The total impact figures from the operations period are derived from adding the total impacts from operations payroll and local expenditures. The output figure comes directly from Table 7.1-5, Annual Impact of LES Facility Purchases, the household earnings figure comes from adding the total annual impact on earnings from Table 7.1-4, Annual Impact of Operations Payroll and Table 7.1-5, Annual Impact of LES Facility Purchases as does the total new jobs figure. (See Figure 7.1-8, Annual Flow of Direct and Indirect Economic Benefits Associated with NEF Operations for annual flows of economic benefits associated with the NEF operation period.)

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TABLES

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Table 7.1-1 Operating Plant Payroll Estimates

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Level	Proportion	Jobs #	Average Pay	Total Payroll
Management	10%	21	$95,000	$1,995,000
Professional	20%	42	$62,000	$2,604,000
Skilled	60%	126	$42,000	$5,292,000
Administrative	10%	21	$30,000	$ 630,000
Total	**100%**	**210**		**$10,521,000**

Table 7.1-2 Annual Impact of Construction Payroll

	RIMS II Direct Effect Multipliers	Impact	Regional Increase in Non-Mining Sector
Direct Impact on:			
Earnings by Households		$15,273,750	
Indirect Impact on:			
Earnings by Households	0.5491	$8,386,816	
Total Impact on:			
Earnings by Households	1.5491	$23,660,566	1.0%
Direct Impact on:			
Employment (jobs)		397	
Indirect Impact on:			
Employment (jobs)	0.6385	253	
Total Impact on:			
Employment (jobs)	1.6385	650	0.7%

Table 7.1-3 Total Impact of Local Spending for Construction Goods and Services

Industry	Local Purchases	Final Demand Multiplies			Total Impact			
		Output	Earnings	Employment*	Output	Earnings	Job-years	Jobs/year
Concrete	$5,000,000	1.7112	0.5087	16.4093	$8,556,000	$2,543,500	82	10
Reinforcing Steel	$500,000	1	0	0	$500,000	$0	0	0
Structural Steel	$2,000,000	1	0	0	$2,000,000	$0	0	0
Lumber	$250,000	1	0	0	$250,000	$0	0	0
Site Preparation – Total	$20,000,00	1.6002	0.4459	13.7205	$32,004,000	$8,918,000	274	34
Transportation (freight on all materials)	$2,000,000	1.7782	0.5066	17.6983	$3,556,400	$1,013,200	35	4
Subcontracts by type of service								
Precast Concrete	$20,000,000	1.6002	0.4459	13.7205	$32,004,000	$8,918,000	274	34
Multiple Arch/Bldg. Packages	$40,000,000	1.6002	0.4459	13.7205	$64,008,000	$17,836,000	549	69
Equipment Installation Packages	$25,000,000	1.6002	0.4459	13.7205	$40,005,000	$11,147,500	323	43
Mechanical/Piping/HVAC Packages	$75,000,000	1.6002	0.4459	13.7205	$120,015,000	$33,442,500	1029	129
Electrical/Controls Packages	$75,000,000	1.6002	0.4459	13.7205	$120,015,000	$33,442,500	1029	129
Total	$264,750,000				**$422,913,400**	**$117,261,200**	**3616**	
Per Year (over 8-year period)	$33,093,750	*The employment multiplier is measured on the basis of $1 million change in output delivered to final demand			**$52,864,175**	**$14,657,650**		**452**
		Indirect Impact			**$19,770,425**			

Table 7.1-4 Annual Impact of Operations Payroll

	RIMS II Direct Effect Multipliers	Impact	Regional Increase in Non-Mining Sector
Direct Impact on:			
Earnings by Households		$10,521,000	
Indirect Impact on:			
Earnings by Households	0.8969	$9,436,285	
Total Impact on:			
Earnings by Households	1.8969	$19,957,285	0.8%
Direct Impact on:			
Employment (jobs)		210	
Indirect Impact on:			
Employment (jobs)	2.3039	484	
Total Impact on:			
Employment (jobs)	3.3039	694	0.7%

Table 7.1-5 Annual Impact of NEF Purchases

Item	Local Purchases	Final Demand Multipliers			Total Impact on 8-County Region		
	(Direct Impact)	Output	Earnings	Employment*	Output	Earnings	Employment
Landscaping	$75,000	1.6154	0.7509	38.1785	$121,155	$56,318	3
Protective Clothing	$30,000	1.4698	0.3211	13.4385	$44,094	$9,633	0
Laboratory Chemicals	$50,000	1.7137	0.3411	6.4671	$85,685	$17,055	0
Plant Spare Equipment	$170,000	1.4774	0.3783	10.722	$251,158	$64,311	2
Office Equipment	$160,000	1	0	0	$160,000	$0	0
Engineered Parts	$150,000	1.6005	0.5761	16.6379	$240,075	$86,415	2
Electrical/Electronic Parts	$220,000	1.5052	0.4576	14.8929	$331,144	$100,672	3
Electricity	$7,000,000	1.5129	0.2892	5.4635	$10,590,300	$2,024,400	38
Natural Gas	$56,000	2.8977	0.3734	7.3419	$162,271	$20,910	0
Waste Water	$93,000	1.7537	0.4507	11.9573	$163,094	$41,915	1
Solid Waste Disposal	$3,000	1.7537	0.4507	11.9573	$5,261	$1,352	0
Insurance	$0	1.5546	0.5486	17.6514	$0	$0	0
Catering	$50,000	1.5453	0.4801	30.1599	$77,265	$24,005	2
Building Maintenance	$370,000	1.5772	0.4727	14.819	$583,564	$174,899	5
Custodial Services	$250,000	1.7909	0.7261	41.7122	$447,725	$181,525	10
Professional Services	$180,000	1.6377	0.6922	18.8168	$294,786	$124,596	3
Security Services	$500,000	1.4976	0.6315	28.894	$784,800	$315,750	14
Mail, Document Services	$100,000	1.637	0.7074	19.4951	$163,700	$70,740	2
Office Supplies	$140,000	1	0	0	$140,000	$0	0
Total	$9,597,000	*The employment multiplier is measured on the basis of $1 million change in output delivered to final demand.			$14,610,077	$3,314,496	88
		Indirect Impact			$5,013,077		

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FIGURES

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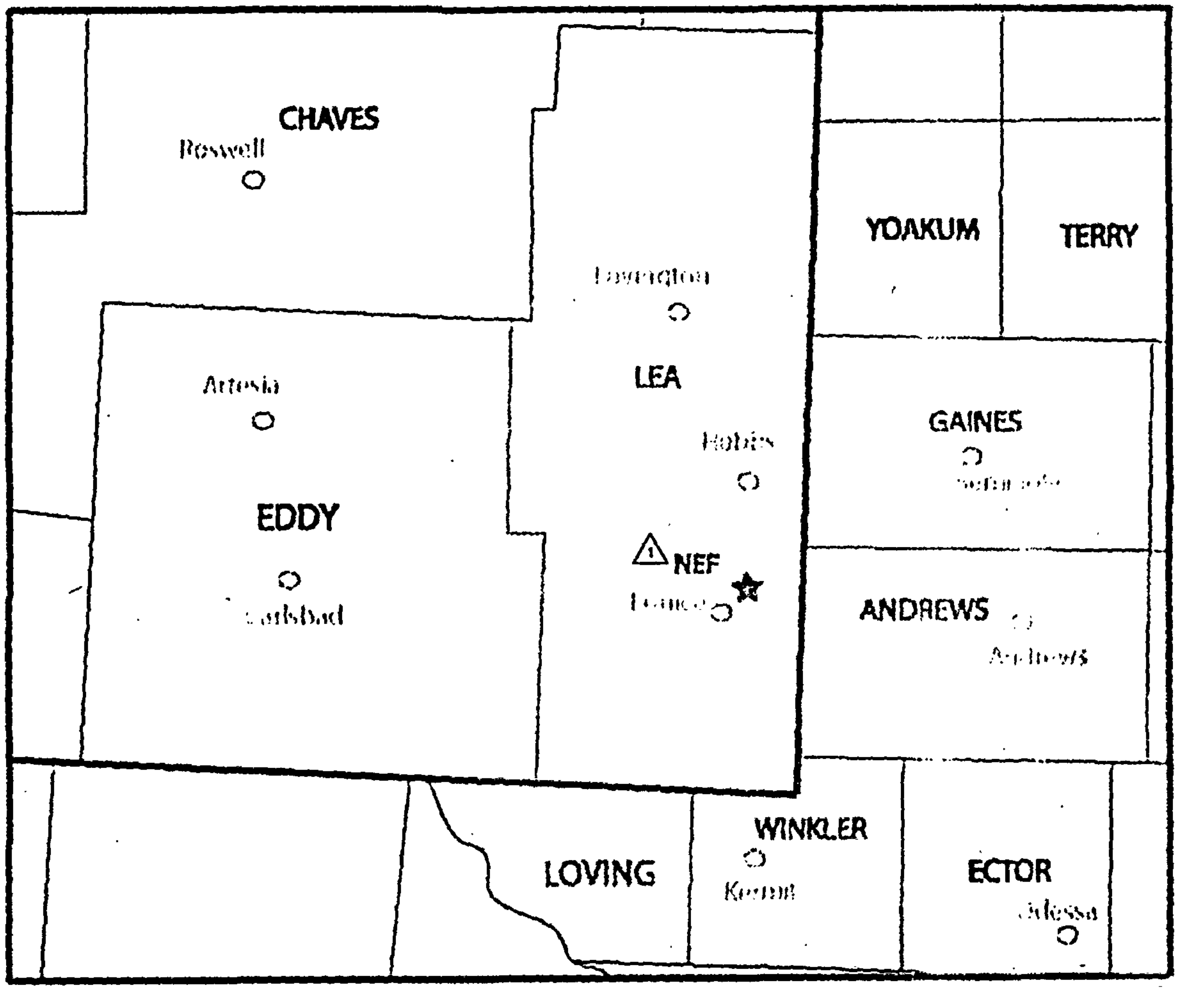
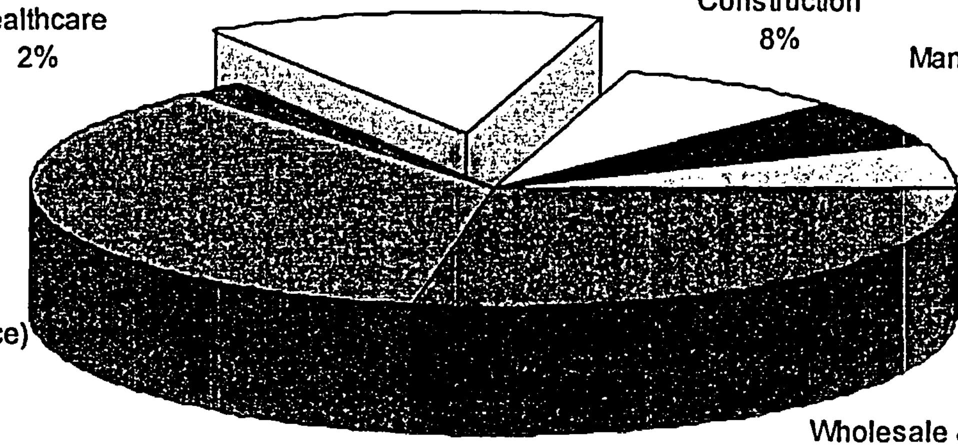


REFERENCE NUMBER
Figure 7.1–1.dwg

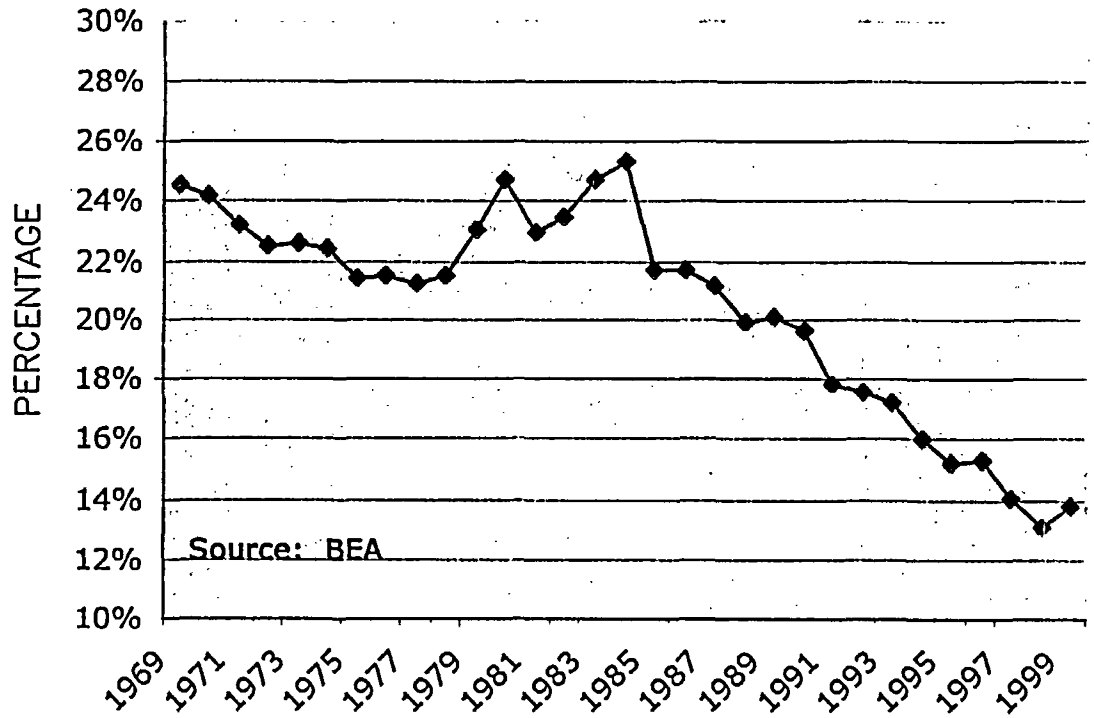
FIGURE 7.1-1
EIGHT–COUNTY ECONOMIC IMPACT AREA
ENVIRONMENTAL REPORT
REVISION 1 DATE: FEBRUARY 2004



Source: (BEA, 2003a)

REFERENCE NUMBER
Figure 7.1–2.dwg

FIGURE 7.1-2
PRIVATE EMPLOYMENT IN EIGHT–COUNTY REGION
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



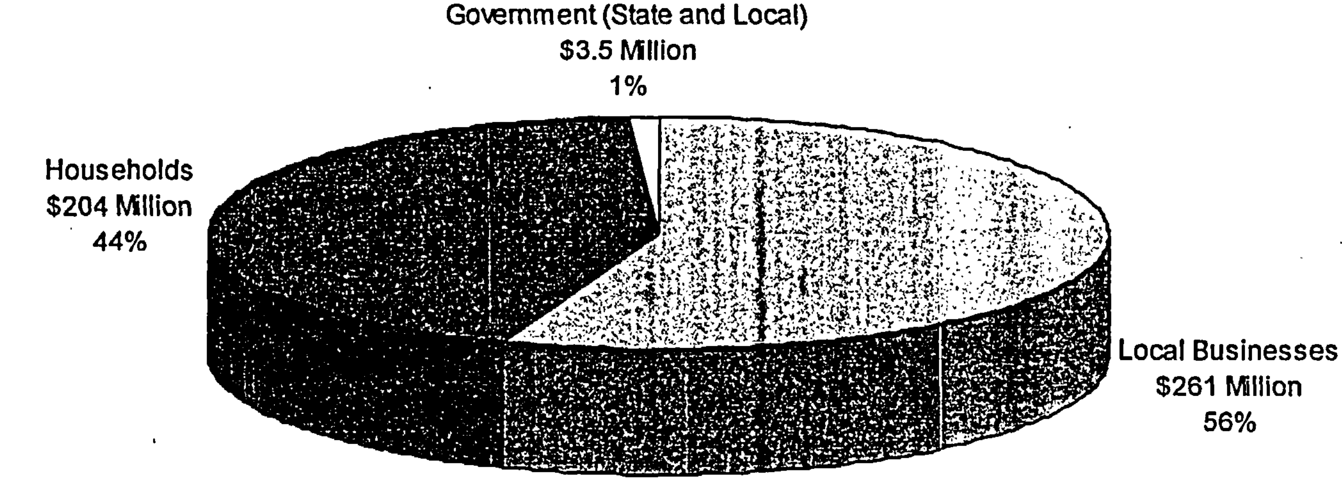
REFERENCE NUMBER
Figure 7.1–3.dwg

FIGURE 7.1-3

MINING AS A SHARE OF PRIVATE EMPLOYMENT IN EIGHT–COUNTY REGION
ENVIRONMENTAL REPORT

REVISION DATE: DECEMBER 2003

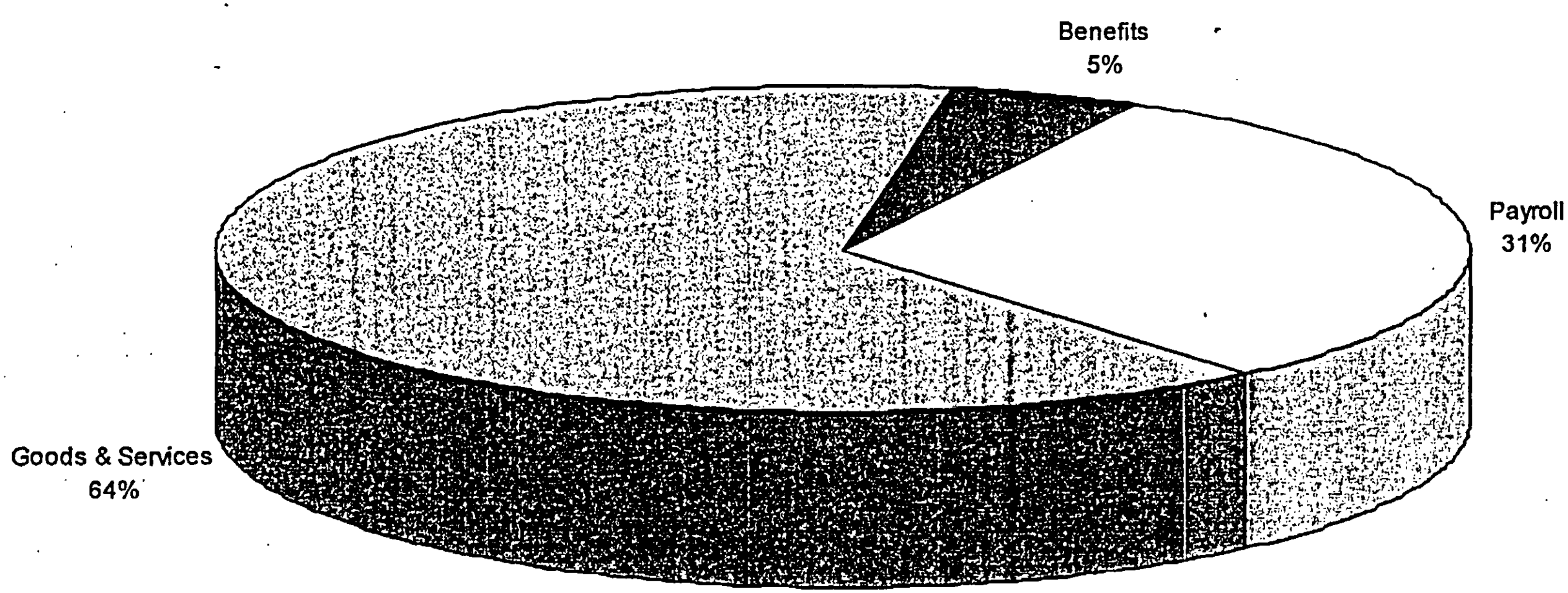
Total Value:
$469 Million



Estimated expenditures within eight-County region over 8 year construction and thirty-year licensing periods, discounted at 8 percent

