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> The Physical Security Plan, Safeguards Contingency Plan, Guard Force Training and Qualification Plan, and the Standard Practice Procedure Plan for the Protection of Classified Matter are not included, as these documents contain or reference safeguards information.

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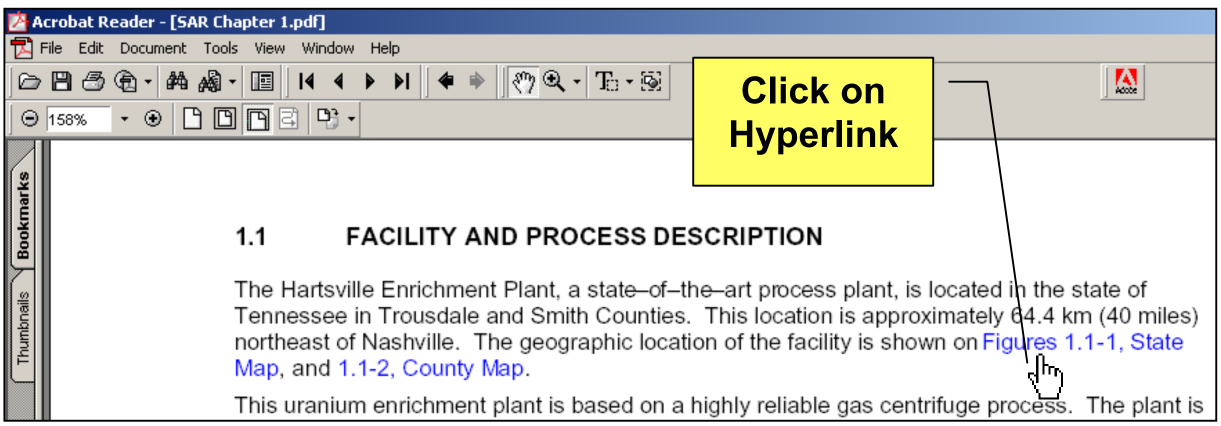

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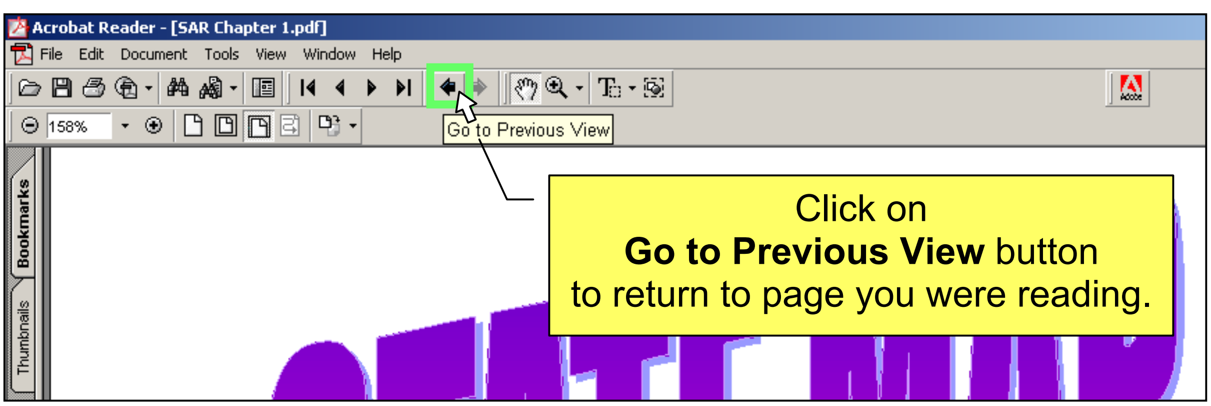

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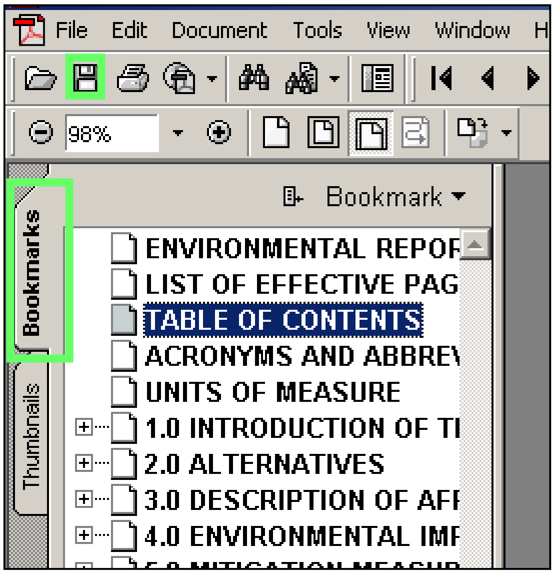

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5. Files are organized by **chapters** and **sections**.

Revision 1, February 2004

NATIONAL ENRICHMENT FACILITY

ENVIRONMENTAL REPORT

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ACRONYMS and ABBREVIATIONS

AC	alternating current
ACI	American Concrete Institute
ADEM	Alabama Department of Environmental Management
AEA	Atomic Energy Act
AEP	American Electric Power
AEGL	Acute Exposure Guideline Level
AHU	air handling unit
AISC	American Institute of Steel Construction
ALARA	as low as reasonably achievable
ALI	Annual Limit on Intake
ANPR	Advance Notice of Proposed Rulemaking
ANS	American Nuclear Society
ANSI	American National Standards Institute
AP	air particulate
APE	area of potential effects
AQB	Air Quality Bureau
ARAP	Aquatic Resource Alteration Permit
ASCE	American Society of Civil Engineers
ASLB	Atomic Safety and Licensing Board
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASTM	American Society for Testing Materials
ATSDR	Agency for Toxic Substances and Disease Registry
AVLIS	Atomic Vapor Laser Isotope Separation
BDC	baseline design criteria
BEA	Bureau of Economic Analysis
BLM	Bureau of Land Management
BMP	Best Management Practices
BNFL	British Nuclear Fuels
BNFL-EL	British Nuclear Fuels – Enrichment Limited
BOD	biochemical oxygen demand
BS	Bachelor of Science
CA	Controlled Area
CAA	Clean Air Act
CAAS	Criticality Accident Alarm System
CAB	Centrifuge Assembly Building
CAM	Continuous Air Monitor
CAP	Corrective Action Program
CBG	Census Block Group
CEDE	Committed Effective Dose Equivalent
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFO	Chief Financial Officer
CFR	Code of Federal Regulations
CHP	certified health physicist
CIS	Commonwealth of Independent States
CM	configuration management

ACRONYMS and ABBREVIATIONS

COD	chemical oxygen demand
COO	Chief Operating Officer
CRDB	Cylinder Receipt and Dispatch Building
CUB	Central Utilities Building
CVRF	Central Volume Reduction Facility
CWA	Clean Water Act
D&D	decontamination and decommissioning
DAC	derived air concentration
DBA	design basis accident
DBE	design basis earthquake
DCF	dose conversion factor
DE	Dose Equivalent
DEIS	Draft Environmental Impact Statement
DI	deionized
DOC	United States Department of Commerce
DOE	United States Department of Energy
DOI	United States Department of Interior
DOT	United States Department of Transportation
E	east
EDE	Effective Dose Equivalent
EECP	Entry/Exit Control Point
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPRI	Electric Power Research Institute
eqs.	equations
ER	Environmental Report
ERPG	Emergency Response Planning Guideline
ENE	east north east
ESE	east south east
ETTP	East Tennessee Technology Park
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHA	fire hazards analysis
FNMC	Fundamental Nuclear Material Control
FR	Federal Register
FWPCA	Federal Water Pollution Control Act
GDP	Gaseous Diffusion Plant
GET	General Employee Training
GEVS	Gaseous Effluent Vent System
GPS	Global Positioning System
HEPA	high efficiency particulate air
HEU	highly enriched uranium
HMTA	Hazardous Materials Transportation Act
HS&E	Health, Safety, and Environment

ACRONYMS and ABBREVIATIONS

HUD	United States Department of Housing and Urban Development
HVAC	heating, ventilating, and air conditioning
HWA	Hazardous Waste Act
HWB	Hazardous Waste Bureau
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
INFL	International Nuclear Fuels Plc
I/O or I-O	input/output
IPD	Implicit Price Deflator
IROFS	items relied on for safety
ISA	Integrated Safety Analysis
ISO	International Organization for Standardization
JCIDA	Jackson County Industrial Development Authority
LAN	local area network
LCC	local control center
LCD	local climatic data
L_{dn}	Day-Night Average Sound Level
L_{eq}	Equivalent Sound Level
LES	Louisiana Energy Services
LEU	low enriched uranium
LLC	Limited Liability Company
LLD	lower limits of detection
LLNL	Lawrence Livermore National Laboratory
LLW	low-level waste
LOI	local operator interface
LQ	Location Quotients
LTA	lost time accident
LTC	load tap changer
LTTS	Low Temperature Take-off Station
M&TE	measuring and test equipment
MAPEP	Mixed Analyte Performance Evaluation Program
max.	maximum
MC&A	material control and accountability
MCL	maximum contaminant level
MCNP	Monte Carlo N-Particle
MDA	minimum detectable activity
MDC	minimum detectable concentration
ME&I	mechanical, electrical and instrumentation
min.	minimum
MM	modified mercalli
MMI	modified mercalli intensity
MOU	Memorandum of Understanding
MOX	mixed oxide fuel
MUA	multi-attribute utility analysis
N	north
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautic Space Administration
NCA	Noise Control Act
NCRP	National Council on Radiological Protection and Measurements

ACRONYMS and ABBREVIATIONS

NCS	nuclear criticality safety
NCSE	nuclear criticality safety evaluation
NDA	Non-destructive assessment
NE	Northeast
NEF	National Enrichment Facility
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NELAC	National Environmental Laboratory Accreditation Conference
NIOSH	National Institute of Occupational Safety and Health
NIST	National Institute of Standards and Technology
NM	New Mexico
NMAC	New Mexico Administrative Code
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environmental Department
NMHWB	New Mexico Hazardous Waste Bureau
NMRPR	New Mexico Radiation Protection Regulations
NMSA	New Mexico State Agency
NMSE	New Mexico State Engineer
NMSHPO	New Mexico State Historic Preservation Office
NMSLO	New Mexico State Land Office
NMSS	Nuclear Material Safety and Safeguards
NMWQB	New Mexico Water Quality Bureau
NMWQCC	New Mexico Quality Control Commission
NNE	north-northeast
NNW	north-northwest
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPDWS	National Primary Drinking Water Standard
NRC	United States Nuclear Regulatory Commission
NRHP	National Registry of Historic Places
NSDWS	National Secondary Drinking Water Standard
NSPS	New Source Performance Standards
NSR	New Source Review
NTS	Nevada Test Site
NWS	National Weather Service
NW	northwest
OEPA	Ohio Environmental Protection Agency
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
OVEC	Ohio Valley Electric Corporation
P&IDs	piping and instrumentation diagrams
p.	page
PA	public address
PEL	Permissible Exposure Level

ACRONYMS and ABBREVIATIONS

PFPE	perfluorinated polyether
PGA	peak ground acceleration
pH	measure of the acidity or alkalinity
PHA	Process Hazard Analysis
Ph.D.	Doctor of Philosophy
PIA	Potentially Impacted Area
PLC	Programmable Logic Controllers
PM	preventive maintenance
$PM_{2.5}$	particulates $\leq 2.5\mu m$
PM_{10}	particulates $\leq 10\mu m$
PMF	probable maximum flood
PMP	Probable Maximum Precipitation
PMWP	Probable Maximum Winter Precipitation
PORTS	Portsmouth Gaseous Diffusion Plant
POTW	Publicly Owned Treatment Works
pp.	pages
PRC	Peoples Republic of China
PSAR	Preliminary Safety Analysis Report
PSP	Physical Security Plan
QA	quality assurance
QAPD	Quality Assurance Program Description
QC	Quality Control
RCB	Radiation Control Bureau
RCRA	Resource Conservation and Recovery Act
RCZ	radiation control zone
REIS	Regional Economic Information System
REMP	Radiological Environmental Monitoring Program
RIMS	Regional Input-Output Modeling System
ROI	Region of Interest or Radius of Influence
RTE	Rare Threatened and Endangered
RWP	radiation work permit
S	south
SAR	Safety Analysis Report
SB	Separations Building
Sc.D.	Doctor of Science
SCRAM	Support Center for Regulatory Air Models
SDWA	Safe Drinking Water Act
SE	southeast
SER	Safety Evaluation Report
SHPO	State Historic Preservation Officer
SILEX	Separation of Isotopes by Laser Excitation
SNM	special nuclear material
SPCC	spill prevention, control, and countermeasures
SPL	Sound Level Pressure
SRC	Safety Review Committee
SSC	structure, system, and component
SSE	safe shutdown earthquake
SSE	south-southeast
SSW	south-southwest

ACRONYMS and ABBREVIATIONS

STEL	short term exposure limits
STP	standard temperature and pressure
SVOC	semivolatile organic compounds
SW	southwest
SWPPP	Storm Water Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDS	Total Dissolved Solids
TEDE	total effective dose equivalent
TLD	thermoluminescent dosimeter
TN	Tennessee
TSB	Technical Services Building
TSP	total suspended particulates
TVA	Tennessee Valley Authority
TWA	time weighted average
TWDB	Texas Water Development Board
TX	Texas
UBC	Uranium byproduct cylinder
UCL	Urenco Capenhurst Limited
UCN	Ultra-Centrifuge Netherlands NV
UNAMAP	Users Network for Applied Modeling of Air Pollution
UPS	uninterruptible power supply
US	United States
USACE	United States Army Corps of Engineers
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UV	ultravoilet
VOC	volatile organic compound
W	West
WCS	Waste Control Specialists
WIPP	Waste Isolation Pilot Plant
WMA	wildlife management area
WNA	World Nuclear Association
WNW	west-northwest
WQB	Water Quality Bureau
WQCC	Water Quality Control Commission
WSW	west-southwest

UNITS OF MEASURE

Bq	Becquerel
BTU	british thermal unit
°C	degrees celsius
Ci	curie
cm	centimeter
d	day
dB	decibel
dBA	decibel A-weighted
dpm	disintegrations per minute
°F	degrees farenheit
ft	feet
g	gram
g_a	gravitational acceleration
gal	gallon
gpm	gallons per minute
Gy	Gray
ha	hectares
hp	horsepower
hr	hour
Hz	hertz (cycle per second)
in	inch
in. H_2O	inches of water (column)
J	Joule
kg	kilogram
km	kilometer
kWh	kilowatt-hour
L	liter
lb	pound
lbs	pounds
m	meter
mbar abs	millibar absolute
mbarg	millibar gauge
MBq	megabecquerel
mi	mile
min	minute
M_N	local magnitude
Mo	month
msl	mean sea level
MT or t	metric ton
MTU	Metric ton uranium
oz	ounce
Pa	pascal
ppb	parts per billion
ppm	parts per million
psia	pounds per square inch absolute
psig	pounds per square inch gauge
R	Roentgen
rad	radiation absorbed dose
rem	Roentgen equivalent man

UNITS OF MEASURE

scfm	standard cubic feet per minute
s	second
Sv	sievert
SWU	separative work unit
µmhos	micromhos
V	volt
VA	volt-ampere
W	watt
$^{w}/_{o}$	weight percent
χ/Q	atmospheric concentration per unit source
yd	yard
yr	year
σ	standard deviation

Pico (p)	X 10^{-12}
Nano (n)	X 10^{-9}
Micro (µ)	X 10^{-6}
Milli (m)	X 10^{-3}
Centi (c)	X 10^{-2}
Kilo (k)	X 10^{3}
Mega (M)	X 10^{6}

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1.0 INTRODUCTION OF THE ENVIRONMENTAL REPORT

This Environmental Report (ER) constitutes one portion of an application submitted by Louisiana Energy Services (LES) to the Nuclear Regulatory Commission (NRC) for a license to construct and operate a gas centrifuge uranium enrichment facility. The proposed facility, the National Enrichment Facility (NEF) will be located near Eunice, New Mexico, in Lea County. The ER for this proposed facility serves two primary purposes. First, it provides information that is specifically required by the NRC to assist it in meeting its obligations under the National Environmental Policy Act (NEPA) of 1969 (Pub. Law 91-190, 83 Stat. 852) (USC, 2003a) and the agency's NEPA-implementing regulations. Second, it demonstrates that the environmental protection measures proposed by LES are adequate to protect both the environment and the health and safety of the public.

LES has prepared this ER to meet the requirements specified in 10 CFR 51, Subpart A, particularly those requirements set forth in 10 CFR 51.45(b)-(e) (CFR, 2003a). The organization of this ER is generally consistent with the format for environmental reports recommended in NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report August 2003 (NRC, 2003a).

This ER evaluates the environmental impacts of the LES proposed facility. Accordingly, this document discusses the proposed action, the need for and purposes of the proposed action, and applicable regulatory requirements, permits, and required consultations (ER Chapter 1, Introduction of the Environmental Report); considers reasonable alternatives to the proposed action (Chapter 2, Alternatives); describes the proposed NEF and the environment potentially affected by the proposed action (Chapter 3, Description of the Affected Environment); presents and compares the potential impacts resulting from the proposed action and its alternatives (Chapter 4, Environmental Impacts); identifies mitigation measures that could eliminate or lessen the potential environmental impacts of the proposed action (Chapter 5, Mitigation Measures); describes environmental measurements and monitoring programs (Chapter 6, Environmental Measurements and Monitoring Programs); provides a cost benefit analysis (Chapter 7, Cost Benefit Analysis); and summarizes potential environmental consequences (Chapter 8, Summary of Environmental Consequences). A list of references and preparers is also provided in Chapter 9, References, and Chapter 10 List of Preparers, respectively.

The effective date of this ER is December 2003.

The LES Partnership

Louisiana Energy Services (LES), L.P. is a Delaware limited partnership. It has been formed solely to provide uranium enrichment services for commercial nuclear power plants. LES has one, 100% owned subsidiary, operating as a limited liability company, formed for the purpose of purchasing Industrial Revenue Bonds and no divisions. The general partners are as follows:

A. Urenco Investments, Inc. (a Delaware corporation and wholly-owned subsidiary of Urenco Limited, a corporation formed under the laws of the United Kingdom ("Urenco") and owned in equal shares by BNFL Enrichment Limited ("BNFL-EL"), Ultra-Centrifuge Nederland NV ("UCN"), and Uranit GmbH ("Uranit") companies formed under English, Dutch and German law, respectively; BNFL-EL is wholly-owned by British Nuclear Fuels plc, which is wholly-owned by the Government of the United Kingdom; UCN is 99% owned by the Government of the Netherlands, with the remaining 1% owned collectively

by the Royal Dutch Shell Group, DSM, Koninklijke Philips Electronics N.V. and Stork N.V.; Uranit is owned by Eon Kernkraft GmbH (50%) and RWE Power AG (50%), which are corporations formed under laws of the Federal Republic of Germany); and

B. Westinghouse Enrichment Company LLC (a Delaware limited liability company and wholly-owned subsidiary of Westinghouse Electric Company LLC, a Delaware limited liability company ("Westinghouse"), whose ultimate parent, through two intermediary Delaware corporations and one corporation formed under the laws of the United Kingdom, is British Nuclear Fuels plc, which is wholly-owned by the government of the United Kingdom).

The names and addresses of the responsible officials for the general partners are as follows:

Urenco Investments, Inc.
Charles W. Pryor, President and CEO
2600 Virginia Avenue NW, Suite 610
Washington, DC 20037

Dr. Pryor is a citizen of the United States of America

Westinghouse Enrichment Company LLC
Ian B. Duncan, President
4350 Northern Pike
Monroeville, PA 15146

Mr. Duncan is a citizen of the United Kingdom.

The limited partners are as follows:

A. Urenco Deelnemingen B.V. (a Netherlands corporation and wholly-owned subsidiary of Urenco Nederlands B.V. (UNL));

B. Westinghouse Enrichment Company LLC (the Delaware limited liability company, wholly-owned by Westinghouse, that also is acting as a General Partner);

C. Entergy Louisiana, Inc. (a Louisiana corporation and wholly-owned subsidiary of Entergy Corporation, a publicly-held Delaware corporation and a public utility holding company);

D. Claiborne Energy Services, Inc. (a Louisiana corporation and wholly-owned subsidiary of Duke Energy Corporation, a publicly-held North Carolina corporation);

E. Cenesco Company, LLC (a Delaware limited liability company and wholly-owned subsidiary of Exelon Generation Company, LLC, a Pennsylvania limited liability company).

F. Penesco Company, LLC (a Delaware limited liability company and wholly-owned subsidiary of Exelon Generation Company, LLC, a Pennsylvania limited liability company).

Urenco owns 70.5% of the partnership, while Westinghouse owns 19.5% of LES. The remaining 10% is owned by the companies representing the three electric utilities, i.e., Entergy Corporation, Duke Energy Corporation, and Exelon Generation Company, LLC.

The President of LES is E. James Ferland, a citizen of the United States of America. LES' principal location for business is Albuquerque, NM. The facility will be located in Lea County

near Eunice, New Mexico. No other companies will be present or operating on the NEF site other than services specifically contracted by LES.

Foreign Ownership, Control and Influence (FOCI) of LES is addressed in the NEF Standard Practice Procedures for the Protection of Classified Matter, Appendix 1 – FOCI Package. The NRC in their letter dated, March 24, 2003, has stated "…that while the mere presence of foreign ownership would not preclude grant of the application, any foreign relationship must be examined to determine whether it is inimical to the common defense and security [of the United States]". (NRC, 2003b) The FOCI Package mentioned above provides sufficient information for this examination to be conducted.

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1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1.1 Need for and Purpose of the Proposed Action

As set forth in Section 1.1, Proposed Action, the proposed action is the issuance of an NRC license under 10 CFR 70 (CFR, 2003b), 10 CFR 30 (CFR, 2003c) and 10 CFR 40 (CFR, 2003d) that would authorize LES to possess and use special nuclear material (SNM), source material and byproduct material, and to construct and operate a uranium enrichment facility at a site located in Lea County, New Mexico. The LES facility will produce enriched Uranium-235 (^{235}U) up to a nominal 5 $^{w}/_{o}$ by the gas centrifuge process, with a nominal production of 3,000,000 separative work units (SWUs) per year. The enriched uranium will be used primarily in domestic commercial nuclear power plants in the United States.

Uranium enrichment is critical to the production of fuel for U.S. commercial nuclear power plants, which currently supply approximately 20% of the nation's electricity requirements. In recent years, however, domestic uranium enrichment has fallen from a capacity greater than domestic demand to a level that is less than half of domestic requirements (DOE, 2002a). In fact, at present, less than 15% of U.S. enrichment requirements are being met by enrichment plants located in the U.S. (DOE, 2003a). Notwithstanding, forecasts of installed nuclear generating capacity suggest a continuing demand for uranium enrichment services, both in the U.S. and abroad.The current lack of domestic enrichment capacity relative to domestic requirements has prompted concern within the U.S. government. Indeed, in a July 25, 2002 letter to the NRC commenting on general policy issues raised by LES in the course of its preapplication activities, William D. Magwood, IV, Director of the DOE Office of Nuclear Energy, Science and Technology, stressed the importance of promoting and developing additional domestic enrichment capacity. In this letter, DOE noted that "[i]n interagency discussions, led by the National Security Council, concerning the domestic uranium enrichment industry, there was a clear determination that the U.S. should maintain a viable, competitive, domestic uranium enrichment industry for the foreseeable future. In addition to identifying the policy objective of encouraging private sector investment in new uranium enrichment capacity, DOE has emphasized that "[t]he Department firmly believes that there is sufficient domestic demand to support multiple enrichers and that competition is important to maintain a health industry (DOE, 2002a).

This recent DOE letter to the NRC is consistent with prior DOE statements concerning the importance from a national energy security perspective of establishing additional reliable and economical uranium enrichment capacity in the U.S. In DOE's annual report, "Effect of U.S./Russia Highly Enriched Uranium Agreement 2001, dated December 31, 2001, DOE noted that "[w]ith the tightening of world supply and the closure of the Portsmouth Gaseous Diffusion Plant by USEC, in May 2001, the reliability of U.S. supply capability has become an important energy security issue." With respect to national energy security, DOE further stated:

> "The Department believes that the earlier than anticipated cessation of plant operations at Portsmouth has serious domestic energy security consequences, including the inability of the U.S. enrichment supplier USEC to meet all its enrichment customers' contracted fuel requirements, in the event of a supply disruption from either the Paducah plant production or the Highly Enriched

> Uranium (HEU) Agreement deliveries. The energy 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 capability in the near term."

As reflected in DOE's July 25, 2002 letter to the NRC, the Department of State has similarly recognized that "[m]aintaining a reliable and economical U.S. uranium enrichment industry is an important U.S. energy security objective." (Magwood letter, citing unclassified excerpt from U.S. Department of State cable SECSTATE WASHDC 212326Z DEC 01 (NOTAL)). Importantly, the letter emphasized that "the U.S. Government supports the deployment of Urenco gas centrifuge technology in new U.S. commercial enrichment facilities as a means of maintaining a reliable and economical U.S. uranium enrichment industry." Thus, current U.S. energy security concerns and policy objectives establish a clear need for additional domestic uranium enrichment capacity, a need that also has been recognized by Congress for some time. See e.g., S. Rep. No. 101-60, 101st Congress, 1st Session 8, 20 (1989) ("some domestic enrichment capability is essential for maintaining energy security"); H.R. Rep. No. 102-474, pt. 2, at 76 (1992) ("a healthy and strong uranium enrichment program is of vital national interest").

National security concerns and policy objectives also underscore the need for an additional reliable and economical domestic source of enrichment services. Congress has characterized uranium enrichment as a "strategically important domestic industry of vital national interest," essential to the national security and energy security of the United States" and necessary to avoid dependence on imports." S. Rep No. 101-60, 101st Congress, 1st Session 8, 43 (1989); Energy Policy Act of 1992, 42 U.S.C. Section 2296b-6. National security and defense interests require assurance that "the nuclear energy industry in the United States does not become unduly dependent on foreign sources of uranium or uranium enrichment services." S. Rep. No. 102-72, 102d Congress 1st Session 144-45 (1991). Indeed, in connection with the Claiborne Enrichment Center (CEC) proposed by LES in 1991 (LES, 1991a), the NRC recognized "[t]he fact that USEC already exists to serve national security interests does not entirely obviate a role for LES in helping to ensure a reliable and efficient domestic uranium enrichment industry, particularly when USEC is the only domestic supplier." Louisiana Energy Services (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 96 n. 15 (1998) citing H.R. Rep. No. 102-474, 102d Congress, 2d Session, pt. 1 at 143 (1992) (emphasis in original). Indeed, the NRC stated that "it might fairly be said that national policy establishes a need for a reliable and economical domestic source of enrichment services," and that "congressional and NRC policy statements" articulating such considerations of national policy "bear in [its] view, on any evaluation of the need for the facility and its potential benefits." CLI-98-3, 47 NRC at 95-96.

During 2002, two companies that offer uranium enrichment services worldwide announced plans to license and build new centrifuge based uranium enrichment plants in the U.S. (NRC, 2002a).

The NEF would further attainment of the foregoing energy and national security policy objectives. The enriched uranium produced by the NEF would constitute a significant addition to current U.S. enrichment capacity. As noted above, the NEF would produce low-enriched uranium at the rate of 3 million SWU/yr. This is equivalent to roughly one-fourth of the current U.S. enrichment services demand.

Operation of the NEF would foster greater security and reliability with respect to the U.S. low-enriched uranium supply. Of equal importance, it would provide for more diverse domestic

suppliers of enrichment services. At present, U.S. enrichment requirements are being met principally through enriched uranium produced at USEC's 50-year old Paducah gaseous diffusion plant (GDP) and at foreign enrichment facilities. Much of the foreign-derived enriched uranium being used in the U.S. comes from the downblending of Russian high-enriched uranium (HEU), pursuant to a 1993 agreement between the U.S. and Russian governments that is administered by USEC. This agreement, however, is currently scheduled to expire in 2013, and is not unsusceptible to disruptions caused by both political and commercial factors.

In the license application for its proposed lead cascade facility, USEC, which is currently the only domestic provider of enriched uranium to U.S. purchasers, explicitly recognized that the age of its Paducah facility, coupled with production cost considerations and the expiration of the HEU agreement in 10 years, necessitates deployment of more modern, lower-cost domestic enrichment capacity by the end of this decade. The NEF, which would begin production in 2008 and achieve full nominal production output by 2013, would help meet this need. Indeed, USEC is pursuing the development and deployment of its own centrifuge technology. The presence of multiple enrichment services providers in the U.S., each with the capability to increase capacity to meet potential future supply shortfalls, would enhance both diversity and security of supply for generators and end-users of nuclear-generated electricity in the U.S. As discussed in ER Section 1.1.2, Market Analysis of Enriched Uranium Supply and Requirements, purchasers of enrichment services view diversity and security of supply as vital from a commercial perspective as well.

The reliability and economics of the Urenco-owned centrifuge technology to be deployed in the NEF are well-established. This technology has been in use for over 30 years, and is currently deployed at Urenco's three European enrichment facilities. These facilities are located in Gronau, Germany; Almelo, Netherlands; and Capenhurst, United Kingdom. These facilities had a combined production capability of 6 million SWU at the end of 2002 (URENCO, 2003). This capability is scheduled to increase to 6.5 million SWU by the end of 2003. The duration of operations at these facilities and their collective SWU output confirms the operational reliability and commercial viability of the centrifuge technology that LES will install in the NEF.

Notwithstanding its initial development over three decades ago, the gas centrifuge technology to be deployed by LES remains a state-of-the-art technology. As a result of its longstanding use in Europe, the Urenco centrifuge enrichment process has undergone numerous enhancements, which have increased the efficiency of the process, as well as yielded significant safety and environmental benefits. The advantages of the Urenco-owned centrifuge technology relative to other extant enrichment technologies are discussed further in ER Section 2.1.3.1, Alternative Technologies. Chief among these is that the Urenco centrifuge enrichment process requirements approximately 50 times less energy than the gas diffusion processes still in use in France and the U.S. In this regard, the French company Areva plans to deploy Urenco centrifuge technology in a new enrichment facility to be constructed in France.

It is noteworthy that the U.S. government has previously expressed support for consideration by Urenco to partner with a U.S. company or companies for the purpose of transferring Urenco technology to new U.S. commercial uranium enrichment facilities (DOE, 2002a). Because it would deploy commercially viable and advanced centrifuge enrichment technology in the near term, the NEF would further important U.S. energy and national security objectives. Specifically, it would provide additional, reliable, and economical domestic enrichment capacity in a manner that would enhance the diversity and security of the U.S. enriched uranium supply.