REFERENCE NUMBER
Figure 7.1-4.dwg

FIGURE 7.1-4
TOTAL PRESENT VALUE OF EXPECTED LES EXPENDITURES
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003

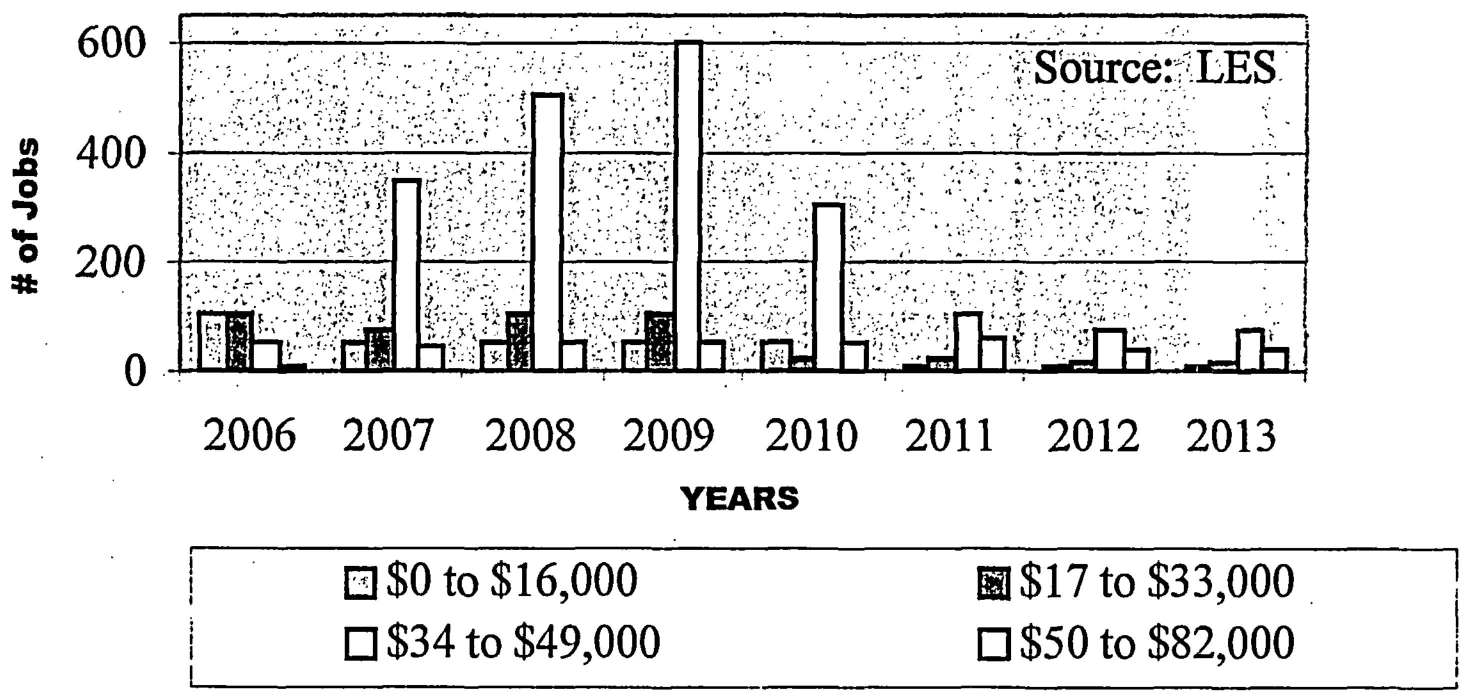


REFERENCE NUMBER
Figure 7.1–5.dwg

FIGURE 7.1-5

TOTAL CONSTRUCTION EXPENDITURES $397 MILLION OVER EIGHT YEARS
ENVIRONMENTAL REPORT

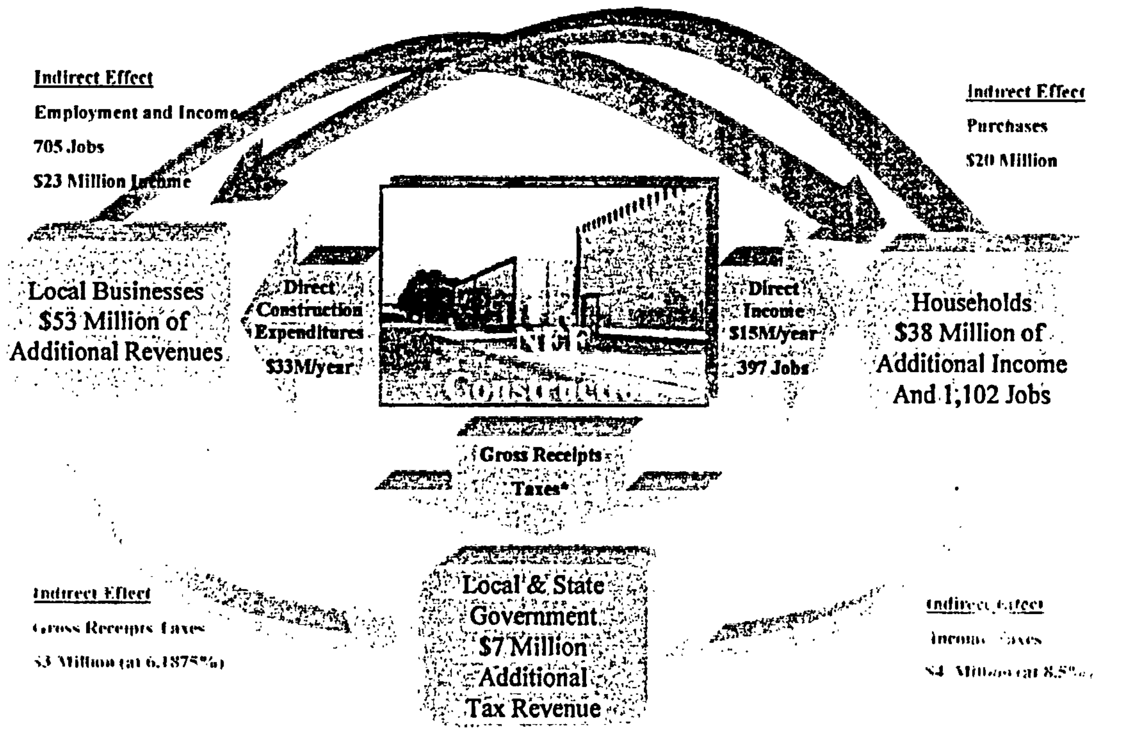
REVISION DATE: DECEMBER 2003



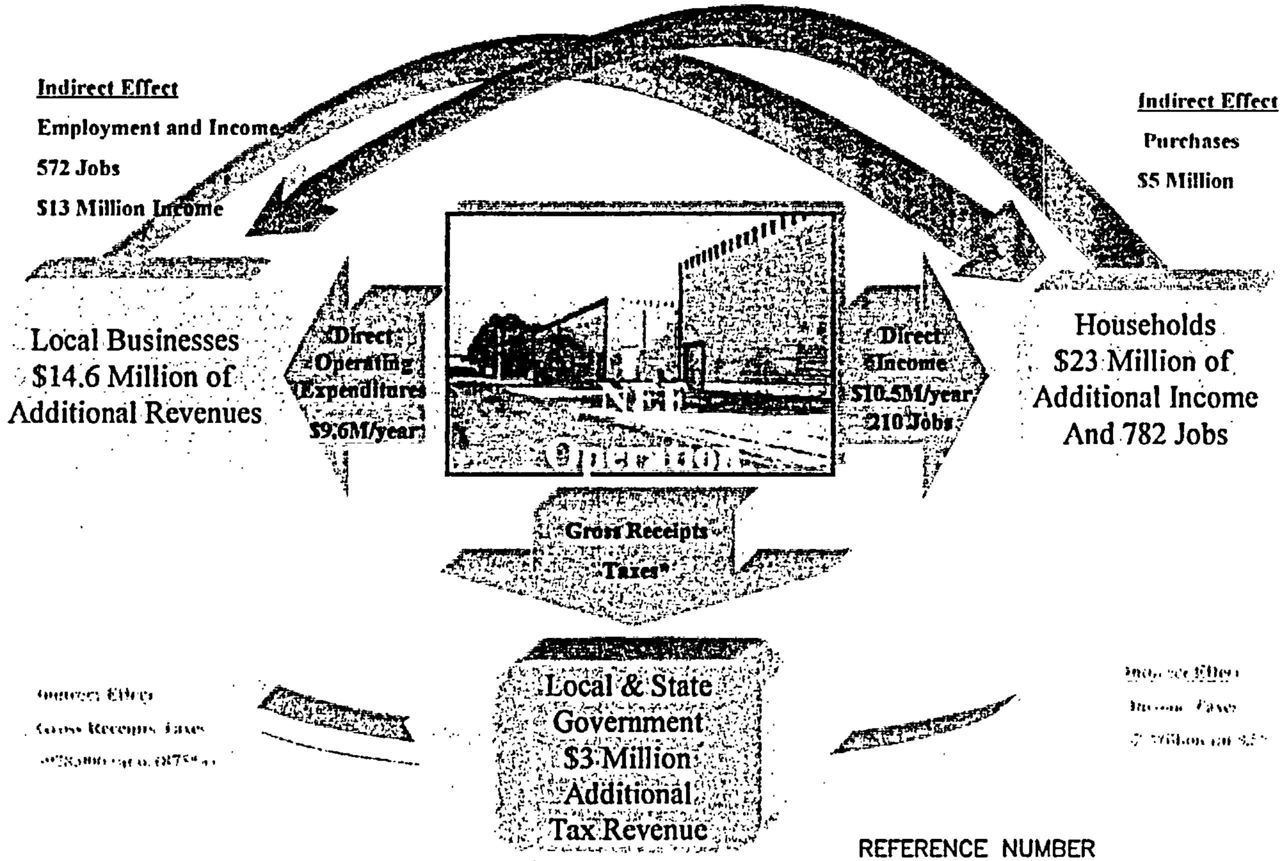
REFERENCE NUMBER
Figure 7.1–6.dwg

FIGURE 7.1-6

ESTIMATED CONSTRUCTION JOBS
BY ANNUAL PAY
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



REFERENCE NUMBER Figure 7.1-7.dwg	**FIGURE 7.1-7** ANNUAL FLOW OF DIRECT AND INDIRECT ECONOMIC BENEFITS ASSOCIATED WITH NEF CONSTRUCTION ENVIRONMENTAL REPORT REVISION DATE: DECEMBER 2003



REFERENCE NUMBER

REFERENCE NUMBER
Figure 7.1–8.dwg

FIGURE 7.1-8
ANNUAL FLOW OF DIRECT AND INDIRECT ECONOMIC BENEFITS ASSOCIATED WITH NEF OPERATIONS
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003

7.2 ENVIRONMENTAL COST - BENEFIT, PLANT CONSTRUCTION AND OPERATION

This section describes qualitatively the environmental costs and benefits of the proposed NEF in Lea County, New Mexico. It identifies the impacts of the plant construction and operation on the site and adjacent environment. Table 7.2-1, Qualitative Environmental Costs/Benefits of NEF During Construction and Operation, summarizes the results.

7.2.1 Site Preparation and Plant Construction

7.2.1.1 Existing Site

There will be minimal disturbance to the existing site features at the project site associated with construction activities. Approximately 81 ha (200 acres) within 220 ha (543-acres) will be subjected to clearing and earthmoving activities. Site property outside the primary plant area will generally be left in its preconstruction condition or improved through stabilization as needed.

7.2.1.2 Land Conservation and Erosion Control Measures

Louisiana Energy Services (LES) anticipates there will be some short-term increases in soil erosion at the site due to construction activities. Erosion impacts due to site clearing, excavation, if required, and grading will be mitigated by utilization of proper construction and erosion best management practices (BMPs). These practices include minimizing the construction footprint to the extent possible, mitigating discharge including stormwater runoff (i.e., the use of detention and retention ponds), the protection of all unused naturalized areas, and site stabilization practices to reduce the potential for erosion. Only about one-quarter of the site will be involved in construction activities at any one time. Cleared areas will be seeded as soon as practicable and watering will be used to control fugitive dust. Water conservation will be considered when deciding how often dust suppression sprays will be applied.

7.2.1.3 Aesthetic Changes

Visual and noise impacts due to site preparation and plant construction activities are anticipated to be minimal, due to the remote location of the site and the buffer zone along the outer perimeter of the property boundary. Some elevated and intermittent noise levels during construction may be discernable offsite but should not constitute an annoyance to nearby residences since the nearest resident is 4.3 km (2.63 mi) away. The visual intrusion of the NEF upon an otherwise relatively denuded landscape that constitutes the plant site property should not be objectionable given the vegetative buffer around the site and its remote location.

7.2.1.4 Ecological Resources

Pre-construction and construction activities at the site are not expected to have any significant adverse impact on vegetation and wildlife. LES anticipates that construction activities within the existing clear-cut area will remove some shrub vegetation and cause some small animal life to relocate on the site. No proposed activities will impact communities or habitats defined as rare or unique, or that support threatened and endangered species, since no such communities or habitats have been identified anywhere within the site.

7.2.1.5 Access Roads and Local Traffic

All traffic into and out of the site will be along New Mexico Highway 234 because Highway 234 is dedicated to heavy-duty use and built to industrial standards, it would be able to handle increased heavy-duty traffic adequately. Additionally, due to the already substantial truck traffic using these roads to access Andrews County, Texas there would be little additional effect on other road users.

7.2.1.6 Water Resources

Water quality impacts will be controlled during construction by compliance with the State of New Mexico's water quality regulations and the use of BMPs as detailed in the site Stormwater Pollution Prevention Plan (SWPPP). In addition, a Spill Prevention, Control and Countermeasure (SPCC) plan will be implemented to minimize the possibility of spills of hazardous substances, minimize the environmental impact of any spills and ensure prompt and appropriate remediation. Spills during construction are more likely to occur near vehicle maintenance and fueling operations, storage tanks, painting operations and warehouses. The SPCC plan will identify sources, locations and quantities of potential spills, and response measures. The plan will also identify individuals and their responsibilities for implementation of the plan and provide for prompt notifications of state and local authorities as needed.

7.2.1.7 Noise and Dust Control Measures

Objectionable construction noises are to be reduced to acceptable levels by use of noise control equipment on all powered equipment. Shrub and vegetation buffer areas, which will be left around the plant property, will combine to reduce noise. Since substantial truck traffic already exists along New Mexico State Highway 234, the temporarily increased noise levels along Highway 234 due to construction activities are not expected to adversely affect nearby residents.

Traffic areas during construction will be watered as necessary to prevent dust. Water conservation will be considered when deciding how often dust suppression sprays will be applied. All potential air pollution and dust emission conditions will be monitored to assure compliance with applicable health, safety, and environmental regulations.

7.2.1.8 Socioeconomic

Construction of the NEF is expected to have positive socioeconomic impacts on the region. The Regional Input-Output Modeling System (RIMS II) allows estimation of various indirect impacts associated with each of the expenditures associated with the NEF. According to the RIMS II analysis, the region's residents can anticipate an annual impact of $53 million in increased economic activity for local businesses, $38 million in increased earnings by households, and an annual average of 1,102 new jobs during the 8-year construction period. The temporary influx of labor is not expected to overload local services and facilities within the Hobbs-Eunice, New Mexico area.

7.2.1.8.1 Yearly Purchases of Steel, Concrete and Related Construction Materials

The initial construction period for NEF is approximately three years. This period will encompass site preparation and construction of most site structures. Due to the phased installation of

centrifuge equipment, production will commence prior to completion of the initial three-year construction period. The manpower and materials used during this phase of the project will vary depending on the construction plan. Table 7.2-2, Estimated Construction Material Yearly Purchases, provides the estimated total quantities of purchased construction materials and Table 7.2-3, Estimated Yearly Labor Costs for Construction, provides the estimated labor that will be required to install these materials. The scheduling of materials and labor expenditures is subject to the provisions of the project construction execution plan, which has not yet been developed.

Approximately 60 to 80% of the construction materials will be purchased from the local NEF site area. According to the labor survey conducted as part of the conceptual estimate, the major portion of the required craft labor forces will come from the five or six counties around the project area, including the nearby Texas counties.

7.2.2 Plant Operation

7.2.2.1 Surface and Groundwater Quality

Liquid effluents at the NEF will include stormwater runoff, sanitary and industrial wastewater, and treated radiologically contaminated wastewater. Radiologically contaminated process water will be treated to 10 CFR 20, Appendix B limits (CFR, 2003q) and discharged to the Treated Effluent Evaporative Basin, which is a double-lined treated effluent evaporative basin with leak detection). Site stormwater runoff from the Uranium Byproduct Cylinder (UBC) Storage Pad is routed to the UBC Storage Pad Stormwater Retention Basin. The general site runoff is routed to the Site Stormwater Detention Basin. Stormwater discharges will be regulated by the National Pollutant Discharge Elimination System (NPDES) during operation. Approximately 174,100 m^3 (46 million gal) of stormwater from the plant site is expected to be released annually to the two stormwater basins.

7.2.2.2 Terrestrial and Aquatic Environments

No communities or habitats defined as rare or unique or that support threatened and endangered species, have been identified anywhere on the NEF site. Thus, no operation activities are expected to impact such communities or habitats.

7.2.2.3 Air Quality

No adverse air quality impacts to the environment, either on or offsite, are anticipated to occur. Air emissions from the facility during normal facility operations will be limited to the plant ventilation air and gaseous effluent systems. All plant process/gaseous air effluents are to be filtered and monitored on a continuous basis for chemical and radiological contaminants, which could be derived from the UF_6 process system. If any UF_6 contaminants are detected in ambient in-plant air systems, the air is treated by appropriate filtration methods prior to its venting to the environment. Two emergency diesel generators that supply standby electrical power operate only in the event of power interruptions. They will have negligible health and environmental impacts.

7.2.2.4 Visual/Scenic

No impairments to local visual or scenic values will result due to the operation of the NEF. The facility and associated structures will be relatively compact, located in a rural location. No offensive noises or odors will be produced as a result of plant operations.

7.2.2.5 Socioeconomic

The Regional Input-Output Modeling System (RIMS) II allows estimation of various indirect impacts associated with each of the expenditures associated with the NEF. Over the anticipated thirty-year license period of the NEF, residents can anticipate an annual total of $15 million in increased economic activity, $23 million in increased earnings by households and an annual average of 782 jobs directly or indirectly relating to the NEF.

In general, no significant impacts are expected to occur for any local area infrastructure (e.g., schools, housing, water, and sewer). Costs of operation should be diffused sufficiently throughout the Hobbs-Eunice, New Mexico area to be indistinguishable from normal economic growth.

7.2.2.6 Radiological Impacts

Potential radiological impacts from operation of the NEF would result from controlled releases of small quantities of UF_6 during normal operations and releases of UF_6 under hypothetical accident conditions. Normal operational release rates to the atmosphere and to the onsite Treated Effluent Evaporative Basin are expected to be less than 8.9 MBq/yr (240 µCi/yr) and 2.1 MBq/yr (56µCi/yr), respectively.

The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose equivalents from gaseous effluent to an adult located at the plant site south boundary are 1.7×10^{-4} mSv (1.7×10^{-2} mrem) and 1.4×10^{-3} mSv (1.4×10^{-1} mrem), respectively. The maximum effective dose equivalent and maximum annual organ (lung) dose equivalent from discharged gaseous effluent to the nearest resident (teenager) located 4.3 km (2.63 mi) in the west sector are expected to be less than 1.7×10^{-5} mSv (1.7×10^{-3} mrem) and 1.2×10^{-4} mSv (1.2×10^{-2} mrem), respectively.

The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose equivalents from liquid effluent to an adult at the south site boundary are 1.7×10^{-5} mSv (1.7×10^{-3} mrem) and 1.5×10^{-4} mSv (1.5×10^{-2} mrem), respectively. The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose equivalents from liquid effluent to an individual (teenager) at the nearest residence are 1.7×10^{-6} mSv (1.7×10^{-4} mrem) and 1.3×10^{-5} mSv (1.3×10^{-3} mrem), respectively.

The maximum annual dose equivalent due to external radiation from the UBC Storage Pad and all other feed, product and byproduct cylinders on the NEF property (skyshine and direct) is estimated to be less than 2.0×10^{-1} mSv (20 mrem) to the maximally exposed person at the nearest point on the site boundary (2,000 hrs/yr) and 8×10^{-12} mSv/yr (8×10^{-10} mrem/yr) to the maximally exposed resident (8,760 hrs/yr) located at 4.3 km (2.63 mi) west of the NEF. Given the conservative assumptions used in estimating these values, these concentrations and resulting dose equivalents are insignificant and their potential impacts on the environment and health are inconsequential.

These dose equivalents due to normal operations are small fractions of the normal background radiation range of 2.0 to 3.0 mSv (200 to 300 mrem) dose equivalent that an average individual receives in the US, and within regulatory limits. .

7.2.2.7 Other Impacts of Plant Operation

NEF water will be obtained from the Hobbs and Eunice, New Mexico municipal water systems, and routine liquid effluent will be treated and discharged to evaporative pond(s), whereas sanitary wastes will be discharged to onsite septic systems. Facility water requirements are relatively low and well within the capacities of the Hobbs and Eunice water utilities. The current capacity for the Eunice Potable water supply system is 16,350 m^3/day (4.3 million gpd), and current usage is 5,600 m^3/day (1.48 million gal/d). The Hobbs water system capacity is 75,700 m^3/day (20 million gal/d) whereas its usage is 23,450 m^3/day (6.2 million gal/d). Requirements for operation of the NEF are expected to be 240 m^3/day (63,423 gal/d), a volume well within the capacity of the supply systems. Non-hazardous and non-radioactive solid waste is expected to be approximately 172,500 kg (380,400 lbs) annually. It will be shipped offsite to a licensed landfill. The local Lea County landfill capacity is more than adequate to accept the non-hazardous waste.

7.2.2.8 Decommissioning

The plan for decommissioning is to decontaminate or remove all materials promptly from the site that prevent release of the facility for unrestricted use. This approach avoids the need for long-term storage and monitoring of wastes on site. Only building shells and the site infrastructure will remain. All remaining facilities will be decontaminated where needed to acceptable levels for unrestricted use.

Depleted UF_6 , if not already sold or otherwise disposed of prior to decommissioning, will be disposed of in accordance with regulatory requirements. Radioactive wastes will be disposed of in licensed low-level radioactive waste disposal sites. Hazardous wastes will be treated or disposed of in licensed hazardous waste facilities. Neither conversion (if done), nor disposal of radioactive or hazardous material will occur at the plant site, but at licensed facilities located elsewhere.

Following decommissioning, all parts of the plant and site will be unrestricted to any specific type of use.

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TABLES

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Table 7.2-1 Qualitative Environmental Costs/Benefits of NEF During Construction And Operation

Qualitative Costs	Determination/Evaluation
Change in real estate values in areas/communities adjacent to the facility (e.g., land, homes, rental property etc.)	Potentially inflationary
Traffic changes along local streets and highways	Some increases during shift changes
Demand on local services, public utilities, schools, etc.	Some increased utilization expected, but within services capacity
Impact to natural environmental components (e.g., ecology, water quality, air quality, etc.)	Minimal impacts
Alteration of aesthetic, scenic, historic, or archaeological areas or values	No measurable impact
Change in local recreational potential	Not significant
Qualitative Benefits	
Site soil stabilization and erosion reduction	Beneficial
Incentive for development of other ancillary/support business development resulting from presence of LES facility	Beneficial
Change in real estate values in areas/communities adjacent to the facility (e.g., land, homes, rental property etc.)	Potentially beneficial
Increase in local employment opportunities	Beneficial
Impacts to local retail trade and services	Beneficial
Development of local workforce capabilities	Beneficial

Table 7.2-2 Estimated Construction Material Yearly Purchases
Page 1 of 1

Commodity	Quantity	Total Value (Material Cost)	Yearly Purchases
Concrete/Forms/Rebar	59,196 m^3 (77,425 yd^3)	$9,441,000	$9,441,000
Pre-Cast Concrete	120,774 m^2 (1,300,000 ft^2)	$25,232,000	$8,410,667
Structural Steel	1,865 t (2,056 tons)	$5,524,000	$5,524,000
Architectural Items	1 Lot	$26,995,000 Finishes, etc.	$26,995,000
HVAC Systems	109 Each	$27,098,000 Systems Mat'ls.	$27,098,000
Utility Piping	55,656 m (182,597 linear ft)	$20,777,000	$20,777,000
Electrical Conduit & Wire	361,898 m (1,187,328 linear ft)	$14,174,000	$7,087,000

Table 7.2-3 Estimated Yearly Labor Costs for Construction

Type of Work	Number Of Craft-Hours	Approx. No. People	Total Value	Yearly Purchases
Civil & Site Work	163,000	65 people for 1 year	$5,264,900	$5,264,900
Concrete Work	541,000	70 people for 3 years	$17,420,200	$5,806,733
Structural Steel	54,000	25 people for 1 year	$1,852,200	$1,852,200
Pre-cast Concrete	166,000	66 people for 1 year	$5,345,200	$5,345,200
Architectural Finishes	284,000	150 people for 1 year	$9,088,000	$9,088,000
Utility Equipment	23,000	15 people for 1 year	$969,450	$969,450
HVAC Sys. & Ductwork	186,000	40 people for 1 year	$6,175,200	$6,175,200
Electrical Conduit & Wire	280,000	70 people for 2 years	$10,556,000	$5,278,000

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7.3 NO-ACTION ALTERNATIVE COST-BENEFIT

The no-action alternative would be to not build the proposed NEF. Under the no-action alternative, the NRC would deny the license application for the plant, in which case the proposed site is assumed to continue its current use and the potential impacts of constructing and operating the proposed NEF would not occur. Although the no-action alternative would avoid impacts to the NEF area, it could lead to impacts at other locations.

Under the no-action alternative, for example, reactor licensees would still need uranium enrichment services. LES estimates that the proposed NEF production (3 million SWU/Yr) represents about 25% of the estimated U.S. requirement for enrichment services in the year 2002. During the period 2003 through 2010, these US requirements are forecast to average 11.1 million SWU and during the 10-year period 2011 through 2020 they are forecast to average between 10.1 and 10.2 million SWU. Indigenous supply from the single, aging, high cost, and electric power intensive Paducah GDP, which is operated by USEC, could theoretically supply up to 6.5 million SWU of these requirements (55%). However, USEC has obligated much of the ongoing production from the Paducah GDP to meet the contractual requirements of some of its Far East customers. As a result, a significant amount of USEC's obligations to US customers are being met with a foreign source (Russian HEU-derived SWU) that USEC purchases under its contract as executive agent for the US government

Many US operators of nuclear power plants in the US, who are also the end users of uranium enrichment services in the US, view the present supply situation with concern. They see a world supply and requirements situation for economical uranium enrichment services that is presently in balance, exhibiting a potential for significant shortfall if plans that have been announced by two of the primary enrichers are not executed.

These US purchasers find that as a result of recent trade actions and substantial duties imposed on Eurodif, that one source of competitive enrichment services for US consumption has been significantly reduced for the foreseeable future. They view themselves as being largely dependent on a single enricher, USEC, whose only operating enrichment plant is the Paducah GDP. These purchasers are concerned that the primary source of enrichment services that USEC delivers for use in their nuclear power plants is obtained from Russia and could be vulnerable to either internal or international political unrest in the future. Also, they are concerned that neither the performance nor economics of the updated version of the DOE centrifuge technology that USEC is planning to use have been successfully demonstrated.

Not building the NEF, therefore, could have the following consequences:

- The inability to meet important considerations of energy and national security policy, namely the need for the development of additional, secure, reliable, and economical domestic enrichment capacity.
- Continued reliance on the high-cost, power-intensive, and inefficient technology now in use at the aging Paducah gaseous diffusion plant, or, alternatively, reliance on the proposed USEC gas centrifuge technology that, at present, is still under development and has yet to be deployed on a commercial scale.
- Continued extensive reliance on uranium enriched in foreign countries.

- The inability to ensure both security of supply and diverse domestic suppliers for U.S. purchasers of enrichment services.
- A possible uranium enrichment supply deficit with respect to the uranium enrichment requirements forecasts set forth in ER Section 1.1.2, Market Analysis of Enriched Uranium Supply and Requirements.

ER Section 2.4, Comparison of the Predictive Environmental Impacts, describes the environmental impacts of the no-action alternatives and compares them to the proposed action. Table 2.4-1, Comparison of Potential Impacts for the Proposed Action and the No-Action Alternatives and 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternatives, summarize that comparison in tabular form for the 13 environmental categories, described in detail in ER Chapter 4, Environmental Impacts. In sum, LES anticipates the affects to the environment of all no-action alternatives to be at least equal to or greater than the proposed action in the near term. There are potentially lesser impacts in the long term, but this is based on USEC's unproven commercially demonstrated technology or the availability of the speculative DOE HEU-derived supply source. In addition, under the no-action alternative, attainment of both important national policy and commercial objectives would be, at best, delayed.

The following types of impacts would be avoided in the Lea County area by the no-action alternative (see Table 2.1-1, Chemicals and Their Properties and Table 7.2-1, Qualitative Environmental Costs/Benefits of NEF During Construction and Operation). During construction, the potential, short-term impacts of soil erosion and fugitive emissions from dust and construction equipment; disruption to ecological habitats; noise from equipment; and traffic from worker transportation and supply deliveries. These impacts, as discussed in Chapter 4, are temporary and limited in scope due to construction BMPs. During operation, the no-action alternative would avoid increased traffic due to feed/product deliveries and shipments and worker transportation; increased demand on utility and waste services; and public and occupational exposure from effluent releases. These impacts, however, will be minimal because the area already has traffic from a nearby city and general trucking commerce; there is sufficient capacity of utility and waste services in the region; and effluent releases will be strictly controlled, maintained onsite, monitored, and maintained below regulatory limits.

While the no-action alternative would have no impact on the socioeconomic structure of the Lea County area, the proposed action would have moderate to significant beneficial effects (see Tables 7.1-1 through 7.1-5). The results of the economic analysis show that the greatest fiscal impacts (i.e., 63% of total present value impacts) will derive from the 8-year construction period associated with the proposed facility. The largest impact on local business revenues stems from local construction expenditures, while the most significant impact on household earnings and jobs is associated with construction payroll and employment projected during the 8-year construction period. Operation of the facility will also have a net positive impact on the eight-county area and will help diversify the regional economy and provide some additional insulation from the volatility of the oil and gas dependent economy of the region.

LES estimates that construction payroll will total $122.2 million with an additional $21 million expended for employment benefits over the 8-year construction period. Construction services purchased from third party firms within the region will add $265 million in direct benefits to the local economy during the NEF's construction.

LES anticipates annual payroll to be $10.5 million with an additional $3.2 million expenditure in employee benefits once the plant is operational. Approximately $9.6 million will be spent annually on local goods and services required for operation of the NEF.

The tax revenue to the State of New Mexico and Lea County resulting from the construction and operation of the NEF is estimated to range from $177 million up to $212 million. Refer to Tables 4.10-2, Estimated Tax Revenue, and 4.10-3, Estimated Tax Revenue Allocations, for further details.

The Regional Input-Output Modeling System (RIMS) II allows estimation of various indirect impacts associated with each of the expenditures associated with the operation of NEF. According to the RIMS II analysis, the region's residents can anticipate an annual total of $53 million in increased economic activity, $38 million in increased earnings by households, and an annual average of 1,102 new jobs during the eight-year construction period. Over the anticipated 30-year license period of the NEF, residents can anticipate an annual total of $15 million in increased economic activity, $23 million in increased earnings by households and an annual average of 782 new jobs directly or indirectly relating to the NEF. In general, no significant impacts are expected to occur for any local infrastructure areas (e.g., schools, housing, water, and emergency responders). Costs of operation should be diffused sufficiently to be indistinguishable from normal economic growth. Based on the above information, cost-benefit analyses in Section 7.1, Economic Cost-Benefits, Plant Construction and Operation and Section 7.2, Environmental Cost-Benefit, Plant Construction and Operation, and the minimal impacts to the affected environment demonstrated in Chapter 4, LES has concluded that the preferred alternative is the proposed action, construction and operation of the NEF.