1.1.2 Market Analysis of Enriched Uranium Supply and Requirements

Consistent with the guidance contained in NUREG-1520 (NRC, 2002b) concerning the need for and purpose of the proposed action, this section sets forth information on the quantities of enriched uranium used for domestic benefit, domestic and foreign requirements for enrichment services, and potential alternative sources of supply for the NEF's proposed services for the period 2002 to 2020. ER Section 1.1.2.1, Forecast of Installation Nuclear Power Generating Capacity, presents a forecast of installed nuclear power generating capacity during the specified period: ER Section 1.1.2.2, Uranium Enrichment Requirements Forecast, presents a forecast of uranium enrichment requirements; ER Section 1.1.2.3, Current and Potential Future Sources of Uranium Enrichment Services, discusses current and potential future sources of uranium enrichment services throughout the world; ER Section 1.1.2.4, Market Analysis of Supply and Requirements, discusses market supply and requirements under alternative scenarios and ER Section 1.1.2.5, Commercial Considerations and Other Implications of Each Scenario, discusses various commercial considerations and other implications associated with each scenario.

1.1.2.1 Forecast of Installation Nuclear Power Generating Capacity

LES has prepared forecasts of installed nuclear power generating capacity by country and categorized them into the following five world regions: (i) U.S., (ii) Western Europe, (iii) Commonwealth of Independent States (CIS) and Eastern Europe, (iv) East Asia, and (v) remaining countries are grouped as Other.

Eastern Europe consists of the following emerging market economy countries that were in the past classified as Communist Bloc countries and are operating nuclear power plants: Bulgaria, the Czech Republic, Slovakia, Hungary, Lithuania, and Romania. Of the 12 CIS countries that were part of the former Soviet Union (FSU), the three with nuclear power plants still operating are Russia, Ukraine and Armenia.

East Asia includes Japan, the Republic of Korea (South Korea), Taiwan, the People's Republic of China (PRC) and North Korea. It is the only region forecast to increase nuclear power capacity significantly from current levels.

This forecast was based on LES's country-by-country and unit-by-unit review of current nuclear power programs and plans for the future. The resulting LES projections of future world nuclear generation capacity are dependent on the following factors:

- Nuclear generating units currently in operation and retirements among these units that occur during the forecast period;
- Capacity that is created by extending the operating lifetimes of units currently in operation beyond initial expectations through license renewal;
- Units under construction, already ordered, or firmly planned with likely near-term site approval; and
- Additional new capacity that will require site approval and will be ordered in the future.

LES believes that world nuclear capacity will be dominated by plants currently in operation over the forecast period of this report, accounting for 76% of the total in 2015 and 63% in 2020. A

small but significant contribution of 3% in 2015 and 2020 is obtained from capacity uprates and restarts of previously shutdown units. The growing importance of license renewal is also highlighted, reaching 7% in 2015 and 14% in 2020. Units currently under construction, firmly planned or proposed will account for 11% in 2015 and 12% in 2020, while additional new capacity will account for 4% in 2015 and 8% in 2020. Cumulative retirements over the same period will amount to 9% of total operable capacity in the year 2015 and 15% in 2020, offsetting the amount of capacity currently under construction or firmly planned with site approval. Figure 1.1-1, Forecast and Composition of World Nuclear Generation Capacity, presents LES's forecast and composition of world nuclear generation capacity in these five categories.

In the U.S., it is expected that a significant portion of existing units with operating licenses scheduled to expire by 2020 will find license renewal to be technically, economically and politically feasible. In fact, the Nuclear Regulatory Commission (NRC) granted the first license extension in the U.S. to the two unit Calvert Cliffs Nuclear Station in March 2000. By June 2003 a total of 16 units had been granted license extensions in the U.S. Applications for the renewal of operating licenses for 14 additional units have been submitted to the NRC for review, and the NRC has been notified of operator plans to submit applications for at least an additional 28 units during the next three years (NEI, 2003; NRC, 2003c). This accounts for more than 50% of the installed nuclear generating capacity in the U.S. As of March 2002, the NRC expected "that virtually the entire operating fleet will ultimately apply" to renew their operating licenses (NRC, 2002c). The transition to a competitive electric generation market has not led to the early retirement of additional U.S. operating capacity, but instead has resulted in further plant investment in the form of plant power uprates. These have included more than 50 power uprates, representing approximately two Gigawatts electric (GWe) of total power increases that have been approved by the NRC during the last three years (mid 2000 through mid 2003), six applications for power uprates that are currently under review by the NRC, and an additional 31 applications for power uprates that are expected by the NRC over the next five years (NRC, 2003d). LES's forecast of installed nuclear power generating capacity is summarized in Table 1.1-1, Summary of World Nuclear Power Installed Capacity Forecast (GWe).

As shown in Figure 1.1-2, Comparison of Forecasts of U.S. Nuclear Generation Capacity and Figure 1.1-3, Comparison of Forecasts of World Nuclear Generation Capacity for the U.S. and world, respectively, these LES forecasts are consistent with the most recently published forecasts of installed nuclear generation capacity prepared by the U.S. Department of Energy/Energy Information Administration (EIA) (DOE, 2003b) and the World Nuclear Association (WNA) (WNA, 2003).

On a world basis, LES's forecast is consistent with an average annual nuclear power installed capacity growth rate of 1.0% through 2010, and a very low annual rate of growth, 0.1%, thereafter, as the effects of plant retirements begin to offset the introduction of new plants. World installed nuclear power capacity is forecast to rise a total of 8.7% from 356.8 GWe at the end of 2002 to 387.7 GWe by 2010, and to rise an additional 0.6% to 390.1 GWe by 2020. The corresponding annual average rate of change in installed nuclear power capacity by world region is presented in Table 1.1-2, Forecast of Annual Average Rate of Change in Installed Nuclear Power Capacity.

The period through 2010 generally includes existing construction and some firmly planned additions minus early retirements. The period after 2010 is governed by the retirement of existing capacity, mitigated by license renewal, and additional new capacity which is not yet firmly planned. Nuclear capacity in Western Europe declines at a rate that increases noticeably

after the year 2010 as the terms of existing operating licenses are reached and longer lifetimes are thwarted by phase out plans in some countries and only limited new capacity additions are made. Capacity in the U.S. increases through 2010 through uprates and the restart of Browns Ferry 1, but a few plant retirements then cause a slight decline before installed capacity recovers as new plants are introduced after 2015. There is a small increase for nuclear power in the CIS and Eastern Europe through 2010, as many nuclear units using first generation Soviet technology are not retired as quickly as some forecasters in Western Europe initially hoped would be the case. However, retirements result in a small decline after 2010. Ambitious plans in Russia to double nuclear generation capacity by the year 2020 are assumed to go mostly unrealized. East Asia shows strong growth through 2010 and beyond, as nuclear continues to expand to fill a portion of growing energy needs in this resource-limited part of the world. Countries in the other region undergo modest growth through 2010 as existing projects are completed and some units placed on extended standby return to service, but little net growth thereafter.

1.1.2.2 Uranium Enrichment Requirements Forecast

A forecast of uranium enrichment services requirements was prepared by LES consistent with its nuclear power generation capacity forecasts, which were presented in ER Section 1.1.2.1, Forecast of Installation Nuclear Power Generating Capacity. A summary of the nuclear fuel design and management parameters that were used in developing the forecast of uranium enrichment requirements is as follows:

Country-by-country average capacity factors rising with time from a world average of 82% in 2003 to 84% by 2007. The average capacity factor for the U.S. is 90% for the long-term;

- Individual plant enriched product assays based on plant design, energy production, design burnup, and fuel type (note that Russian designed fuel has a 0.30 weight percent ($^{w}/_{o}$) uranium isotope 235 (^{235}U) margin when compared to Western fuel design, while typical Japanese practice includes a 0.20 $^{w}/_{o}$ ^{235}U margin that is assumed to decline over time);
- Enrichment tails assays of 0.30 $^{w}/_{o}$ ^{235}U, except for the U.S. and U.K. where the assay has increased to 0.32 $^{w}/_{o}$; Japan (0.28 $^{w}/_{o}$, increasing to 0.30 $^{w}/_{o}$ over time); France (0.27 $^{w}/_{o}$); and the CIS and Eastern Europe where tails assays of 0.11 $^{w}/_{o}$ are assumed;
- Current plant specific fuel discharge burnup rates for the U.S., and country and reactor type-specific fuel burnup rates elsewhere, generally increasing in the future;
- Country (for some non-U.S. countries) and plant specific fuel cycle lengths (for the U.S. and other countries), collectively averaging approximately 20 months in the case of the U.S., and 16 months for all light water reactors (includes U.S. reactors);
- Equivalent uranium enrichment requirement savings resulting from plutonium recycle in some Western European countries (France, Germany, Belgium, Switzerland, and possibly Sweden) and Japan. The projections assume that the previously planned Japanese implementation of recycle will continue to be delayed and that the rate of implementation will also be slowed initially; and
- Equivalent enrichment requirements savings resulting from the recycle of excess weapons plutonium in the U.S. and Russia are also included. Total equivalent enrichment services

requirements savings associated with recycling of commercial and military plutonium are in the range of 2% and 3% over the long term.

Table 1.1-3, World Average Annual Uranium Enrichment Requirements Forecast After Adjustment for Plutonium Recycle in MOX Fuel (Million SWU) provides a forecast of average annual enrichment services requirements by world region that must be supplied from world sources of uranium enrichment services. These requirements reflect adjustment for the use of recycled plutonium in mixed oxide (MOX) fuel. It should be recognized that on a year to year basis, there can be both upward and downward annual fluctuations that reflect the various combinations of nominal 12-month, 18-month and 24-month operating/refueling cycles that occur at nuclear power plants throughout the world. Therefore, interval averages are provided in this table.

As shown in Figure 1-1.4, Comparison of Forecasts of World Average Annual Uranium Enrichment Requirements Forecasts, Unadjusted for Plutonium Recycle in MOX Fuel, during the 2003 to 2005 period, world annual enrichment services requirements are forecast to be 40.2 million separative work units (SWU), which is a 3.3% increase over the estimated 2002 value of 38.9 million SWU. LES forecasts that annual enrichment services requirements will rise very gradually with the average annual requirements during the 2006 to 2010 period reaching 41.6 million SWU, an increase of 3.5% over the prior five year period. Annual requirements for enrichment services are forecast to be virtually flat thereafter, averaging 41.5 million SWU per year throughout the period 2011 through 2020.

These LES forecasts of uranium enrichment requirements in the U.S. and world are generally consistent with the most recently published forecasts by both the EIA and WNA (WNA, 2003; DOE, 2001g; DOE, 2003c). Figure 1.1-4, Comparison of Forecast of World Average Annual Uranium Enrichment Requirements Forecasts, Unadjusted for Plutonium Recycle in MOX Fuel and Figure 1.1-5, Comparison of Forecast of U.S. Average Annual Uranium Enrichment Requirements Forecast, Unadjusted for Plutonium Recycle in MOX Fuel, provide comparisons of the LES forecasts with those published by these two organizations for world and U.S. requirements. Since both EIA and WNA present their uranium enrichment requirements forecasts prior to adjustment for the use of recycled plutonium in MOX fuel, LES has presented its forecasts in the same manner.

Since the EIA does not publish a forecast of plutonium recycle in MOX fuel, LES has compared its forecast of plutonium recycle in MOX fuel, which is developed based in part on published information (NEA 2003), against that of WNA (WNA, 2003) and finds the forecasts to be in general agreement. LES's assumptions, as reflected in Table 1.1-3, for the adjustment to uranium enrichment requirements associated with the utilization of commercial and military plutonium recycle in MOX fuel are summarized in Table 1.1-4.

In the context of the analysis that is presented in subsequent sections of this report, it may be useful to note that LES's uranium enrichment requirements forecasts, which are presented in Table 1.1-3, suggest U.S. requirements for uranium enrichment services (Figure 1.1-5) that are 14.6% lower than the average of the EIA and WNA forecasts during the period 2011 through 2020 and 8.5% lower worldwide than the average of the EIA and WNA forecasts (Figure 1.1-4) during this same period. If the higher EIA or WNA forecasts for uranium enrichment requirements were used by LES in the analysis that is presented in this report, then an even greater need would be forecast for newly constructed uranium enrichment capability.

1.1.2.3 Current and Potential Future Sources of Uranium Enrichment Services

Table 1.1-5, Current and Potential Future Sources of Uranium Enrichment Services, summarizes current and potential future sources and quantities of uranium enrichment services. These sources include existing inventories of low enriched uranium (LEU), production from existing uranium enrichment plants, enrichment services obtained by blending down Russian weapons grade highly enriched uranium (HEU), as well as new enrichment plants and expansions in existing facilities, together with enrichment services that might be obtained by blending down U.S. HEU. The distinction is made in this table between current annual "physical capability," and current annual "economically competitive and physically usable capability," both of which may be less that the facility's "nameplate rating." In the case of facilities that are in the process of expanding their capability, the annual production that is available to fill customer requirements during the year is listed, not the end of year capability.

The nameplate rating is characterized as the annual enrichment capability of the enrichment cascades if all auxiliary systems were physically capable of supporting that level of facility operation, which is not always the situation in an older facility. The physical capability is characterized as the annual enrichment capability of the entire facility, taking into account whatever limits may be imposed by auxiliary systems, but independent of the economics associated with operation at that level of production. The economically competitive and physically usable capability refers to that portion, which may be all or part, of the physical capability that is capable of producing enrichment services that can be competitively priced. For instance, the cost of firm power during the summer months which can be several times higher than the cost of non-firm power that may be purchased under contract during the remainder of the year. In practice this limits the annual enrichment capability of electricity intensive gaseous diffusion enrichment plants. In addition, physically usable requires that the enriched uranium product that can be obtained from the enrichment plant that is not subject to international trade restrictions and will meet appropriate material specifications for its use in commercial nuclear power plants that operate in countries outside the CIS and Eastern Europe.

Current total world annual supply capability from all available sources, independent of physical suitability of material or economics is presently estimated by LES to be approximately 49.6 million SWU, as shown in Table 1.1-5. However, the total world annual supply capability of enrichment services that are used to meet CIS and Eastern European requirements, plus those which are economically competitive and meet material specifications for use by Western customers, and are not constrained by international trade restrictions amounts to only 40.7 million SWU, as also shown in Table 1.1-5. This is only 1.8 million SWU greater than the estimated 2002 requirements of 38.9 million SWU and nearly identical to the 2003 to 2005 average requirements of 40.2 million SWU, which were presented in Table 1.1-3, World Average Annual Uranium Enrichment Requirements Forecast After Adjustment for Plutonium Recycle in MOX Fuel (Million SWU). These conclusions are consistent with other recently published analyses of the market for uranium enrichment services (NEIN, 2003; NMR, 2002b; Van Namen, 2000; Grigoriev, 2002).

The Inventories (Table 1.1-5, Ref. 1) refer to existing inventories of LEU that are held primarily by owners and operators of nuclear power plants in Europe and East Asia, those that are present in Kazakhstan, and to a limited extent elsewhere. LES expects that most such inventories will be used internally in the near term and will decline from just under one million SWU in 2003 to 0.5 million SWU by 2007.

The Urenco centrifuge enrichment capability (Table 1.1-5, Ref. 2) refers to capability from machines that are presently in operation or in the process of being installed at Urenco's three European enrichment plants, which are located in Gronau, Germany, Almelo, Netherlands and Capenhurst, United Kingdom. These plants had a combined production capability of approximately 6.0 million SWU at the end of 2002 (URENCO, 2003) scheduled to increase to 6.5 million SWU per year by the end of 2003. LES estimates that by the end of 2008 the combined Urenco production capability will be approximately 8 million SWU per year. Urenco is expected to provide 6.0 million SWU of enrichment services during 2003. While Urenco is expected to replace older capacity that reaches its design lifetime, remaining centrifuge manufacturing capability is then projected to be devoted to the LES and Cogema centrifuge plants discussed below. Urenco has the capability to react to increase in demand as envisioned by other forecasts (EIA and WNA) as shown in Figure 1.1-5 and, in this case, Urenco's product capability may exceed 8 million SWU per year in the long term.

The existing Eurodif enrichment capability (Table 1.1-5, Ref. 3) refers to capability from the 10.8 million SWU per year (nameplate rating) Georges Besse gaseous diffusion plant (GDP) (NEIN, 2002) that is located near Pierrelatte, France. It should be noted that about 2.8 million SWU per year of the physically available Eurodif enrichment capability is not economically competitive due to very high electric power costs at that higher operating range (FF, 1999). According to the schedule that was announced by Areva (which is the holding company for Cogema - the majority owner of Eurodif and the company responsible for marketing its enrichment services), it is expected that the 8 (=10.8-2.8) million SWU per year in GDP enrichment capability may be split between customer deliveries and pre-production beginning in 2007, as the new replacement centrifuge plant begins operations. This will enable Eurodif to build up a surplus of enrichment services that it can use to supplement centrifuge production following the planned shut down of the Georges Besse GDP in 2012 (NF, 2002a). Accordingly, during the period 2005 through 2010 Eurodif is forecast to be able to supply to the market 7.1 million SWU on an average annual basis from the Georges Besse GDP, with the balance used to create the previously mentioned stockpile. Eurodif's ability to supply the market from this plant will drop to an average annual capability of 3 million SWU during the period 2011 through 2015, based on LES forecasts for the Georges Besse GDP's last two years of operation.

The existing USEC enrichment capability (Table 1.1-5, Ref. 4) refers to capability from the 8 million SWU per year GDP, which is located in Paducah, Kentucky (USEC, 2002a). The annual nameplate capability of 11.3 million is not physically attainable without capital upgrades to the plant, which are not expected. LES estimates that approximately 1.5 million SWU per year of the 8 million SWU capability is not economically competitive due to very high electric power costs in that operating range (Sterba, 1999). This is similar to the situation described previously for the Eurodif GDP. The commercial centrifuge plant construction schedule originally announced by USEC called for the first increment of production from its new commercial centrifuge enrichment plant by 2010, followed by a rapid ramp up to full production by 2013 (Spurgeon, 2002). Recent USEC statements suggest that it now expects to beat this original schedule by one year, as reflected in Table 1.1-5 (USEC, 2003a). To optimize economic operation of its plants, LES assumes that USEC would operate the Paducah GDP at the full 6.5 million SWU per year through the second year of commercial centrifuge operations, and then shut down at the end of that year (TPS, 2002). In so doing, it is assumed that USEC would be able to supply up to 4.5 million SWU to the market during the second year of commercial centrifuge operation from the Paducah GDP, stockpiling the balance to be used to supplement centrifuge plant production as it continues to be ramped up to full production capability.

Of the Russian 20 million SWU in total annual uranium enrichment plant capability (Korotkevich, 2003; Shidlovsky, 2001) (Table 1.1-5, Refs. 5, 14, 15 and 16), Russia claims that approximately 10 million SWU of its annual uranium enrichment capability is available for use in Western nuclear power plants (NF, 1991; NEIN, 1994). However, current U.S. and European trade policies (FR, 2000; FR ,1992; EUB, 2002) effectively limit the quantity of Russian enrichment services that can be sold directly to Western customers to approximately 3 million SWU annually, of which 2.7 million SWU is the estimated level of Western exports for 2002. Approximately 4.2 million SWU per year of the remaining 7.3 (=10.0-2.7) million SWU per year of enrichment services that are constrained by trade policy are used to create HEU blendstock. This is estimated by LES based on enriching 0.3 $^{w}/_{o}$ ^{235}U tails material as feed up to 1.5 $^{w}/_{o}$ ^{235}U product to be used as blendstock, at a tails assay of 0.11 $^{w}/_{o}$ ^{235}U, in the amount required to blend 30 MT (33 tons) of Russian HEU annually. Approximately 1.6 million SWU per year of it is used to recycle tails material (i.e., enrich tails to natural uranium assay or higher) for Urenco and Eurodif (WNA, 2002; NMR, 2002a). This is estimated by LES based on enriching 0.3 $^{w}/_{o}$ tails to produce 2,000 MT (2,205 tons) of uranium at a natural enrichment equivalent assay of 0.711 $^{w}/_{o}$ ^{235}U at an operating tails of 0.2 $^{w}/_{o}$ ^{235}U. This leaves approximately 1.5 (=7.3-4.2-1.6) million SWU per year of trade policy constrained, but otherwise available, Russian enrichment capacity available for potential export. Enrichment exports are forecast to have the potential to increase to 3.5 million SWU annually over the next five years within the existing trade constraints, reducing the excess to 0.7 million SWU. The excess capacity may be used to recycle Russia's own tails material or to further enrich the European tails in order to create the equivalent of natural uranium feed for export.

Russia has an additional 10 million SWU of annual uranium enrichment capacity that does not meet material specifications for use in Western nuclear power plants. Approximately 1.6 million SWU of this additional annual Russian capacity is excess to the approximately 8.4 million SWU per year in CIS and Eastern European requirements, but due to its material properties it cannot be exported to the Western world. This excess annual capacity is instead utilized by Russia for the recycling of Russian tails material. Given the complexity of the Russian situation, Table 1.1-6, Summary of Current Russian Sources and Uses of Enrichment Services, provides a summary of the sources and uses of Russian enrichment services as described above.

As older centrifuges reach their design lifetimes, Russia reportedly plans to replace them with newer designs that have higher outputs. As a result, total Russian centrifuge enrichment capacity could potentially increase by as much as 30% or 6 million SWU over the next ten or more years (Korotkevich, 2003). It is assumed that one-half of the increase would take place at the exportable enrichment plant site, while the other half would take place at the enrichment plant sites devoted to meeting the needs of Russian designed reactors. The potential increase in Russian enrichment export capabilities to the Western world is considered speculative at this time, particularly given the fact that trade constraints prevent the full use of already existing Russian enrichment export capability. Russia is assumed to replace retiring centrifuges to maintain the current total annual physical capability of 20 million SWU. If Russia is able to significantly increase its domestic nuclear generation capacity, the enrichment plant capacity devoted to internal needs could be increased as needed.

The other existing capability (Table 1.1-5, Ref. 6) is dominated by just under 1 million SWU of annual centrifuge and diffusion enrichment capability in the Peoples Republic of China (PRC) just over 0.8 million SWU of annual Japanese centrifuge enrichment capability, and just under 0.1 million SWU of annual capability from other countries, for a current total of 1.9 million SWU

of annual capacity. The majority of this capability is used internally, although the PRC exports small amounts to the U.S. The PRC has replaced its small diffusion enrichment capability with centrifuge capability that is imported from Russia. The Japanese capability is expected to gradually decline, reaching zero by about 2010, due to high failure rates that have limited centrifuge operating lifetimes. Brazil has recently announced its plans to begin operation of a small uranium enrichment facility, which will be gradually ramped up to meet its internal requirements (NEA, 2003; RNS, 2002a; NTI, 2002; NF, 1999a; JNCDI, 2002; JNFL, 1998; JNFL, 2000a; JNFL, 2000b).

The Russian HEU-derived LEU (Table 1.1-5, Ref. 7a) while expected to average just over 6 million SWU per year for three years starting sometime after 2003 to allow for catch up on previous deliveries, is expected to return to an annual level of 30 MT (33 tons) HEU or approximately 5.5 million SWU through 2013, when the term of the current U.S.-Russian Agreement for 500 MT (551 tons) HEU concludes (USEC, 2002b). Ongoing discussions continue between the U.S. and Russia regarding additional quantities of Russian HEU-derived LEU for the post 2013 time period (NF, 2002b). While recognizing a very high level of uncertainty, one might postulate that this arrangement may continue beyond the term of the present agreement, and possibly at the current level of 5.5 million SWU per year. It is important to note, as explained below, that in order to create and utilize the 5.5 million SWU contained in the LEU that is derived from the Russian HEU, 4.2 million SWU contained in blendstock is required. Therefore, the net addition to world supply is only 1.3 (=5.5-4.2) million SWU per year.

By way of background it should be understood that the HEU recovered from nuclear weapons, which is reported to have a ^{235}U assay of approximately 90 $^{w}/_{o}$, can be converted to LEU that is usable in commercial nuclear power plants by blending it with slightly enriched uranium; for example, 1.5 $^{w}/_{o}$ ^{235}U uranium blendstock. Since the mass difference enrichment technologies, which are gaseous diffusion and gas centrifugation, enrich the undesirable light isotope ^{234}U at a higher rate than they enrich ^{235}U, the 0.0054 $^{w}/_{o}$ trace concentration of ^{234}U in natural uranium (which might otherwise serve as the feed material to create the 1.5 $^{w}/_{o}$ blendstock) is amplified to on the order of 1.25 $^{w}/_{o}$ in 90 $^{w}/_{o}$ ^{235}U HEU. Fortunately, the reverse is also true and the ^{234}U isotope is depleted at a greater rate than ^{235}U in the enrichment plant tails streams; for example, down to 0.0014 $^{w}/_{o}$ in 0.30 $^{w}/_{o}$ ^{235}U tails. Because of this, enrichment plant tails provide a good starting point for the production of slightly enriched uranium blendstock (e.g., 1.5 $^{w}/_{o}$ ^{235}U) and are therefore used for blending down the 90 $^{w}/_{o}$ Russian HEU (Mikerin, 1995). In short, the two-step process, the enriching of tails to produce 1.5 $^{w}/_{o}$ LEU blendstock (assuming a tails assay of 0.11 $^{w}/_{o}$ ^{235}U) and the actual blending of the HEU with this LEU blendstock results in the dilution of ^{234}U to a level that conforms with the Western industry's nuclear fuel material specifications.

Figure 1.1-6, Relationship Among HEU, Blendstock, Product, illustrates this process and presents HEU to LEU conversion relationships that highlight the contribution of the enrichment services that are associated with creating the blendstock relative to the enrichment services that may be associated with the resulting product, which is available for use in commercial nuclear power plants.

As illustrated in Figure 1.1-6, 76% (=0.140/0.184) of the SWU that is available in the product must have been expended to produce the blendstock. Therefore, assuming that 30 MT (33 tons) HEU is processed each year to yield LEU that contains the equivalent of 5.5 million SWU, then 4.2 million SWU (=.76*5.5) of this amount is expended in producing the blendstock. The net amount of additional SWU resulting from the down blending of 30 MT (33 tons) HEU is only

1.3 million SWU (=.24*5.5). The SWU-to-product ratios and uranium feed-to-product ratios are calculated using standard equations for separative work and material balance (EEI, 1990).

Note that an additional 0.2 million SWU per year is derived from Russian HEU (Table 1.1-5, Ref. 7b) directly blended with European utility reprocessed uranium (RepU). The program is expected to expand, providing an estimated 0.6 million SWU by the year 2010 (NF, 1999b; NF, 2002c).

USEC is presently utilizing the balance of the Department of Energy (DOE) HEU-derived LEU originally 50 MT (55 tons) of HEU, later reduced to 48 MT (53 tons) (DOE, 2001b)) that was transferred to it at privatization (Table 1.1-5, Ref. 8) at an annual rate of approximately 0.6 million SWU. At the present rate of utilization it is expected to be exhausted by 2006.

There is also DOE HEU (Table 1.1-5, Ref. 9) that includes the 33 MT (36 tons) of HEU (MT HEU) (approximately 3.1 million SWU equivalent) that is being used by the Tennessee Valley Authority (TVA) (FR, 2001) and 10 MT (11 tons) HEU (DOE, 2000b) (approximately 1.8 million SWU equivalent) that is expected to become available beginning in 2009. The unit enrichment content varies among the sources of DOE HEU due to both the different HEU assays and the expected blend stock requirements. The TVA material is expected to be utilized at a rate of 0.25 million SWU per year over a twelve year period beginning in 2005. The 10 MT (11 tons) HEU is forecast to be used over a four year period, allowing DOE HEU-derived SWU to ramp up to 0.7 million SWU per year between 2009 and 2012, before dropping back to 0.25 million SWU per year. Approximately 45 MT (49.6 tons) of additional scrap, research reactor fuel and other HEU with a SWU content of 4.4 million SWU or less have been declared excess, but no formal disposition plan has been established. This material could result in a net addition of 0.1 to 0.4 million SWU to annual enrichment supply after the year 2010, but is considered too speculative to include at this time.

In addition, the U.S. defense establishment is reported to hold approximately 490 MT (540 tons) HEU in various forms (e.g., weapons, naval reactor fuel, reserves) (Albright, 1997). However, there has been no indication if some or all of this material may be made available for commercial use, and if so on what schedule. Any forecast that includes use of the enrichment services that may be associated with this material must be recognized as being highly speculative. Therefore, LES does not consider it to be prudent to include it in this market analysis. Furthermore, to the extent that some or all of the equivalent uranium enrichment services associated with this material were assumed to become available, it is important to remember that blendstock must be prepared, as previously discussed in the context of the Russian HEU.

Based on the down blending analysis of the Russian HEU that was summarized in Figure 1.1-6, it appears that 0.76 million SWU is required to create the blendstock in order to obtain each 1 million SWU in LEU product, which could be made available for commercial use in nuclear power plants. This means that the net increase in enrichment services that could be obtained from any additional DOE HEU-derived LEU would be only 24% of the SWU contained in the LEU. Therefore even if it were assumed that all 490 MT (540 tons) HEU were made available, at the present conversion rate of 0.184 million SWU per MT HEU, multiplied by 24%, then only an additional 22 million SWU in net new supply could become available. This is equivalent to about two years of U.S. total requirements for enrichment services. If this were spread out over 20 years, it would add a net 1.1 million SWU per year or less than 3% (=1.1/41.5) to the available world supply. Furthermore, it would require virtually USEC's entire 3.5 million SWU of

planned new commercial centrifuge enrichment capability to create the blendstock that would be required to down blend this material (3.43 = 490 * 0.184 * 76/20).

Eurodif plans for a new centrifuge enrichment plant have been announced (Table 1.1-5, Ref. 10). It plans to replace its existing gaseous diffusion plant with a new 7.5 million SWU per year enrichment plant that utilizes Urenco centrifuge technology. It expects to bring the new plant into operation beginning in 2007 and achieve full capability operation of 7.5 million SWU per year by 2016. Achieving the announced schedule is dependent upon Urenco and Areva reaching a detailed agreement regarding the structure of a joint venture to manufacture centrifuges (NF, 2002d).