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8.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

8.1 INTRODUCTION

This Environmental Report (ER) was prepared by Louisiana Energy Services (LES) to assess the potential environmental impacts of licensing the construction and operation of a uranium enrichment facility to be located in Lea County, near the city of Eunice, New Mexico (the proposed action). The proposed facility will use the centrifuge enrichment process, which is an energy-efficient, proven advanced technology. The National Enrichment Facility (NEF) will be owned and operated by LES, as described in Safety Analysis Report (SAR) Chapter 1, General Information, which is a Delaware limited partnership company. LES prepared this ER in accordance with 10 CFR 51 (CFR, 2003a), which implements the requirements of the National Environmental Policy Act of 1969 (NEPA), as amended (USC, 2003a). This ER also reflects the applicable elements of the Nuclear Regulatory Commission (NRC) guidance, including format, in NUREG-1748, "Environmental Review Guidelines for Licensing Actions Associated with NMSS Programs," Final Report (NRC, 2003a). This ER analyzes the potential environmental impacts of the proposed action and eventual Decontamination and Decommissioning (D&D) of the facility, and discusses the effluent and environmental monitoring programs proposed to assess the potential environmental impacts of facility construction and operation. The ER also considers a no-action alternative.

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8.2 PROPOSED ACTION

The proposed action is to license the construction and operation of the NEF uranium enrichment facility in Lea County, near the city of Eunice, New Mexico. The NEF will use the gas centrifuge enrichment process to separate natural uranium hexafluoride UF_6 feed material containing 0.711 $^{w}/_{o}$ ^{235}U into a product stream enriched up to 5.0 $^{w}/_{o}$ ^{235}U and a depleted stream containing approximately 0.32 $^{w}/_{o}$ ^{235}U. Production capacity at design throughput is approximately 3.0 million separative work units (SWU) per year. Facility construction is expected to require eight years. Construction would be conducted in six phases. Operation would commence after the completion of the first cascade in the first phase. The facility is licensed for 30 years. Decontamination and Decommissioning (D&D) is projected to take approximately nine years. LES estimates the cost of the plant to be approximately $1.2 billion (in 2002 dollars) excluding escalation, contingency, interest, tails disposition, decommissioning, and any replacement equipment required during the operational life of the facility.

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8.3 NEED FOR THE PROPOSED ACTION

The proposed action will serve the clear and well-substantiated need for additional reliable and economical uranium enrichment capacity in the United States. This underlying need for the proposed NEF stems directly from important US energy and national security concerns and the continuing demand for reliable and economical uranium enrichment services. As the Department of Energy (DOE) has noted (DOE, 2002a), these energy and national security concerns "...are due, in large part, to the lack of available replacement for the inefficient and non-competitive gaseous diffusion enrichment plants. These concerns highlight the importance of identifying and deploying an economically competitive replacement domestic enrichment capacity in the near term." By providing this needed additional domestic enrichment capacity, the NEF would also serve important commercial objectives related to the security of supply of enriched uranium in the US. At present, the enrichment services needs of US utilities are susceptible to "a supply disruption from either the Paducah plant production or the highly-enriched uranium (HEU) Agreement deliveries."

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8.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the NRC would not approve the license application to construct and operate the proposed National Enrichment Facility (NEF). As a result, the additional domestic source and supply of enrichment services that would result from the issuance of the license to LES would not become available to utility customers. These potential LES utility customers would be required to fill their enrichment needs through existing suppliers, with USEC's Paducah plant being the only domestic facility available to serve this purpose. Thus, under the no-action alternative, a decision not to approve the license application would result in only one domestic source of enrichment services, a source that employs a high-cost, inefficient technology – a situation that the DOE has indicated could lead to "serious domestic energy consequences." (DOE, 2002a). ER Section 2.4, Comparison of the Predicted Environmental Impacts, describes the environmental impacts of the no-action alternative scenarios and compares them to the proposed action. Table 2.4-1, Comparison of Potential Impacts for the Proposed Action and the No-Action Alternative Scenarios and Table 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternative Scenarios, which summarizes that comparison in tabular form for thirteen environmental categories, are described in detail in Chapter 4, Environmental Impacts. In summary, LES anticipates that the effects to the environment of all no-action alternative scenarios to be greater than the proposed action in both the short and long term. There are potentially lesser impacts in some environmental categories, but this is based on an unproven commercially demonstrated technology. In addition, the important objective of security of supply is delayed.

The following types of impacts would be avoided in Lea County, New Mexico and the surrounding area by the no-action alternative (see ER Table 2.4-2). During construction, the potential, short-term impacts are soil erosion and fugitive emissions from dust and construction equipment; minor disruption to ecological habitats and cultural resources, noise from equipment; and traffic from worker transportation and supply deliveries. These impacts, as discussed in Chapter 4, are temporary and limited in scope due to construction best management practices (BMPs). During operation, the no-action alternative would avoid increased traffic due to feed/product deliveries and shipments, and worker transportation; increased demand on utility and waste services; and public and occupational exposure from effluent releases. These impacts, however, will be minimal because the local roadway (New Mexico Highway 234) already has significant traffic of similar nature; there is sufficient capacity of utility and waste services in the region; and effluent releases will be strictly controlled, monitored, and maintained below regulatory limits (CFR, 2003q; CFR, 2003w; CFR, 2003o; NMAC, 2002a).

While the no-action alternative would have no impact on the socioeconomic structure of the Lea County, New Mexico area, the proposed action would have moderate to significant beneficial effects (see Table 7.1-2, Annual Impact of Construction Payroll, Table 7.1-3, Total Impact of Local Spending for Construction Goods and Services, Table 7.1-4, Annual Impact of Operations Payroll, and Table 7.1-5, Annual Impact of NEF Purchases). The results of the economic analysis show that the greatest fiscal impacts (i.e., 63% of total present value impacts) will derive from the eight-year construction period associated with the proposed facility. The largest impact on local business revenues stems from local construction expenditures, while the most significant impact on household earnings and jobs is associated with construction payroll and employment projected during the eight-year construction period. Operation of the facility will also have a net positive impact on the eight-county area and will help diversify the regional

economy and provide some additional insulation from the volatility of the oil and gas dependent economy of the region.

LES has estimated the economic impacts to the local economy during the 8-year construction period and 30-year license period of the NEF. This includes a five and one-half year period when both construction and operation and ongoing simultaneously. The analysis traces the economic impact of the proposed NEF, identifying the direct impacts of the plant on revenues of local businesses, on incomes accruing to households, on employment, and on the revenues of state and local government. The analysis also explores the indirect impacts of the NEF within a 80-km (50-mi) radius of the NEF. Details of the analysis are provided in ER Section 7.1, Economic Cost-Benefits, Plant Construction and Operation, and are summarized below.

LES estimates that construction payroll will total $122.2 million with an additional $21 million expended for employment benefits over the eight-year construction period. Construction services purchased from third party firms within the region will add $265 million in direct benefits to the local economy during the NEF's construction.

LES anticipates annual payroll to be $10.5 million with additional $3.2 million expenditure in employee benefits once the plant is operational. Approximately $9.5 million will be spent annually on local goods and services required for operation of the NEF.

The tax revenue to the State of New Mexico and Lea County resulting from the construction and operation of the NEF is estimated to range from $177 million up to $212 million. Refer to Tables 4.10-2, Estimated Tax Revenue, and 4.10-3, Estimated Tax Revenue Allocations, for further details.

Based on the cost-benefit analyses in ER Sections 7.1 and 7.2, and the minimal impacts to the affected environment demonstrated in Chapter 4, LES has concluded that the preferred alternative is the proposed action, construction and operation of the NEF.

8.5 ENVIRONMENTAL IMPACTS OF CONSTRUCTION

The construction of the NEF involves the clearing of approximately 81 ha (200 acres) of previously undisturbed area within a 220-ha (543-acre) site. Most of this area will be graded and will form the Controlled Area that includes all support buildings and the 8.5-ha (21-acre) uranium byproduct cylinder (UBC) Storage Pad. Numerous environmental protection measures will be taken to mitigate potential construction impacts. The measures will include controls for noise, oil and hazardous material spills, and dust. Potential impacts associated with the construction phase of the NEF are primarily limited to increased dust (degraded air quality) and noise from vehicular traffic, and potential soil erosion during excavations. It is unlikely that NEF construction activities will impact water resources since the site does not have any surface water and only limited groundwater. Groundwater resources will not be used during construction or at any time during the operational life of the plant.

During the construction phase of the NEF, standard clearing methods (i.e., the use of heavy equipment) in combination with excavation will be used. Only about one-third of the total site area will be disturbed, affording the biota of the site an opportunity to move to undisturbed areas within the NEF site as well as to additional areas of suitable habitat bordering the NEF site. Trenching associated with plant construction and relocation of the existing CO_2 line will be in accordance with all applicable regulations so as to minimize any direct or indirect impacts on the environment.

The anticipated effects on the soil during construction activities are limited to a potential short-term increase in soil erosion. However, this will be mitigated by proper construction best management practices (BMPs). These practices include minimizing the construction footprint to the extent possible, avoiding all direct discharges by the use of detention ponds, the protection of all unused naturalized areas, and site stabilization practices to reduce the potential for erosion and sedimentation. Other temporary stormwater detention basins will be constructed and used as sedimentation collection basins during construction and stabilized afterwards. After construction is complete, the site will be stabilized with natural, low-water consumption landscaping, pavement, and crushed stone to control erosion.

Water quality impacts will be controlled during construction by compliance with the requirements of an National Pollutant Discharge Elimination System (NPDES) Construction General Permit and BMPs detailed in the site Stormwater Pollution Prevention Plan (SWPPP). In addition, a Spill Prevention, Control and Countermeasure (SPCC) plan will be implemented to minimize the possibility of spills of hazardous substances, minimize environmental impact of any spills, and ensure prompt and appropriate remediation. Spills during construction are more likely to occur around vehicle maintenance and fueling operations, storage tanks, painting operations and warehouses. The SPCC plan will identify sources, locations and quantities of potential spills, as well as response measures. The plan will also identify individuals and their responsibilities for implementation of the plan and provide for prompt notifications of state and local authorities.

The construction phase impacts on air quality, land use, transportation, and socioeconomics are localized, temporary, and small. The temporary influx of labor is not expected to overload community services and facilities.

Dust will be generated to some degree during the various stages of construction activity. The amount of dust emissions will vary according to the types of activity. The first 5 months of

earthwork will likely be the period of highest emissions with the greatest number of construction vehicles operating on an unprepared surface. However, no more than one-quarter of the site, or about 18 ha (45 acres), will be involved in this type of work at any one time. Airborne dust will be controlled through the use of BMPs such as surface water sprays (when required), by ensuring trucks' loads and soil piles are covered, and by promptly removing construction wastes from the site. The application of water sprays for dust suppression will be applied only when required so that water resources can be conserved to the maximum extent possible.

Construction of the NEF is expected to have generally positive socioeconomic impacts on the region. No radioactive releases (other than natural radioactive materials, for example, in soil) will result from site development and facility construction activities.

8.6 ENVIRONMENTAL IMPACTS OF OPERATION

Operation of the National Enrichment Facility (NEF) would result in the production of gaseous effluent, liquid effluent, and solid waste streams. Each stream could contain small amounts of hazardous and radioactive compounds, either alone or in a mixed form. Based on the experience gained from operation of the Urenco European plants, the aggregate routine airborne uranium gaseous releases to the atmosphere are estimated to be less than 10 g (0.35 ounces) annually. However, based on recent environmental monitoring at the Urenco plants, the annual release is closer to 0.1 MBq (2.8 μCi) which is equivalent to 3.9 g of natural uranium. Extremely minute amounts of uranium and hydrogen fluoride (all well below regulatory limits) could potentially be released at the roof-top through the gaseous effluent stacks. The discharge stacks for the Gaseous Effluent Vent System (GEVS) (Separations Building GEVS and Technical Services Building (TSB) GEVS) are co-located atop of the TSB. A third roof-top stack on the TSB discharges effluents from the confinement ventilation function of the TSB heating, ventilation and air conditioning (HVAC). A fourth roof-top stack is located atop the Centrifuge Assembly Building (CAB) that discharges any gaseous effluent from the Centrifuge Test and Post Mortem Facilities Exhaust Filtration System. Gaseous effluent discharges from each of the four stacks are filtered for particulates and hydrogen fluoride (HF), and are continuously monitored prior to release.

Liquid effluents include stormwater runoff, sanitary waste water, cooling tower blowdown water and treated contaminated process water. All liquid effluents, with the exception of sanitary waste water, are discharged to one of three onsite basins.

The Site Stormwater Detention Basin is designed with an outlet structure for drainage. Local terrain serves as the receiving area for this basin. During a rainfall event larger than the design basis, the potential exists to overflow the basin if the outfall capacity is insufficient to pass beyond design basis inflows to the basin. Overflow of the basin is an unlikely event. The additional impact to the surrounding land over that which would occur during such a flood alone, is assumed to be small. Therefore, potential overflow of the Site Stormwater Detention Basin during an event beyond its design basis is expected to have a minimal impact to surrounding land.

The UBC Storage Pad Stormwater Retention Basin, which exclusively serves the UBC Storage Pad and cooling tower blowdown water discharges, is lined to prevent infiltration. It is designed to retain a volume slightly more than twice that for the 24-hour, 100-year frequency storm and an allowance for cooling tower blowdown. This lined basin has no flow outlet and all effluents are dispositioned through evaporation.

Discharge of operations-generated potentially contaminated liquid effluent is made exclusively to the Treated Effluent Evaporative Basin. Only liquids meeting site administrative limits (based on NRC standards in 10 CFR 20 (CFR, 2003q) are discharged to this basin. The basin is double-lined with leak detection and open to allow evaporation.

Sanitary waste water will be discharged onsite to the NEF septic tanks and leach fields. No contaminated liquid discharges will be allowed through the onsite septic systems.

Since the NEF will not obtain any water from or discharge process effluents from the site, there are no anticipated impacts on natural water systems quality due to facility water use. Control of surface water runoff will be required for NEF activities, covered by the NPDES General Permit

and a New Mexico Water Quality Bureau Groundwater Discharge Plan/Permit. As a result, no significant impacts are expected for either surface water bodies or groundwater.

Solid waste that would be generated at NEF is grouped into nonhazardous, radioactive, hazardous, and mixed waste categories. All these wastes will be collected and transferred to authorized offsite treatment or disposal facilities. All solid radioactive waste generated will be Class A low-level waste as defined in 10 CFR 61 (CFR, 2003r). This waste consists of industrial waste, filters and filter material, resins, gloves, shoe covers, and laboratory waste. Approximately 86,950 kg (191,800 lbs) of low-level waste would be generated annually. In addition, annual hazardous and mixed wastes generated at NEF are expected to be about 1,770 kg (3,930 lbs) and 50 kg (110 lbs), respectively. These wastes will be collected, inspected, volume-reduced, and transferred to treatment facilities or disposed of at authorized waste disposal facilities. Nonhazardous waste, including miscellaneous trash, filters, resins, and paper will be shipped offsite for compaction and then sent to a licensed landfill. The NEF is expected to produce approximately 172,500 kg (380,400 lbs) of this waste annually. Local landfill capacity is more than adequate to accept this mass of nonhazardous waste.

Operation of the NEF would also result in the annual nominal production of approximately 7,800 metric tons (8,600 tons) of depleted UF_6. The depleted UF_6 would be stored onsite in cylinders (UBCs) that will have little or no impact while in storage. The removal and disposition of the depleted UF_6 will most likely involve its conversion offsite to triuranium octoxide (U_3O_8).

8.7 RADIOLOGICAL IMPACTS

The assessment of potential impacts considers the entire population surrounding the proposed NEF within a distance of 80 km (50 mi).

Radiological impacts are regulated under 10 CFR 20 (CFR, 2003q), which specifies a total effective dose equivalent (TEDE) limit for members of the public of 1 mSv/yr (100 mrem/yr) from all sources and pathways from the NEF, excluding natural background sources. In addition, 10 CFR 20.1101(d) (CFR, 2003bb) requires that constraints on atmospheric releases be established for the NEF such that no member of the public would be expected to receive a total effective dose equivalent in excess of 0.1 mSv/yr (10 mrem/yr) from these releases. Further, the NEF would be subject to the Environmental Protection Agency's (EPA) standards, including: standards contained in 40 CFR 190 (CFR, 2003f) that require that dose equivalents under routine operations not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid, and 0.25 mSv (25 mrem) to any other organ from all pathways.

The general public and the environment may be impacted by radiation and radioactive material from the NEF as the result of discharges of gaseous and liquid effluent discharges, including controlled releases from the uranium enrichment process lines during decontamination and maintenance of equipment. In addition, radiation exposure to the public may result from the transportation and storage of uranium hexaflouride (UF_6) feed cylinders, UF_6 product cylinders, low-level radioactive waste, and depleted UF_6 cylinders.

Potential radiological impacts from operation of the NEF would result from controlled releases of small quantities of UF_6 during normal operations and releases of UF_6 under hypothetical accident conditions. Normal operational release rates to the atmosphere and to the onsite Treated Effluent Evaporative Basin are expected to be less than 8.9 MBq/yr (240 μCi/yr) and 2.1 MBq/yr (56 μCi/yr), respectively. The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose equivalents from discharged gaseous effluent to an adult located at the plant site south boundary are 1.7×10^{-4} mSv (1.7×10^{-2} mrem) and 1.4×10^{-3} mSv (1.4×10^{-1} mrem), respectively. The maximum effective dose equivalent and maximum annual organ (lung) dose equivalent from gaseous effluent to the nearest resident (teenager) located 4.3 km (2.63 mi) in the west sector are expected to be less than 1.7×10^{-5} mSv (1.7×10^{-3} mrem) and 1.2×10^{-4} mSv (1.2×10^{-2} mrem), respectively.

The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose equivalents from liquid effluent to an adult at the south site boundary are 1.7×10^{-5} mSv (1.7×10^{-3} mrem) and 1.5×10^{-4} mSv (1.5×10^{-2} mrem), respectively, assuming the Treated Effluent Evaporative Basin is dry only 10% of the year (i.e., resuspension of dust when dry). The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose equivalents from discharged liquid effluent to an individual (teenager) at the nearest residence are 1.7×10^{-6} mSv (1.7×10^{-4} mrem) and 1.3×10^{-5} mSv (1.3×10^{-3} mrem), respectively, for the same release assumptions.

The maximum annual dose equivalent due to external radiation from the UBC Storage Pad and all other feed, product and byproduct cylinders on NEF property (skyshine and direct) is estimated to be less than 2.0×10^{-1} mSv (< 20 mrem) to the maximally exposed person at the nearest point on the site boundary (2,000 hrs/yr) and 8×10^{-12} mSv (8×10^{-10} mrem) to the maximally exposed resident (8,760 hrs/yr) located 4.3 km (2.63 mi) west of NEF.

With respect to the impact from the transportation of UF_6 as feed, product or depleted material and solid low level waste, the cumulative dose impact has been found to be small. The cumulative dose equivalent to the general public from the "worst-case" combination of all transport categories combined equaled 2.33 x 10^{-6} person-Sv/year (2.33 x 10^{-4} person-rem/year). Similarly, the dose equivalent to the onlooker, drivers and workers totaled 1.05 x 10^{-3}, 9.49 x 10^{-2}, 6.98 x 10^{-4} person-Sv/year (1.05 x 10^{-1}, 9.49 x 10^{-2}, and 6.98 x 10^{-2} person-rem/year), respectively.

The dose equivalents due to normal operations are small fractions of the normal background range of 2.0 to 3.0 mSv (200 to 300 mrem) that an average individual receives in the US, and well within regulatory limits. Given the conservative assumptions used in estimating these values, these concentrations and resulting dose equivalents are insignificant, and their potential impacts on the environment and health are inconsequential.

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8.8 NONRADIOLOGICAL IMPACTS

Numerous design features and administrative procedures are employed to minimize gaseous and liquid effluent releases and keep them within regulatory limits. Potential nonradiological impacts of operation of the NEF include releases of inorganic and organic chemicals to the atmosphere and surface water impoundments during normal operations Other potential impacts involve land use, transportation, soils, water resources, ecological resources, air quality, historic and cultural resources, socioeconomic and public health. Impacts from hazardous, radiological and mixed wastes and radiological effluents have been discussed earlier.

The other potential nonradiological impacts from the construction and operation of NEF are discussed below:

Land-Use Impacts:

The anticipated effects on the soil during construction activities are limited to a potential short-term increase in soil erosion. However, this will be mitigated by proper construction best management practices (BMPs). These practices include minimizing the construction footprint to the extent possible, limiting site slopes, using a sedimentation detention basin, protecting undisturbed areas with silt fencing and straw bales as appropriate, and employing site stabilization practices such as placing crushed stone on top of disturbed soil in areas of concentrated runoff. In addition onsite construction roads will be periodically watered when required, to control fugitive dust emissions. Water conservation will be considered when deciding how often dust suppression sprays will be applied. After construction is complete, the site will be stabilized with natural, low-water maintenance landscaping and pavement.

A Spill Prevention, Control and Countermeasures (SPCC) plan will also be implemented during construction to minimize environmental impacts from potential spills and ensure prompt and appropriate remediation. Spills during construction are likely to occur around vehicle maintenance and fueling locations, storage tanks, and painting operations. The SPCC plan will identify sources, locations and quantities of potential spills and response measures. The plan will also identify individuals and their responsibilities for implementation of the plan and provide for prompt notification of state and local authorities, as required.

Waste management BMPs will be used to minimize solid waste and hazardous materials. These practices 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. Where practicable, materials suitable for recycling will be collected. If external washing of construction vehicles is necessary, no detergents will be used, and the runoff will be diverted to onsite retention basins. Water conservation measures will be considered to minimize water use. Adequately maintained sanitary facilities will be provided for construction crews.

The NEF facility will require the installation of water, natural gas and electrical utility lines. In lieu of connecting to the local sewer system, six onsite underground septic tanks each with one or more leach fields will be installed for the treatment of sanitary wastes.

A new potable water supply line will be extended from the city of Eunice to the NEF site and another potable water supply line will be extended from the city of Hobbs. The line from Eunice will be about 8 km (5 mi) in length. The line from Hobbs will be about 32 km (20 mi) in length. Placement of the new water supply lines along New Mexico Highways 18 and 234 would

minimize impacts to vegetation and wildlife. Since there are no bodies of water between the site and the city of Eunice, no waterways will be disturbed. Likewise, based on site visits, there are no bodies of water between the site vicinity and the city of Hobbs. The natural gas line feeding the site will connect to an existing, nearby line. This will minimize impacts of short-term disturbances related to the placement of the tie-in line.

Two new electrical transmission lines on a large loop system are proposed for providing electrical service to the NEF. These lines would tie into a trunk line about 13 km (8 mi) to the west. Similar to the new water supply lines, land use impacts would be minimized by placing associated support structures along New Mexico Highway 234. An application for highway easement modification will be submitted to the state. There are currently several power poles along the highway in front of the adjacent, vacant parcel east of the site. In conjunction with the new electrical lines serving the site, the local company providing electrical service, Xcel Energy, will install two independent substations for redundant service assurance.

Six underground septic tanks will be installed onsite. The combined leach fields will require about 975 m (3,200 ft) of percolation drain field. The drain field will either be placed below grade or buried in a mound consisting of sand, aggregate and soil.

Overall land use impacts to the site and vicinity will be minimal considering that the majority of the site will remain undeveloped, the current industrial activity on neighboring properties, the nearby, expansive oil and gas well fields, and the placement of most utility installations along highway easements.

Transportation Impacts:

Impacts from construction and operation on transportation will include the generation of fugitive dust, changes in scenic quality, added environmental noise and small radiation dose to the public from the transport of UF_6 feed and product cylinders, as well as low-level radioactive waste.

Dust will be generated to some degree during the various stages of construction activity. The amount of dust emissions will vary according to the types of activity. LES estimated that fugitive dust are expected to be well below the National Ambient Air Quality Standards (CFR, 2003w).

Although site construction will significantly alter its natural state, and considering that there are no high quality viewing areas and the industrial development of surrounding properties, impacts to the scenic quality of the site are not considered to be significant. Also, construction vehicles will be comparable to trucks servicing neighboring facilities. Construction worker and worker during operation transportation impacts are not considered to be significant.

The temporary increase in noise levels along New Mexico Highways 18 and 234 and Texas Highway 176 due to construction vehicles are not expected to impact nearby receptors significantly, due to substantial truck traffic currently using these roadways, and the large distance between the nearest receptors and the site, i.e., 4.3 km (2.63 mi). See the environmental noise discussion below concerning noise levels due to traffic during operations.

Water Resources:

Site groundwater will not be utilized for any reason, and therefore, should not be impacted by routine NEF operations. The NEF water supply will be obtained from the cities of Eunice, New Mexico, and Hobbs, New Mexico. Current capacities for the Eunice and Hobbs, New Mexico municipal water supply system are 16,350 m^3/day (4.32 million gpd) and 75,700 m^3/day

(20 million gpd), respectively and current usages are 5,600 m^3/day (1.48 million gpd) and 23,450 m^3/day (6.2 million gpd), respectively. Average and peak potable water requirements for operation of the NEF are expected to be approximately 240 m^3/day (63,423 gpd) and 85 m^3/hr (378 gpm), respectively. These usage rates are well within the capacities of both water systems.

Liquid effluents include stormwater runoff, sanitary waste water, cooling tower blowdown water and treated contaminated process water. All liquid effluents, with the exception of sanitary waste water, are discharged to one of three onsite basins.

Stormwater from the site will be diverted and collected in the Site Stormwater Detention Basin. This basin collects runoff from various developed parts of the site. It is unlined and will have an outlet structure to control discharges above the design level. The normal discharge will be through evaporation and infiltration into the ground. The basin is designed to contain runoff for a volume equal to that for the 24-hour, 100-year return frequency storm, a 15.2-cm (6.0-in) rainfall. It will have less than 123,350 m^3 (100-acre-ft) of storage capacity. In addition, the basin has 0.6 m (2 ft) of free-board beyond the design capacity. It will also be designed to discharge post-construction peak flow runoff rates from the outfall that are equal to or less than the pre-construction runoff rates from the area.

Cooling tower blowdown water and stormwater runoff from the UBC Storage Pad are discharged to the UBC Storage Pad Stormwater Retention Basin. The ultimate disposition of this water will be through evaporation along with permanent impoundment of the residual dry solids byproduct of evaporation. It is designed to contain runoff for a volume equal to twice that for the 24-hour, 100-year return frequency storm, a 15.2-cm (6.0-in) rainfall and an allowance for cooling tower blowdown water. The UBC Storage Pad Stormwater Retention Basin is designed to contain a volume of approximately 77,700 m^3 (63 acre-ft). This basin is designed with a synthetic membrane lining to minimize any infiltration into the ground.

Discharge of treated contaminated plant process water will be to the onsite Treated Effluent Evaporative Basin. The Treated Effluent Evaporative Basin is utilized for the collection and containment of liquid effluent from the Liquid Effluent Collection and Treatment System. The ultimate disposal the liquid effluent will be through evaporation of water and permanent impoundment of the residual dry solids. Total annual discharge to that basin will be approximately 2,535 m^3/yr (669,844 gal/yr). The basin will be designed for double that volume. Evaporation will provide the only means of liquid disposal from this basin. The basin will include a double-layer membrane liner with a leak detection system to prevent infiltration of basin water into the ground.

<u>Ecological Resources:</u>

No communities or habitats that have been defined as rare or unique or that support threatened and endangered species have been identified as occurring on the 220-ha (543-acre) NEF site. Thus, no proposed activities are expected to impact communities or habitats defined as rare or unique or that support threatened and endangered species within the site area. Field surveys that were performed in September and October 2003, and April 2004, for the lesser prairie chicken, the sand dune lizard, and the black-tailed prairie dog determined that these species were not present at the NEF site. Another survey for the sand dune lizard was conducted in June 2004 and confirmed there were no sand dune lizards at the NEF site.

Several practices and procedures have been designed to minimize adverse impacts to the ecological resources of the NEF site. These practices and procedures include the use of BMPs,

i.e., minimizing the construction footprint to the extent possible, channeling site stormwater to temporary detention basins during construction, the protection of all unused naturalized areas, and site stabilization practices to reduce the potential for erosion and sedimentation.

Historic and Cultural Resources:

A pedestrian cultural resource survey of the 220-ha (543-acre) NEF site identified seven prehistoric archaeological sites; three of these sites are located in the Area of Potential Effect (APE). Based on its survey findings and consultations with the New Mexico State Historic Preservation Officer (SHPO), LES is developing a treatment/mitigation plan to recover any significant information from the identified archaeological sites.

Given the small number of potential archaeological sites and isolated occurrences located on the site, and LES's ability to avoid or mitigate impacts to those sites, the NEF project will not have a significant impact on historic and cultural resources. (See ER Section 4.8.6, Minimizing Adverse Impacts.)

Environmental Noise:

Noise generated by the operation of NEF will be primarily limited to truck movements on the road. Potential impacts to local schools, churches, hospitals, and residences are expected to be insignificant because of the large distance to the nearest sensitive receptors. The nearest home is located west of the site at a distance of approximately 4.3 km (2.63 mi) and is not expected to perceive operational noise levels from the plant. The nearest school, hospital, church and other sensitive noise receptors are beyond this distance, thus the noise will be dissipated and attenuated, helping decrease the sound levels even further. Homes located near the construction traffic at the intersection of New Mexico Highway 234 and New Mexico Highway 18 will be affected by the vehicle noise, but due to existing heavy tractor trailer vehicle traffic, the change should be minimal. No schools, hospitals, or any other sensitive receptors are located at this intersection. Expected noise levels will mostly affect a 1.6-km (1-mi) radius and due to the large size of the site, sound levels resulting from the cumulative noise of all site activities will not have a significant impact on even those receptors closest to the site boundary.

Socioeconomics:

LES has estimated the economic impacts to the local economy during the 8-year construction period and 30-year license period of the NEF. This includes a five and one-half year period when both construction and operation are ongoing simultaneously. The analysis traces the economic impact of the proposed NEF, identifying the direct impacts of the plant on revenues of local businesses on incomes accruing to households, on employment, and on the revenues of the state and local government. The analysis also explores the indirect impacts of the NEF within a 80-km (50-mi) radius of the NEF. Details of the analysis are provided in ER Section 7.1, Economic Cost-Benefits, Plant Construction and Operation, and are summarized below.

LES estimates that construction payroll will total $122.2 million with an additional $21 million expended for employment benefits over the eight-year construction period. Construction services purchased from third party firms within the region will add $265 million in direct benefits to the local economy during NEF's construction. See ER Section 7.1, Economic Cost-Benefits, Plant Construction and Operation.

LES anticipates annual payroll to be $10.5 million with an additional $3.2 million expenditure in employee benefits once the plant is operational. Approximately $9.5 million will be spent annually on local goods and services required for operation of the NEF.

The tax revenue to the State of New Mexico and Lea County resulting from the construction and operation of the NEF is estimated to range from $177 million up to $212 million. Refer to Tables 4.10-2, Estimated Tax Revenue, and 4.10-3, Estimated Tax Revenue Allocations, for further details.

The Regional Input-Output Modeling System (RIMS) II allows estimation of various indirect impacts associated with each of the expenditures listed above. According to the RIMS II analysis, the region's residents can anticipate an annual total of $53 million in increased economic activity, $38 million in increased earnings by households, and an annual average of 1,102 new jobs during the eight-year construction period. Over the anticipated thirty-year license period of the NEF, residents can anticipate an annual total of $15 million in increased economic activity, $23 million in increased earnings by households and an annual average of 782 new jobs directly or indirectly relating to the NEF. Table 8.8-1, Estimated Annual Economic Impacts from the National Enrichment Facility, summarizes the impact economic by the facility on Lea County and the surrounding area. A more detailed discussion of the RIMS II methodology and results is found in ER Section 7.1.

The major impact of facility construction on human activities is expected to be a result of the influx of labor into the area on a daily or semi-permanent basis. LES estimates that approximately 15% of the construction work force (120 workers) is expected to move into the vicinity as new residents. Previous experience regarding construction for the nuclear industry projects suggests that of those who move, approximately 65% will bring their families, which on average consist of the worker, a spouse, and one school-aged child. The likely increase in area population during peak construction, therefore, will total 360. This is less than 1% of the total Lea, New Mexico-Andrews, Texas Counties' 2000 population. For additional information, refer to ER Section 4.10.

The increase in jobs and population would lead to a need for additional housing and an increased level of community services, such as schools, fire and police protection, and medical services. However, since the growth in jobs and population would occur over a period of several years, providers of these services should be able to accommodate the growth. For example, the estimated peak increase in school-age children is 120, or less than 1% of the total Lea, New Mexico-Andrews, Texas Counties' 2000 enrollment. Based on the local area teacher-student ratio of approximately 1:17 and assuming an even distribution of students among all grade levels, the increase in students represents seven classrooms. This impact should be manageable, however, considering that Lea County has experienced a far greater temporary population growth due to petroleum industry work in the mid-1980s.

Similarly, an estimated 120 housing units would be needed to accommodate the new NEF construction workforce. The percentage of vacant housing units in the Lea, New Mexico-Andrews, Texas County area in 2000 was about 16% and 15%, respectively, meaning that more than 4,000 housing units were available. Accordingly, there should be no measurable impact related to the need for additional housing.

While some additional investment in facilities and equipment may be necessary, local government revenues would also increase (see ER Section 7.1 and discussion above

concerning LES' anticipated payments to the State of New Mexico and to Lea County, New Mexico under the Lea County Industrial Revenue Bond business incentive program during the construction and operation of the facility). These benefits and payments will provide the source for additional government investment in facilities and equipment. That revenue increase may lag somewhat behind the need for new investment more easily, but the incremental nature of the growth should allow local governments to more easily accommodate the increase. Consequently, insignificant negative impacts on community services would be expected.

Public Health Impacts:

Trace quantities of hydrogen fluoride (HF) are released to the atmosphere during normal separation operations. The annual HF release rate is estimated as less than 1 kg (< 2.2 lb). The HF emissions from the plant will not exceed the strictest of regulatory limits at the point of release. Standard dispersion modeling techniques estimated the HF concentration at the nearest fence boundary to be 3.2×10^{-4} $\mu g/m^3$ and the concentration at the nearest residence located west of the site at a distance of 4.3 km (2.63 mi) as 6.4×10^{-6} $\mu g/m^3$. Both of these concentrations are several orders of magnitude below the strictest HF exposure standards in use today (see ER Section 4.12.1.1, Routine Gaseous Effluent).

Radiological public health impacts were summarized previously in ER Section 8.7, Radiological Impacts.