The LES partnership has announced its plan to build a new 3 million SWU per year enrichment plant in New Mexico, using Urenco centrifuge technology (Table 1.1-5, Ref. 11). It expects to bring the new plant into operation beginning in 2007 and to achieve full capability of 3 million SWU per year in 2013 (URENCO, 2002b; HNS, 2003; LES, 2003a).

USEC has also announced plans to replace the Paducah GDP with a new 3.5 million SWU per year centrifuge enrichment plant (Table 1.1-5, Ref. 12). It now plans to begin enrichment operations at the new plant by 2009, with full capability by 2012 (TPS, 2002; Spurgeon, 2002; USEC, 2003a).

The potential new capability in Other, (Table 1.1-5, Ref. 13) is primarily due to the expected increase in PRC capability at its centrifuge plant, using Russian technology. The centrifuge enrichment capacity is expected to expand starting around 2010 in order to keep pace with the PRC's growing internal requirements, reaching 1.5 million SWU per year by 2015, for an increase of almost 0.6 million SWU/yr. A small centrifuge enrichment plant in Brazil is expected to grow to 0.2 million SWU by 2010, for an increase of just over 0.1 million SWU/yr and will be devoted to internal needs (NF, 1999a; RNS, 2002b; NTI, 2002).

It is useful to note the geographical distribution of these current and potential future sources of enrichment services, as identified in Table 1.1-7, Current and Potential Future Sources of Uranium Enrichment Services Arranged According to Geographical Locations and the concentration of sources of enrichment services among individual companies, as identified in Table 1.1-8, Current and Potential Future Sources of Uranium Enrichment Services Arranged According to Commercial Ownership or Control, to better appreciate the market considerations that will be discussed in subsequent sections of this report.

1.1.2.4 Market Analysis of Supply and Requirements

1.1.2.4.1 Scenario A – LES and USEC Centrifuge Plants Are Built in the U.S.

Scenario A represents the scenario that is being actively pursued by both LES and USEC, consistent with schedules that have been announced by each company. Figure 1.1-7, Illustration of Supply and Requirements for Scenario A, presents LES's forecast of uranium enrichment supply and requirements through 2020, consistent with this scenario. The shaded areas are keyed by reference number to Tables 1.1-5 through 1.1-8 and are described above.

During the period 2003 through 2005, the average annual economically competitive and physically usable production capacity that is not constrained by international trade agreements, together with the SWU derived from Russian HEU and other sources reflected in the tables

previously provided, is forecast to be 41.8 million SWU, assuming that Urenco adds an additional one million SWU of new capacity by then. However, this is just 1.6 million SWU (4.0%) more than average annual forecast requirements during this same period of 40.2 million SWU.

Moving forward in time to the period 2006 through 2010, during which it is assumed by LES that: Urenco has reached 8 million SWU per year of capacity in Europe; LES has 1.5 million SWU per year of capability in operation; Eurodif has the first 1.75 million SWU per year of centrifuge capability in operation and is supplementing this with 5.75 million SWU per year of its older more expensive GDP production to achieve a total capability of 7.5 million SWU per year, and has pre-produced and stockpiled the balance of 2.25 (=8.0–5.75) million SWU for use in subsequent years to optimize the transition; USEC will have brought the about 2.0 million SWU per year of centrifuge enrichment capability into operation, and will prepare to shutdown the older and more expensive GDP production after having pre-produced and stockpiled the balance of 2.0 (=6.5-4.5) million SWU for use in subsequent years to optimize the transition during 2011; Russia continues to sell 12 million SWU per year into the world market (i.e., includes supply to Russian designed nuclear power plants in the CIS and Eastern Europe, and exports to Western nuclear power plants, but excludes blendstock and enrichment of tails for other enrichers); the Russian HEU-derived LEU continues to provide enrichment services into the market at a rate of 5.5 million SWU per year and USEC has exhausted its DOE HEU-derived SWU; and DOE HEU-derived SWU continues to enter the market at a rate of 0.25 million to 0.7 million SWU per year. Under this scenario, the average annual economically competitive and unconstrained production capacity during the 2006 through 2010 period of 43.2 million SWU is only 1.6 million SWU (3.8%) more than average annual forecast requirements during this same period of 41.6 million SWU.

Continuing with this scenario to 2011 through 2015 period, by the end of this period it is assumed that Urenco continues to maintain a capability of 8 million SWU per year of capacity in Europe; LES has reached 3 million SWU per year of capability in operation; Eurodif has completed 6.5 million SWU per year of centrifuge capability in operation, has shut down its older more expensive GDP production, and is using 1 million SWU of pre-produced SWU to achieve a total annual capability of 7.5 million SWU; USEC will have brought the entire 3.5 million SWU per year of new centrifuge enrichment capability into operation and like Eurodif, will have shut down its older more expensive GDP production; Russia sells 12 million SWU per year into the world market; the Russian HEI-derived LES continues to provide enrichment services into the market at a rate of 5.5 million SWU per year; USEC has exhausted its DOE HEU-derived SWU and DOE HEU-derived SWU continues to enter the market at a rate of 0.25 to 0.7 million SWU per year. During the period 2011 through 2015, the average annual economically competitive and unconstrained production capacity, together with the SWU derived from Russian HEU and other elements of the tables previously provided, is forecast to be 42.0 million SWU which is 0.6 million SWU (1.4%) more than the average annual forecast requirements during this same period of 41.4 million SWU.

During the 2016 to 2020 period, the final capital additions are assumed to have been implemented for new centrifuge enrichment capacity. Minor perturbations to supply continue to take place. Accordingly, during the period 2016 through 2020, the average annual economically competitive and unconstrained production capacity, together with the SWU derived from Russian HEU and other elements of the tables previously provided, is forecast to be 41.8 million

SWU which is 0.2 million SWU (0.5%) more than the average annual forecast requirements during this same period of 41.6 million SWU.

Supply and requirements are in very close balance after 2010, emphasizing the need for all supply sources, including the proposed LES and USEC centrifuge enrichment plants in the U.S. Commercial considerations and other implications associated with Scenario A are presented in ER Section 1.1.2.5.1, Scenario A – LES and USEC Centrifuge Plants Are Built in the U.S.

The following sections present alternatives to Scenario A wherein it is postulated that LES does not proceed with the construction and operation of its proposed gas centrifuge enrichment facility in New Mexico. To provide perspective for these scenarios, Figure 1.1-8, Illustration of Supply and Requirements for Scenario A Without the Proposed NEF, illustrates the forecast uranium enrichment supply and requirements situation for Scenario A without the 3 million SWU per year LES centrifuge enrichment plant.

1.1.2.4.2 Scenario B – No LES; USEC Deploys Centrifuge Plant and Continues to Operate Paducah GDP

An alternative scenario is that the 3 million SWU per year LES centrifuge uranium enrichment plant is not built in the U.S. Since an initial motivating factor for building this plant was to increase the amount of indigenous uranium enrichment capacity in the U.S., the first alternative considered is one that also provides for additional enrichment capacity located in the U.S. Under this scenario, it is postulated that USEC continues with its current plans to build and operate a 3.5 million SWU per year commercial uranium enrichment plant. However, instead of shutting down the Paducah GDP upon completion of the new centrifuge enrichment plant, USEC continues to operate the Paducah GDP. This would result in the availability of excess supply that is equal to about 9% of annual requirements. Commercial considerations and other implications associated with Scenario B are presented in ER Section 1.1.2.5.2, Scenario B – No LES; USEC Deploys Centrifuge Plant and Continues to Operate Paducah GDP.

1.1.2.4.3 Scenario C – No LES; USEC Deploys Centrifuge Plant and Increases Centrifuge Plant Capability

This alternative scenario also assumes that the 3 million SWU per year LES centrifuge uranium enrichment plant is not built in the U.S. It also provides for additional enrichment capacity located in the U.S. Under Scenario C, it is postulated that USEC continues with its current plans to build and operate a 3.5 million SWU per year commercial uranium enrichment plant and also continues to operate the Paducah GDP on a temporary basis to compensate for the absence of the LES plant, while its commercial centrifuge plant is being gradually brought into operation. However, instead of stopping at 3.5 million SWU, USEC continues to add centrifuge enrichment capability to its new commercial centrifuge enrichment plant in order to compensate for the 3 million SWU per year of enrichment services that would have been provided by LES under Scenario A. Under Scenario C, USEC would need to operate the Paducah GDP for an additional two or three years in order to meet the enrichment services requirements that would have been supplied by LES and also to pre-produce inventories that would be needed to supplement centrifuge production during the expansion of the new plant. Commercial considerations and other implications associated with Scenario C are presented in ER Section

1.1.2.5.3, Scenario C – No LES; USEC Deploys Centrifuge Plant and Increases Centrifuge Plant Capability.

1.1.2.4.4 Scenario D – No LES; USEC Does Not Deploy Centrifuge Plant and Continues to Operate Paducah GDP

This alternative scenario assumes that the 3 million SWU per year LES centrifuge uranium enrichment plant is not built in the U.S. Under this scenario, it is postulated that USEC does not succeed with its current plans to build and operate a 3.5 million SWU per year commercial uranium enrichment plant. Instead, it assumed that USEC continues to operate the Paducah GDP on a long term basis at 6.5 million SWU per year to compensate for the absence of the 3 million SWU per year LES plant and the 3.5 million SWU per year USEC centrifuge plant. Commercial considerations and other implications associated with Scenario D are presented in ER Section 1.1.2.5.4, Scenario D – No LES; USEC Does Not Deploy Centrifuge Plant and Continues to Operate Paducah GDP.

1.1.2.4.5 Scenario E – No LES; Urenco Expands Centrifuge Capability in Europe

This alternative scenario also assumes that the 3 million SWU per year LES centrifuge uranium enrichment plant is not built in the U.S. However, it does not provide for additional enrichment capacity located in the U.S. Under this scenario, it is postulated that Urenco expands its existing European plants to compensate for the 3 million SWU per year of enrichment services that would have been provided by LES under Scenario A. Commercial considerations and other implications associated with Scenario E are presented in ER Section 1.1.2.5.5, Scenario E – No LES; Urenco Expands Centrifuge Capability in Europe.

1.1.2.4.6 Scenario F – No LES; Russia Increases Sales of the HEU-Derived SWU Under the U.S.-Russian Agreement

This alternative scenario assumes that the 3 million SWU per year LES centrifuge uranium enrichment plant is not built in the U.S. However, it does not provide for additional enrichment capacity located in the U.S. Under this scenario, it is postulated that Russia increases sales of the HEU-derived SWU to USEC under the U.S.-Russia Agreement to compensate for the 3 million SWU per year of enrichment services that would have been provided by LES under the Scenario A. Commercial considerations and other implications associated with Scenario F are presented in ER Section 1.1.2.5.6, Scenario F – No LES; Russia Increases Sales of the HEU-Derived SWU Under the U.S.-Russian Agreement.

1.1.2.4.7 Scenario G – No LES; Russia Is Allowed to Increase Sales Into Europe and the U.S.

This alternative scenario also assumes that the 3 million SWU per year LES centrifuge uranium enrichment plant is not built in the U.S. However, it does not provide for additional enrichment capacity located in the U.S. Under this scenario, it is postulated that Russia is allowed to increase its sales of commercial enrichment services into the U.S. and Europe to compensate for the 3 million SWU per year of enrichment services that would have been provided by LES under Scenario A. Commercial considerations and other implications associated with Scenario G

are presented in ER Section 1.1.2.5.7, Scenario G – No LES; Russian is Allowed to Increase Sales Into the U.S. and Europe.

1.1.2.4.8 Scenario H – No LES; U.S. HEU-Derived LEU is Made Available to the Commercial Market

This alternative scenario assumes that the 3 million SWU per year LES centrifuge uranium enrichment plant is not built in the U.S. Under this scenario, it is postulated that the U.S. government makes available additional HEU-derived LEU to the U.S. commercial market. However, as previously discussed in ER Section 1.1.2.4, Market Analysis of Supply and Requirements, it is not apparent that there are sufficient net equivalent enrichment services to compensate on a long term basis for the 3 million SWU per year of enrichment services that would have been provided by LES under Scenario A. Commercial considerations and other implications associated with Scenario H are presented in Section 1.1.2.5.8, Scenario H – No LES; HEU-Derived LEU is Made Available to the Commercial Market.

The scenarios described above do not represent the only long term possibilities for U.S and world enrichment supply. These scenarios do represent the most likely alternatives apparent at the present time based upon known and planned sources of supply. When examining the alternatives available if LES does not build a uranium enrichment plant in the U.S., only one alternative source of supply is considered in each alternative scenario. It is of course possible that several alternative supply sources could combine to fill the supply gap that is anticipated if the LES facility is not built. However, the approach taken allows the implications of each potential alternative source of supply to be examined individually. Nonetheless, the implications that are presented in ER Section 1.1.2.5, Commercial Considerations and Other Implications of Each Scenario, for each individual alternative scenario would still be relevant even if the alternatives are postulated to be used in combination.

1.1.2.5 Commercial Considerations and Other Implications of Each Scenario

As background for the discussion that follows, it is important to recognize that the owners and operators of nuclear power plants have two primary objectives in purchasing nuclear fuel, including uranium enrichment services (Rives, 2002; Culp, 2002). The first objective is security of supply – that is the ability of the purchaser to rely on their suppliers to deliver nuclear fuel materials and services on schedule and within technical specifications, according to the terms of the contract, for the contract's entire term. The second objective is to ensure a competitive procurement process – that is the ability of the purchaser to select from among multiple suppliers through a process that is conducive to fostering reasonable prices for the nuclear fuel materials and services that are purchased.

While one can postulate alternative supply scenarios, a number of which are presented in ER Section 1.1.2.4, there are commercial considerations and other implications associated with each such scenario, many of which can have a significant impact on the purchasers' ability to achieve the two primary purchasing objectives just presented.

Nuclear power plants are a significant component of the U.S. electric power supply system, providing 20% of the electricity that is consumed in the U.S. each year. The current U.S. market for uranium enrichment services is characterized by annual requirements of approximately 11.5 million SWU. During the eight year period 2003 through 2010 these requirements are forecast

to average 11.7 million SWU per year and during the ten year period 2011 through 2020 they are forecast to average 11.4 million SWU per year.

Indigenous supply from the single, aging, high cost, and electric power intensive Paducah GDP, which is operated by USEC, could potentially supply up to 6.5 million SWU of these requirements (approximately 55%), as was previously discussed in ER Section 1.1.2.4. 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 U.S. customers are being met with the Russian HEU-derived SWU that USEC purchases from Techsnabexport (Tenex) under its contract as executive agent for the U.S. government. Recognizing the numerous problems associated with long term dependence on the Paducah GDP, USEC has established plans to build a 3.5 million SWU per year commercial uranium enrichment plant within ten years, using an upgraded version of DOE centrifuge technology, and shut down the Paducah GDP. The balance of U.S. requirements for uranium enrichment services are under contract to Urenco and Eurodif, whose facilities are located in Europe (DOE, 2003a).

Operators of many nuclear power plants in the U.S., who are also the end users of uranium enrichment services in the U.S., 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 (i.e., Scenario A - both USEC and LES proceed with their respective plans to build new commercial centrifuge uranium enrichment plants in the U.S. and USEC ceases to operate the Paducah GDP). These U.S. purchasers find that as a result of trade actions and substantial duties imposed on Eurodif (FR, 2002a; FR, 2002b) that one source of competitive enrichment services for U.S. consumption has been significantly restricted 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, which has very high operating costs that impact the financial situation of USEC itself. 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 ((O'Neill, 2002). Also, there is concern 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. This is not to say that the technology would not be successful, but there is still much to be done, while the schedule announced by USEC is very aggressive and the economics remain unproven.

With this background the commercial considerations and other implications associated with each of the scenarios identified in ER Section 1.1.2.4 will be briefly addressed.

1.1.2.5.1 Scenario A – LES and USEC Centrifuge Plants Are Built in the U.S.

This scenario effectively replaces the 6.5 million SWU per year of enrichment services from the Paducah GDP, with a combination of 3.5 million SWU per year of enrichment services from a new USEC commercial centrifuge enrichment plant and 3 million SWU per year of enrichment services from a new LES centrifuge enrichment plant, leaving the total capability of indigenous U.S. primary supply effectively unchanged, but secure for the long term. As shown in Figure 1.1-7, Illustration of Supply and Requirements for Scenario A, economic world supply capability

is in approximate balance with long term world requirements for this scenario. Given the balance between the forecasts of world long term supply and requirements for uranium enrichment services, the poor economics and limited lifetime of the Paducah GDP, and the potential uncertainty surrounding the announced schedule and ultimate success of USEC's centrifuge program, there is a need for new U.S. enrichment capability that utilizes proven technology on an achievable schedule, as is provided for in Scenario A.

This scenario would result in the establishment of two long term sources of energy efficient, low cost, reliable uranium enrichment services in the U.S., which is positive with respect to the security of supply objective. In addition, the presence of two indigenous enrichment facilities in the U.S. should serve to foster competition and result in more predictable long term sources of uranium enrichment services, which would help meet the objective of ensuring a competitive procurement process for U.S. purchasers of these services. Two indigenous enrichment suppliers, each with the potential to expand capacity would also provide protection against the prospect of severe supply shortfalls if Russia decides against the extension of the current U.S.–Russia HEU Agreement beyond 2013.

1.1.2.5.2 Scenario B – No LES; USEC Deploys Centrifuge Plant and Continues to Operate Paducah GDP

Under this scenario, it is postulated that LES does not build a uranium enrichment plant in the U.S. Accordingly, there is a 2.8 million SWU per year supply deficit (i.e., 3 million SWU per year of LES capacity that is partially offset by 0.2 million SWU per year of excess during the 2016-2020 period even with LES) for which other sources of supply must compensate. This scenario further assumes that this supply capability is made up by USEC, which continues to operate the Paducah GDP. However, USEC would also be operating a 3.5 million SWU per year centrifuge enrichment plant and would be expected to continue with its obligations under the executive agent agreement to purchase 5.5 million SWU per year of Russian HEU-derived SWU. Given its existing customer base, it is expected that USEC would have to operate the Paducah GDP at less than 3 million SWU per year.

The negative financial impact of operating the Paducah GDP at low production levels (NF, 2002e) could threaten USEC's ability to fund its planned centrifuge plant, as well as create financial instability for the corporation.

While providing for indigenous U.S. supply, the resulting concerns associated with the age of the Paducah GDP, its significant requirements for electric power, the low level at which it would have to be operated, the resulting impact on USEC overall financial situation, and the lack of multiple competitive sources of indigenous U.S. supply, would not alleviate concerns among U.S. purchasers of enrichment services regarding either long term security of supply or ensuring a competitive procurement process for U.S. purchasers of these services. Scenario B is not viewed by LES as an attractive long term solution.

1.1.2.5.3 Scenario C – No LES; USEC Deploys Centrifuge Plant and Increases Centrifuge Plant Capability

Under this scenario, it is postulated that LES does not build a uranium enrichment plant in the U.S. Accordingly, there is a 2.8 million SWU per year supply deficit (i.e., 3 million SWU per year of LES capacity that is partially offset by 0.2 million SWU per year of excess during the 2016-

2020 period even with LES) for which other sources of supply must compensate. This scenario further assumes that this supply capability is made up by USEC, which would proceed to build and operate a 3.5 million SWU per year centrifuge enrichment plant, continue to operate the Paducah GDP on an interim basis longer than currently planned, and then rapidly increase its centrifuge enrichment plant capability to as much as 6.3 million SWU per year. USEC would also be expected to continue with its obligations under the executive agent agreement to purchase 5.5 million SWU per year of Russian HEU-derived SWU. The immediate expansion of the just completed centrifuge enrichment plant would be expected to be quite difficult for USEC from a financial perspective. However, with financial participation from external sources, it may be achievable. At the present time, USEC can provide no assurance that it will be able to fund its previously announced 3.5 million SWU per year commercial centrifuge enrichment plant. To assume funding sources for a near doubling of the plant capability would be highly speculative at this time, particularly without its having demonstrated yet that the centrifuge technology will perform as anticipated.

Scenario C, should it come to fruition, provides for indigenous U.S. supply, but only from a single USEC-owned enrichment plant. The remaining concerns are 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 and the outcome will not be known for a number of years. There would remain an ongoing absence of multiple competitive sources of indigenous U.S. supply. Accordingly, this may not alleviate concerns among U.S. purchasers of enrichment services regarding either long term security of supply or ensuring a competitive procurement process for U.S. purchasers of these services. Given its dependence on a yet to be proven technology and a single indigenous U.S. enricher, Scenario C is not viewed by LES as the most advantageous long term solution.

1.1.2.5.4 Scenario D – No LES; USEC Does Not Deploy Centrifuge Plant and Continues to Operate Paducah GDP

Under this scenario, it is postulated that neither LES nor USEC build uranium enrichment plants in the U.S. Accordingly, there is a 6.3 million SWU per year supply deficit (i.e., 3 million SWU per year of LES capacity, and 3.5 million SWU per year of USEC centrifuge capacity that are partially offset by 0.2 million SWU per year of excess during the 2016-2020 period even with LES and USEC centrifuge) for which other sources of supply must compensate. This scenario further assumes that this missing supply capability is primarily made up by USEC, which continues to operate the Paducah GDP at 6.5 million SWU per year. Given the unfavorable economics of continued GDP operation, this would be viewed as having a high economic cost associated with it. Obviously, USEC views continued operation of the Paducah GDP as being unacceptable or undesirable, as evidenced by its announcement to build a commercial centrifuge enrichment plant and shut down the Paducah GDP (TPS, 2002; Spurgeon, 2002).

At some point in time, it is reasonable to assume that the Paducah GDP must ultimately be replaced. Accordingly, Scenario D does not represent a permanent solution, but only a postponement of the time when new uranium enrichment capacity must be constructed in the U.S. The cost of such a postponement is likely to be quite high and the risk of supply disruption in the U.S. would increase as the Paducah GDP continues to get older.

While providing for indigenous U.S. supply, the concerns associated with the age of the Paducah GDP, its significant electric power requirements, the resulting impact on USEC's

overall financial situation, and the lack of multiple competitive sources of indigenous U.S. supply, would not alleviate concerns among U.S. purchasers of enrichment services regarding either long term security of supply or ensuring a competitive procurement process for U.S. purchasers of these services. Scenario D is not viewed by LES as a viable long term solution.

1.1.2.5.5 Scenario E – No LES; Urenco Expands Centrifuge Capability in Europe

Under this scenario, it is postulated that LES does not build a uranium enrichment plant in the U.S. Instead it is postulated that Urenco expands its centrifuge capability in Europe to offset the loss of 3 million SWU per year of enrichment capability in the U.S. While this may be physically possible, from a commercial perspective this may be unacceptable to Urenco for a number reasons. For example, there are a variety of risks associated with such factors as uncertain level of sales that might be achieved for Urenco in the U.S. market, significant concentration of its enrichment business in a single market, unpredictable changes in currency exchange rates, transatlantic shipping, and unknown future trade actions that could be undertaken by a protective U.S. government on behalf of its indigenous enricher. Furthermore, its decision to enter the LES partnership indicates that Urenco perceives building new centrifuge capability in the U.S. as a more attractive option to expanding its centrifuge enrichment capability in Europe (Scenario E). Of course, if enrichment prices were high enough and contract terms long enough, the above mentioned commercial risks could potentially be overcome from the enricher’s perspective. However, such a situation would not be reviewed as favorable by U.S. purchasers.

Scenario E would not alleviate the desire on the part of U.S. purchasers for either additional indigenous uranium enrichment capability in the U.S. or provide for a second source of supply competition located in the U.S. Consequently, neither the security of supply objective nor the objective of ensuring a competitive procurement process for U.S. purchasers of these services could be assured.

1.1.2.5.6 Scenario F – No LES; Russia Increases Sales of the HEU-Derived SWU Under the U.S.-Russian Agreement

Under this scenario, it is postulated that LES does not build a 3 million SWU per year uranium enrichment plant in the U.S. Instead it is postulated that Russia increases its sales of the HEU-derived SWU to USEC under the U.S.-Russian Agreement. Given that uranium enrichment services from the Paducah GDP are preferentially used by USEC to meet contract obligations to its non-U.S. customers, this scenario implies that USEC could potentially be meeting approximately 75% ([5.5+3]/11.4) of U.S. post 2010 annual requirements for uranium enrichment services with Russian HEU-derived SWU. This would appear to introduce security of supply risks on a national level (IMPF, 2002).

While Scenario F may be physically possible, it should be recognized that the net addition of 3 million SWU per year derived from blending down the Russian HEU would require an additional 2.3 million SWU per year in enrichment capacity to prepare blend stock. Incidently, this is equivalent to the combination of the 1.6 million SWU per year that is being used to enrich tails for the European enrichers, as shown in Table 1.1-5, and the 0.7 million SWU per year of Russian capability that is shown as being constrained (Table 1.1-6, Ref. 14). Furthermore, accelerating the use of the Russian HEU by approximately 55% (=3.0/5.5) would result in its

being exhausted much earlier than previously anticipated, quite likely before 2020, based upon present estimates of available Russian HEU (Albright, 1997). Thus the issue of replacement capacity for LES would not have been solved, only postponed. There is also no guarantee that Russia will make the additional HEU needed to implement this option available in the first place.

Scenario F would not alleviate the desire on the part of U.S. purchasers for either additional indigenous uranium enrichment capability in the U.S. or provide for a second source of supply competition located in the U.S. Consequently, neither the security of supply objective nor the objective of ensuring a competitive procurement process for U.S. purchasers of these services could be assured.

1.1.2.5.7 Scenario G – No LES; Russia Is Allowed to Increases Sales Into the U.S. and Europe

Under this scenario, it is postulated that LES does not build a uranium enrichment plant in the U.S. Instead it is postulated that Russia increases its sales of commercial SWU to Western countries, including the U.S. While 3 million SWU per year of additional supply would be required to compensate for the lack of the proposed LES facility, Russia presently has only 2.3 million SWU per year in available and physically acceptable enrichment capacity. This includes the combination of the 1.6 million SWU per year that is presently used to enrich tails for the European enrichers, as shown in Table 1.1-5, Ref. 15, and the 0.7 million SWU of Russian capability that is shown as being constrained in the future (Table 1.1-5, Ref. 14). Some reports have suggested that Russia might be able to expand its export capability by 25% to 30% (NMR, 2002a; Korotkevich, 2003), which would be equivalent to 2.5 to 3.0 million SWU per year in exportable enrichment services, by replacing its older less efficient centrifuges with its higher capacity generation of centrifuges. However, this is not certain. Russian commercial enrichment sales in the U.S. have been subject to trade restrictions for the past ten years. If the current suspension agreement ends in 2004, the original antidumping investigation could resume. USEC and its labor unions have given no indication that they would cease their opposition to new imports of Russian commercial enrichment services into the U.S. Additionally, the agreement between USEC and DOE that was executed in 2002 appears to allow USEC to cease operation of the Paducah GDP without penalty under this scenario (USEC, 2002c).

Scenario G would not alleviate the desire on the part of U.S. purchasers for either additional indigenous uranium enrichment capability in the U.S. or provide for a second source of supply competition located in the U.S. Consequently, neither the security of supply objective nor the objective of ensuring a competitive procurement process for U.S. purchasers of these services could be assured.

1.1.2.5.8 Scenario H – No LES; U.S. HEU-Derived LEU is Made Available to the Commercial Market

Under this scenario, it is postulated that LES does not build a uranium enrichment plant in the U.S. Instead it is postulated that U.S. HEU-derived LEU is made available to the commercial market. As discussed in ER Section 1.1.2.3, Current and Potential Future Services of Enrichment Services, the U.S. defense establishment is reported to hold approximately 490 MT (540 tons) HEU in various forms that have not been declared surplus to U.S. government

needs. However, there has been no indication if some or all of this material may be made available for commercial use, and if so on what schedule. Any forecast that includes use of the enrichment services that may be associated with this material must be recognized as being highly speculative. Therefore, LES does not consider it to be prudent to include it in this market analysis. Furthermore, to the extent that some or all of the equivalent uranium enrichment services associated with this material were assumed to become available, it is important to remember that blendstock must be prepared.

Based on the discussion presented in ER Section 1.1.2.3, the net increase in enrichment services that could be obtained from any additional DOE HEU-derived LEU would be only 24% of the SWU contained in the LEU. Therefore even if it were assumed that all 490 MT (540 tons) HEU were made available, at the present conversion rate of 0.184 million SWU per MT HEU, multiplied by 24%, the net increase in supply would be only 22 (=490x0.184x0.24) million SWU. This is about two years of U.S. total requirements for enrichment services. If this were spread out over 20 years, it would add a net 1.1 million SWU per year, or less than 3% to the available world supply. This still leaves a deficit of 1 to 2 million SWU per year during the postulated 20 years over which this material would be used.

The issue of replacement capacity for LES would not have been solved under Scenario H. Consequently, neither the security of supply objective nor the objective of ensuring a competitive procurement process for U.S. purchasers of these services could be assured.

1.1.3 Conclusion

Including the scenario that is being actively pursued at the present time, Scenario A, a total of eight alternative supply scenarios have been identified and summarized in ER Section 1.1.2.4, Market Analysis of Supply and Requirements, with respect to their ability to meet future long term nuclear power plant operating requirements for uranium enrichment services. In addition, a number of commercial considerations and other implications for each scenario have been identified in ER Section 1.1.2.5, Commercial Considerations and Other Implications of Each Scenario. When the critical nuclear fuel procurement objectives, security of supply and ensuring a competitive procurement process for U.S. purchasers of these services are considered, it becomes apparent that for long term planning purposes those alternatives that rely upon either additional Russian or U.S. HEU-derived SWU (Scenarios F and H) or additional use of Russian commercial enrichment services (Scenario G) are inadequate. While further expansion of Urenco enrichment facilities in Europe to meet what would be potentially unfilled U.S. requirements (Scenario E) might on the surface be viewed as a satisfactory approach, it does not contribute substantially to meeting the objective of improved security of supply through the construction of additional indigenous U.S. supply capability. In addition, as a result of factors that are largely outside the control of either U.S. purchasers or Urenco, as identified in ER Section 1.1.2.5.5, Scenario E – No LES; Urenco Expands Centrifuge Capability in Europe, this approach may not contribute to meeting the objective of ensuring a competitive procurement process for U.S. purchasers of these services. In addition, the commercial risks, as also discussed in ER Section 1.1.2.5.5, may be unacceptable to Urenco.

This leaves Scenarios A through D, which provide for the use of either existing or new indigenous uranium enrichment capacity in the U.S. for further consideration. Among these alternatives, Scenarios A and C involve the long term use of centrifuge technology for uranium enrichment. In Scenario A, LES deploys and operates 3 million SWU per year of centrifuge

enrichment capability while USEC deploys and operates 3.5 million SWU per year of centrifuge enrichment capability. In Scenario C, USEC ultimately deploys about 6.5 million SWU per year of centrifuge enrichment capability and LES does not proceed.