Methylene chloride is used in small bench-top quantities to clean certain components. All chemicals at NEF will be used in accordance with the manufacturer's recommendations. All chemicals are used in quantities that are considered deminimus with respect to air emissions outside the NEF. Its use and the resulting emissions have been evaluated and determined to pose minimal or no public risk. All regulated gaseous effluents will be below regulatory limits as specified in permits issued by the New Mexico Air Quality Bureau (NMAC, 2002a). LES has concluded that the public health impacts from radiological and nonradiological constituents used within NEF are minimal and well below regulatory limits at the point of discharge. All hazardous materials and waste streams will be managed and disposed of in accordance with the permit requirements issued by the EPA Region 6 and the New Mexico Environment Department.

8.9 DECONTAMINATION AND DECOMMISSIONING

Decontamination and decommissioning of the facility will be staged during facility operations and is projected to take approximately nine years. Potential adverse environmental impacts would primarily be the release of small quantities of uranium to the Treated Effluent Evaporative Basin as a consequence of decontamination operations. Releases will be maintained such that associated impacts are the same order of magnitude or less than normal operational impacts. Decommissioning would also result in release of the facilities and land for unrestricted use, discontinuation of water and electrical power usage, and reduction in vehicular traffic.

As Urenco plant experience in Europe has demonstrated, conventional decontamination techniques are entirely effective for all plant items. All recoverable items will be decontaminated except for a relatively small amount of intractably contaminated material. The majority of materials requiring disposal will include centrifuge rotor fragments, trash, and residue from the effluent treatment systems. No problems are anticipated which will prevent the site from being released for unrestricted use. Additional details concerning decommissioning are provided in SAR Chapter 10, Decommissioning.

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8.10 DEPLETED URANIUM DISPOSITION

Enrichment operations at the NEF will generate an average 7,800 metric tons (8,600 tons) of depleted UF_6 per year. After temporary storage onsite, the depleted UF_6 in Uranium Byproduct Cylinders (UBCs) would then be shipped offsite in preparation for appropriate deconversion to a more chemically stable form. Currently, there are no deconversion facilities in the US for large quantities of depleted UF_6, although DOE has awarded a commercial contract that provides for two deconversion facilities to be operational within approximately three to five years. Nevertheless, LES is pursuing commercially available deconversion services in lieu of counting on the availability of the DOE facilities as described below. Therefore, LES evaluated expected environmental impacts based on plausible strategies for offsite deconversion and disposal. LES projects that the depleted UF_6 will be deconverted from fluoride to the more stable oxide form, and disposed of in a deep geological facility or placed in long-term storage. LES estimates that the environmental impacts associated with such a strategy will be small.

LES has committed to the Governor of New Mexico (LES, 2003b) that: (1) there will be no long-term disposal or long-term storage (beyond the life of the plant) of UBCs in the State of New Mexico; (2) a disposal path outside the State of New Mexico is utilized as soon as possible; (3) LES will aggressively pursue economically viable paths for UBCs as soon as they become available; (4) LES will work with qualified vendors pursuing construction of private deconversion facilities by entering in good faith discussions to provide such vendor long-term UBC contracts to assist them in their financing efforts; and (5) LES will put in place as part of the NRC license a financial surety bonding mechanism that assures funding will be available in the event of any default by LES.

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8.11 ENVIRONMENTAL JUSTICE

An analysis of census block groups (CGBs) within a 6.4-km (4-mi) radius of the site was conducted in accordance with NRC guidance in NUREG-1748 (NRC, 2003a) to assess whether any disproportionately large minority or low-income populations were present that warranted further analysis of the potential for disproportionately high and adverse environmental impacts upon those populations.

The LES environmental justice analysis demonstrates that no individual CBG and the 130-km^2 (50-mi^2) area around the NEF are comprised of more than 50% of any minority population. With respect to the Hispanic or Latino population, the largest minority population in both census tracts, the percentages are as follows: Census Tract 8, CGB 2 – 24.8%; Census Tract 9501, CBG 4 – 19.8%. The largest minority group in the 130-km^2 (50-mi^2) area around the NEF is Hispanic or Latino, accounting for 11.7%. Moreover, none of these percentages exceeds the applicable State or County percentages for this minority population by more than 20 percentage points.

In addition, the LES analysis demonstrates that no individual CBG is comprised of more than 50% of low-income households. The percentages are as follows: Tract 8, CBG 2 –3.6%; Tract 9501, CBG 4- 9.9%. Neither of these percentages exceeds 50 percent; moreover, neither of these populations significantly exceeds the percentage of low-income households in the applicable State or County.

Based on this analysis, LES has concluded that no disproportionately high minority or low-income populations exist that would warrant further examination of disproportionately high and adverse environmental impacts upon such populations.

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8.12 CONCLUSION

In conclusion, analysis of the potential environmental impacts associated with construction and operation of NEF indicates that adverse impacts are small and are outweighed by the substantial socioeconomic benefits associated with plant construction and operation. Additionally, the NEF will meet the underlying need for additional reliable and economical uranium enrichment capacity in the United States, thereby serving important energy and national security policy objectives. Accordingly, because the impacts of the proposed NEF are minimal and acceptable, and the benefits are desirable, the no-action alternative may be rejected in favor of the proposed action. Significantly, LES has also completed a safety analysis of the proposed facility, in which demonstrates that NEF operation will be conducted in a safe and acceptable manner.

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TABLES

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Table 8.8-1 Estimated Annual Economic Impacts From the National Enrichment Facility (Lea County and Nearby)

Impact	Construction	Operations
Local Businesses Additional Revenues	$53 Million	$14.6 Million
Household Additional Income	$38 Million	$23 Million
State & Local Government Additional Tax Revenue	$7.0 Million	$3 Million
Employment	1,102 Jobs	782 Jobs

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TABLE OF CONTENTS

LIST OF TABLES

10.0 LIST OF PREPARERS

The organizations and individuals listed below are the principal contributors to the preparation of this Environmental Report (ER). Table 10-1 summarizes the specific chapters to which each principal contributor provided input.

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Project Manager

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TABLES

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Table 10-1 Principal Contributors to the ER

Page 1 of 2

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Tim J. Leftwich Principal			C	C		C			C			
Georgia Institute of Technology												
William A. Schaffer, Ph.D. Economist		C					C		C			
Lockwood Greene												
Rebecca Punch Draftsman	C	C	C	C		C	C					
John L. Shaw, P.E. Project Director	R	R	R	R	R	R	R	R	R	R		
Carroll Walker, P.E. Assistant Manager	C	C	C	C		C	C					
Marsha Wood Administrative Assistant							A		A	A	A	
Louisiana Energy Services												
Rod M. Krich, Vice President Licensing, Safety & Nuclear Engineering	R	R	R	R	R	R	R	R	R	R	R	R
Weston Geophysical Engineers, Inc.			C						C			
George C. Klimkiewicz President			C						C			
Winston & Strawn												
James R. Curtiss Attorney at Law	R	R	R	R	R	R	R	R	R	R	R	R
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Table 10-1 Principal Contributors to the ER
Page 2 of 2

Principal Contributor	Chapters										Appendices	
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Michael Lynch Project Manager	R	R	R	R	R	R	R	R	R	R	R	R
Framatome ANP												
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Matthew D. Fuller Health & Safety Technologist			C	C		C			C			
George A. Harper, P.E. Manager, Regulatory Compliance Programs	R	R	C	C	R	R	R	R	R		R	R
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L = Lead Author C = Contributing Author A = Admin R = Reviewer

APPENDIX A

CONSULTATION DOCUMENTS

(This page intentionally left blank)

American Indian Consultation List of Addressees

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Anadarko, OK 73005

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Comanche of Oklahoma
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Lawton, OK 73502

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FORT SILL APACHE TRIBE
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Hobart, OK 73657

Cc:
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Assistant Tribal Historic Preservation Officer
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Mescalero Apache Tribe
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Tonto Apache Tribe

Vivian Burdette, Chairperson
TONTO APACHE TRIBE
Reservation #30
Payson, AZ 85541

Cc:
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P.O. Box 1188
Camp Verde, AZ 86322

Dear xxxxx,

Louisiana Energy Services (LES) is proposing to construct a Uranium enrichment plant called the National Enrichment Facility (NEF) near the town of Eunice, Lea County, New Mexico. The proposed facility will be constructed on Sections 32 and 33 of Township 21S, Range 38E.

The NEF project will involve the construction of multiple buildings and the expansion of access roads existing on the 543-acre site. Approximately 350 acres will be directly impacted by construction of the facility.

Framatome ANP has been contracted to assist LES in preparing an Environmental Report (ER) for this project. In addition to informing your agency of LES's plans, we are asking for comments concerning the proposed facilities as they relate to archeological, cultural and historical sites important to Native American groups. To facilitate your review, a site map of the project area has been included. Your comments will be included in the ER that will be submitted to the Nuclear Regulatory Commission (NRC) for review.

We would appreciate receiving your comments within 30 days. Should you have any questions or need additional information please contact Dr. Edward F. Maher at (978) 568-2785 or edward.maher@framatome-anp.com..

Sincerely,

R.M. Krich
Vice President
Licensing, Safety and Nuclear Engineering

Enclosure: Map

Mr. Ed Roberson
Roswell Field Office Manager
Bureau Of Land Management
2909 W. Second
Roswell, NM 88201

Dear Mr. Roberson:

Louisiana Energy Services (LES) is proposing to construct a Uranium enrichment plant called the National Enrichment Facility (NEF) near the town of Eunice, Lea County, New Mexico. The proposed facility will be constructed on Sections 32 and 33 of Township 21S, Range 38E.

The NEF project will involve the construction of multiple buildings and the expansion of access roads existing on the 543-acre site. Approximately 350 acres will be directly impacted by construction of the facility.

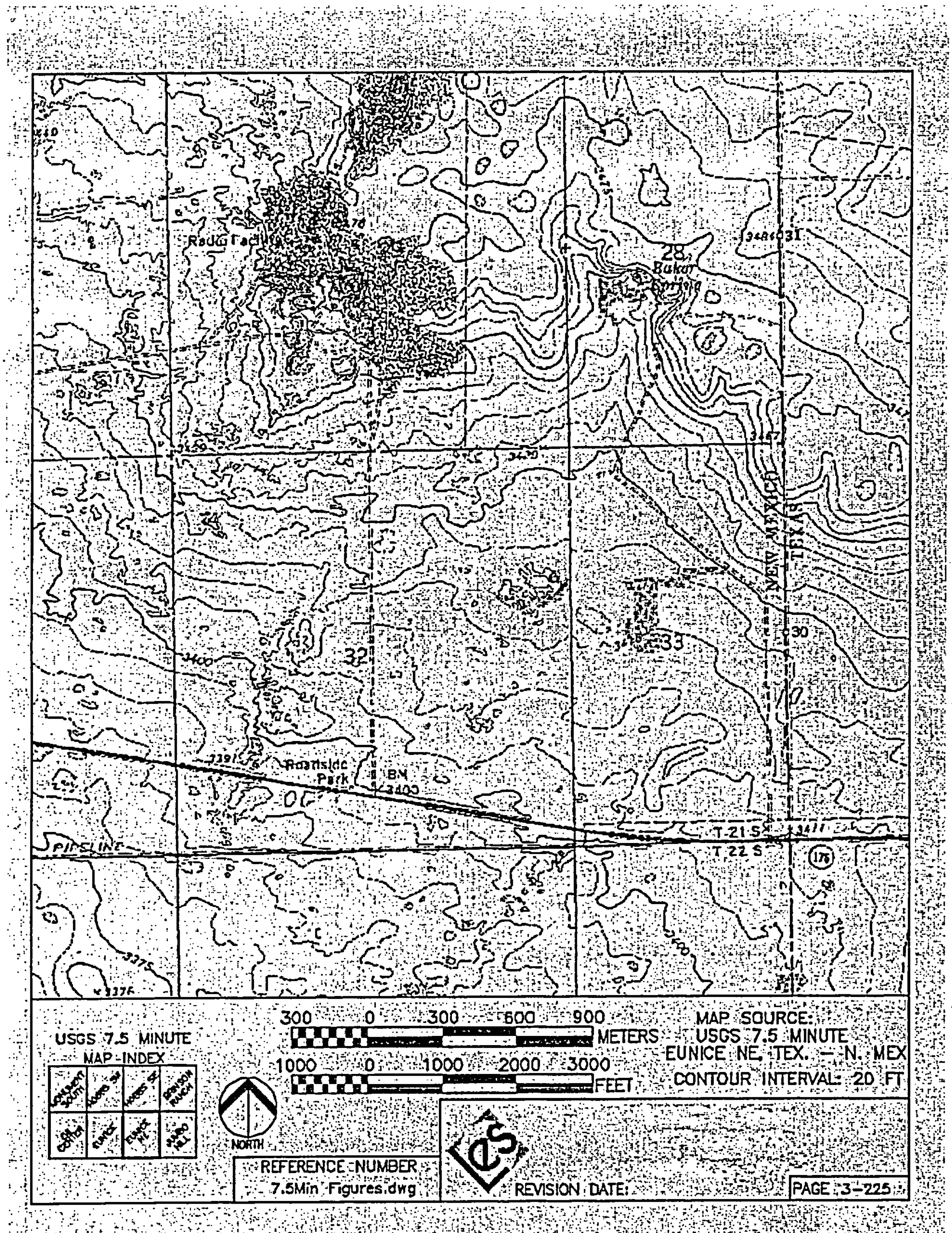
Framatome ANP has been contracted to assist LES in preparing an Environmental Report (ER) for this project. In addition to informing your agency of LES's plans, we are asking for comments and information concerning the proposed facilities as they relate to threatened and endangered species, critical habitats, other wildlife, wetlands, and any other natural resource concerns. Based on an initial environmental analysis, this project is not expected to result in significant negative effects on the local environment. To facilitate your review, a site map of the project area has been included. Your comments will be included in the ER that will be submitted to the Nuclear Regulatory Commission (NRC) for review.

We would appreciate receiving your comments within 30 days. Should you have any questions or need additional information please contact Dr. Edward F. Maher at (978) 568-2785 or Edward.maher@.framatome-anp.com,

Sincerely,

R.M. Krich
Vice President
Licensing, Safety and Nuclear Engineering

Enclosure: Map


Radio Facility
28
Baker
31
32
33
30
Roadside Park
BM 3400
T 21 S
T 22 S
176
PIPELINE
TEX
NEW MEX
3400
3375
USGS 7.5 MINUTE MAP INDEX
300 0 300 600 900 METERS
1000 0 1000 2000 3000 FEET
NORTH
MAP SOURCE:
USGS 7.5 MINUTE
EUNICE NE, TEX. — N. MEX
CONTOUR INTERVAL: 20 FT
REFERENCE NUMBER
7.5Min Figures.dwg
REVISION DATE:
PAGE 3-225

Mr. Bruce Thompson
New Mexico Department of Game & Fish
1 Wildlife Way
P.O. Box 25112
Santa Fe, NM 87504

Dear Mr. Thompson:

Louisiana Energy Services (LES) is proposing to construct a Uranium enrichment plant called the National Enrichment Facility (NEF) near the town of Eunice, Lea County, New Mexico. The proposed facility will be constructed on Sections 32 and 33 of Township 21S, Range 38E.

The NEF project, will involve the construction of multiple buildings and the expansion of access roads existing on the 543-acre site. Approximately 350 acres will be directly impacted by construction of the facility.

Framatome ANP has been contracted to assist LES in preparing an Environmental Report (ER) for this project. In addition to informing your agency of LES's plans, we are asking for comments and information concerning the proposed facilities as they relate to threatened and endangered species, critical habitats, other wildlife, wetlands, and any other natural resource concerns. Based on an initial environmental analysis, this project is not expected to result in significant negative effects on the local environment. To facilitate your review, a site map of the project area has been included. Your comments will be included in the ER that will be submitted to the Nuclear Regulatory Commission (NRC) for review.

We would appreciate receiving your comments within 30 days. Should you have any questions or need additional information please contact Dr. Edward F. Maher at (978) 568-2785 or Edward.maher@framatome-anp.com..

Sincerely,

R.M. Krich
Vice President
Licensing, Safety and Nuclear Engineering

Enclosure: Map

Ms. Katherine Slick, Director
NM Historic Preservation Division
228 E. Palace Ave., Room 320
Santa Fe, NM 87501

Dear Ms. Slick:

Louisiana Energy Services (LES) is proposing to construct a Uranium enrichment plant called the National Enrichment Facility (NEF) near the town of Eunice, Lea County, New Mexico. The proposed facility will be constructed on Sections 32 and 33 of Township 21S, Range 38E.

The NEF project will involve the construction of multiple buildings and the expansion of access roads existing on the 543 acre site. Approximately 350 acres will be directly impacted by construction of the facility. A complete cultural resources survey will be conducted on the project area by WCRM, Inc.

Framatome-ANP has been contracted to assist LES in preparing an Environmental Report (ER) for this project. In addition to informing your agency of LES's plans, we are asking for comments concerning the proposed facilities as they relate to archeological, cultural and historical sites. To facilitate your review, a site map of the project area has been included. Your comments will be included in the ER that will be submitted to the Nuclear Regulatory Commission (NRC) for review.

We would appreciate receiving your comments within 30 days. Should you have any questions or need additional information please contact Dr. Edward F. Maher at (978) 568-2785 or Edward.maher@framatome-anp.com.