In contrast, Scenarios B and D rely either in part or entirely upon the long term use of the Paducah GDP. In Scenario B, USEC deploys and operates 3.5 million SWU per year of centrifuge enrichment capability, which it supplements by the continued operation of the Paducah GDP at a level of less than 3 million SWU per year, while LES does not proceed. In Scenario D, neither LES nor USEC deploy new centrifuge enrichment capability, and USEC continues to operate the Paducah GDP at 6.5 million SWU per year. LES believes that the approach that best serves the U.S. owners and operators of nuclear power plants and ultimately the consumers of electricity in the U.S. would be Scenario A. This approach, which is being actively pursued at the present time, provides for the construction and operation of two new uranium enrichment plants in the U.S., using centrifuge technology that would significantly improve security of supply, with ongoing competition from both USEC and LES, as well as Urenco and eventually Cogema (on behalf of Areva/Eurodif) ensure a competitive procurement process for U.S. purchasers of these services. The presence of multiple suppliers with the capability to increase capacity to meet potential supply shortfalls greatly enhances security of supply for both generators and end-users of nuclear electric generation in the U.S.

TABLES

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Table 1.1-1 Summary of World Nuclear Power Installed Capacity Forecast (GWe)
Page 1 of 1

Year	U.S.	Western Europe	CIS & E. Europe	East Asia	Other	World
2002	97.3	126.9	45.1	68.2	19.3	356.8
2005	99.1	125.0	48.5	75.6	23.4	371.6
2010	102.7	120.2	49.7	86.5	28.6	387.7
2015	100.0	112.6	49.8	96.6	30.0	389.0
2020	101.7	104.4	47.4	105.0	31.6	390.1

Table 1.1-2 Forecast of Annual Average Rate of Change in Installed Nuclear Power Capacity

World Region	Annual Rate of Change to 2010	Annual Rate of Change after 2010
United States	0.7%	-0.1%
Western Europe	-0.7%	-1.4%
East Asia	3.0%	2.0%
CIS/Eastern Europe	1.2%	-0.5%
Other	5.0%	1.0%
World	1.0%	0.1%

Table 1.1-3 World Average Annual Uranium Enrichment Requirements Forecast After Adjustment for Plutonium Recycle in MOX Fuel (Million SWU)

Year	U.S.	Western Europe	CIS & E. Europe	East Asia	Other	World
2002	11.5	11.2	8.2	7.4	0.5	38.9
2003-2005	11.6	11.3	8.5	8.2	0.6	40.2
2006-2010	11.8	11.2	8.6	9.1	0.9	41.6
2011-2015	11.4	10.8	8.2	9.9	1.0	41.4
2016-2020	11.4	10.4	7.9	10.8	1.1	41.6

Table 1.1-4 LES Forecast of Adjustment for Plutonium Recycle in MOX Fuel to Uranium Enrichment Services (Million SWU)

Period	U.S.	World
2002	0.0	0.7
2003-2005	0.0	0.8
2006-2010	0.0	1.0
2011-2015	0.3	1.5
2016-2020	0.3	1.5

Table 1.1-5 Current and Potential Future Sources of Uranium Enrichment Services

Page 1 of 2

Ref.	Source	Technology	Current Annual Physical Capability Millions SWU	Annual Economically Competitive and Usable Capability Million SWU 2003	2016	Comments Regarding Potential Future Action
1	Inventories	Inventory	0.9	0.9	0.5	0.5 in 2005 onward. Includes existing LEU inventories, most of which will be used internally.
2	Urenco (existing and planned expansion)	Centrifuge	6.0	6.0	8.0	Expected to be 6.5 by end of 2003. For 2016 assumes replacement and expansion to 8.0 in Europe.
3	Eurodif (existing)	Diffusion	10.8	8.0	0.0	Scheduled to ramp down beginning in 2007 as replacement centrifuge plant begins operation.
4	USEC (existing)	Diffusion	8.0	6.5	0.0	Scheduled to ramp down beginning in 2010 as replacement centrifuge plant begins operation.
5	Russian/Tenex (commercial)	Centrifuge	11.1	11.1	11.6	Approx. 8.4 is used to meet CIS and Eastern European requirements, approx. 2.7 is exported to Western countries.
6	Other (existing)	Both	1.9	1.9	1.0	Primarily Japan & PRC for internal use; expected to decline to approx. 1.0 by 2010.
7a	Russian HEU-derived (includes 4.2 from blendstock)	Inventory down blending required	5.5	5.5	5.5	U.S.-Russian Agreement ends in 2013; may/may not be extended.
7b	Russian-HEU derived (blended with RepU)	Inventory down blending required	0.2	0.2	0.6	Russian HEU that is blended directly with European RepU under Framatome ANP contract.
8	USEC-DOE HEU-derived	Inventory, down blending required	0.6	0.6	0.0	Present supply is expected to be exhausted by 2006.
9	DOE HEU-derived (potential source)	Inventory, down blending required	0.0	0.0	0.3	0.3 expected beginning in 2005, ramping up to 0.7 between 2009 and 2012, then back to 0.3.
10	Eurodif (new)	Centrifuge	0.0	0.0	7.5	Scheduled to ramp up beginning in 2007, while ramping down existing diffusion capacity to achieve and maintain total capacity of 7.5 by 2016.
11	LES (new)	Centrifuge	0.0	0.0	3.0	Scheduled to ramp up beginning in late 2008, to achieve and maintain total capacity of 3.0 by 2013.
12	USEC (new)	Centrifuge	0.0	0.0	3.5	Expected to ramp up beginning in 2009 to achieve and maintain total capacity of 3.5 by 2012.
13	Other (new)	Centrifuge	0.0	0.0	0.7	Primarily Peoples Republic of China (PRC) capacity for internal use; expected to increase to match internal requirements.

Table 1.1-5 Current and Potential Future Sources of Uranium Enrichment Services

Page 2 of 2

Ref.	Source	Technology	Current Annual Physical Capability Millions SWU	Annual Economically Competitive and Usable Capability Million SWU 2003	2016	Comments Regarding Potential Future Action
14	Russian (constrained)	Centrifuge	1.5	0.0	0.0	Expected to ramp down to achieve and maintain total of 0.7 by 2007 as exports increase.
15	Russian (tails enrichment)	Centrifuge	1.6	0.0	0.0	Also constrained by Western trade policies.
16	Russian (outside of specifications for use in nuclear power plants)	Centrifuge	1.6	0.0	0.0	Excess to internal needs and unsuitable for export; used to enrich tails to create uranium for internal use.
	Total		49.6	40.7	42.2	

Table 1.1-6 Summary of Current Russian Sources and Uses of Enrichment Services

Source/Use	Current Annual Physical Capability Million SWU	Cross Reference to Table 1.1-5
Material Meeting Western Specifications		
• Exported to Western Countries	2.7	(5)
• Used for HEU Blendstock	4.2	(7a)
• Used to enrich tails for European enrichers	1.6	(15)
• Constrained material excess	1.5	(14)
Material Not Meeting Western Specifications		
• Used in CIS and Eastern European Nuclear Power Plants	8.4	(5)
• Used internally to process tails	1.6	(16)
TOTAL	20.0	
Russian HEU-derived SWU in excess of Blendstock (under U.S.-Russian Agreement)	1.3	(7a)
Russian HEU-derived SWU (blended with RepU for European utilities)	0.2	(7b)

Table 1.1-7 Current and Potential Future Sources of Uranium Enrichment Services Arranged According to Geographical Locations

Table 1.1-5 Ref.	Source	Geographical Location	Current Annual Physical Capability Million SWU	Annual Economically Competitive and Usable Capability Million SWU 2003	2016
4	USEC (existing)	U.S.	8.0	6.5	0.0
8	USEC – DOE HEU-derived	U.S.	0.6	0.6	0.0
9	DOE HEU-derived (potential source)	U.S.	0.0	0.0	0.3
11	LES (new)	U.S.	0.0	0.0	3.0
12	USEC (new)	U.S.	0.0	0.0	3.5
	Subtotal U.S.		**8.6**	**7.1**	**6.8**
2	Urenco (existing and planned expansion)	Europe	6.0	6.5	8.0
3	Eurodif (existing)	Europe	10.8	8.0	0.0
10	Eurodif (new)	Europe	0.0	0.0	7.5
	Subtotal Europe		**16.8**	**14.5**	**15.5**
5	Russian/Tenex (commercial)	Russia	11.1	11.1	11.6
7a	Russian HEU-derived (includes 4.2 from blendstock)	Russia	5.5	5.5	5.5
7b	Russian HEU-derived (blended with RepU)	Russia	0.2	0.2	0.6
14	Russian (constrained)	Russia	1.5	0.0	0.0
15	Russian (tails enrichment)	Russia	1.6	0.0	0.0
16	Russian (outside of specifications for use in nuclear power plants)	Russia	1.6	0.0	0.0
	Subtotal Russia		**21.3**	**16.8**	**17.7**
6	Other (existing)	East Asia (primarily)	1.9	1.9	1.0
13	Other (new)	East Asia (primarily)	0.0	0.0	0.7
	Subtotal East Asia		**1.9**	**1.9**	**1.7**
1	Inventories	Dispersed	0.9	0.9	0.5

Table 1.1-8 Current and Potential Future Sources of Uranium Enrichment Services Arranged According to Commercial Ownership or Control

Table 1.1-5 Ref.	Source	Commercial Ownership or Control	Current Annual Physical Capability Million SWU	Annual Economically Competitive and Usable Capability Million SWU 2003	2016
4	USEC (existing)	USEC	8.0	6.5	0.0
8	USEC – DOE HEU-derived	USEC	0.6	0.6	0.0
12	USEC (new)	USEC	0.0	0.0	3.5
7	Russian HEU-derived (includes 4.2 from blendstock)	USEC	5.5	5.5	5.5
	Subtotal USEC		**14.1**	**12.6**	**9.0**
9	DOE HEU-derived (potential source)	DOE	0.0	0.0	0.3
	Subtotal DOE		**0.0**	**0.0**	**0.3**
11	LES (new)	LES	0.0	0.0	3.0
	Subtotal LES		**0.0**	**0.0**	**3.0**
2	Urenco (existing/new)	Urenco	6.0	6.5	8.0
	Subtotal Urenco		**6.0**	**6.5**	**8.0**
3	Eurodif (existing)	Eurodif	10.8	8.0	0.0
10	Eurodif (new)	Eurodif	0.0	0.0	7.5
	Subtotal Eurodif		**10.8**	**8.0**	**7.5**
5	Russian/Tenex (commercial)	Russia	11.1	11.1	11.6
7b	Russian HEU-derived (blended with RepU)	Russia	0.2	0.2	0.6
14	Russian (constrained)	Russia	1.5	0.0	0.0
15	Russian (tails enrichment)	Russia	1.6	0.0	0.0
16	Russian (outside of specifications for use in Western nuclear power plants)	Russia	1.6	0.0	0.0
	Subtotal Russia		**16.0**	**11.3**	**12.2**
6	Other (existing)	PRC/Japan (primarily)	1.9	1.9	1.0
13	Other (new)	PRC/Japan (primarily)	0.0	0.0	0.7
	Subtotal Other PRC/Japan (primarily)		**1.9**	**1.9**	**1.7**
1	Inventories	Dispersed	0.9	0.9	0.5

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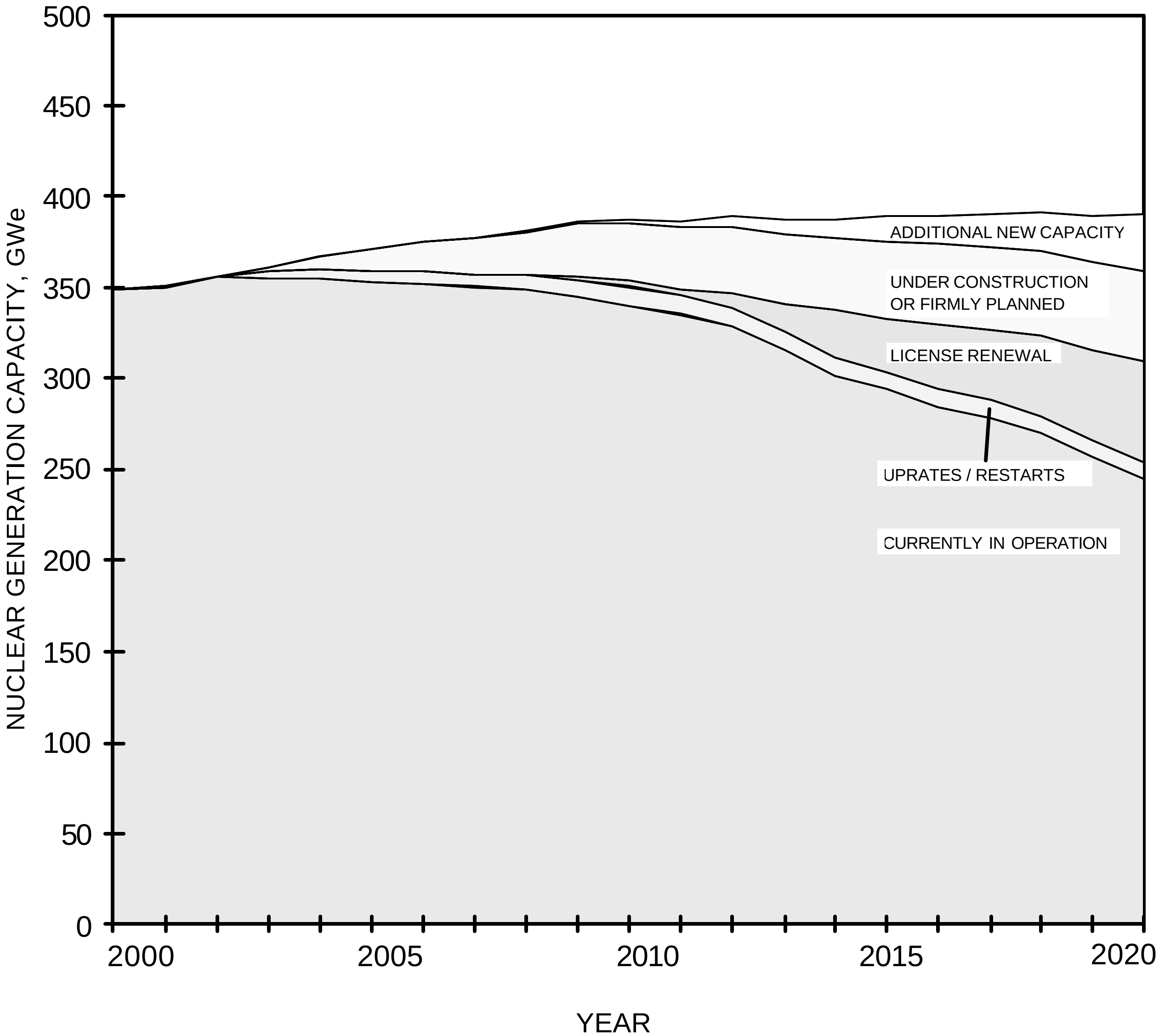
FIGURES



REFERENCE NUMBER
Figure 1.1—1.doc

FIGURE 1.1-1

FORECAST AND COMPOSTITION OF WORLD
NUCLEAR GENERATION CAPACITY
ENVIRONMENTAL REPORT

REVISION DATE: DECEMBER 2003

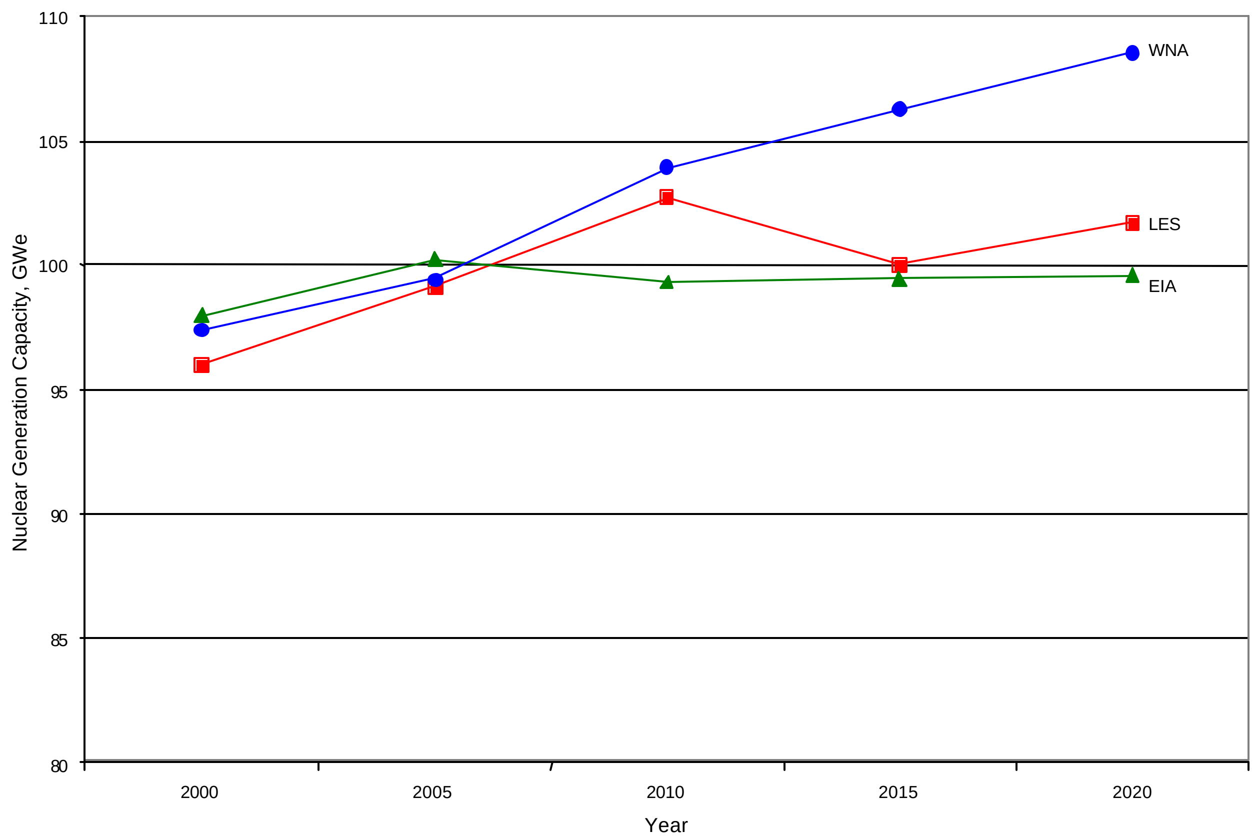


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Figure 1.1–2.doc

FIGURE 1.1-2

COMPARISON OF FORECASTS OF
U.S. NUCLEAR GENERATION CAPACITY
ENVIRONMENTAL REPORT

REVISION DATE: DECEMBER 2003

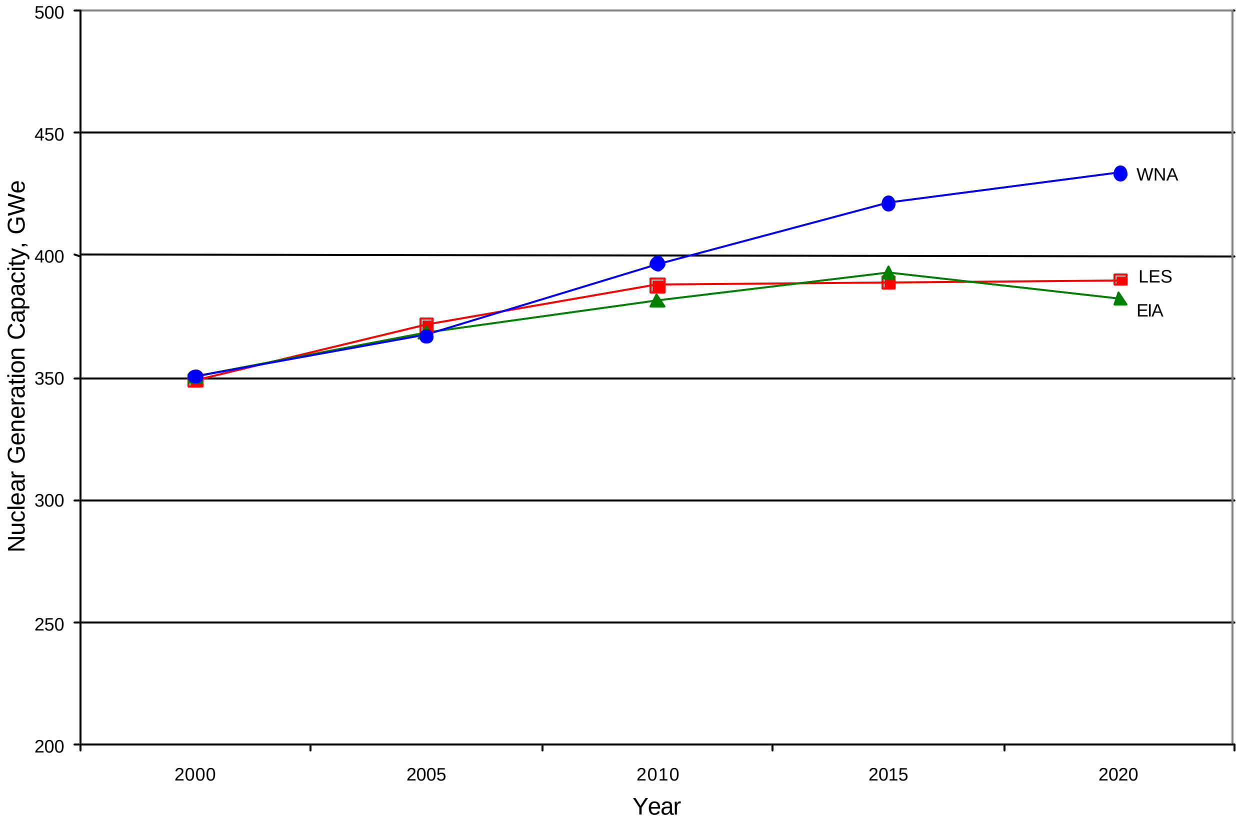

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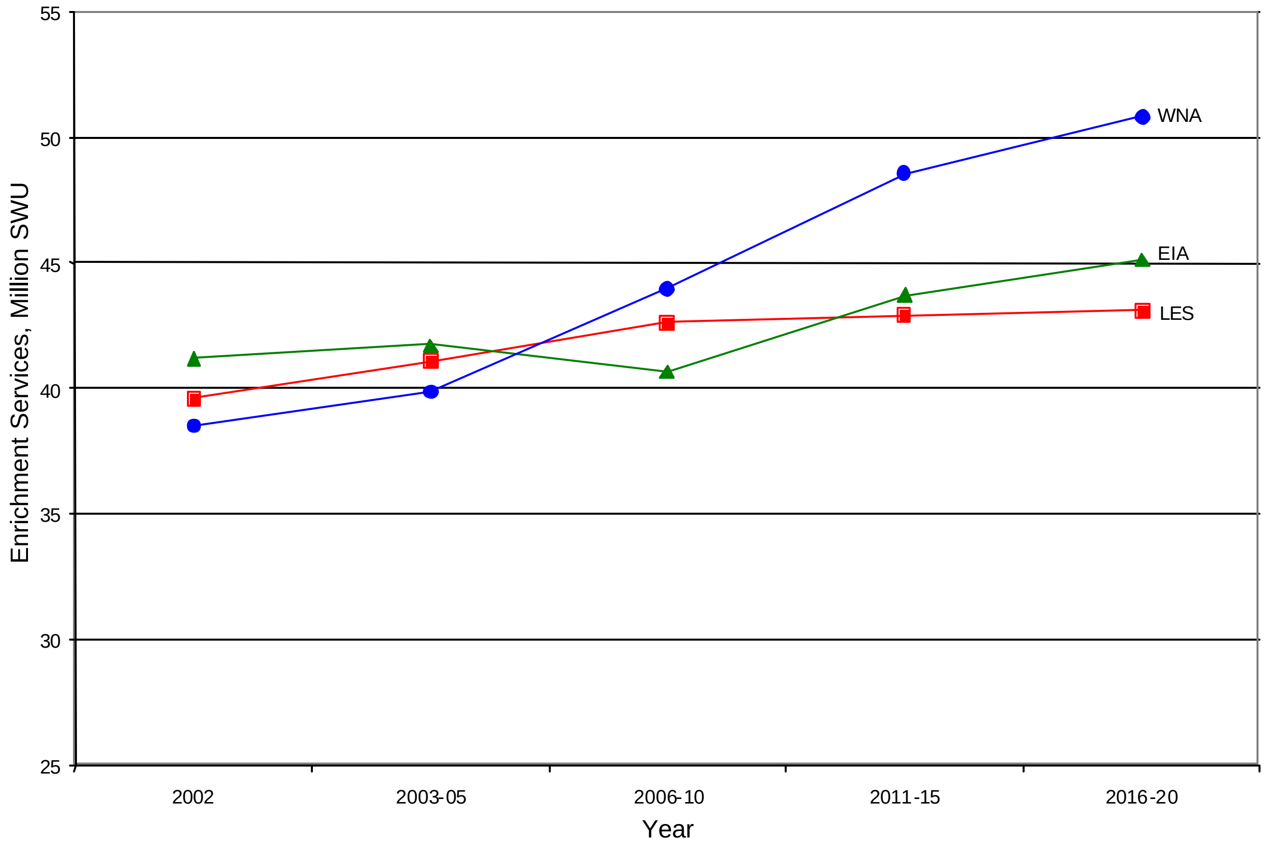
Figure 1.1–3.doc

FIGURE 1.1–3

COMPARISON OF FORECASTS OF WORLD NUCLEAR GENERATION CAPACITY

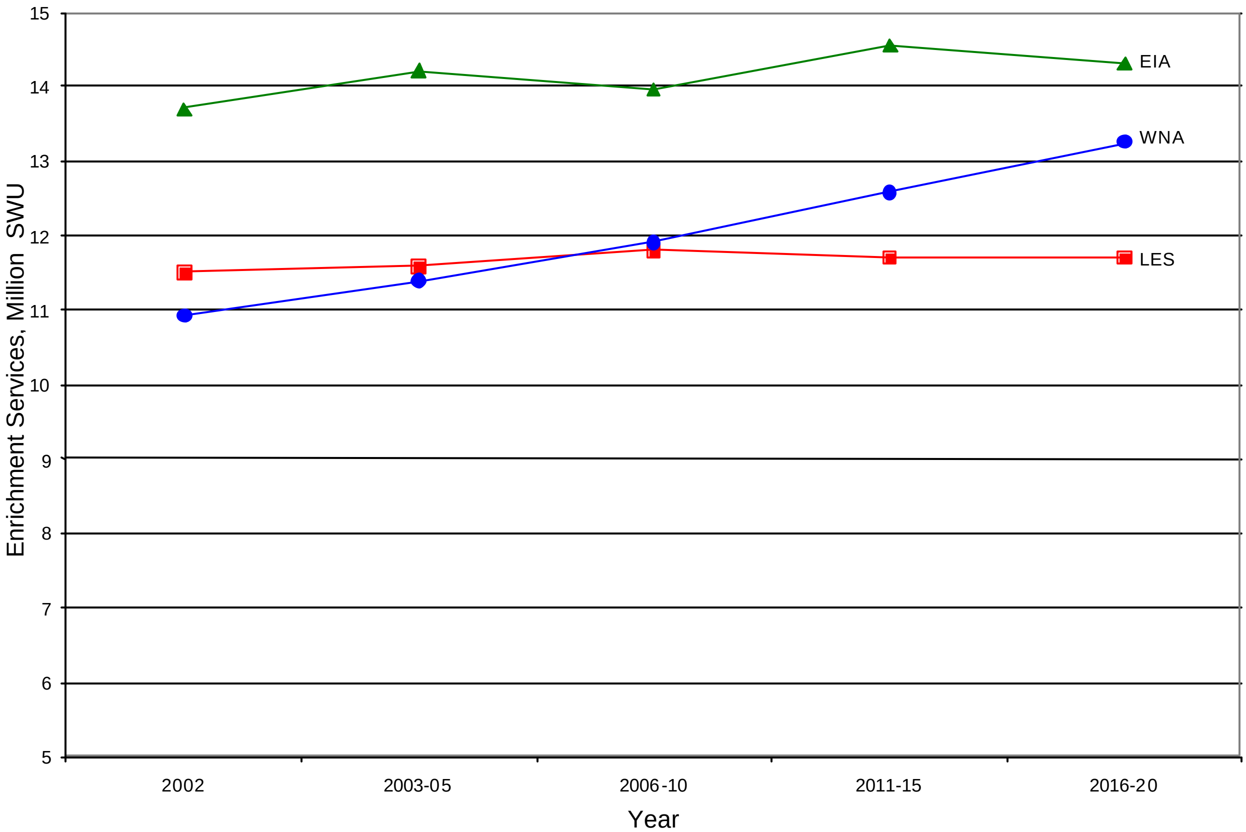
ENVIRONMENTAL REPORT

REVISION DATE: DECEMBER 2003



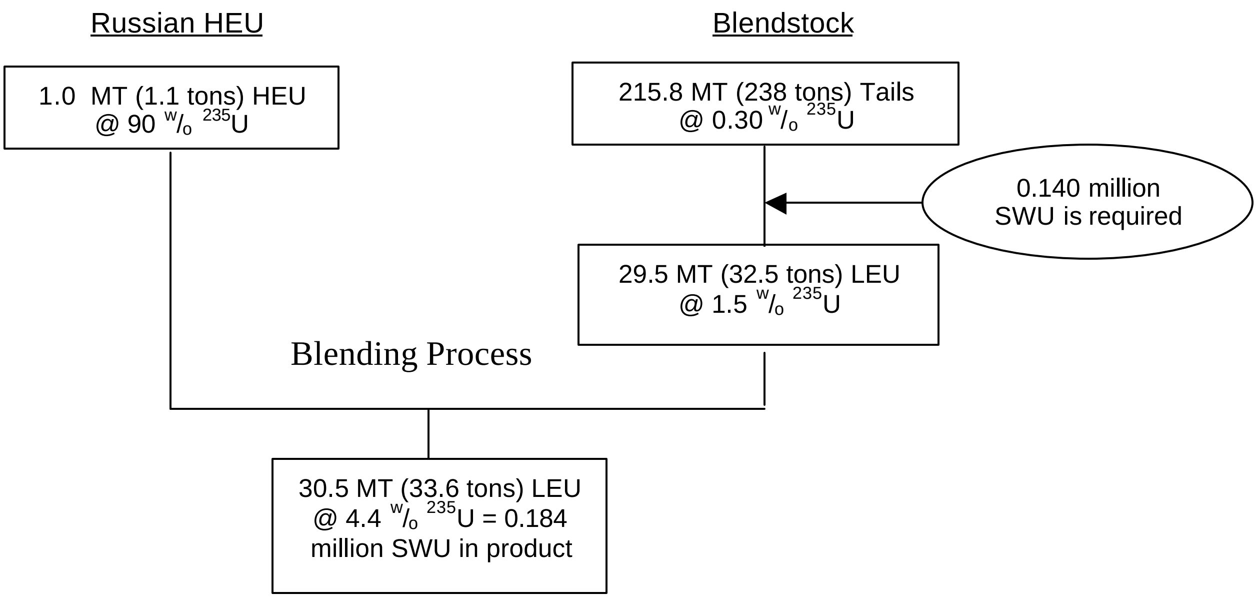
REFERENCE NUMBER
Figure 1.1-4.doc

FIGURE 1.1-4
COMPARISON OF FORECAST OF WORLD AVERAGE ANNUAL URANIUM ENRICHMENT REQUIREMENTS FORECASTS, UNADJUSTED FOR PLUTONIUM RECYCLE IN MOX FUEL
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



REFERENCE NUMBER
Figure 1.1-5.doc

FIGURE 1.1-5
COMPARISON OF FORECAST OF U.S. AVERAGE ANNUAL URANIUM ENRICHMENT REQUIREMENTS FORECAST, UNADJUSTED FOR PLUTONIUM RECYCLE IN MOX FUEL
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



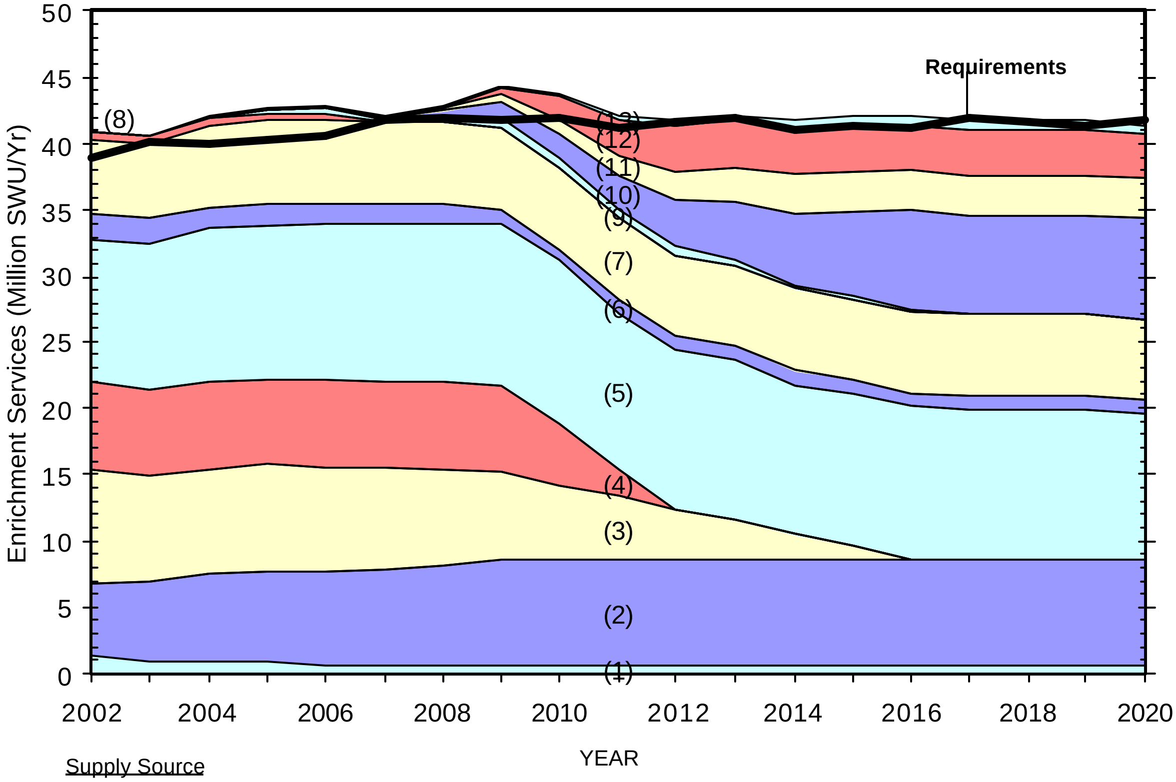
REFERENCE NUMBER
Figure 1.1–6.doc

FIGURE 1.1-6

RELATIONSHIP AMONG HEU, BLENDSTOCK, PRODUCT

ENVIRONMENTAL REPORT

REVISION DATE: DECEMBER 2003

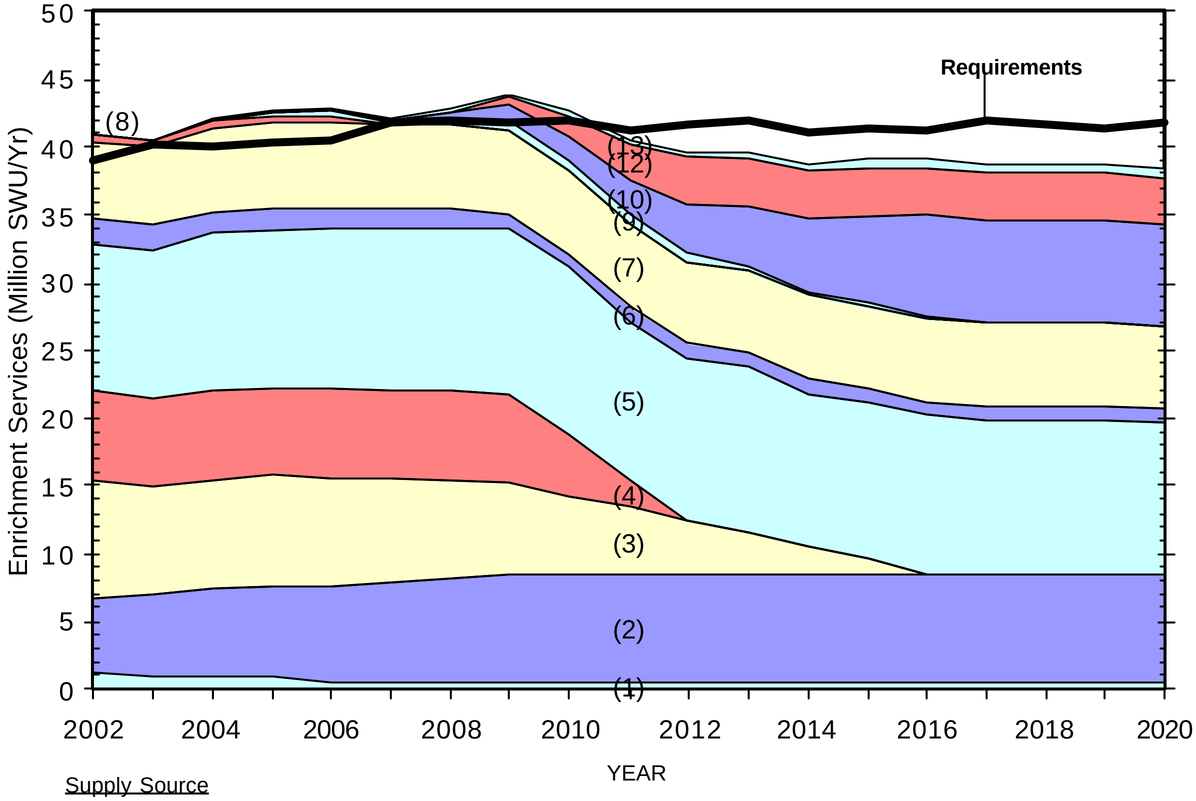


Supply Source

(1) Inventory
(2) Urenco
(3) Eurodif (existing)
(4) USEC (existing)
(5) Russian/Tenex
(6) Other
(7) Russian HEU
(8) USEC DOE HEU
(9) DOE HEU
(10) Eurodif (new)
(11) LES (new)
(12) USEC (new)
(13) Other (new)

REFERENCE NUMBER
Figure 1.1–7.doc

FIGURE 1.1-7
ILLUSTRATION OF SUPPLY AND REQUIREMENTS FOR SCENARIO A
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



Supply Source

(1) Inventory
(2) Urenco
(3) Eurodif (existing)
(4) USEC (existing)
(5) Russian/Tenex
(6) Other
(7) Russian HEU
(8) USEC DOE HEU
(9) DOE HEU
(10) Eurodif (new)
(11) LES (new) - NA
(12) USEC (new)
(13) Other (new)

REFERENCE NUMBER
Figure 1.1–8.doc

FIGURE 1.1-8
ILLUSTRATION OF SUPPLY AND REQUIREMENTS FOR SCENARIO A WITHOUT THE PROPOSED NEF
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003

1.2 PROPOSED ACTION

The proposed action is the issuance of an NRC license under 10 CFR 70 (CFR, 2003b) for the construction and operation of a uranium enrichment facility 8 km (5 mi) east of Eunice, New Mexico in Lea County. The NEF will use the gas centrifuge process to separate natural uranium hexafluoride feed material containing approximately 0.71 Uranium-235 (^{235}U) into a product stream enriched up to 5.0 $^{w}/_{o}$ ^{235}U and a depleted UF_6 stream containing approximately 0.2 to 0.34 $^{w}/_{o}$ ^{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 (8) years. Construction will be conducted in six phases. Operation will commence after the completion of the first cascade in the first Cascade Hall. The facility is licensed for 30 years of operation. Decommissioning and Decontamination (D&D) is projected to take nine (9) 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.

1.2.1 The Proposed Site

The proposed NEF site is located in Southeast New Mexico, approximately 32 km (20 mi) south of Hobbs, New Mexico (population 28,657). The site is located in Lea County, approximately 0.8 km (0.5 mi) west of the Texas state border, 51 km (32 mi) west-north-west of Andrews, Texas (population 10,182) and 523 km (325 mi) southeast of Albuquerque, New Mexico (population 712,728). The nearest large population center (>100,000 population) and commercial airport is the Midland-Odessa, Texas area which is approximately 103 km (64 mi) to the southeast. The approximate center of the NEF is located at latitude 32 degrees, 26 min, 1.74 sec North and longitude 103 degrees, 4 min, 43.47 sec West. Refer to Figure 1.2-1, Location of Proposed Site and Figure 1.2-2, NEF Location Relative to Population Centers Within 80 Kilometers (50 Miles).

Lea County is situated at an average elevation of 1,220 m (4,000 ft) above mean sea level (msl) and is characterized most often by its flat topography. Lea County covers 11,381 km^2 (4,393 mi^2) or approximately 1,138,114 ha (2,822,522 acres) which is three times the size of Rhode Island and only slightly smaller than Connecticut. From north to south, Lea County spans 173 km (108 mi) and 70 km (44 mi) from east to west spans at its widest point.

The proposed NEF site location is Section 32, Township 21S, Range 38E. The site is located approximately 8 km (5 mi) east of the nearest city, which is Eunice, New Mexico (population 2,562). Eunice is located at the crossing junction of New Mexico Highway 207 and New Mexico Highway 234, 32 km (20 mi) south of Hobbs, New Mexico. New Mexico Highway 234 (east-west) and New Mexico Highway 18 (north-south) are the major transportation routes near the site. These two highways intersect about 6.4 km (4 mi) west of the proposed NEF site. An active railroad line operated by the Texas-New Mexico Railroad runs parallels to New Mexico Highway 18 and just east of Eunice within 5.8 km (3.6 mi) of the NEF site. There is also an active railroad spur line that runs from the Texas-New Mexico Railroad, along the North boundary of the NEF site and terminates at the Waste Control Specialists (WCS) facility, just across the New Mexico-Texas border.

The NEF site is currently owned by the State of New Mexico and is being acquired by LES through a State Land Swap arrangement. Until such time the land swap is completed, the State of New Mexico has granted a 35-year easement to LES for Section 32 for site access and control. The site is near the WCS. WCS is situated just across the Texas State border. WCS possesses a radioactive materials license from Texas, an NRC Agreement state. The facility is licensed to treat and temporarily store low-level and mixed waste. WCS is also permitted to treat and dispose of hazardous waste. Land Section 33, currently owned by WCS, is under consideration for purchase by LES and serves as a natural buffer zone between WCS and the NEF. LES has no current plans to erect buildings or structures on Section 33 should this land purchase be consummated.

The site is bordered to the north by a sand/aggregate quarry owned by Wallach Concrete, Inc.. The quarry owner leases land space to a “produced water” reclamation company that maintains three small “produced water” lagoons. New Mexico Highway 234 borders the NEF site on the south. Lea County operates a landfill on the south side of New Mexico Highway 234, approximately 1 km (0.6 mi) from the center of the NEF site.

The NEF site is relatively flat with slight undulations in elevation, with an elevation profile ranging from 1,033 to 1,045 m (3,390 to 3,430 ft) above msl. Overall slope direction of the site is southwest. Predominant vegetation species identified were mesquite bush, yucca, sand sage and sand drop seed. The site is actively grazed by domestic livestock. (See Figure 1.2-3, NEF Location Relative to Transportation Routes for the site location relative to other important landmarks and transportation routes.)

1.2.2 Description of NEF Operations and Systems

The NEF is designed to separate a feed stream containing the naturally occurring proportions of uranium isotopes into a product stream enriched in ^{235}U and a stream depleted in the ^{235}U isotope. The feed material for the enrichment process is uranium hexafluoride (UF_6) with a natural composition of isotopes ^{234}U, ^{235}U, and ^{238}U. The enrichment process involves the mechanical separation of isotopes using a fast-rotating cylinder (centrifuge) which is based on a difference in centrifugal forces due to differences in molecular weight of the uranic isotopes. No chemical or nuclear reactions take place. The feed, product, and depleted UF_6 streams are all in the form of UF_6.

The UF_6 is delivered to the plant in standard Type 48X or 48Y international transit cylinders, which are connected to the plant in feed stations joined to a common manifold. Heat is then applied electrically to sublime UF_6 from solid to vapor. The gas is flow controlled through a pressure control system for distribution to individual cascades at sub-atmospheric pressure.

Individual centrifuges are not able to produce the desired product and depleted UF_6 concentration in a single step. They are therefore grouped together in series and parallel to form arrays known as cascades. A typical cascade hall comprises many hundreds of centrifuges. A cascade hall is made up of eight cascades. UF_6 is drawn through cascades with vacuum pumps and moved to the transport cylinders located in product and tails take-off stations where it can desublime. Highly reliable UF_6 resistant pumps have been developed for transferring the process gas.

Depleted uranium material is desublimed at the Tails Low-Temperature Take-Off Station into chilled Uranium Byproduct Cylinders (UBCs), Type 48Y. The product is desublimed into 30B cylinders for shipping or Type 48Y for internal use.

The entire plant process gas system operates at sub-atmospheric pressure. This provides a high degree of safety but also means that the system is susceptible to in-leakage of air. Any in-leakage of air passes through the cascades and is preferentially directed into the product stream. A vent system is provided to remove hazardous contaminants from low levels of light gas (any gas lighter than UF_6) that arise on a regular basis from background in-leakage, routine venting of UF_6 cylinders, and purging of UF_6 lines.

Each Plant Module – consisting of two Cascade Halls - is provided with a cooling water system to remove excess heat at key positions on the centrifuges in order to maintain optimum temperatures within the centrifuges.

The centrifuges are driven by a medium frequency Alternating Current (AC) supply system. A converter produces the medium frequency supply from the AC main supply using high efficiency switching devices for both run-up and continuous operation.

In addition to operating the process at subatmospheric pressure, the other primary difference between the Louisiana Energy Services, Claiborne Enrichment Center, and the NEF cascade systems is that all assay units are now identical, whereas in the Claiborne Enrichment Center, one assay unit was designed to produce low assays - in the region of 2.5%. An additional change is the increase from seven cascades per cascade hall to eight cascades per cascade hall. Maximum cascade hall capacity has been increased to 545,000 SWU/yr.

1.2.3 Comparison of the NEF Design to the LES Claiborne Enrichment Center Design

While the design of the NEF is fundamentally the same as the Claiborne Enrichment Center design reviewed and approved by the NRC in the 1990s (NRC, 1994a), a number of improvements or enhancements have been made in the current design from an environmental and safety perspective. One of these changes is the increase from seven cascades per Assay Unit to eight cascades per Assay Unit. Maximum Assay Unit capacity has been increased from 280,000 SWU/yr to 545,000 SWU/yr.

There are two important differences in the UF_6 Feed System for the NEF as compared to the Claiborne Enrichment Center. First, the liquid UF_6 phase above atmospheric pressure has been eliminated. Sublimation from the solid phase directly to the gaseous phase below atmospheric pressure is the process to be used in the NEF. A sealed autoclave is replaced with a Solid Feed Station enclosure for heating the feed cylinder. A second major difference is the use of chilled air, rather than chilled water, to cool the feed purification cylinder.

The NEF “Product Take-Off System” uses a process similar to the Claiborne Enrichment Center, but there are certain differences. In the current system proposed for the NEF, there is only one product pumping stage, whereas the proposed Claiborne Enrichment Center system used two pumping stages to transport the product for desublimation. In the NEF system, pressures are controlled such that desublimation cannot occur in the piping, eliminating the need for heat tracing and valve hot boxes. In the Claiborne Enrichment Center, the product

cylinder stations relied on common chillers to cool the stations, the current system, however, uses a dedicated chiller for each station. The cold traps used to desublime any UF_6 in the vent gases are smaller than those of the Claiborne Enrichment Center design and each is situated on load cells to allow continuous monitoring of accumulation (LES, 1991a).

The NEF "Product Liquid Sampling System" uses a process very similar to Claiborne Enrichment Center, but will have a permanent vent system, the Blending and Sampling Vent Subsystem, rather than a mobile unit as used in Claiborne Enrichment Center (LES, 1991a).

The NEF "Product Blending System" uses a process similar to the proposed Claiborne Enrichment Center. One major difference, however, is the use of Solid Feed Stations to heat the donor cylinders in the NEF. The Claiborne Enrichment Center design required the use of autoclaves to heat the donor cylinders in the Claiborne Enrichment Center. Other differences between the two designs include the use of only four receiver stations in the NEF process versus five in the Claiborne Enrichment Center and the use of a dedicated vacuum pump/trap set in the NEF design versus a mobile set in the Claiborne Enrichment Center (LES, 1991a).

The NEF "Tails Take-Off System" uses a process similar to that proposed for the Claiborne Enrichment Center, but there are certain differences. In the NEF system there is only one tails pumping stage, whereas the Claiborne Enrichment Center would have used two pumping stages to transport the tails for desublimation. UF_6 tails are desublimed in cylinders cooled with chilled air in the current system, the Claiborne Enrichment Center would have used chilled water to cool the cylinders. The Claiborne Enrichment Center design called for a total of ten UBCs in five double cooling stations for each Separation Plant Module (two Cascade Halls), but the NEF current system uses ten cylinders in single cooling stations for each Cascade Hall. Finally, the current system has a dedicated vacuum pump/trap set for venting and does not use the Feed Purification System like the Claiborne Enrichment Center (LES, 1991a).

The major structures and areas of the NEF are described below and shown in Figure 1.2-4, NEF Buildings. A more detailed description of the site and the facility may be found in the Safety Analysis Report (SAR) Chapter 3, Integrated Safety Analysis Summary.

The Security Building serves as the primary access control point for the facility. It also contains the necessary space and provisions for an alternate Emergency Operations Center (EOC) should the primary facility become unusable.

The Separations Building houses three, essentially identical, plant process units. Each Separations Building Module is comprised of a UF_6 Handling Area, two Cascade Halls, and a Process Services Area. UF_6 is fed into the Cascade Halls and enriched UF_6 and depleted UF_6 are removed. The Cylinder Receipt and Dispatch Building (CRDB) is located between Separations Building Modules.

The Centrifuge Assembly Building (CAB) is used to assemble centrifuges before the centrifuges are moved to the Separations Building and installed in the cascades.

The Technical Services Building (TSB) contains various laboratories and maintenance facilities necessary to safely operate and maintain the facility. The TSB also includes a Medical Room and the Control Room. In an emergency, the Control Room serves as the primary Emergency Operations Center (EOC) for the facility. Most site infrastructure facilities (i.e., laboratories for sample analysis) are located in the TSB.

The Central Utilities Building (CUB) provides a central location for the utility services for the process buildings. The CUB also contains the two standby diesel powered electric generators that provide power to protect selected equipment in the unlikely event of loss of offsite supplied power. The building also contains electrical rooms, an air compression room, a boiler room, and cooling water facility.

The Cylinder Receipt and Dispatch Building (CRDB) is used to receive, inspect, weigh and temporarily store cylinders of natural UF_6 sent to the plant and dispatch cylinders of enriched UF_6 to customers. Additionally, clean, empty product and UBC are received, inspected, weighed, and temporarily stored prior to their being filled in the Separations Building.

The UBC Storage Pad is a series of concrete pads designed to store up to 15,727 UBCs. A single-lined UBC Storage Pad Stormwater Retention Basin will be used specifically to retain runoff from the UBC Storage Pad during heavy rainfalls. This basin will also receive cooling tower blowdown. The unlined Site Stormwater Detention basin will receive rainfall runoff from the balance of the developed plant site. Liquid effluent from plant process systems will be discharged to the double-lined Treated Effluent Evaporative Basin provided with a leak detection system.

1.2.4 Schedule of Major Steps Associated with the Proposed Action

The NEF will be constructed in six phases corresponding to the successive completion of six centrifuge Cascade Halls. All construction will be completed in 2013. Each phase will result in an additional nominal 0.5 million SWU, with the first unit beginning operation prior to the completion of the remaining phases. Like the Claiborne Enrichment Center (LES, 1991a), the NEF is designed for at least 30 years of operation. A review of the centrifuge replacement options will be conducted late in the second decade of 2000. Decommissioning is expected to take approximately nine (9) years.

The anticipated schedule for licensing, construction, operation and decommissioning is as follows:

Milestone	Estimated Date
• Submit Facility License Application	December 2003
• Initiate Facility Construction	April 2006
• Start First Cascade	June 2008
• Achieve Full Nominal Production Output	June 2013
• Submit License Termination Plan to NRC	April 2025
• Complete Construction of D&D Facility	April 2027
• D&D Completed	April 2036

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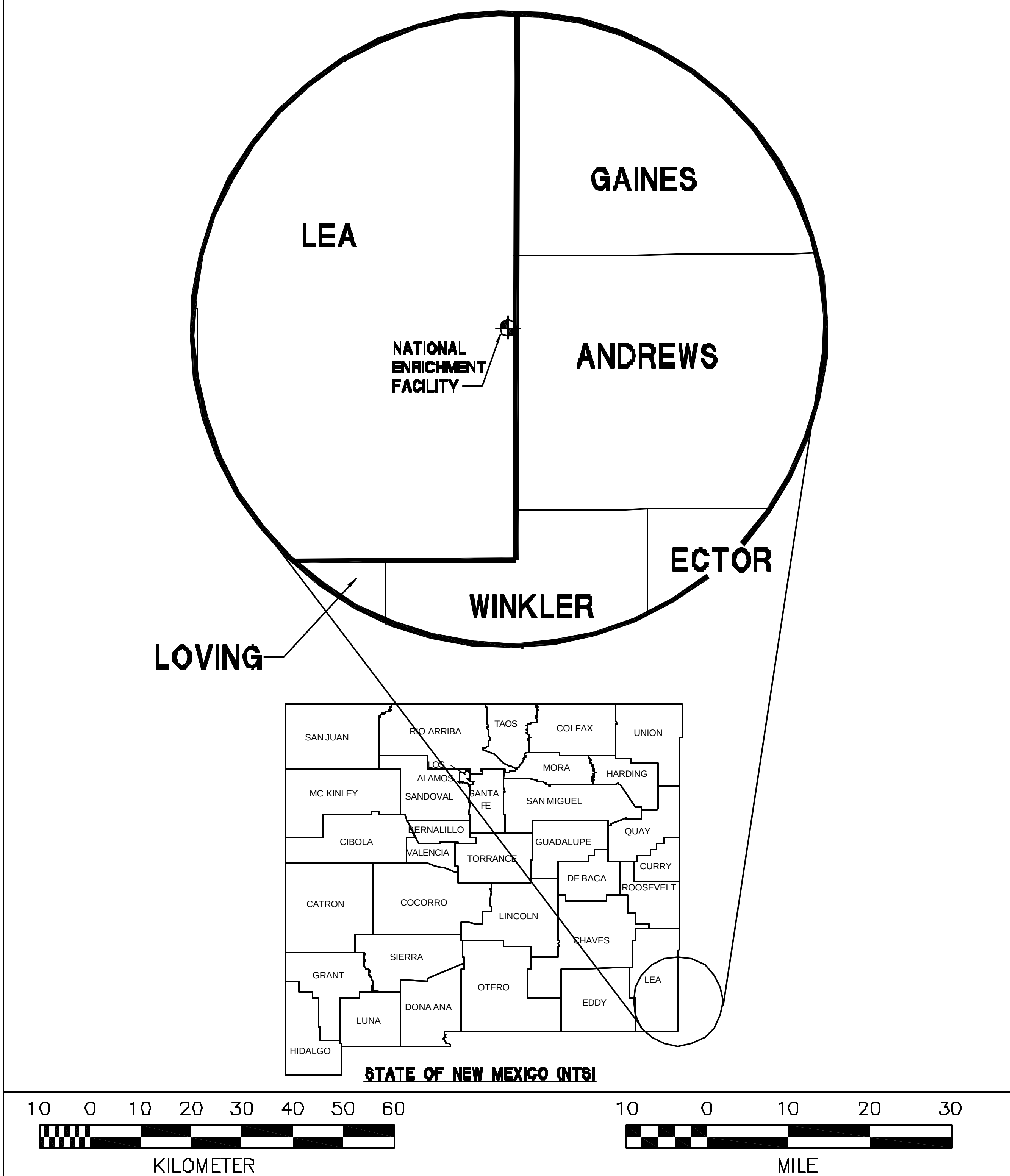
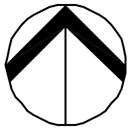
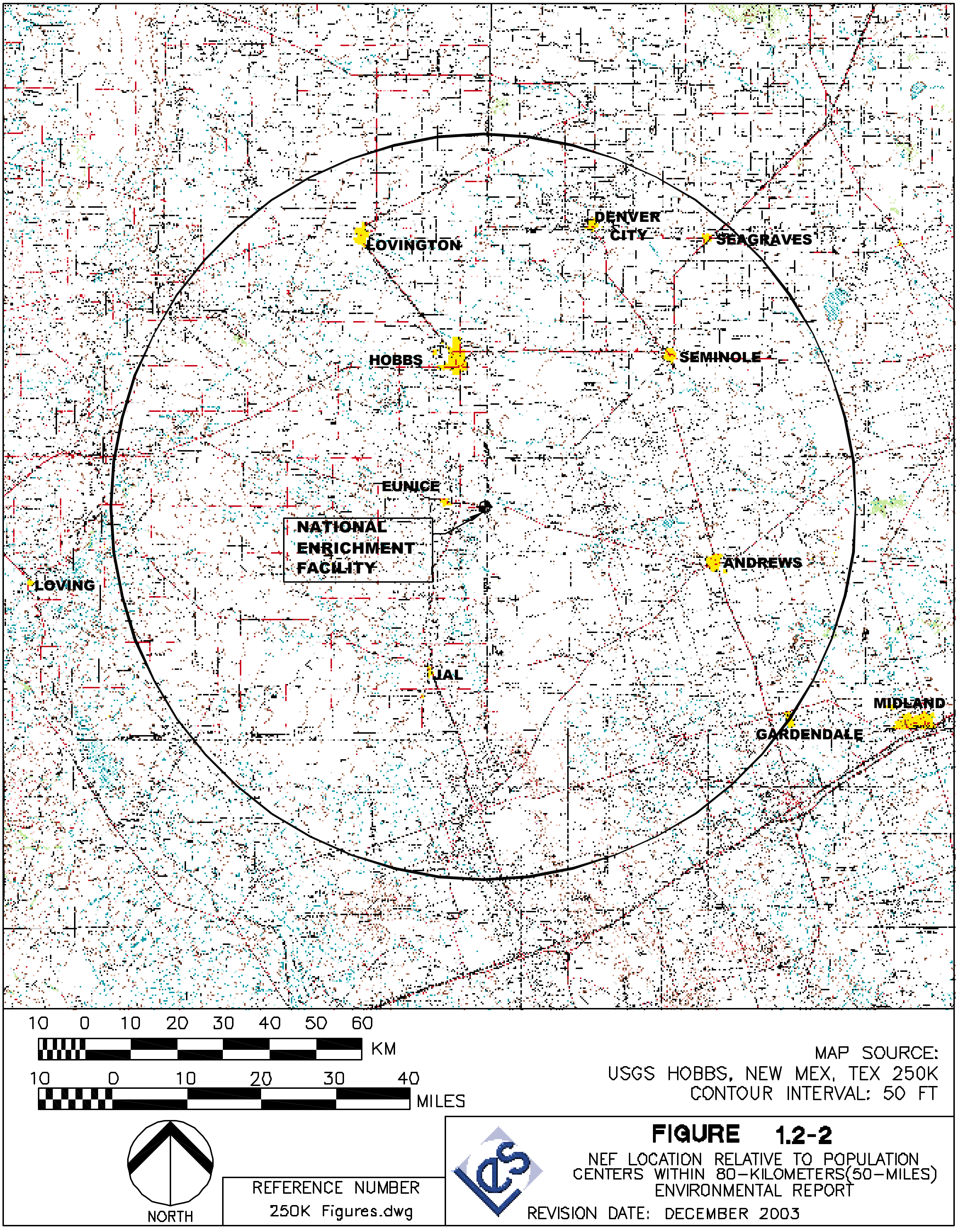
FIGURES





REFERENCE NUMBER
State map.dwg

FIGURE 1.2-1
LOCATION OF PROPOSED SITE
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



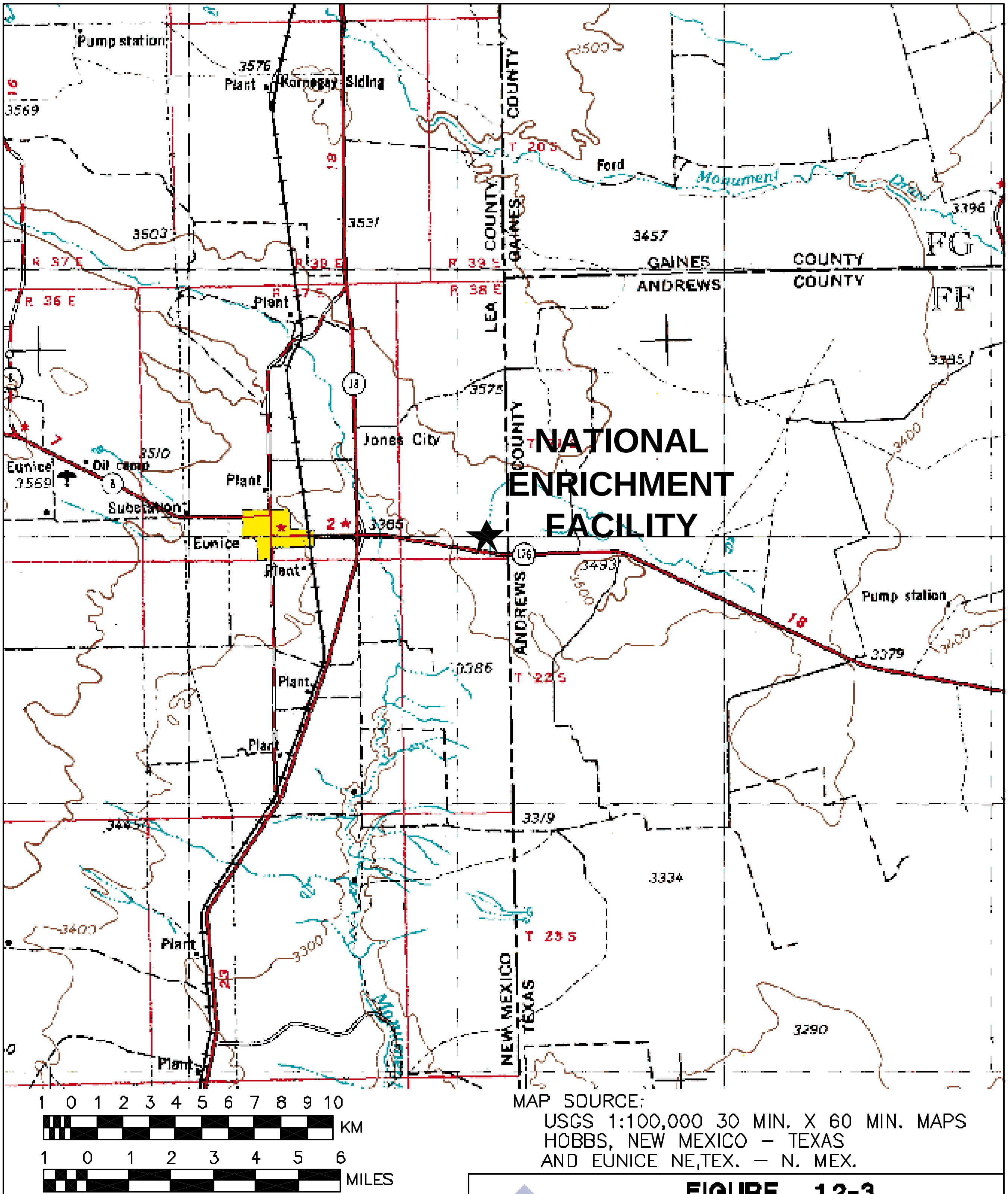
MAP SOURCE:
USGS HOBBS, NEW MEX, TEX 250K
CONTOUR INTERVAL: 50 FT

REFERENCE NUMBER
250K Figures.dwg

FIGURE 1.2-2

NEF LOCATION RELATIVE TO POPULATION CENTERS WITHIN 80-KILOMETERS(50-MILES)
ENVIRONMENTAL REPORT

REVISION DATE: DECEMBER 2003



MAP SOURCE:
USGS 1:100,000 30 MIN. X 60 MIN. MAPS
HOBBS, NEW MEXICO – TEXAS
AND EUNICE NE,TEX. – N. MEX.