Sincerely,

R.M. Krich
Vice President
Licensing, Safety and Nuclear Engineering

Enclosure: Map

Ms. Joy Nicholopoulous
U.S. Fish & Wildlife Service
New Mexico Field Office
2105 Osuna Road NE
Albuquerque, NM 87113-1001

Dear Ms. Joy Nicholopoulous:

Louisiana Energy Services (LES) is proposing to construct a Uranium enrichment plant called the National Enrichment Facility (NEF) near the town of Eunice, Lea County, New Mexico. The proposed facility will be constructed on Sections 32 and 33 of Township 21S, Range 38E.

The NEF project will involve the construction of multiple buildings and the expansion of access roads existing on the 543-acre site. Approximately 350 acres will be directly impacted by construction of the facility.

Framatome-ANP has been contracted to assist LES in preparing an Environmental Report (ER) for this project. In addition to informing your agency of LES's plans, we are asking for comments and information concerning the proposed facilities as they relate to threatened and endangered species, critical habitats, other wildlife, wetlands, and any other natural resource concerns. Based on an initial environmental analysis, this project is not expected to result in significant negative effects on the local environment. To facilitate your review, a site map of the project area has been included. Your comments will be included in the ER that will be submitted to the Nuclear Regulatory Commission (NRC) for review.

We would appreciate receiving your comments within 30 days. Should you have any questions or need additional information please contact Dr. Edward F. Maher at (978) 568-2785 or edward.maher@framatome-anp.com .

Sincerely,

R.M. Krich
Vice President
Licensing, Safety and Nuclear Engineering

Enclosure: Map

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

October 8, 2003

Dr. Edward F. Maher
Framatome ANP
400 Donald Lynch Blvd.
Marlborough, MA 01752

Re: National Enrichment Facility Near Eunice, Lea County, New Mexico

Dear Dr. Maher:

I am writing in response to the letter the Historic Preservation Division (HPD) received September 18, 2003 from R.M. Krich, Vice President of Louisiana Energy Services. As you are probably aware, involvement of the U.S. Nuclear Regulatory Commission brings this project under the purview of Section 106 of the National Historic Preservation Act (NHPA). Under Section 106, the effects on cultural resources must be evaluated.

Our records show that Western Cultural Resource Management (WCRM) has been retained to conduct a pedestrian archaeological survey of the proposed project area. That survey resulted in the identification of seven archaeological sites. WCRM will (if they have not already) prepare a report of their findings and submit it to your office for review. Please forward the report to HPD for review so that we can issue a determination of effect for this project.

In addition, if tribal consultation has not already been conducted, now is a good time to initiate it. I have enclosed a listing of tribes that have indicated they wish to be contacted for projects occurring in Lea County. This list is provided as guidance only and you may wish to contact other tribes as well. Please forward us a copy of a letter that is sent to the tribes and indicate which tribes were contacted. Please also send us copies of any responses you may receive.

We look forward to reviewing the archaeological survey report. If you have any questions, please do not hesitate to contact me. I can be reached by telephone at (505) 827-4064 or by email at mensey@oca.state.nm.us.

Sincerely,

Michelle M. Ensey
Staff Archaeologist

Log: 68950
Enc.

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Director, Cultural Preserv. Office
(928) 734-3751

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Texas

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P.O. Box 17579 – Ysleta Station
El Paso, TX 79917
Phone: (915) 859-7913
Fax: (915) 859-2988

rev. 07/02/2003

Native American Consultations
New Mexico Historic Preservation Division (HPD)

(NOTE: This is a county-by-county working list for determining which Native American Indian tribes want to be consulted for proposed projects in various geographic parts of New Mexico. It has been generated from a HPD ethnographic study, the National Park Service's Native American Consultation Database, and tribes telling us they wish to be consulted for at least "certain projects" in that specific county. We are always in the process of updating and refining consultative efforts. It is NOT a definitive list, and may change depending on the type and location of the proposed project. We have been working with agencies, Native American Indian tribes, and The Advisory Council on Historic Preservation to develop a GIS based map resource system. Tribes wishing to amend or change their areas of geographic interest should contact the HPD at 228 E. Palace Ave., Room 320, Santa Fe, NM 87501; 505-827-6320; fax 505-827-6338)

BERNALILLO
Hopi Tribe
Isleta Pueblo
Laguna Pueblo
Navajo Nation
Sandia Pueblo
White Mountain Apache Tribe
Ysleta del Sur

CATRON
Acoma Pueblo
Fort Sill Apache Tribe
Hopi Tribe
Isleta Pueblo
Laguna Pueblo
Mescalero Apache Tribe
Navajo Nation
White Mountain Apache Tribe

CHAVES
Apache Tribe of Oklahoma
Comanche Indian Tribe
Kiowa Tribe
Mescalero Apache Tribe
Ysleta del Sur Pueblo

CIBOLA
Acoma Pueblo
Hopi Tribe
Isleta Pueblo
Mescalero Apache Tribe
Navajo Nation
White Mountain Apache Tribe
Zuni Pueblo

COLFAX
Comanche Indian Tribe
Kiowa Tribe
Jicarilla Apache Nation
Taos Pueblo

CURRY
Apache Tribe of Oklahoma
Comanche Indian Tribe
Kiowa Tribe

De BACA
Comanche Indian Tribe
Isleta Pueblo
Kiowa Tribe
Mescalero Apache Tribe
Navajo Nation

DONA ANA
Comanche Indian Tribe
Fort Sill Apache Tribe
Isleta Pueblo
Kiowa Tribe (east half of county)
Mescalero Apache Tribe
Navajo Nation
White Mountain Apache Tribe
Ysleta del Sur Pueblo

EDDY
Comanche Indian Tribe
Kiowa Tribe
Mescalero Apache Tribe
Ysleta del Sur Pueblo

GRANT
Fort Sill Apache Tribe
Hopi Tribe
Isleta Pueblo
Mescalero Apache Tribe
Navajo Nation
White Mountain Apache Tribe

GUADALUPE
Comanche Indian Tribe
Isleta Pueblo
Jicarilla Apache Nation
Kiowa Tribe
Mescalero Apache Tribe
Navajo Nation

HARDING
Comanche Indian Tribe
Jicarilla Apache Nation
Kiowa Tribe

HIDALGO
Fort Sill Apache Tribe
Hopi Tribe
Mescalero Apache Tribe
White Mountain Apache Tribe

LEA
Apache Tribe of Oklahoma
Comanche Indian Tribe
Kiowa Tribe
Mescalero Apache Tribe
Ysleta del Sur Pueblo

LINCOLN
Comanche Indian Tribe
Isleta Pueblo
Kiowa Tribe
Mescalero Apache Tribe
Ysleta del Sur Pueblo

LOS ALAMOS
Cochiti Pueblo
Comanche Indian Tribe
Hopi Tribe
Jemez Pueblo
Navajo Nation
Santa Clara Pueblo
San Ildefonso Pueblo

LUNA
Fort Sill Apache Tribe
Hopi Tribe
Mescalero Apache Tribe
White Mountain Apache Tribe
Ysleta del Sur Pueblo

McKINLEY
Acoma Pueblo
Comanche Indian Tribe
Hopi Tribe
Isleta Pueblo
Laguna Pueblo
Navajo Nation
San Ildefonso Pueblo
White Mountain Apache Tribe
Zuni Pueblo

MORA
Comanche Indian Tribe
Hopi Tribe
Jicarilla Apache Nation
Kiowa Tribe
Navajo Nation
Taos Pueblo

OTERO
Comanche Indian Tribe
Isleta Pueblo
Kiowa Tribe
Mescalero Apache Tribe
Ysleta del Sur Pueblo

QUAY
Apache Tribe of Oklahoma
Comanche Indian Tribe
Isleta Pueblo
Jicarilla Apache Nation
Kiowa Tribe
Pawnee Tribe

PUEBLO GOVERNORS/TRIBAL OFFICIALS

SOUTHERN PUEBLOS

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Pueblo of Acoma
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September 30, 2003

Dr. Edward F. Maher
Framatome ANP
4000 Donald Lynch Blvd.
Marlborough MA 01752

Re: Louisiana Energy Services National Enrichment Facility, Lea County, New Mexico
NMGF Project No.: 8926

Dear Dr. Maher:

This letter was prepared in response to a September 15, 2003, letter from R.M. Krich of Louisiana Energy Services, requesting written comment from the NM Department of Game and Fish (Department) on the above referenced project. A project scoping meeting for state regulatory agencies, held in Santa Fe on September 17, 2003, was attended by Rachel Jankowitz of my staff.

The proposed project is a gas centrifuge uranium enrichment facility, located on Section 32 and 33, Township 21S, Range 38E. The size of the site is 543 acres, of which approximately 350 acres will be directly impacted by construction. Facilities will include process and administrative structures, access roads and a depleted uranium storage pad. Framatome ANP is in process of generating an Environmental Report which will be used by the U.S. Nuclear Regulatory Commission to prepare an Environmental Impact Statement for the facility, as required under the National Environmental Policy Act (NEPA).

The project location is within the range of a state listed threatened species, *Sceloporus arenicolus*, the sand dune lizard. Ms Denise Gallegos of GL Environmental, a subcontractor for Framatome ANP, has identified potential suitable habitat for the sand dune lizard on the project site. She stated that occupancy surveys had not yet been completed, and also that GL Environmental had been in contact with the Department herpetologist, Mr. Charlie Painter.

The sand dune lizard occurs only in a limited range comprising a narrow band of shinnery oak sand dunes in southeast New Mexico and adjacent Texas. The Department species management plan identifies the range east of Highway 18 to the Texas border as a one mile wide band of primary habitat, with up to three miles wide marginal habitat. "Future disruptions in this restricted habitat can sever the TX-NM habitat corridor of *S. arenicolus* populations and increase the risk of local extinction." It is considered prudent to conserve even unoccupied suitable habitat because of the dynamic nature of the sand dune system, and uncertainties regarding the life history and metapopulation characteristics of the lizard. Oil and gas development has been identified as a threat to the species. NEPA analysis of the project's impact on sand dune lizard should include a discussion of the cumulative impacts in the region.

For the purpose of minimizing adverse impact to sand dune lizards and their habitat, facilities (including parking lots, drainage ponds, storage sheds, etc) should be located as far as feasible from occupied or suitable dune blowouts and associated stands of shinnery oak. Suitable habitat should be clearly identified and protected from traffic or other damage during construction and operation. It should be noted that while the lizards may be active until mid-September, the management plan survey methodology recommends that, in order to increase the probability of finding sand dune lizards if they occur, presence/absence surveys should be conducted during May and June between 0800 and 1300 h. If occupancy of the project site is documented, or for any further information, please contact Mr. Painter at (505) 476-8106.

Approximately one mile of carbon dioxide transmission pipeline will be relocated off the proposed project site to the Highway 176 corridor. Any impact associated with the pipeline relocation should be included in NEPA analysis as an indirect impact of the enrichment facility project. A copy of the Department trenching guidelines is enclosed with this letter.

The site design includes three ponds which will hold runoff and cooling water. The NM Water Quality Control Commission has established surface water quality standards for wildlife usage. If the ponds will not meet those standards, compliance with the federal Migratory Bird Treaty Act requires that they be protected from avian wildlife. This is usually accomplished by the use of netting or floating plastic balls. It was indicated at the scoping meeting that floating balls will be used to exclude birds. Advantages of floating balls over netting include disguising of the water surface so birds don't try to land, and lower maintenance needs. Disadvantages include higher initial cost and susceptibility to high winds. The bird exclusion balls also reduce evaporation, which may be an advantage or disadvantage depending on the design purpose of the pond.

Thank you for the opportunity to review and comment on your project. If you have any questions, please contact Rachel Jankowitz of my staff at 505-476-8159 or rjankowitz@state.nm.us.

Sincerely,

Lisa Kirkpatrick

Lisa Kirkpatrick, Chief
Conservation Services Division

LK/rjj

(encl)

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

TRENCHING GUIDELINES

NEW MEXICO DEPARTMENT OF GAME AND FISH

November 1994

Open trenches and ditches can trap small mammals, amphibians and reptiles and can cause injury to large mammals. Periods of highest activity for many of these species include night time, summer months and wet weather. Loss of wildlife can be minimized by implementing the following recommendations.

- To minimize the amount of open trenches at any given time, keep trenching and back-filling crews close together.

- Trench during the cooler months (October – March). However, there may be exceptions (e.g., critical wintering areas) which need to be assessed on a site-specific basis.

- Avoid leaving trenches open overnight. Where trenches cannot be back-filled immediately, escape ramps should be constructed at least every 90 meters. Escape ramps can be short lateral trenches sloping to the surface or wooden planks extending to the surface. The slope should be less than 45 degrees (100%). Trenches that have been left open overnight, especially where endangered species occur, should be inspected and animals removed prior to back-filling.

State wide there are 41 threatened, endangered or sensitive species potentially at risk by trenching operations, (Source: 11/01/94 query of Biota Information System of New Mexico, version 2.5). Risk to these species depends upon a wide variety of conditons at the trenching site, such as trench depth, side slope, soil characteristics, season, and precipitation events.

COMANCHE TRIBE
NAGPRA

October 8, 2003

Greetings,

The Comanche Nation is in receipt of your request for consultation in compliance with the revised 36 CFR 800 Guidelines issued by the Advisory Council for Historic Preservation.

We are unable to confirm the determination of "*no effect*" on our Traditional Ancestral lands. However, in the scope of work, if archaeological materials are exposed, such as bone, organic/inorganic materials, glass, metal, pottery, chipped stone tools, or historic crockery, we respectfully request that all activities are halted and the Comanche Nation notified immediately.

If you have any questions or concerns, please feel free to contact me at (580) 492-3754.

Sincerely,

Donnita F. Sovo
Administrative Assistant
Comanche Nation Environmental Program

P.O. Box 908 • Lawton, Oklahoma 73502 • (580) 492-3754 • (580) 492-3733 FAX

1133 Connecticut Ave. NW Suite 200 Washington D.C. 20036
(Voice) 202.659.4344 (Fax) 202.659.0791

September 15, 2003

Vivian Burdette, Chairperson
TONTO APACHE TRIBE
Reservation #30
Payson, AZ 85541

Dear Ms. Burdette:

Louisiana Energy Services (LES) is proposing to construct a gas centrifuge uranium enrichment plant called the National Enrichment Facility (NEF) near the town of Eunice, Lea County, New Mexico The proposed facility will be constructed on Section 32 of Township 21S, Range 38E.

The NEF project will involve the construction of multiple buildings and the expansion of access roads existing on the 543-acre site. Approximately 350 acres will be directly impacted by construction of the facility.

Framatome ANP has been contracted to assist LES in preparing an Environmental Report (ER) for this project. This document, along with other environmental information, will be used by the U.S. Nuclear Regulatory Commission (NRC) to prepare an Environmental Impact Statement for the facility. In addition to informing your agency of LES's plans, we are asking for comments and information concerning the proposed facility as it relates to threatened and endangered species, critical habitats, other wildlife, wetlands, and any other natural resource concerns. Based on an initial environmental analysis, this project is not expected to result in significant negative effects on the local environment. To facilitate your review, a site map of the project area has been enclosed. Your comments will be included in the ER that will be submitted to the NRC.

We would appreciate receiving your comments within 30 days from receipt of this letter; please return them to Dr. Edward F. Maher, Framatome ANP, 400 Donald Lynch Blvd, Marlborough, MA 01752. Should you have any questions or need additional information please contact Dr. Maher at (978) 568-2785 or edward.maher@framatome-anp.com.

Respectfully,

R.M. Krich
Vice President
Licensing, Safety and Nuclear Engineering

Enclosure: Map

MESCALERO APACHE TRIBAL HISTORIC PRESERVATION OFFICE
P.O. Box 227
Mescalero, New Mexico 88340
Phone: 505/464-4711
Fax: 505/464-4637

September 24, 2003

R. M. Kirch
Louisiana Energy Services
1133 Connecticut Ave. NW Suite 200
Washington D.C 20036

Dear Mr. Kirch:

Thank you for providing the Mescalero Apache Tribe the opportunity to comment on the National Enrichment Facility near the town of Eunice, Lea County, New Mexico. This project is located within the Mescalero Apache Tribe's traditional homelands and thus we are interested in this project.

There is no knowledge of any Traditional Cultural Places in this area, but we would like to request that a cultural resources survey be undertaken for this project. The survey would aid in our assurance that no cultural or archeological sites that are affiliated to the Apache are located in this area that could be impacted by this project. Please send us a copy of the survey report when it is completed for our review.

Feel free to contact me if you have any questions or if our concerns cannot be met.

Sincerely,

Holly B.E. Houghten
Tribal Historic Preservation Officer

CC: Sara Misquez, Tribal President

APPENDIX B

AIR QUALITY IMPACTS OF CONSTRUCTION SITE PREPARATION ACTIVITIES

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Introduction

Air quality impacts from construction site preparation were evaluated using emission factors and air dispersion modeling. Emission rates of Clean Air Act Criteria Pollutants and non-methane hydrocarbons (a precursor of ozone, a Criteria Pollutant) were estimated for exhaust emissions from construction vehicles and for fugitive dust using emission factors provided in AP-42, the Environmental Protection Agency (EPA's) Compilation of Air Pollutant Emission Factors (EPA, 1995). These emission rates were input into the Industrial Source Complex Short-Term (ISCST3) air dispersion model to estimate both short-term and annual average air concentrations at the facility property boundary. ISCST3 is a refined, EPA-approved air dispersion model in the Users Network for Applied Modeling of Air Pollution (UNAMAP) series of air models (EPA, 1987). It is a steady-state Gaussian plume model that can be used to estimate ground-level air concentrations from industrial sources out to a distance of 50 km (31 mi). The air emissions calculations and air dispersion modeling are discussed in more detail below. Air concentrations predicted at the property boundary are then compared to National Ambient Air Quality Standards (NAAQS).