CONTOUR INTERVAL: 100 FT

REFERENCE NUMBER
15Min Figures.dwg

FIGURE 1.2-3
NEF LOCATION RELATIVE TO
TRANSPORTATION ROUTES
ENVIRONMENTAL REPORT

REVISION DATE: DECEMBER 2003

Figure removed under 10 CFR 2.390.

1.3 APPLICABLE REGULATORY REQUIREMENTS, PERMITS AND REQUIRED CONSULTATIONS

In addition to the NRC licensing and regulatory requirements, a variety of environmental regulations apply to the NEF during the site assessment, construction, and operation phases. Some of these regulations require permits from, consultations with, or approvals by, other governing or regulatory agencies. Some apply only during certain phases of NEF development, rather than over to the entire life of the facility. Federal, state and local statutes and regulations (non-nuclear) have been reviewed to determine their applicability to the site assessment, construction, and operation phases or the proposed site.

Following is a list of federal, state, and local agencies with whom consultations have been conducted. Table 1.3-1, Regulatory Compliance Status, summarizes the status of the permits and approvals required to construct and operate NEF.

1.3.1 Federal Agencies

Nuclear Regulatory Commission (NRC)

The Atomic Energy Act of 1954, as amended, gives the NRC regulatory jurisdiction over the design, construction, operation, and decommissioning of the NEF facility specifically with regard to assurance of public health and safety in 10 CFR 70 and 40 (CFR, 2003b; CFR, 2003d), which are applicable to uranium enrichment facilities. The NRC performs periodic surveillance of construction, operation and maintenance of the facility. The NRC, in accordance with 10 CFR 51 (CFR, 2003a), also assesses the potential environmental impacts of the proposed plant.

NRC establishes standards for protection against radiation hazards arising out of licensed activities. The NRC licenses are issued pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Organization Act of 1974. The regulations apply to all persons who receive, possess, use or transfer licensed materials.

Domestic Licensing of Source Material (10 CFR 40) (CFR, 2003d) establishes the procedures and criteria for the issuance of licenses to receive, possess, use, transfer, or deliver source material.

Rule of General Applicability to Domestic Licensing of Byproduct Material (10 CFR 30) (CFR, 2003c) establishes the procedure and criteria for the issuance of licenses to receive, possess, use, transfer, or deliver byproduct material.

Packaging and Transportation of Radioactive Material (10 CFR 71) (CFR, 2003e) regulates shipping containers and the safe packaging and transportation of radioactive materials under authority of the NRC and DOT.

U.S. Environmental Protection Agency, (EPA)

The EPA has primary authority relating to compliance with the Clean Air Act (CAA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), and Resource Conservation and Recovery Act (RCRA). However, EPA Region 6 has delegated regulatory jurisdiction to the New Mexico Environmental Hazardous Waste Bureau (NMHWB) for nearly all aspects of permitting,

monitoring, and reporting activities relating to these statutes and associated programs. Applicable state requirements, permits, and approvals are described in Section 1.3.2, State Agencies.

Environmental Standards for the Uranium Fuel Cycle (40 CFR 190 Subpart B) (CFR, 2003f) establishes the maximum doses to the body organs resulting from operational normal releases and received by members of the public.

Emission Standards for NRC Licensed Facilities (40 CFR 61 Subpart I) (CFR, 2003g) establishes limits on emission of radionuclides to air such that the public would not receive an effective dose equivalent exceeding 0.1 mSv/yr (10 mrem/yr).

The Safe Drinking Water Act (SDWA) provides for protection of public water supply systems and underground sources of drinking water. 40 CFR 141.2 (CFR, 2003h) defines public water supply systems as systems that provide water for human consumption to at least 25 people or at least 15 connections. Underground sources of drinking water are also protected from contaminated releases and spills by this act. NEF is not using site groundwater or surface water supplies. NEF will obtain potable water from nearby municipal water supply systems (cities of Eunice and Hobbs, New Mexico).

The Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 350 to 372) (CFR, 2003i) establishes the requirements for Federal, State and local governments, Indian Tribes, and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals. The Community Right-to-Know provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities, working with facilities, can use the information to improve chemical safety and protect public health and the environment.

National Pollutant Discharge Elimination System (NPDES) General Permit for Industrial Stormwater: This permit is required for point source discharge of stormwater runoff from industrial or commercial facilities to the waters of the state. All new and existing point source industrial stormwater discharges associated with industrial activity require a NPDES Stormwater Permit from the EPA Region 6 and an oversight review by the New Mexico Water Quality Bureau. Most common is a general permit which is available to almost any industry, but there is also an option to obtain an individual NPDES permit. NEF may be required to obtain this type of permit because of the surface water runoff into the detention basins.

NPDES General Permit for Construction Stormwater: Construction of the NEF will involve the grubbing, clearing, grading or excavation of 0.4 or more ha (5 or more acres) of land coverage and must receive a NPDES Construction Stormwater General Permit from the EPA Region 6 and an oversight review by the New Mexico Water Quality Bureau. Various land clearing activities such as offsite borrow pits for fill material have also been covered under this general permit. LES construction contractors will be clearing approximately 81 ha (200 acres) during the construction phase of the project.

U.S. Department of Transportation (DOT)

Transport of the NEF UF_6 cylinders requires compliance with the following DOT enabling regulations:

- 49 CFR 107, Hazardous Materials Program Procedures, Subpart G: Registration and Fee to DOT as a Person who Offers or Transports Hazardous Materials (CFR, 2003j).

- 49 CFR 171, General Information, Regulations and Definitions (CFR, 2003k).
- 49 CFR 173, Shippers – General Requirements for Shipments and Packages, Subpart I: Radioactive Materials (CFR, 2003l).
- 49 CFR 177, Carriage by Public Highway (CFR, 2003m).
- 49 CFR 178, Specification for Packagings (CFR, 2003m).

All provisions of these enabling regulations will be met prior to the transport of UF_6 cylinders. NEF may be transporting UF_6 cylinders back to its clients on interstate highways.

U.S. Department of Agriculture (USDA)

The U.S. Natural Resources Conservation Service (USNRCS) branch of the USDA is responsible for the preservation of prime or unique farmlands. However, the USNRCS does not identify NEF land as prime farmlands because the land is not available for agricultural production.

The Noise Control Act of 1972 (42 U.S.C. § 4901 et seq.) (USC, 2003b)

The Noise Control Act transfers the responsibility of noise control to State and local governments. Commercial facilities are required to comply with Federal, State, interstate, and local requirements regarding noise control. The NEF is located in a county (Lea) that does not have a noise control ordinance.

National Historic Preservation Act of 1966 (16 U.S.C. § 470 et seq.) (USC, 2003c)

The National Historic Preservation Act (NHPA) was enacted to protect the nation’s cultural resources. The NHPA is amended by the Archaeological and Historic Preservation Act. This amendment directs Federal agencies in recovering and preserving historic and archaeological data that would be lost as the result of construction activities. Seven potential archaeological sites have been identified on the NEF site. Four of these are potentially eligible for listing on the NRHP based on the presence of charcoal, intact subsurface features, and/or cultural deposits, or the potential for subsurface features. Only one of these sites is within the proposed NEF plant footprint. If required, a mitigation plan will be developed and implemented to protect this site.

Hazardous Materials Transportation Act (49 U.S.C. § 1801 et seq. Title 49 CFR 106-179) (USC, 2003d)

The Hazardous Materials Transportation Act (HMTA) regulates transportation of hazardous material (including radioactive material) in and between States. According to HMTA, States may regulate the transport of hazardous material as long as they are consistent with HMTA or the Department of Transportation (DOT) regulations that are posed in Title 49 CFR 171-177. Other regulations regarding packaging for transportation of radionuclides are contained in Title 49 CFR 173 (CFR, 2003l), Subpart I. The NEF may be transporting UF_6 cylinders back to its clients on interstate highways.

U.S. Army Corps of Engineers (USACE)

The Clean Water Act established a permit program under Section 404 to be administered by the USACE to regulate the discharge of dredged or fill material into "the waters of the U.S." The USACE also evaluates wetlands, floodplains, dam inspection and dredging of waterways. The

proposed NEF will not impact or involve any wetlands, surface waters, dams or other waterways. LES has inspected this site and concluded that no dry arroyas are present. Therefore, a Section 404 permit will not be required.

Occupational Safety and Health Administration (OSHA)

The Occupational Safety and Health Act of 1970 (OSHA) is designed to increase the safety of workers in the workplace. It provides that the Department of Labor is expected to recognize the dangers that may exist in workplaces and establish employee safety and health standards. The identification, classification, and regulations of potential occupational carcinogens are found at 29 CFR 1910.101 (CFR, 2003h), while the standards pertaining to hazardous materials are listed in 29 CFR 1910.120 (CFR, 2003o). OSHA regulates mitigation requirements and mandates proper training and equipment for workers. NEF employees and management are subject to the requirements of 29 CFR 1910.

U.S. Department of Interior (DOI)

The U.S. Fish and Wildlife Services (USFWS) Bureau of DOI is responsible for the protection of threatened and endangered species. There are no threatened or endangered species on the NEF site.

1.3.2 State Agencies

The New Mexico Environment Department (NMED) is charged with responsibility to manage and protect human health and the environment in the state of New Mexico. The NMED consists of several divisions that have responsibility for various permits and environmental programs. LES has consulted with NMED regarding NMED permit requirements. The general and specific NMED permits and permit requirements are discussed below by the NMED Bureau that has responsibility for reviewing and approving the permitting action:

New Mexico Air Quality Bureau (NMED/ABQ):

The Air Quality Bureau (AQB) Permitting Section processes permit applications for industries that emit pollutants to the air. The Permitting Section consists of two groups: New Source Review and Title V. New Source Review (NSR) is responsible for issuing Construction Permits, Technical and Administrative Revisions or Modifications to existing permits, Notices of Intent (NOIs) for smaller industrial operations, and No Permit Required (NPR) determinations. The two types of Permits issued for larger industrial facilities are (NMAC, 2002a):

Construction Permits are required for any person constructing a stationary source which has a potential emission rate greater than 4.5 kg (10 lbs) per hour or 22.7 MT (25 tons) per year of any regulated air contaminant for which there is a National or New Mexico Ambient Air Quality Standard. If the specified threshold in this subsection is exceeded for any one regulated air contaminant, all regulated air contaminants with National or New Mexico Ambient Air Quality Standards emitted are subject to permit review. Within this subsection, the potential emission rate for nitrogen dioxide shall be based on total oxides of nitrogen; all sources with the potential emission rate greater than 4.5 kg (10 lbs) per hour, or 22.7 MT (25 tons) per year, of criteria pollutants (such as nitrogen oxides and carbon monoxide). Air quality permits must be obtained for new or modified sources.

Operating Permits (under Title V) are required for major sources that have a potential to emit more than 4.5 kg (10 lbs) per hour or 91 MT (100 tons) per year for criteria pollutants, or for landfills greater than 2.5 million m^3 (88 million ft^3). In addition, major sources also include facilities that have the potential to emit greater than 9.1 MT (10 tons) per year of a single Hazardous Air Pollutant, or 22.7 MT (25 tons) per year of any combination of Hazardous Air Pollutants.

Generally, mobile sources are not required to obtain an operating permit from AQB; however, there are provisions for inspection and maintenance of mobile sources in certain non-attainment areas. Lea County, New Mexico is not located in a non-attainment area. NEF may need to obtain an Operating Permit because of the gas-fired boilers that will provide comfort heating for the NEF buildings.

NESCHPS Permit*:* Since the NEF will not emit more than 4.5 kg/yr (10 tons/yr) of hazardous air pollutant, and/or 22.7 MT/yr (25 tons/yr) of a combination of hazardous air pollutants, LES will not be required to obtain a Hazardous Air Pollutant Title V Permit. Presently, minor sources subject to New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) are exempt from the requirement to apply for a Title V Operating Permit.

New Mexico Water Quality Bureau (NMED/WQB)

National Pollutant Discharge Elimination System (NPDES) General Permit for Industrial Stormwater: This permit is required for point source discharge of stormwater runoff from industrial or commercial facilities to the waters of the state. All new and existing point source industrial stormwater discharges associated with industrial activity require a NPDES Stormwater Permit from the EPA Region 6 and an oversight review by the New Mexico Water Quality Bureau. Most common is a general permit which is available to almost any industry, but there is also an option to obtain an individual NPDES permit. NEF may be required to obtain this type of permit because of the surface water runoff into the detention basins.

NPDES General Permit for Construction Stormwater*:* Construction of the NEF will involve the grubbing, clearing, grading or excavation of 0.4 or more ha (5 or more acres) of land coverage and must receive a NPDES Construction Stormwater General Permit from the EPA Region 6 and an oversight review by the New Mexico Water Quality Bureau. Various land clearing activities such as offsite borrow pits for fill material have also been covered under this general permit. LES construction contractors will be clearing approximately 81 ha (200 acres) during the construction phase of the project.

Groundwater Discharge Permit/Plan: The New Mexico Water Quality Bureau requires that facilities that discharge an aggregate waste water of more than 7.6 m^3 (2,000 gal) per day to surface impoundments or septic systems apply for and submit a groundwater discharge permit and plan. This requirement is based on the assumption that these discharges have the potential of affecting groundwater. NEF will discharge treated process water, stormwater and cooling tower blow-down water to surface impoundments, as well as domestic septic wastes. The groundwater discharge permit/plan will be required under New Mexico Administrative Codes (NMAC) 20.6.2.3104 NMAC. Section 20.6.2.3104 NMAC of the New Mexico Water Quality Control Commission Regulations (20.6.2 NMAC) (NMAC, 2002b) requires that any person proposing to discharge effluent or leachate so that it may move directly or indirectly into groundwater must have an approved discharge permit, unless a specific exemption is provided

for in the Regulations. Pursuant to Regulation 20.6.2.3108 NMAC, NMED will, within 30 days of deeming the application administratively complete, publish a public notice and allow 30 days for public comment before taking final action on a discharge permit. A public hearing will be held if NMED determines that there is significant public interest. It takes approximately 180 days to process a complete application and issue a discharge permit if no public hearing is held.

Aquatic Resource Alteration Permit (ARAP/Section 401 Certification): This permit is required for activities that involve physically altering waters (streams and wetlands) of the state, including water withdrawals that have the potential to significantly degrade the water quality in the stream. Persons who conduct any activity that involves the alteration of waters of the State require a state and possibly a federal permit. Federal permits are required for projects involving the discharge of dredged or fill material into waters of the U.S. or wetlands. Aquatic Resource Alteration Permits (ARAP) are required for any alteration of state waters, including wetlands that do not require a federal permit. Currently, LES does not anticipate having to obtain an ARAP unless a dry arroya is identified on the NEF site. LES has made a determination that a dry arroya is not present; however, NMED has not made an official determination on this issue.

New Mexico Hazardous Waste Bureau (NMED/HWB)

The New Mexico Hazardous Waste Bureaus (HWB) mission is to provide regulatory oversight and technical guidance to New Mexico hazardous waste generators and treatment, storage, and disposal facilities as required by the New Mexico Hazardous Waste Act [HWA; Chapter 74, Article 4 NMSA 1978] (NMAC, 2000) and regulations promulgated under the Act. The bureau issues hazardous waste permits for all phases, quantities and degrees of hazardous waste management including treating, storing and disposing of listed or hazardous materials.

Hazardous Waste Permits: These permits are required for the treating, storing or disposing of hazardous wastes. The level of permit and associated monitoring requirements depend on the volume and type of waste generated and whether or not the waste is treated or just stored for offsite disposal. Any person owning or operating a new or existing facility that treats, stores, or disposes of a hazardous waste must obtain a hazardous waste permit from the New Mexico Hazardous Waste Bureau. It is anticipated that small to medium volumes of hazardous waste will be stored at the facility for eventual offsite disposal. The NEF will generate small quantities of hazardous waste that are expected to be greater than 100 kg (220 lbs) per month and is not planning to store these wastes in excess of 90 days (see ER Section 3.12, Waste Management). Thus, the NEF will qualify as a small quantity hazardous waste generator in accordance with 20.4.1 NMAC (NMAC, 2000).

The NEF is committed to pollution prevention and waste minimization practices and will incorporate RCRA pollution prevention goals, as identified in 40 CFR 261 (CFR, 2003p). A Pollution Prevention Waste Minimization Plan will be developed to meet the waste minimization criteria of NRC, EPA and state regulations. The Pollution Prevention Waste Minimization Plan will describe how the NEF design procedures for operation will minimize (to the extent practicable) the generation of radioactive, mixed, hazardous, and nonhazardous solid waste.

New Mexico State Land Office (NMSLO):

Right–of-Entry Permit: Surface Resources section of the NMSLO administers renewable resources and sustainable activities on state trust land and works to enhance environmental quality of the lands. Also, it manages the biological, archeological, and paleontological resources. Surface Resources administers agriculture leases, rights of way, and special access

permits. It is responsible for mapping, surveying, geographic information systems, and records management. LES applied for and received a Right-of-Entry Permit early in the license application preparation phase so that they could conduct environmental surveys on Section 32 prior to the land being transferred, or an easement granted, to LES.

New Mexico Department of Game and Fish (NMDGF):

Rare, Threatened and Endangered Species Survey: The NMDGF mission is to assist all New Mexico wildlife in need. The program funds four general categories: research, public education, habitat protection, and wildlife rehabilitation, including rare threatened and endangered species. LES obtained a permit and conducted a rare, threatened and endangered (RTE) survey for both plants and animals. RTE species were not identified on the NEF site.

New Mexico Radiological Control Bureau (NMED/RCB):

(X-Ray) Radiation Machine Registration: Radiation machine is defined by the New Mexico Radiation Protection Regulations (NMRPR) as any device capable of producing radiation except those which produce radiation only from radioactive material. Examples include medical x-ray machines, particle accelerators, and x-ray radiography machines used for non-destructive testing of materials. The bureau regulates the machines and their usage in accordance with the requirements of the NMRPR (20.3 NMAC) (NMAC, 2001a). Registrants are required to maintain hardcopies of pertinent parts of the regulations. Mandatory parts include 20.3.2, 20.3.4 (except appendices), and 20.3.10. Other parts apply as applicable for the type of use. LES plans to use non-destructive (x-ray) inspection systems for package security requirement. If the output at 0.3 m (1 ft) from the unit exceeds 1.29E-07 C/kg/hr (0.5 mR/hr), than the x-ray unit must be registered with the State Radiological Control Bureau under section 20.3.11 of NMED.

New Mexico State Historic Preservation Office (NMSHPO) (NMAC, 2001b):

Class III Cultural Survey: Cultural properties, including prehistoric and historic archaeological sites, historic buildings and other structures, and traditional cultural properties located on state land in New Mexico are protected by the Cultural Properties Act. It is unlawful for any person to excavate, injure, destroy, or remove any cultural property or artifact on state land without a permit. It is also unlawful for any person to intentionally excavate any unmarked human burial, and any material object or artifact interred with the remains, located on any non-federal or non-Indian land in New Mexico without a permit. LES retained a subcontractor that obtained a permit to conduct an archaeological survey since the survey. The survey was conducted during September and October of 2003.

A Class III Cultural Resource Inventory and Palentological Survey was conducted on the site. The survey for the cultural resources (archaeological, historical and palentological) consisted of the following: 1) File search and records check; 2) Class III field inventory; and 3) Class III inventory report for the project. The tasks described in this scope are those necessary to complete a Class III survey and National Register of Historic Places evaluations of all cultural resources within the project area and approval by the New Mexico State Historic Preservation Office. Results of the survey are provided in ER Section 3.8, Historic and Cultural Resources, and Section 4.8, Historic and Cultural Resource Impacts.

1.3.3 Local Agencies

Plans for construction and operation of the proposed NEF are being communicated to and coordinated with local organizations. Officials in Lea and Andrews Counties have been contacted regarding the locations of roads and water lines which traverse the site. The Eunice and Hobbs municipal water system operators have been contacted to obtain compliance information for the potable water supplies received from these cities.

Emergency support services have been coordinated with the state and local agencies. When contacted, the Central Dispatch in the Eunice Police Department will dispatch fire, Emergency Medical Services (EMS) and local law enforcement personnel. Mutual Aid agreements exist between the Eunice Police Department, Lea County Sheriff's Department, and New Mexico State Police, which are activated if additional police support is needed. Mutual aid agreements also exist between Eunice, New Mexico, the City of Hobbs Fire Department, and Andrews County, Texas for additional Fire and medical services. If emergency fire and medical services personnel in Lea County are not available, the mutual aid agreements are activated and the Eunice Central Dispatch will contact the appropriate agencies for the services requested at the facility.

Memoranda of Understanding (MOU) have been signed between LES and Eunice Fire and Rescue and the City of Hobbs Fire Department for fire and medical emergency services. MOUs have also been signed with the Eunice Police Department, the Lea County Sheriff's Office and the New Mexico Department of Public Safety, which includes both the New Mexico State Police and the New Mexico Office of Emergency Management. Copies of the Memoranda of Understanding with the agencies that have agreed to support the LES project for construction and operation of the NEF are included in NEF Emergency Plan. The Emergency Preparedness Manager ensures that MOU with offsite agencies are reviewed annually and renewed at least every four years or more frequently if necessary. The Emergency Preparedness Manager maintains files of the current MOU.

1.3.4 Permit and Approval Status

Several permits associated with construction activities have been drafted and will be formally submitted to the appropriate agency prior to the commencement of construction. Construction and operational permit applications will be prepared and submitted, and regulator approval and/or permits will be received prior to construction or facility operation.

Initial consultations have been made with the cognizant agencies. More specific discussions will be held, as appropriate, as the project progresses. See Table 1.3-1, Regulatory Compliance Status, for a summary listing of the required Federal, State and local permits and their current status.

TABLES

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Table 1.3-1 Regulatory Compliance Status

Requirement	Agency	Status	Comments
Federal			
10 CFR 70, 10 CFR 40, 10 CFR 30	NRC	Submitted December 2003	Facility License
NPDES Industrial Stormwater Permit	EPA Region 6	In progress	Oversight Review by New Mexico (see below)
NPDES Construction Stormwater Permit	EPA Region 6	In Progress	Oversight Review by New Mexico (see below)
State			
Air Construction Permit	NMED/AQB	In Progress	Required for fossil fuel burners
Air Operating Permit	NMED/AQB	Deferred Until Construction is Completed	Application 60 days before operations
NESCHPS Permit	NMED/AQB	In Progress	Submitted in lieu of Title V HAPs
Groundwater Discharge Permit/Plan	NMED/WQB	Deferred Until Construction is Completed	For Industrial and Septic Discharges to Evaporative Retention/Detention Ponds
NPDES Industrial Stormwater	NMED/WQB	In Progress	For Entire Site and UBC Storage Pad (New Mexico Review)
NPDES Construction Stormwater Permit	NMED/WQB	In Progress	For Runoff Water during Construction Phases (New Mexico Review)
Hazardous Waste Permit	NMED/HWB	In Progress	For Waste Storage < 90 days
EPA Waste Activity EPA ID Number	NMED/HWB	In Progress	For Depleted UF_6
Machine-Produced Radiation-Registration (x-ray inspection)	NMED/RCB	Deferred Until Construction is Completed	For Security Non-Destructive Inspection (X-Ray) Machines
Rare, Threatened & Endangered Specie Survey Permit	NMDGF	Completed	For conducting RTE species surveys on state-owned land
Right-Of-Entry Permit	NMSLO	Completed	For entry onto Section 32
Class III Cultural Survey Permit	NMSHPO	Completed	To conduct surveys on Section 32

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2.0 ALTERNATIVES

This chapter describes the alternatives to the proposed action described in ER Section 1.2, Proposed Action. The range of alternatives considered in detail is consistent with the underlying need for and purposes of the proposed action, as set forth in ER Section 1.1, Purpose and Need for the Proposed Action. Accordingly, the range of alternatives considered is based on the underlying need for additional reliable and economical uranium enrichment capacity in the United States – as would be provided by the proposed National Enrichment Facility (NEF) – as well as related commercial considerations concerning the security of supply of enriched uranium. The alternatives considered in detail include (1) the “no-action” alternative under which the proposed NEF would not be built, (2) the proposed action to issue an Nuclear Regulatory Commission (NRC) license to Louisiana Energy Services (LES) for the construction and operation of the NEF, (3) alternative technologies available for an operational uranium enrichment facility, (4) design alternatives and (5) alternative sites for the proposed enrichment facility.

This chapter also addresses the alternatives that were considered, but ultimately eliminated, as well as the potential cumulative impacts of the proposed action. Finally, this chapter presents, in tabular form, a comparison of the potential environmental impacts associated with the proposed action and various scenarios possibly arising under the no-action alternative.

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2.1 DETAILED DESCRIPTION OF THE ALTERNATIVES

This section identifies the no action alternative, the proposed action, and reasonable alternatives to the proposed action. Included are the technical design requirements for the proposed action and its reasonable alternatives.

2.1.1 No-Action Alternative

The no-action alternative for the NEF would be to not build the proposed NEF. Under the no-action alternative, the NRC would not approve the license application to construct and operate the proposed facility. Accordingly, the current owner of the property upon which the proposed facility would be sited, the State of New Mexico, would be free to pursue alternative uses of the property.In the absence of NRC approval of the NEF license, utility customers would be required to meet their uranium enrichment service needs through existing suppliers. In the US, this would mean that the one remaining enrichment facility, the gaseous diffusion facility operated by USEC at Paducah, Kentucky, would be the only domestic facility available to serve this purpose. Similarly, USEC would remain the sole domestic supplier of low-enriched uranium. This scenario would be inconsistent with the clear federal policy of fostering the development of additional, secure, reliable, and economical domestic enrichment capacity to promote both US energy security and national security. The Department of Energy (DOE) has noted that this could have "serious domestic energy security consequences, including the inability of the US enrichment supplier (USEC) to meet all of its enrichment customers' contracted fuel requirements in the event of a fuel supply disruption from either the Paducah plant production or the highly enriched uranium (HEU) Agreement deliveries."

As the DOE has further recognized, these energy security concerns are due largely to the current lack of available replacement capacity for the "inefficient and noncompetitive gaseous diffusion enrichment plants." (Sterba, 1999) In its application for the Lead Cascade American Centrifuge Facility, USEC noted the Portsmouth facility "is over 50 years old and the power costs to product SWU are significant." Although USEC is pursuing development and deployment of its own advanced centrifuge technology, this technology has yet to be proven commercially viable. Even if USEC were able to bring the proposed facility online successfully, its operation alone would neither provide for diverse suppliers of enrichment services in the US nor guarantee security of supply, particularly in view of forecasted installed nuclear generating capacity and uranium enrichment requirements discussed in ER Section 1.1.2, Market Analysis of Enriched Uranium Supply and Requirements.