Emission Rate Estimates

Sources of Criteria Pollutants during construction site preparation will include combustion sources and fugitive dust. Of the combustion sources, vehicle exhaust will be the dominant source. Fugitive volatile emissions will also occur because vehicles will be refueled on-site. Fugitive dust will originate predominantly from vehicle traffic on unpaved surfaces, earth moving, excavating and bulldozing, and to a lesser extent from wind erosion. Emission rates from vehicle exhaust and fugitive dust were estimated for a 10-hour workday assuming peak construction activity levels were maintained throughout the year. This will lead to a conservative estimate of the annual average air concentrations because the peak construction activity levels will occur for only a portion of the year. Emission factors and assumptions specific to each of these two sources are discussed separately in the following paragraphs:

Vehicle Exhaust

Vehicles that will be operating on the site during construction consist of two types: support vehicles and construction equipment. The support vehicles will include twenty pickup trucks, ten gators (gas-powered carts), five fuel trucks, three stakebody trucks, five mechanic's trucks and five boom trucks. Emission factors in AP-42 for "highway mobile sources" were used to estimate emissions of criteria pollutants and non-methane hydrocarbons for these vehicles. Use of AP-42 requires that highway mobile sources be categorized by vehicle size: the gators were assumed to be Light Duty Vehicles, the pickup trucks and the mechanic's trucks were assumed to be Category I Light Duty Trucks; the boom trucks and stakebody trucks were assumed to be Category II Light Duty Trucks; and the fuel trucks were assumed to be Heavy Duty Trucks. Baseline emission factors for each of the vehicle categories are provided in AP-42 as a function of the model year of the vehicle and the year of emissions, and increase with the age of the vehicle. Emission factors were used for emissions occurring from model year 2001

vehicles on January 1, 2003. An assumption of three-year old vehicles is conservative yet realistic, given the typical operating life of construction vehicles. The baseline emissions from AP-42 can be adjusted based on operating conditions that vary from those under which the emissions in the baseline tables were measured (e.g., average speed, percentage of cold starts, ambient temperature, mileage accumulation, etc.). However, in the absence of any detailed knowledge of the likely operating conditions of the support vehicles, the baseline emission factors were used and are considered adequate for a screening-level analysis of the air quality impacts from the site preparation activities. It should be noted that the emission factor for non-methane hydrocarbons includes refueling emissions, and therefore, no separate emission estimates are needed to account for onsite refueling. It was assumed that each of the support vehicles would be in use each workday and would travel an average of 16.1 km (10 mi) around the construction site. Average emission rates (in g/s) for the entire workday for each vehicle were estimated by multiplying the AP-42 emission factor (in g/mi) by 16.1 km (10 mi) and dividing by the number of seconds in the workday (36,000). Table B-1, Support Vehicle Emissions, lists the emission factors used and the resulting emission rates for the support vehicles.

The construction equipment that will be operating on the site during peak construction consists of five bulldozers, three graders, three pans, six dump trucks, three backhoes, four loaders, four rollers, three water trucks and two tractors. Emission factors, in units of grams per hour of operation, provided in AP-42 for diesel-powered construction equipment, were compiled. The emission factors used are listed in Table B-2, Construction Equipment Inventory and Emission Factors, along with a count of the number of pieces of equipment which fall into each of the construction equipment types for which emission factors are provided in AP-42. The EPA does not include refueling emissions in the diesel emission factors for non-methane hydrocarbons because the low-volatility of diesel fuel results in these emissions being relatively insignificant. In calculating emissions, it was conservatively assumed that all the equipment listed in Table B-2 would be in continuous operation throughout the 10-hour workday. Table B-3, Emission Rates for All Construction Vehicles, contains the emission estimates for all the equipment operating simultaneously. These emissions were treated as workday average emission rates in the air dispersion modeling, even though they are more representative of peak emissions.

Fugitive Dust

A fugitive dust emission factor of 2.7 MT per ha (1.2 tons per acre) per month of construction activity is provided in AP-42 for heavy construction activities. This factor is based on downwind measurements of construction sites and therefore includes background and all site-related sources of particulates. The value is most applicable to construction sites with: (1) medium activity level, (2) moderate silt content (~30%), and (3) a semi-arid climate. Note that this factor is referenced to total suspended particulates (TSP), and use of it to estimate particulate matter no greater than 10 μm in diameter (PM_{10}) will result in conservatively high estimates. Also, because derivation of this factor assumes that construction activity occurs 30 days per month, the factor itself is conservatively high for TSP.

The AP-42 emission factor applies to particles 30 µm or less in size, whereas the NAAQS for particulates applies to PM_{10} (i.e., particles 10 µm or less in size). Based on particle size multipliers presented in AP-42 for other fugitive dust sources, PM_{10} typically is generated in about a 1:2 ratio with total particulates 30 µm or less in size. Therefore, a correction factor of 0.5 was applied to the construction emission factor in order to adjust it to PM_{10}.

Since the derivation of the AP-42 emission factor assumed construction activity on 30 days per month, a second correction factor to account for actual number of workdays was applied. The average number of workdays per month is 21.4 (4 major holidays were excluded). The second correction factor is therefore 21.4/30 or 0.71.

The AP-42 emission factor also assumes uncontrolled emissions, whereas the NEF construction site will undergo watering for dust suppression. Water conservation will be considered when deciding how often dust suppression sprays will be applied. The EPA suggests in AP-42 that a twice-daily watering program will reduce dust emissions by up to 50%. Other EPA research suggests that watering can achieve emission reductions upwards of 90%. Therefore, a third correction factor of 0.1 was applied to the AP-42 emission factor to account for fugitive dust controls.

The resulting emission factor after application of the three correction factors is 1.2 x 0.5 x 0.71 x 0.1 = 0.04 tons of dust/acre/month (0.09 MT of dust/ha/month). To this point, an assumption has been made that the fugitive dust emissions will occur from the entire site. This assumption is representative of peak emissions rather than average emissions over the construction period. To account for this, the workday average emission rate (in g/s) was calculated assuming that 18 ha (45 acres) of the entire 73-ha (180-acre) site would be under construction at any given time over the period of construction and that emissions occur entirely within the 10-hour workday. This assumption is still conservative considering there are only 33 construction vehicles to be onsite during peak activity. This average workday emission rate was assumed to occur 5 days per week for 50 weeks per year.

The resulting estimate of the workday average emission rate of PM_{10} is 2.4 g/s (19.1 lbs/hr). Because this emission rate is based on an assumption of emissions occurring from 18 ha (45 acres) of the entire site, it is more representative of peak emissions than of the average over the entire construction period.

Air Dispersion Modeling

The ISCST3 air dispersion model was used to estimate maximum short-term and annual average air concentrations of criteria pollutants and non-methane hydrocarbons released by construction site preparation activities. Averaging periods used for short-term air concentrations included all those for which a NAAQS exists (i.e., 1-hour, 3-hour, 8-hour and 24-hour averages). Maximum ground-level air concentrations were determined along the facility property boundary that was assumed to be 150 m (492 ft) from the construction area.

Because vehicles will be moving and working at varying points within the construction site, both vehicle emissions and fugitive dust were modeled as if emitted uniformly over the entire 73-ha (180-acre) construction site. Emissions were thus represented in the ISCST3 model as aarea source 853 m (2,798 ft) on each side centered over the construction site. A unit emission rate of 1 g/s (7.9 lbs/hr) was assumed for the 18-ha (45-acre) source. Because predicted air concentrations are directly proportional to the emission rate, pollutant-specific air concentrations were obtained by multiplying the air concentrations output by ISCST3 using a unit emission rate by the actual pollutant emission rates.

An important aspect of refined air dispersion modeling is use of appropriate meteorological data into the model. ISCST3 requires hourly observations of wind speed and direction, mixing height, air temperature and atmospheric stability. This requires both surface and upper-air meteorological data. Surface meteorological data from the Midland-Odessa, Texas, National Weather Service (NWS) station were combined with concurrent mixing height data from Midland-Odessa for use in the ISCST3 model. According to air modeling guidance, a five-year record of meteorological data should be used. Five years of data (1987 to 1991) were used in the modeling so that expected worst-case meteorological conditions for the area would be included. This 5-year data set is the most recent set of verified data available from the EPA for Midland-Odessa. In order to account for the fact that emissions will occur primarily during the workday, air concentrations were calculated for 7 a.m. to 5 p.m. for 5-day intervals separated by 2-day gaps to account for weekends. This was done for 50 weeks per year.

For each of the five years in the meteorological record, the maximum 1-hour, 3-hour, 8-hour, 24-hour, and annual average concentrations at the site property boundary were determined. In addition, because the NAAQS for PM_{10} allows for one exceedance of the 24-hour standard per year, the second highest 24-hour averages were also determined. Air concentrations at the property boundary were located using a discrete receptor grid with a distance of 150 m (492 ft) to the boundary. Table B-4, Maximum Predicted Site-Boundary Air Concentrations Based on a 1.0 g/s Emission Rate, lists the maximum site-boundary air concentrations (based on a unit emission rate) for each of the averaging times and the direction from the construction site of the receptor grid point at which it occurred.

<u>Pollutant-Specific Air Concentrations and Comparison to NAAQS</u>

The air concentrations in Table B-4 were multiplied by the emission rates in Tables B-1 and B-3 to obtain pollutant-specific air concentrations. These concentrations were then compared to the appropriate NAAQS. The predicted maximum air concentrations and NAAQS are shown in Table B-5, Predicted Property-Boundary Air Concentrations and Applicable NAAQS ($\mu g/m^3$). No NAAQS has been set for hydrocarbons; however, the total annual emissions of hydrocarbons predicted from the site (approximately 4.08 MT (4.5 tons)) are well below the level 36.3 MT (40 tons) that defines a significant source of volatile organic compounds (40 CFR 50.21) (CFR, 2003w). Air concentrations of the Criteria Pollutants predicted for vehicle emissions were all at least an order of magnitude below the NAAQS. PM_{10} emissions from fugitive dust were also below the NAAQS. The maximum annual average concentration was lower by a factor of 2:1 and the second

highest 24-hour average was lower by about a factor of 1:1. The results of the fugitive dust estimates should be viewed in light of the fact that the peak anticipated fugitive emissions were assumed to occur throughout the year, and that one quarter of the entire construction site was assumed to be under construction at any given time during the construction process. These conservative assumptions will result in predicted air concentrations that tend to overestimate the potential impacts.

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TABLES

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Table B-1 Support Vehicle Emissions

Vehicle	Emission Factor g/km (g/mi)	Number	Daily Mileage km (mi)	Daily Emissions g (lb)		Work-day (10-hr) Average Emission Rate g/s (lb/hr)	
NONMETHANE HYDROCARBONS:							
Light Duty Vehicles	0.75 (1.2)	10	16.1 (10)	120	(0.26)	0.00333	(0.0264)
Light Duty Truck I	0.81 (1.3)	25	16.1 (10)	325	(0.72)	0.00903	(0.0717)
Light Duty Truck II	0.87 (1.4)	8	16.1 (10)	112	(0.25)	0.00311	(0.2247)
Heavy Duty Truck	1.55 (2.5)	5	16.1 (10)	125	(0.28)	0.00347	(0.0275)
Total				682	(1.50)	0.01894	(0.1503)
CARBON MONOXIDE:							
Light Duty Vehicles	2.86 (4.6)	10	16.1 (10)	460	(1.01)	0.01278	(0.1014)
Light Duty Truck I	4.41 (7.1)	30	16.1 (10)	2130	(4.69)	0.05917	(0.4696)
Light Duty Truck II	4.47 (7.2)	8	16.1 (10)	576	(1.27)	0.01600	(0.1269)
Heavy Duty Truck	7.89 (12.7)	5	16.1 (10)	635	(1.40)	0.01764	(0.1400)
Total				3801	(8.37)	0.10559	(0.8380)
NITROGEN OXIDES:							
Light Duty Vehicles	0.43 (0.7)	10	16.1 (10)	70	(0.15)	0.00194	(0.0154)
Light Duty Truck I	0.56 (0.9)	30	16.1 (10)	270	(0.59)	0.00750	(0.0595)
Light Duty Truck II	0.56 (0.9)	8	16.1 (10)	72	(0.16)	0.00200	(0.0159)
Heavy Duty Truck	2.24 (3.6)	5	16.1 (10)	180	(0.40)	0.00500	(0.0397)
Total				592	(1.30)	0.01644	(0.1305)

Table B-2 Construction Equipment Inventory And Emission Factors

Equipment	Numbers	Emission Factors Per Vehicle, g/s (lb/hr)				
		Exhaust Hydrocarbons	Carbon Monoxide	Nitrogen Oxides	Sulfur Oxides	Particulates
Wheeled Tractor	2	85.26 (676.7)	1622.77 (12879.4)	575.84 (4570.2)	40.9 (325)	61.5 (488)
Grader	3	18.07 (143.4)	68.46 (543.3)	324.43 (2574.9)	39.0 (310)	27.7 (220)
Pans	3	18.07 (143.4)	68.46 (543.3)	324.43 (2574.9)	39.9 (317)	27.7 (220)
Wheeled Loader	4	113.17 (898.19)	259.58 (2060.2)	858.19 (6811.2)	82.5 (655)	77.9 (618)
Track-type Loader	5	44.55 (353.6)	91.15 (723.4)	375.22 (2978.0)	34.4 (273)	26.4 (210)
Off-Road Truck	7	86.84 (689.2)	816.81 (6482.7)	1889.16 (14,993.6)	206.6 (1640)	116.0 (921)
Roller	4	30.58 (242.7)	137.97 (1095.0)	392.9 (3118)	30.5 (242)	22.7 (180)
Miscellaneous	5	69.35 (550.4)	306.37 (2431.6)	767.3 (6090)	64.7 (514)	63.2 (502)

Table B-3 Emission Rates For All Construction Vehicles

Equipment	Work-Day Average Emissions Rates g/s (lb/hr)				
	Exhaust Hydrocarbons	Carbon Monoxide	Nitrogen Oxides	Sulfur Oxides	Particulates
Wheeled Tractor	0.047 (0.37)	0.902 (0.716)	0.320 (2.5)	0.023 (0.18)	0.034 (0.27)
Grader	0.015 (0.12)	0.057 (0.45)	0.270 (2.1)	0.033 (0.26)	0.023 (0.18)
Pans	0.015 (0.12)	0.057 (0.45)	0.270 (2.1)	0.033 (0.26)	0.023 (0.18)
Wheeled Loader	0.126 (1.00)	0.288 (2.29)	0.954 (7.57)	0.092 (0.73)	0.087 (0.69)
Track-Type Loader	0.062 (0.49)	0.127 (1.01)	0.521 (4.13)	0.048 (0.38)	0.037 (0.29)
Off-Road Truck	0.169 (1.34)	1.588 (12.60)	3.673 (29.15)	0.402 (3.19)	0.226 (1.79)
Roller	0.034 (0.27)	0.153 (1.21)	0.437 (3.47)	0.034 (0.27)	0.025 (0.20)
Miscellaneous	0.096 (0.076)	0.426 (3.38)	1.066 (8,460)	0.090 (0.71)	0.088 (0.70)
Total	0.564 (4.48)	3.598 (28.56)	7.511 (59.61)	0.755 (5.99)	0.543 (4.31)

Table B-4 Maximum Predicted Site-Boundary Air Concentrations Based On A 1.0 g/s Emission Rate

Averaging Time	Maximum Air Concentration (µg/m³)	Direction From Site
1-Hour	1089.9	North-Northeast
3-Hour	409.9	North
8-Hour	145	North-Northeast
Highest 24-Hour	63.3	North
2nd Highest 24-Hour	32.3	North
1-Year	5	North

Table B-5 Predicted Property-Boundary Air Concentrations and Applicable NAAQS

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	Maximum 1-Hr Average (µg/m³)		Maximum 3-Hr Average (µg/m³)		Maximum 8-Hr Average (µg/m³)		Maximum 24-Hr Average (µg/m³)		2nd Highest 24-Hr Average (µg/m³)		Maximum Annual Average (µg/m³)	
Pollutant	Predicted	NAAQS	Predicted	NAAQS	Predicted	NAAQS	Predicted	NAAQS	Predicted	NAAQS	Predicted	NAAQS
VEHICLE EMISSIONS												
Hydrocarbons	635.3	NA	238.9	NA	84.5	NA	36.9	NA	18.8	NA	2.9	NA
Carbon Monoxide	4,036.5	40,000	1,518.1	NA	537.0	10,000	234.4	NA	119.6	NA	18.5	NA
Nitrogen Oxides	8,204.2	NA	3,085.5	NA	1,091.5	NA	476.5	NA	243.1	NA	37.6	100
Sulfur Oxides	822.9	NA	309.5	1310(a)	109.5	NA	47.8	365	24.4	NA	3.8	80
Particulates	591.8	NA	222.6	NA	78.7	NA	34.4	NA	17.5	150	2.7	50
FUGITIVE DUST												
Particulates	2,615.8	NA	983.8	NA	348.0	NA	151.9	NA	77.5	150	12.0	50

(a) Secondary standard
NA Not applicable

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