As discussed in Chapter 1, Introduction to the Environment Report, the US- Russian HEU agreement (for which USEC is the US executive agent) is currently scheduled to expire in 2013, and like other arrangements for the importation of foreign-enriched uranium, it may be subject to disruptions caused by both political and commercial factors. These circumstances have raised concerns among US purchasers of enrichment services with respect to the security of their supplies. The recent contract dispute between Russia's Techsnabexport (Tenex) and its former affiliate Globe Nuclear Services & Supply provides one example of the concerns raised by potential supply disruptions. As noted in a recent trade press article, even though this dispute is not expected to impact the US-Russian HEU Agreement or other sales by Texex, "some utilities may now come to view those supplies as less certain and take steps to line up alternate sources

of supply or to ask for price discounts to account for perceived increased delivery risk." (NW, 2003)

Under the no-action alternative, a decision by the NRC not to approve the NEF license application would perpetuate the reliance on only one domestic source of enrichment services – a source that employs a high-cost, inefficient technology – as well as the existence of only domestic supplier of services. This alternative, therefore, would not serve the recognized need of the US government to promote energy and national security through the development of additional, secure, reliable, and economical domestic enrichment capacity; nor would it serve the need of utility customers to ensure secure supplies and diverse suppliers of enrichment services.

2.1.2 Proposed Action

The proposed action, as described in ER Section 1.2, Proposed Action, is the issuance of an NRC license under 10 CFR 40 and 70 (CFR, 2003b; CFR, 2003e) that would authorize LES to possess and use source material and special nuclear material (SNM) and to construct and operate a uranium enrichment plant at a site located in Lea County, New Mexico. ER Section 1.2 contains a detailed description of the proposed action, including relevant general background information, organization sharing ownership, and project schedule.

2.1.2.1 Description of the Proposed Site

The proposed NEF site is located in Southeastern New Mexico near the New Mexico/Texas state line, in Lea County. The site comprises about 220 ha (543 acres) and is within county Section 32, Township 21 South, Range 38 East. The approximate center of the NEF is at latitude 32 degrees, 26 minutes, 1.74 s North and longitude 103 degrees, 4 min, 43.47 s West. Refer to Figure 2.1-1, 80-Kilometer (50-Mile) Radius With Cities and Roads.

The site lies along the north side of New Mexico Highway 234. It is relatively flat with slight undulations in elevation ranging from 1,033 m to 1,045 m (3,390 m to 3,430 ft) above mean sea level (msl) from the overall slope direction is to the southwest. Except for a gravel covered road which bisects the east and west halves of the property, it is undeveloped and utilized for domestic livestock grazing. Onsite vegetation includes mesquite bushes, shinnery oak shrubs and other native grasses. A barbed wire fence runs along the east, south and west property lines. The fence along the north property line has been dismantled. A 25.4-cm (10-in) diameter, underground carbon dioxide (CO_2) pipeline, running southeast-northwest, traverses the site. The pipeline is owned by Trinity Pipeline, LLC. The CO_2 pipeline will be relocated prior to startup of the NEF. The CO_2 pipeline will be moved sufficiently far from the NEF so as not to pose a safety concern. A 40.6-cm (16-in) diameter, underground natural gas pipeline, owned by the Sid Richardson Energy Services Company, is located along the south property line, paralleling New Mexico Highway 234.

The area surrounding the site consists of vacant land and industrial properties. A railroad spur borders the site to the north. Beyond is a sand/aggregate quarry operated by Wallach Concrete Inc. The quarry owner leases land space to a "produced water" reclamation company (Sundance Services) which maintains three small "produced water" lagoons. There is also a man-made pond stocked with fish on the quarry property. A vacant parcel of land, Section 33 is immediately to the east. Section 33 borders the New Mexico/Texas state line which is 0.8 km

(0.5 mi) east of the site. Several disconnected power poles are situated in front of Section 33, parallel to New Mexico Highway 234. Land further east, in Texas, is occupied by Waste Control Specialists (WCS) LLC, a licensed Resource Conservation Recovery Act (RCRA) disposal facility. A large mound of soil exists northwest of WCS. Reportedly, the mound consists of stockpiled soil excavated by WCS. High-voltage utility lines run in a north-south direction near the property line of WCS, parallel to the New Mexico/Texas state line. To the south, across New Mexico Highway 234, is the Lea County Landfill. DD Landfarm, a petroleum contaminated soil treatment facility is adjacent to the west. Land further north, south and west has mostly been developed by the oil and gas industry. Land east of WCS is occupied by the Letter B Ranch.

Baker Spring, which contains surface water seasonally, is situated a little over 1.6 km (1 mi) northeast of the site. A historical scenic oil country marker with a few picnic tables is situated about 3.2 km (2 mi) to the west along New Mexico Highway 234. New Mexico Highway 234 intersects New Mexico Highway 18 about 4 km (2.5 mi) to the west. The nearest residences are located along the west side of New Mexico Highway 18, just south of its intersection with New Mexico Highway 234. The city of Eunice, New Mexico is further west along New Mexico Highway 234 about 8 km (5 mi) from the site. Monument Draw, an area drainage way, is situated a short distance east of Eunice. Railroad tracks (Texas-New Mexico Railroad) are located on the east end of town and run north-south, parallel to New Mexico Highway 18. The Eunice Airport is situated about 16 km (10 mi) west of the city center. The city of Hobbs, New Mexico (population 28,657) is situated along New Mexico Highway 18 about 32 km (20 mi) to the north and the city of Jal, New Mexico is along New Mexico Highway 18 about 37 km (23 mi) to the south. To the east, New Mexico Highway 234 becomes Texas Highway 176 at the New Mexico/Texas state line. The nearest Texas town, Frankel City, is about 24 km (15 mi) to the east, just north of Texas Highway 176. Andrews, Texas (population 10,182), is further east along Texas Highway 176, about 51 km (32 mi) from the site. The nearest, largest population center is Midland-Odessa, Texas (population >100,000) which is approximately 103 km (64 mi) to the southeast.

Figure 2.1-2, Site Area and Facility Layout Map 1.6-Kilometer (1-Mile) Radius, Figure 2.1-3, Existing Conditions Site Aerial Photograph and Figure 2.1-4, NEF Buildings show the site property boundary and the general layout of the buildings on the NEF site.

2.1.2.2 Applicant for the Proposed Action

Louisiana Energy Services (LES), L.P. is a Delaware limited partnership. It has been formed solely to provide uranium enrichment services for commercial nuclear power plants. LES has one, 100% owned subsidiary, operating as a limited liability company, formed for the purpose of purchasing Industrial Revenue Bonds and no divisions. The general partners are as follows:

A. Urenco (a Delaware corporation and wholly-owned subsidiary of Urenco Limited, a corporation formed under the laws of the United Kingdom ("Urenco") and owned in equal shares by BNFL Enrichment Limited ("BNFL-EL"), Ultra-Centrifuge Nederland NV ("UCN"), and Uranit GmbH ("Uranit") companies formed under English, Dutch and German law, respectively; BNFL-EL is wholly-owned by British Nuclear Fuels plc, which is wholly-owned by the Government of the United Kingdom; UCN is 99% owned by the Government of the Netherlands, with the remaining 1% owned collectively by the Royal Dutch Shell Group, DSM, Koninklijke Philips Electronics N.V. and Stork N.V.; Uranit is

owned by Eon Kernkraft GmbH (50%) and RWE Power AG (50%), which are corporations formed under laws of the Federal Republic of Germany); and

B. Westinghouse Enrichment Company LLC (a Delaware limited liability company and wholly-owned subsidiary of Westinghouse Electric Company LLC, a Delaware limited liability company ("Westinghouse"), whose ultimate parent, through two intermediary Delaware corporations and one corporation formed under the laws of the United Kingdom, is British Nuclear Fuels plc, which is wholly-owned by the government of the United Kingdom).

The names and addresses of the responsible officials for the general partners are as follows:

Urenco Investments, Inc.
Charles W. Pryor, President and CEO
2600 Virginia Avenue NW, Suite 610
Washington, DC 20037

Dr. Pryor is a citizen of the United States of America

Westinghouse Enrichment Company LLC
Ian B. Duncan, President
4350 Northern Pike
Monroeville, PA 15146

Mr. Duncan is a citizen of the United Kingdom.

The limited partners are as follows:

A. Urenco Deelnemingen B.V. (a Netherlands corporation and wholly-owned subsidiary of Urenco Nederlands B.V. (UNL));

B. Westinghouse Enrichment Company LLC (the Delaware limited liability company, wholly-owned by Westinghouse, that also is acting as a General Partner);

C. Entergy Louisiana, Inc. (a Louisiana corporation and wholly-owned subsidiary of Entergy Corporation, a publicly-held Delaware corporation and a public utility holding company);

D. Claiborne Energy Services, Inc. (a Louisiana corporation and wholly-owned subsidiary of Duke Energy Corporation, a publicly-held North Carolina corporation);

E. Cenesco Company, LLC (a Delaware limited liability company and wholly-owned subsidiary of Exelon Generation Company, LLC, a Pennsylvania limited liability company).

F. Penesco Company, LLC (a Delaware limited liability company and wholly-owned subsidiary of Exelon Generation Company, LLC, a Pennsylvania limited liability company).

Urenco owns 70.5% of the partnership, while Westinghouse owns 19.5% of LES. The remaining 10% is owned by the companies representing the three electric utilities, i.e., Entergy Corporation, Duke Energy Corporation, and Exelon Generation Company, LLC.

The President of LES is E. James Ferland, a citizen of the United States of America. LES' principal location for business is Albuquerque, NM. The facility will be located in Lea County near Eunice, New Mexico. No other companies will be present or operating on the NEF site other than services specifically contracted by LES.

LES has presented to Lea County, New Mexico a proposal to develop the NEF. Lea County would issue its Industrial Revenue Bond (National Enrichment Facility Project) Series 2004 in the maximum aggregate principal amount of $1,800,000,000 to accomplish the acquisition, construction and installation of the project pursuant to the County Industrial Revenue Bond Act, Chapter 4, Article 59 NMSA 1978 Compilation, as amended. The Project is comprised of the land, buildings, and equipment.

Under the Act, Lea County is authorized to acquire industrial revenue projects to be located within Lea County but outside the boundaries of any incorporated municipality for the purpose of promoting industry and trade by inducing manufacturing, industrial and commercial enterprises to locate or expand in the State of New Mexico, and for promoting a sound and proper balance in the State of New Mexico between agriculture, commerce, and industry. After acquiring the project, constructing the facility, and installing the facility equipment, Lea County will lease the project to LES, which will operate the facility. Upon expiration of the Bond after 30 years, LES will purchase the project.

The County has no power under the Act to operate the project as a business or otherwise or to use or acquire the project property for any purpose, except as lessor thereof under the terms of the lease.

In the exercise of any remedies provided in the lease, the County shall not take any action at law or in equity that could result in the Issuer obtaining possession of the project property or operating the project as a business or otherwise.

LES is responsible for the design, quality assurance, construction, operation, and decommissioning of the enrichment facility. The President of LES reports to the LES Management Committee. This committee is composed of representatives from the general partners of LES.

Foreign Ownership, Control and Influence (FOCI) of LES is addressed in the NEF Standard Practice Procedures for the Protection of Classified Matter, Appendix 1 – FOCI Package. The NRC in their letter dated, March 24, 2003, has stated "…that while the mere presence of foreign ownership would not preclude grant of the application, any foreign relationship must be examined to determine whether it is inimical to the common defense and security [of the United States]". (NRC, 2003b) The FOCI Package mentioned above provides sufficient information for this examination to be conducted.

2.1.2.3 Facility Description

The NEF is designed to separate a feed stream containing the naturally occurring proportions of uranium isotopes into a product stream enriched in ^{235}U and a uranium stream depleted in the ^{235}U isotope. Following is a summary description of the NEF process, buildings and related operation. The NEF Safety Analysis Report (SAR) contains a detailed description of facility characteristics, including plant design and operating parameters.

The feed material for the enrichment process is uranium hexafluoride (UF_6), with a natural composition of isotopes ^{234}U, ^{235}U, ^{236}U, and ^{238}U. The enrichment process involves the mechanical separation of isotopes using a fast rotating cylinder (centrifuge) and is based on a difference in centrifugal forces due to differences in the molecular weight of the uranic isotopes. No chemical or nuclear reactions take place. The feed, product, and depleted uranium streams are all in the form of UF_6.

The UF_6 feed arrives from conversion facilities as a solid under partial vacuum in 122-cm (48-in) diameter transportation cylinders. Product material is collected in 76-cm (30-in) diameter containers and transported to a fuel fabricator. The depleted UF_6 material is collected in 122-cm (48-in) diameter containers and removed for storage onsite.

The plant design capacity is three million separative work units (SWU) per year. At full production in a given year, the plant will receive approximately 8,600 MT (9,480 tons) of UF_6 feed, produce 800 MT (880 tons) of low enriched UF_6, and yield 7,800 MT (8,600 tons) of depleted UF_6. The principal NEF operational structures are shown on Figure 2.1-4, NEF Buildings, and include the following:

- Separations Building Modules (includes UF_6 Handing Area, Cascade Halls, Process Services Area)
- Cylinder Receipt and Dispatch Building (CRDB)
- Blending and Liquid Sampling Area
- Technical Services Building (TSB)
- Centrifuge Assembly Building (CAB)
- Uranium Byproduct Cylinders (UBC) Storage Pad
- Administration Building
- Central Utilities Building (CUB)
- Security Building
- Visitor Center.

2.1.2.3.1 Separations Building Modules

The facility includes three identical Separations Building Modules. Each module consists of two Cascade Halls. Each Cascade Hall houses eight cascades, each of which consists of hundreds of centrifuges connected in series and parallel producing a single product concentration at any one time. Each Cascade Hall is capable of producing a maximum of 545,000 SWU per year. In addition to the Cascade Halls, each Separations Building Module houses a UF_6 Handling Area and a Process Services Area.

An assay unit consists of eight cascades. The centrifuges are mounted on precast concrete floor-mounted elements (flomels). Each Cascade Hall is enclosed by a structural steel frame, that supports insulated sandwich panels. This enclosure surrounds each Cascade Hall to aid in maintaining a constant temperature within the cascade enclosure.

The UF_6 Handling Area contains the Feed System, Product and Tails Take-off Systems. The Process Services Area contains the gas transport equipment, which connects the cascades to the Product Take-off System and Tails Take-off Systems and the Cascade Systems. The Process Services Area also contains key electrical and cooling water systems.

2.1.2.3.2 Cylinder Receipt and Dispatch Building (CRDB)

The CRDB is located between Separations Building Modules adjacent to the Blending and Liquid Sampling Area. All UF_6 feed cylinders and empty product cylinders and UBCs enter the facility through the CRDB. It is designed to include space for the following:

- Loading and unloading of cylinders
- Inventory weighing
- Preparation and storage of overpack protective packaging
- Buffer storage of feed cylinders
- Semi-finished product storage
- Final product storage
- Prepared cylinder storage.

The majority of the floor area is used as lay-down space for the cylinders, for both storage and staging. The cylinders are placed on concrete saddles to stabilize them while being stored in the CRDB.

Cylinders are delivered to the facility in transport trucks. The trucks enter the CRDB through the main vehicle loading bay, which is equipped with vehicle access platforms that aid with cylinder loading and unloading. Two double girder bridge cranes handle the cylinders within the CRDB. The cranes span the width and run the full length of the building.

After delivery, the cylinders are processed for receipt as either empty UBCs (48Y cylinders) or empty product cylinders (30B cylinders) or UF_6 feed cylinders (48Y or 48X cylinders). They are inspected and weighed and moved to their appropriate locations. UF_6 feed cylinders are delivered to a storage area in the CRDB.

When required for processing, the cylinders, which have been placed in storage areas, will be moved by the overhead cranes one of two rail transporters in the CRDB.

The rail transporter in the UF_6 Handling Area travels on rails embedded in the floor along the entire length of the UF_6 Handling Area and the Blending and Liquid Sampling Area. It moves the cylinders to and from the appropriate feed or receiver stations. It has the ability to handle both the feed cylinders and UBCs 122-cm (48-in) and product 76-cm (30-in) cylinders.

Floors in the CRDB are made of exposed concrete with a washable epoxy coating finish designed to resist process chemicals, decontamination agents, and radiation.

2.1.2.3.3 Blending and Liquid Sampling Area

The Blending and Liquid Sampling Area is adjacent to the CRDB and located between two Separations Building Modules. The primary function of the Blending and Liquid Sampling Area is to provide means to fill 30B cylinders with UF_6 at a required ^{235}U concentration level and sample the product cylinders for ^{235}U concentration and UF_6 purity.

2.1.2.3.4 Technical Services Building (TSB)

The TSB is adjacent to the Blending and Liquid Sampling Area. It contains support areas for the facility and acts as the secure point of entry to the Separations Building Modules and the CRDB. It contains the following functional areas located on the ground floor:

<u>Solid Waste Collection Room</u>

The Solid Waste Collection Room processes both wet and dry low-level solid waste. Wet waste is categorized as radioactive, hazardous or industrial waste and includes assorted materials, oil recovery sludge, oil filters and miscellaneous hazardous wastes. Dry waste is also categorized as radioactive, hazardous or industrial waste and includes assorted materials, activated carbon, aluminum oxide (also referred to as alumina), sodium fluoride, HEPA filters, scrap metal and miscellaneous hazardous materials.

<u>Vacuum Pump Rebuild Workshop</u>

The Vacuum Pump Rebuild Workshop provides space for the maintenance and re-building of plant equipment, mainly pumps that have been decontaminated in the decontamination facility, and other miscellaneous plant equipment.

<u>Decontamination Workshop</u>

The Decontamination Workshop provides a maintenance facility for both UF_6 pumps and vacuum pumps. It is also used for the temporary storage and subsequent dismantling of failed pumps. The activities carried out within the Decontaminated Workshop include receipt and storage of contaminated pumps, out-gassing, Fomblin oil removal and storage, pump stripping, and the dismantling and maintenance of valves and other plant components.

The Decontamination Workshop also provides a facility for the removal of radioactive contamination from contaminated materials and equipment. The decontamination system consists of a series of steps including equipment disassembly, degreasing, decontamination, drying and inspection. Components commonly decontaminated include pumps, valves, piping, instruments, sample bottles, tools and scrap metal.

The Decontamination Workshop is under negative pressure. Therefore, any equipment or personnel entering this room must go through an air-lock.

<u>Ventilated Room</u>

The Ventilated Room provides space for the maintenance of chemical traps and cylinders. The Ventilated Room is also used for the temporary storage of full and empty traps and the contaminated chemicals used in the traps.

The activities carried out within the Ventilated Room include receipt and storage of saturated chemical traps, chemical removal and temporary storage, contaminated cylinder pressure testing, and cylinder pump out and valve maintenance.

The Ventilated Room is under negative pressure. Therefore, any equipment or personnel entering this room must go through an air-lock.

Cylinder Preparation Room

The Cylinder Preparation Room provides a set-aside area for testing and inspecting new or cleaned 30B, 48X, and 48Y cylinders for use in the plant. It is maintained under negative pressure. Therefore, any equipment or personnel entering this room must go through an air-lock.

Equipment is available within the Cylinder Preparation Room to fit plugs and valves to new empty or washed-out empty cylinders to internally visually inspect the cylinders and to pressure test the cylinders, if required.

Mechanical, Electrical and Instrumentation (ME&I) Workshop

The ME&I Workshop provides space for the normal maintenance of non-contaminated plant equipment. The facility also deals with faults associated with the pump motors, all instrument and control equipment, lighting, power, and associated process and services pipe work. It also provides space for the temporary storage of rebuilt and minor plant equipment.

Liquid Effluent Collection and Treatment Room

The Liquid Effluent Collection and Treatment Room is used to collect potentially contaminated liquid effluents produced onsite, which are monitored for contamination prior to processing. These liquid effluents are stored in tanks prior to dispatch. The effluents are segregated into significantly contaminated effluent, slightly contaminated effluent or non-contaminated effluent. Both the significantly and slightly contaminated liquids are processed for uranium recovery while the non-contaminated liquid is neutralized and routed to the double-lined Treated Effluent Evaporative Basin, with leak detection. Liquid effluents produced by the plant include hydrolyzed uranium hexafluoride, degreaser water, citric acid, laundry water, floor wash water, hand wash/shower water and miscellaneous effluent.

Laundry

The Laundry provides an area to clean contaminated and soiled clothing and other articles that have been used throughout the plant. Laundry is sorted into two categories: articles with a high possibility of contamination and articles unlikely to have been contaminated. Those that are likely to be contaminated are further sorted into lightly and heavily soiled articles. Heavily soiled articles are transferred to the solid waste collection system without having been washed.

The Laundry contains two industrial quality washing machines (75-kg capacity (165- lb)), two industrial quality dryers (75-kg capacity (165-lb)), one sorting hood to draw potentially contaminated air away, a sorting table and an inspection table. It also contains a small office and store room.

Gaseous Effluent Vent System (GEVS) Room

The GEVS removes uranyl fluoride (UO_2F_2), i.e., uranium compounds particulates containing uranium and hydrogen fluoride (HF) from potentially contaminated process gas streams. Pre-

filters and absolute high efficiency particulate air (HEPA) filters remove particulates, including uranium particles, and activated charcoal filters remove HF.

Laboratory Area

The Laboratory Area provides space for three laboratories that receive, prepare, and store various samples as follows:

- Mass Spectrometry Laboratory - for the process of uranium isotope measurement
- Chemical Laboratory - for the process of UF_6 quality assurance
- Environmental Monitoring Lab – for the process of environmental/regulatory analysis

Truck Bay/Shipping and Receiving Area

The Truck Bay is used as a place to load packaged low-level radioactive wastes and hazardous wastes onto trucks for transportation offsite to a licensed processing facility and/or licensed disposal facility. It is also used for miscellaneous shipping and receiving.

Medical Room

The Medical Room provides space for a nurse’s station

Radiation Monitoring Control Room

The Radiation Monitoring Control Room is the point of demarcation between non-contaminated areas and potentially contaminated areas of the plant. It includes space for a hand and foot monitor, hand washing facilities, safety showers, and boot barrier access.

Work Station

The Work Station is a temporary work area for plant personnel. It includes wiring for phones and computers and includes adequate lighting levels.

Security

The Entry/Exit Control Point (EECP) into the Controlled Area is located in this area. Personnel entering the Controlled Area are required to undergo security screening.

Lobby

The Lobby is the entry point to the plant.

Break Room

The Break Room provides an area for vending machines, tables and a small kitchenette.

Locker Rooms

- The Locker Rooms provide change areas, showers, and toilets.

Ancillary Areas

The following ancillary areas are located on the first floor: storage areas, utility closets, stairs, vestibule, and elevator equipment room.

The TSB contains the following functional areas located on the second floor.

Control Room

The Control Room is the main monitoring point for the entire plant and provides all of the facilities for the control of the plant, operational requirements and personnel comfort. It is a permanently staffed area that contains the following equipment:

- Overview screen
- Control desk
- Fire alarm system
- Storage facilities
- Communication systems.

In an emergency, the Control Room serves as the primary Emergency Operations Center (EOC) for the facility.

Training Room

The Training Room is used for Control Room training. It has visual and personnel access to the Control Room and contains the following:

- Plant Control System Training System
- Centrifuge Monitoring System Training System
- Central Control System switches and servers.

Security Alarm Center

The Security Alarm Center is used as the primary security monitoring station for the facility. All electronic security systems will be controlled and monitored from this center. These systems will include but not be limited to: Closed Circuit Television (CCTV), Intrusion Detection & Assessment (IDA), Access Control and radio dispatch.

Ancillary Areas

The following ancillary areas are located on the second floor:

- Copy/Storage
- Operator Support
- Archive/Storage
- Shift Manager’s Office
- Security Office
- Toilets
- Mechanical Room.

2.1.2.3.5 Centrifuge Assembly Building (CAB)

The CAB is located adjacent to the CRDB. It is used for the assembly, inspection, and mechanical testing of the centrifuges prior to installation in the Cascade Halls of the Separations Building Modules and introduction of UF_6. Centrifuge assembly operations are undertaken in clean room conditions. The building is divided into the following distinct areas:

- Centrifuge Component Storage Area
- Centrifuge Assembly Area “A”
- Centrifuge Assembly Area “B”
- Assembled Centrifuge Storage Area
- Building Office Area
- Centrifuge Test and Post Mortem Facilities.

<u>Centrifuge Component Storage Area</u>

The Centrifuge Component Storage Area serves as the initial receipt location for the centrifuge parts. It is designed to store up to four weeks of delivered centrifuge components. These components are delivered by truck in specifically designed containers, which are then packed into International Organization for Standardization (ISO) freight containers. These containers are off-loaded via fork lift truck and placed in the storage area through one of two roller shutter doors located at the end of the CAB.

Because the assembly operations are undertaken in clean room conditions, the centrifuge component containers will be cleaned in a washing facility located within the Centrifuge Component Storage Area, prior to admission to the Centrifuge Assembly Area. The component store also acts as an acclimatization area to allow components to equilibrate with the climatic conditions of the Centrifuge Assembly Area.

Transfer of components and personnel between the component store and the centrifuge assembly will be via an airlock to prevent ingress of airborne contaminants.

<u>Centrifuge Assembly Area</u>

Centrifuge components are assembled into complete centrifuges in this area. Assembly operations are carried out on two parallel production lines (A and B). The centrifuge operates in a vacuum; therefore, centrifuge assembly activities are undertaken in clean-room conditions to prevent ingress of volatile contaminants, which would have a detrimental effect on centrifuge performance. Prior to installation into the cascade, the centrifuge has to be conditioned, which is done in the Centrifuge Assembly Area prior to storage in the Assembled Centrifuge Storage Area.

<u>Assembled Centrifuge Storage Area</u>

Assembled and conditioned centrifuges are stored in the Assembled Centrifuge Storage Area prior to installation. During construction of the plant, a separate installation team will access this area and transfer the assembled and conditioned centrifuges to the Cascade Halls for installation.

Centrifuges are to be routed via a covered communication corridor, which links the CAB with the CRDB.

Building Office Area

A general office area is located adjacent to the assembly area. It contains the main personnel entrance to the building as well as entrances to the assembly storage and assembly workshop. It is a two-story area, which includes:

- Offices
- Change Rooms
- Break Room
- Maintenance Area
- Chemical Storage Area
- Battery Charging Area.

Centrifuge Test and Post Mortem Facilities

The Centrifuge Test Facility provides an area to test the functional performance of production centrifuges and ensure compliance with design parameters. It also provides an area to investigate production and operational problems. The demand for centrifuge post mortems is infrequent.

The principal functions of the Centrifuge Post Mortem Facility are to:

- Facilitate dismantling of contaminated centrifuges using equipment and processes, that minimize the potential to contaminate personnel or adjacent facilities.
- To prepare potentially contaminated components and materials for transfer to the TSB prior to disposal.

Centrifuges are brought into the facility on a specially designed transport cart via an airlock entry. The facility is also equipped with radiological monitoring devices, toilets and washing facilities, and hand, foot and clothing personnel monitors to detect surface contamination.

The Centrifuge Post Mortem Facility includes a centrifuge dismantling area and an inspection area. The centrifuge dismantling area includes a stand onto which the centrifuge to be dismantled is mounted providing access to the top and bottom of the centrifuge. A local jib crane is located over the stand to enable removal of the centrifuge from the transport cart and facilitate loading onto the stand.

The inspection area includes an inspection bench, portable lighting, a microscope, an endoscope and a digital video/camera.

2.1.2.3.6 Uranium Byproduct Cylinders (UBC) Storage Pad

The NEF uses an area outside of the CRDB for storage of UBCs containing UF_6 that is depleted in ^{235}U. The depleted UF_6 is stored under vacuum in corrosion resistant Type 48Y cylinders, i.e., UBCs.

The UBC Storage Pad design provides storage cylinders of depleted uranium. The UBC Storage Pad will also be used to store empty feed cylinders that are not immediately recommended to the plant. Approximately 625 UBCs per year will be stored on the UBC Storage Pad. The storage area required to support plant operations accommodates a maximum of 15,727 cylinders of depleted uranium. These cylinders are stacked two high on concrete saddles that elevate the cylinders approximately 0.2 m (0.65 ft) above ground level. (See ER Section 4.13.3.1.1, Uranium Byproduct Cylinder (UBC) Storage.)

Flatbed trucks move the cylinders from the CRDB to the UBC Storage Pad, where cranes remove the cylinders from the trucks and place them on the UBC Storage Pad.

The UBC Storage Pad will be developed in sections over the life of the facility.

2.1.2.3.7 Administration Building

The Administration Building is near the TSB. It contains office areas and a small security station. All personnel access to the plant occurs at this location. Vehicular traffic passes through a security checkpoint before being allowed to park. Parking is located outside of the security gate, and personnel enter the Administration Building after passing through this gate.

Entry to the Administration Building is through the Security Station. The interior of the Security Station is designed to facilitate and control the passage of plant personnel and visitors to and from the plant. Here, employees receive their badges and proceed through a turnstile into the office area or the plant area. Visitors check-in at the Security Station and are directed to the Lobby Area, where a receptionist notifies plant personnel of their arrival.

Entry to the plant area from the Administration Building is only possible through one door. Approximately 50 work locations are provided for the plant office staff. The office environment consists of private, semiprivate, and open office space. It also contains a kitchen, break room, conference rooms, building service facilities such as the janitor’s closet and public telephone, and a mechanical equipment room.

2.1.2.3.8 Central Utilities Building (CUB)

The Central Utilities Building is located near the TSB. It houses two diesel generators, which provide the site with standby power. The building also contains day tanks, switchgear, control panels, and building heating, ventilating, and air conditioning (HVAC) equipment. The rooms housing the diesels are constructed independent of each other with adequate provisions made for maintenance, as well as equipment removal and equipment replacement via roll-up and access doors.

The diesel fuel unloading area provides tanker truck access to the two above ground tanks, which provide diesel fuel storage. Secondary containment (berms) will be provided to contain spills or leaks from the two above ground diesel fuel tanks. The above ground diesel storage tank area will be included in the site Spill Prevention Control and Countermeasures (SPCC) plan.

The CUB also houses the cooling water chillers and pumps, boiler room and air compressors.

2.1.2.3.9 Security Building

The main Security Building is located at the entrance to the plant. It functions as a security checkpoint for all incoming and outgoing traffic. Employees, visitors and trucks that have access approval will be screened at the main Security Building. A smaller security station has been placed at the secondary entrance to the site. All vehicle traffic including common carriers, such as mail delivery trucks, will be screened at this location.

2.1.2.3.10 Visitor Center

A Visitor Center is located outside the security fence area.

2.1.2.4 Process Control Systems

The NEF uses various operations and Process Controls Systems to ensure safe and efficient plant operations. The principal process systems include:

- Decontamination System
- Fomblin Oil Recovery System
- Liquid Effluent Collection and Treatment System
- Solid Waste Collection System
- Gaseous Effluent Vent System
- Centrifuge Test and Post Mortem Exhaust Filtration System
- Laundry System.

2.1.2.4.1 Decontamination System

The Decontamination System is designed to remove radioactive contamination - in the form of uranium hexafluoride (UF_6), uranium tetrafluoride (UF_4) and uranyl fluoride (UO_2F_2) i.e., uranium compounds] from contaminated materials and equipment. The system consists of a series of steps, including equipment disassembly, degreasing, decontamination, drying, and inspection.

Items commonly decontaminated include pumps, valves, piping, instruments, sample bottles, and scrap metal. Decontamination is typically accomplished by immersing the contaminated component in a 5% citric acid bath with ultrasonic agitation, rinsing with water, drying using compressed air, and then inspecting before release. The process time is about one hour for most plant components. Liquid waste is sent to the Liquid Effluent Collection and Treatment System; solid waste/sludge to the Solid Waste Collection System, and enclosure exhaust air to the Gaseous Effluent Vent System prior to venting.

2.1.2.4.2 Fomblin Oil Recovery System

Vacuum pumps use a Perfluorinated Polyether (PFPE) oil, such as Fomblin oil. Fomblin oil is a highly fluorinated, inert oil selected especially for use to avoid reaction with UF_6. The Fomblin Oil Recovery System reclaims spent Fomblin oil from pumps used in the UF_6 processing system. The recovery employs anhydrous sodium carbonate (Na_2CO_3) in a laboratory-scale precipitation process to remove the primary impurities of UO_2F_2, UF_4, and activated carbon to remove trace amounts of hydrocarbons. Refer to ER Section 4.13, Waste Management Impacts, for the annual estimated oil quantity recovered.

2.1.2.4.3 Liquid Effluent Collection and Treatment System

The Liquid Effluent Collection and Treatment System collects potentially contaminated liquid effluents that are generated in a variety of plant operations and processes. These liquid effluents are collected in holding tanks and then transferred to bulk storage tanks prior to dispatch. The bulk liquid storage is segregated by the level of contamination into three categories. Significant and slightly contaminated liquids are processed for uranium recovery, while the non-contaminated liquid is routed to the Treated Effluent Evaporative Basin. The effluent input streams include hydrolyzed UF_6 , degreaser water, citric acid, laundry water, floor wash water, and hand wash/shower water and miscellaneous effluent. Refer to Safety Analysis Report (SAR) Section 3.3 for additional information.

2.1.2.4.4 Solid Waste Collection System

Solid wastes are generated in two categories: wet and dry. The Solid Waste Collection System is simply a group of methods and procedures that apply, as appropriate, to the two categories of solid wastes. The wet waste portion of the system handles all plant radiological, hazardous, and industrial wastes. Input streams include oil recovery sludge, oil filters, and miscellaneous hazardous materials. Each is segregated and handled by separate procedures. The dry waste portion (i.e., liquid content is 1% or less of volume) input streams include activated carbon, aluminum oxide, sodium fluoride, filters, scrap metal, nonmetallic waste and miscellaneous hazardous materials. The wastes are likewise segregated and processed by separated procedures.

2.1.2.4.5 Gaseous Effluent Vent System

The Gaseous Effluent Vent System (GEVS) is designed to route some of the potentially contaminated gaseous streams in the TSB that require treatment before discharge to the atmosphere. The system routes these streams through a filter system prior to exhausting via a vent stack. The stack contains a continuous monitor to indicate radioactivity levels.

Potentially contaminated gaseous streams in the TSB include the Ventilated Room, Decontamination Workshop, Laundry, Fomblin Oil Recovery System, Decontamination System, Chemical Laboratory, and Vacuum Pump Rebuild Work Shop. The total air flow is handled by a central gaseous effluent distribution system that operates under negative pressure. The treatment system includes a single train of filters consisting of a pre-filter, HEPA filter,

impregnated carbon filter (potassium carbonate), centrifugal fan, automatically operated inlet-outlet isolation dampers, monitorings, and differential pressure transducers.

2.1.2.4.6 Laundry System

The Laundry System cleans contaminated and solid clothing and other articles within the plant. The laundry is divided into two main streams: articles with high or low possibility of contamination. Articles likely to be contaminated are collected in special water soluble bags. Articles unlikely to be contaminated are collected in bin bags and sorted into lightly and heavily soiled articles. Lightly soiled articles are laundered; heavy soiled articles are inspected first and if to difficult to clean are sent to the Solid Waste Collection System, otherwise they are laundered as well. Laundry water is discharged to the Liquid Effluent Collection and Treatment System.

2.1.2.4.7 Centrifuge Test and Post Mortem Facilities Exhaust Filtration System

The Centrifuge Test and Post Mortem Facilities Exhaust Filtration System provides exhaust of potentially hazardous contaminants from the Centrifuge Test and Post Mortem Facilities. The system also ensures the Centrifuge Post Mortem Facility is maintained at a negative pressure with respect to adjacent areas. The Centrifuge Test and Post Mortem Facilities Exhaust Filtration System is located in the Centrifuge Assembly Building and is monitored from the Control Room.

The ductwork is connected to one filter station and vents through either of two 100% fans. Both the filter station and either of the fans can handle 100% of the effluent. One of the fans will normally be in standby. Operations that require the Centrifuge Test and Post Mortem Facilities Exhaust Filtration System to be operational are manually shut down if the system shuts down. After filtration, the clean gases pass through a fan, which maintains the negative pressure upstream of the filter station. The clean gases are then discharged through the monitored (alpha and HF) stack on the Centrifuge Assembly Building.

2.1.2.5 Site and Nearby Utilities

The cities of Eunice and Hobbs, New Mexico will provide water to the site. Water consumption for the NEF is calculated to be 240 m^3/day (63,423 gal/d) to meet potable and process consumption needs. Peak water usage for fire protection is 33 L/s (521 gal/min). The natural gas requirements of the plant are 354 m^3/hr (12,500 ft^3/hr). Electrical service to the site will be provided by Xcel Energy. The projected demand is approximately 30 MW. Three septic tanks with a common leach field will be installed onsite for the collection of sanitary and non-contaminated liquid waste.

Identified, onsite pipelines include a 25.4-cm (10-in) diameter, underground carbon dioxide pipeline that runs southeast-northwest. This pipeline is owned by Trinity Pipeline LLC. A 40.6-cm (16-in) diameter, underground natural gas pipeline, owned by the Sid Richardson Energy Services Company, is located along the south property line, paralleling New Mexico Highway 234. A parallel 35.6-cm (14-in) diameter gas pipeline is not in use. There are no known onsite underground storage tanks, wells, or sewer systems.

Detailed information concerning water resources and the use of potable water supplies is discussed in ER Section 3.4, Water Resources, and the impacts from these water resources are discussed in ER Section 4.4, Water Resources Impacts. A discussion of impacts related to utilities that will be provided is included in ER Section 4.1, Land Use Impacts.

2.1.2.6 Chemicals Used at NEF

The NEF uses various types and quantities of non-hazardous and hazardous chemical materials. Table 2.1-1, Chemicals and Their Properties, lists the chemicals associated with the NEF operation and their associated hazards. Tables 2.1-2 through 2.1-5 summarize the chemicals in use and storage, categorized by building. These tables also include the physical state and the expected quantity of chemical materials.

2.1.2.7 Monitoring Stations

The NEF will monitor both non-radiological and radiological parameters. Descriptions of the monitoring stations and the parameters measured are described in other sections of this ER as follows:

- Meteorology (ER Chapter 3, Section 3.6)
- Water Resources (ER Chapter 3, Section 3.4)
- Radiological Effluents (ER Chapter 6, Section 6.1)
- Physiochemical (ER Chapter 6, Section 6.2)
- Ecological (ER Chapter 6, Section 6.3)

2.1.2.8 Summary of Potential Environmental Impacts

Following is a summary of impacts from undertaking the proposed action and measures used to mitigate impacts. Table 2.1-6, Summary of Environmental Impacts for the Proposed Action, summarizes the impact by environment resource and provides a pointer to the corresponding section in ER Chapter 4, Environmental Impacts, that includes a detailed description of the impact. Detailed discussions of proposed mitigation measures and environmental monitoring programs are provided in ER Chapter 5, Mitigation Measures and Chapter 6, Environmental Measurements And Monitoring Programs, respectively.

Operation of the NEF would result in the production of gaseous, liquid, and solid waste streams. Each stream could contain small amounts of hazardous and radioactive compounds either alone or in a mixed form.

Gaseous effluents for both non-radiological and radiological sources will be below regulatory limits as specified in permits issued by the New Mexico Air Quality Bureau (NMAQB) and release limits by NRC (CFR, 2003q; NMAC, 2002a). This will result in minimal potential impacts to members of the public and workers.

Liquid effluents include stormwater runoff, sanitary waste water, cooling tower blowdown water, and treated liquid effluents. All proposed liquid effluents, except sanitary waste water, will be discharged onsite to evaporative detention or retention basins. General site stormwater runoff

is collected and released untreated to a site stormwater detention basin. A single-lined retention basin will collect stormwater runoff from the Uranium Byproduct Cylinder (UBC) Storage Pad and cooling tower blowdown water. All stormwater discharges will be regulated, as required, by a National Pollutant Discharge Elimination System (NPDES) Stormwater Permit. . LES will also need to obtain a New Mexico Groundwater Quality Bureau (WQB) Groundwater Discharge Permit/Plan prior to operation for its onsite discharges of stormwater, treated effluent water, cooling tower blowdown water and sanitary water. Approximately 195,800 m^3 (52 million gal) of stormwater from the site is expected to be released annually to the onsite retention/detention basins.

NEF liquid effluent discharge rates are relatively low, for example, NEF process waste water flow rate from all sources is expected to be about 128,900 m^3/yr (7.64 million gal/yr). This includes waste water from the liquid effluent treatment system, domestic sewerage and cooling tower blowdown waters. Only the former source can be expected to contain minute amounts of uranic material. The liquid effluent treatment system and shower/hand wash/laundry effluents will be discharged onsite to a double-lined evaporative basin; whereas the cooling tower blowdown water and UBC pad stormwater run-off will be discharged onsite to a single-lined retention basin. Domestic sewerage will be discharged to onsite septic tanks with a common leach field system.

The NEF water supply will be obtained from the city of Eunice, Mew 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/hr (378 gpm), respectively. These usage rates are well within the capacities of both water systems.

Solid waste that will be generated at the NEF, which falls into the non-hazardous, radioactive, hazardous, and mixed waste categories, will be collected and transferred to authorized treatment or disposal facilities offsite as follows. All solid radioactive waste generated will be Class A low-level waste as defined in 10 CFR 61 (CFR, 2003r). Approximately 86,950 kg (191,800 lbs) of low-level waste will be generated annually. In addition, annual hazardous and mixed wastes generated are expected to be about 1,770 kg (3,930 lbs) and 50 kg (110 lbs), respectively. A small quantity generator RCRA permit from the New Mexico Hazardous Waste Bureau will be required for the NEF site to store hazardous wastes for up to 90 days and dispose of small quantities by way of licensed disposal contractors. LES des not plan to treat hazardous waste or store quantities longer than 90 days. Non-hazardous waste, expected to be approximately 172,500 kg (380,400 lbs) annually, will be collected and disposed of by a County licensed solid waste disposal contractor. The non-hazardous wastes will be disposed of in the new Lea Country landfill which has more than adequate capacity to accept NEF non-hazardous wastes for the life of the facility.

No communities or habitats defined as rare or unique, or that support threatened and endangered species, have been identified as occurring on the 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 220-ha (543-acre) site.

Noise generated by the operation of the NEF will be primarily limited to truck movements on the road. The noise at the nearest residence will probably increase; however, it may not be

noticeable. While the incremental increases in noise level are small, some residents may experience some disturbance for a short period of time as they adjust to these slight increases.

The results of the economic analysis show that the greatest fiscal impact (i.e., 66% of total 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 in household earnings and jobs is associated with construction payroll and employment projected during the 8-year construction period.

Annual facility operations will involve about 210 employees receiving pay of $10.5 million and $3.1 million in benefits. LES expects that most of these jobs will be filled by Lea County and other nearby county residents, providing numerous opportunities in construction of new housing, in provision of services, and in education. NEF operations could have minor impacts on local public services including education, health services, housing, and recreational facilities, but are anticipated to be minimal.

Radiological release rates to the atmosphere and retention basins during normal operations are estimated to be less than 8.9 MBq/yr (240 μCi/yr) and 14 Bq/yr (390 μCi/yr), respectively. Estimated annual effective dose equivalents and critical organ (lung) dose equivalents from discharged gaseous effluent to a maximally exposed adult individual located at the plant site 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 annual effective dose equivalent and critical organ (teen-lung) dose equivalents from discharged gaseous effluent to the nearest resident located beyond 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. Estimated annual effective dose equivalent and critical organ lungdose equivalents from liquid effluent to a maximally exposed individual 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 nearest resident (teenager) location had a maximum annual effective dose equivalent of 1.7×10^{-6} mSv (1.7×10^{-4} mrem). The maximum annual organ (lung) at the nearest resident (teenager) from liquid effluents was estimated to be 1.3×10^{-5} mSv (1.3×10^{-3} mrem).

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 (NCRP, 1987a), and within regulatory limits (CFR, 2003q). 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.

Operation of the NEF would also result in the annual nominal production of approximately 7,800 metric tons (8,600 tons) at full capacity of depleted UF_6 . The depleted UF_6 would be stored onsite in Uranium Byproduct Cylinders (UBCs) and would have minor impact while in storage. The maximum annual dose equivalent due to external radiation from the UBC Storage Pad (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 approximately 4.3 km (2.63 mi) from the UBC Storage Pad.

Based on 2000 US Census Bureau data, construction and/or operation of the NEF will not pose a disproportionate impact to the Lea County, New Mexico or Andrews County, Texas minority or low-income population.

2.1.3 Reasonable Alternatives

This section includes a discussion of alternative enrichment technologies available for an operational enrichment facility, significant alternative designs selected for the NEF to improve environmental protection, and the site selection process LES used to select the proposed NEF site and to identify alternatives to that site.

2.1.3.1 Alternative Technologies

LES proposes to use the gaseous centrifuge enrichment process at the NEF. The LES gaseous centrifuge technology used by LES (that of Urenco) has been operated and improved several times over the past 30 years. LES considers the alternative technologies of gaseous diffusion or laser enrichment, to be unreasonable due to their high operating, economic, and environmental costs and/or lack of demonstrated commercial viability.

Gaseous diffusion technology involves the pumping of gaseous uranium hexafluoride (UF_6) through diffusion barriers, resulting in the gas exiting the barrier being slightly enriched ^{235}U isotope. The diffusion barriers and their associated compressed gases are staged, similar to the staging of centrifuges, to produce higher enrichments. The technology, which was developed in the US during the 1940s, would entail increased capital cost requirements and excessive electrical energy consumption, without obvious environmental advantages. The amount of energy to produce one separative work unit (SWU) is about 50 times greater than the energy required for centrifuge technology (NRC, 1994a). This technology is currently being used by the US Enrichment Corporation (USEC) at its Paducah facility.

There are two types of laser enrichment technologies, the AVLIS and SILEX technologies . The development of each technology has involved USEC. AVLIS is the Atomic Vapor Laser Isotopic Separation process based on selective photo-ionization (through a laser light) and subsequent separation of ^{235}U atoms from vaporized uranium metal. This technology was proposed as a commercial venture by USEC and its partners in the late 1990s, but soon suspended due to operating and economic factors.

SILEX (Separation of Isotopes by Laser Excitation) is an advanced laser-based process developed by the Australian company, Silex Systems, Ltd. USEC holds the exclusive rights to SILEX's commercial use. The process, however, is still in the early stages of development. In the meantime, through its Lead Cascade Project, USEC intends to build and demonstrate the efficacy of an enrichment facility that will use a gaseous centrifuge technology based on research and development conducted by the US Department of Energy during a two-decade period that ended in 1985.

2.1.3.2 Alternative Designs

The NEF design is, in effect, an enhancement to the design of the Claiborne Enrichment Center formerly proposed by LES. In this regard, LES considered the design aspects of the proposed Claiborne Enrichment Center, for which it submitted a license application to NRC in 1991. Although the NRC staff approved the Claiborne Enrichment Center design, the underlying Urenco centrifuge plant design has undergone certain enhancements in recent years due to operating experience in Europe. Summarized below are the six systems with significant features that have been incorporated into the NEF to improve plant efficiency and further reduce

environmental impacts. They include the Cascade System, UF_6 Feed System, Product Take-Off System, Product Liquid Sampling System, Product Blending System, and Tails Take-Off System.

The primary difference between the Claiborne Enrichment Center and the NEF cascade systems is that all assay units are now identical, whereas in the Claiborne Enrichment Center, one assay unit was designed to produce low assays - in the region of 2.5%. An additional change is the increase from seven Cascades per Cascade Hall to eight Cascades per Cascade Hall. Maximum Cascade Hall capacity has been increased to 545,000 SWU/yr.

There are two major differences in the "UF_6 Feed System" for the NEF as compared to the Claiborne Enrichment Center. First, the liquid UF_6 phase above atmospheric pressure has been eliminated. Sublimation from the solid phase directly to the gaseous phase below atmospheric pressure is the process proposed in the NEF. A sealed autoclave is replaced with a Solid Feed Station enclosure for heating the feed cylinder. A second major difference is the use of chilled air to cool the feed purification cylinder rather than chilled water.

The NEF "Product Take-Off System" uses a process similar to the Claiborne Enrichment Center, but there are differences. In the current system there is only one product pumping stage, while the Claiborne Enrichment Center used two pumping stages to transport the product for desublimation. In this system, pressures are controlled such that desublimation cannot occur in the piping, eliminating the need for heat tracing and valve hot boxes. In the Claiborne Enrichment Center the product cylinder stations relied on common chillers to cool the stations, but the current system uses a dedicated chiller for each station. The cold traps used to desublime any UF_6 in the vent gases are smaller than in the Claiborne Enrichment Center design and each is on load cells to continuously monitor accumulation.

NEF's "Product Liquid Sampling System" uses a process very similar to Claiborne Enrichment Center. NEF has a permanent vent system, the Blending and Sampling Vent Subsystem, rather than a mobile unit as used in Claiborne Enrichment Center.

The NEF "Product Blending System" uses a process similar to the Claiborne Enrichment Center, but one major difference is that the NEF uses Solid Feed Stations to heat the donor cylinders. In the NEF system, the feed material is heated and sublimed directly to a gas under low pressure. Autoclaves were used to heat the donor cylinders in the Claiborne Enrichment Center. In that system, the feed material was heated to a liquid and then drawn off as a gas. Other differences are the use of only four receiver stations in this process versus five in the Claiborne Enrichment Center and the use of a dedicated vacuum pump/trap set in the current design versus a mobile set in the Claiborne Enrichment Center.

NEF's "Tails Take-Off System" uses a process similar to the Claiborne Enrichment Center, but there are differences. In the new system there is only one depleted UF_6 pumping stage, while the Claiborne Enrichment Center used two pumping stages to transport the depleted UF_6 for desublimation. depleted UF_6 are desublimed in cylinders cooled with chilled air in the current system, while the Claiborne Enrichment Center used chilled water to cool the cylinders. The Claiborne Enrichment Center contained a total of ten UBCs in five double cooling stations for each Separation Plant Module (two Cascade Halls), but the current system uses ten cylinders in single cooling stations for each Cascade Hall. Finally, the current system has a dedicated vacuum pump/trap set for venting and does not use the Feed Purification System like the Claiborne Enrichment Center.

Beyond minor changes, there were no other major design alternatives considered by LES that could lower the impact of the NEF on the environment.

2.1.3.3 Alternative Sites

The purpose of the site selection process was to locate a suitable site for construction and operation of the uranium enrichment facility, based on various technical, safety, economic and environmental factors. The process, followed prior to site selection, is described below and used a two-phased screening approach to locate a suitable site. The first phase of the screening analysis involved the evaluation of 15 sites (Figure 2.1-5, Alternate Site Locations) using a Go/No Go criteria. The second phase of the screening analysis involved a more detailed analysis of the sites that remained after the first screening phase against an additional criteria as well as more detailed subcriteria for the first phase criteria.

2.1.3.3.1 Methodology

The selection process used the Multi-Attribute Utility Analysis (MUA) methodology. MUA assesses the relative benefits of a site with multiple, often competing, objectives or criteria. It is designed to ensure that site selection is consistent with organization objectives and that selections are based on well-defined measures of site performance. The methodology uses five steps:

- Develop Value Hierarchy
- Assign Weighting
- Specify Performance Measures (Scales)
- Score and Rank Site
- Conduct Sensitivity Analysis

The value hierarchy contains LES's objectives and the performance criteria used to evaluate achievement of these objectives, which are fundamental, comprehensive, non-redundant, and independent to ensure mathematical validity of priority calculations. Fundamental objectives define the mission of the siting process. Comprehensive objectives cover the major concerns and policy issues considered by LES to be most important. Non-redundancy requires that objectives do not address the same or overlapping performances aspects. Independence of objectives ensures that accomplishment relative to an objective, in effect, dictated by the accomplishment of another objective. Figure 2.1-6, Value of Hierarchy for Site Selection, shows the value hierarchy developed for the LES siting process.

The weighting of objectives and criteria is necessary to reflect the values and priorities properly. Although all objectives identified in the value hierarchy are fundamental, they are not all equally important, nor are the criteria used to define accomplishment of each objective. Therefore, the weights assigned to the objectives reflect quantifiable tradeoffs between objectives and the desirability of one objective relative to others.

Performance measures examine how each fundamental criterion contributes to achieving the primary value of the value hierarchy. The measures developed used constructed scales, which provide precise, unambiguous definitions of project performance. The scales also provide a way to quantify expert opinion about project performance.

The sites are then given a score for each criteria and subcriteria using the scales developed. Site scores, in turn, are converted to measures of benefit by multiplying the scores times the relative contribution of the criterion to the overall value, determined by the weighting.

The results are then tested through a variety of sensitivity analyses that help verify assigned weighting and examine the relative importance of each objective to project ranking. The sensitivity analyses also help demonstrate how sites compare based on their scores for each objective.

2.1.3.3.2 First Phase Screening

Initially, the screening analysis involved the collection of existing qualitative and quantitative data on eight sites. Each site was evaluated using the data available and six first screening criteria (see Table 2.1-7, Matrix of Results from First Phase Screening, and table notes which further define the six screening criteria):

- Seismology/Geology
- Site Characterization Surveys
- Size of Plot
- Land Not Contaminated
- Moderate Climate
- Redundant Electrical Power

These criteria were initially applied to the following eight sites:

- Ambrosia Lake, New Mexico (Rio Algom/Quivira Mining Site)
- Columbia, SC (Westinghouse Nuclear Fuel Site)
- Metropolis, IL (Honeywell International Site)
- Paducah, KY (Department of Energy Gaseous Diffusion Plant Site)
- Portsmouth, OH (Department of Energy Gaseous Diffusion Plant Site)
- Wilmington, NC (Global Nuclear Fuel Site)
- Barnwell, SC (former Barnwell Nuclear Fuel Plant Site)
- Richland, WA (Framatome ANP Nuclear Fuel Cycle Facility Site)

In its site selection process, LES considered sites within the 48 contiguous states. The Columbia, Metropolis, Paducah, Portsmouth, Wilmington, Barnwell and Richland sites were included in the evaluation because they are extant nuclear facilities involved in the nuclear fuel cycle. (The latter two sites are also notable as sites with no existing soil or groundwater contamination.) Ambrosia Lake, a uranium mining site, was included in the evaluation upon the request of an LES partner organization.

Five of the eight sites (Barnwell, Columbia, Metropolis, Paducah and Richland) failed to meet the seismic criterion. Further, the Wilmington site was not made available for consideration.

Because only Portsmouth, and Ambrosia Lake remained as viable sites, LES added two additional sites to the evaluation, as follows:

- Erwin, TN (Nuclear Fuel Services Site)
- Lynchburg, VA (Framatome Fuels Site)

The addition of these sites assured consideration of all major active domestic nuclear fuel facility sites. Framatome, however, did not provide the Lynchburg site for consideration.

Of the three remaining sites, Erwin failed the "size of plot" criterion. It was subsequently determined, following analysis of additional information, that Ambrosia Lake failed the seismic criterion. Upon completion of the first screening evaluation, therefore, it was determined that, of the initial eight sites considered, only Portsmouth met the first screening criteria.

Accordingly, LES sought to identify additional "contingency" sites. These sites were to be in seismically acceptable locations that had submitted applications to the NRC for a power reactor operating license and/or construction permit, but had subsequently cancelled or indefinitely deferred the project. The sites also would not be located adjacent to an operational nuclear power plant (due to enhanced security measures that could affect construction and operation of a centrifuge enrichment facility).

From NRC data, thirty-one planned sites were identified nationwide. Nineteen sites were located adjacent to operational nuclear plants. One site had been converted to a coal unit, and one Washington state site was not considered due to its close proximity to Richland, which failed the seismic criterion. Accordingly, ten sites were identified for consideration, as follows: Sterling, NY; Midland, MI; Bailly, IN; Forked River, NJ; Bellefonte, AL; Hartsville, TN; Phipps Bend, TN; Yellow Creek, MS; Cherokee, SC; and Marble Hill, IN.

Four of the ten sites (Sterling, Midland, Bailly, and Forked River) were located in northern climates, and were not considered due to the potential for severe weather which could impact the facility construction schedule. Of the remaining sites, a search of economic development information did not indicate available property at the Cherokee, Marble Hill, or Phipps Bend sites. Yellow Creek was not selected for consideration due to its remote location (e.g., 75 km (47 mi) from the nearest town of 25,000). Accordingly, Hartsville and Bellefonte were recommended for further consideration.

Subsequently three (3) additional sites were added by LES for consideration:

- Eddy County, New Mexico (adjacent to the Waste Isolation Pilot Plant (WIPP) Site)
- Lea County, New Mexico (adjacent to the Waste Control Specialists (WCS) Site in Texas)
- Clinch River Industrial Site, Tennessee (part of the old Breeder Reactor Site in Oak Ridge)

In all, a total of fifteen sites were evaluated against the first screening criteria.

A matrix of the results from the screening for all 15 sites against the essential criteria is provided in Table 2.1-7, Matrix of Results from First Phase Screening. The following discussion summarizes the results of the screening for the 3 additional sites.

The Clinch River Industrial Site does not meet the Go/No Go criterion for Seismology/Geology (i.e., "peak horizontal ground acceleration no greater than the range of 0.04 g – 0.08 g). In addition, the usable area of the Clinch River Industrial Site 61 ha (151 acres) does not support

the 600 by 800-m (1,969- by 2,625-ft) plant footprint and would require extensive site work to fill the existing pit.

Both the Eddy County and Lea County Sites meet all of the Go/No Go criteria and were evaluated against the second final screening criteria as described in ER Section 2.1.3.3.2, First Phase Screening. Of the 15 sites evaluated, 6 sites (Bellefonte, Carlsbad, Hartsville, Portsmouth, Eddy County, and Lea County) met the initial screening criteria.

During the evaluation of the three additional sites, two adjacent parcels of land were under consideration in Lea County, New Mexico. Section 33 consists of approximately 182 ha (452 acres) in Township 21S, Range 38E of the New Mexico Meridian, and is contiguous with the Texas State Line. Section 32 consists of approximately 220 ha (543 acres) in of Township 21S, Range 38E and is directly west of Section 33. For screening purposes, both sites have the same characteristics with the exception of area size. The site evaluation was actually performed using Section 33. Subsequent to the site evaluation, Section 32 was selected for the NEF. LES has compared the two adjacent sites and concluded that the site evaluation results are applicable to either or both parcels of land.

Portsmouth, Hartsville, Lea County, Eddy County and Bellefonte were evaluated against the second phase criteria, as discussed further below. Over the course of the second phase screening, LES added a sixth site, Carlsbad, New Mexico (former Beker Industrial Corporation Site). (These six sites were also evaluated using the first phase screening criteria described above.)

Table 2.1-7, Matrix of Results from First Phase Screening, lists the results of the first phase screening analysis for all 15 sites discussed in this section. As shown, six sites (Bellefonte, Carlsbad, Hartsville, Lea County, Eddy County and Portsmouth) passed the first phase screening criteria. These sites, in turn, were evaluated in the second phase screening analysis.

2.1.3.3.3 Second Phase Screening/Final Site Selection

The second phase screening/final site selection screening analysis was conducted for six sites: Bellefonte, Carlsbad, Hartsville, Lea County, Eddy County and Portsmouth. This section sets forth the screening criteria used, and then discusses the application of those criteria to the six sites. To facilitate the decision analysis involving 20 screening criteria, the criteria were grouped using a value hierarchy into four major objectives:

- Operational Requirements
- Environmental Acceptability
- Schedule for Commencing Operations
- Operational Efficiencies

Figure 2.1-7, Contributions by Grouped Criteria shows how the criteria were grouped into these objectives.

A swing-weighting method was used to develop the weights for each tier of the value hierarchy. First, the four objectives were ranked in order of relative importance. A weight of 100 was assigned to the most important objective, Operational Requirements. The second most important objective, Environmental Acceptability, was assigned a weight between 0 and 100

that reflected its relative importance compared to the most important objective. In this case, a weight of 80 was assigned, showing only a slightly less relative importance than operational requirements. Similarly, the third and fourth ranked objectives resulted in weights of 70 for Schedule for Commencing Operations and 60 for Operational Efficiencies.

Table 2.1-8, Screening Criteria (Subsequent to First Screening) lists the screening criteria and the weighting values. Figures 2.1-7 and 2.1-8 summarize scoring for the five highest scoring sites against the screening criteria, while individual scores for each criterion are listed in Table 2.1-9, Scoring Summary.

2.1.3.3.3.1 Operational Requirements

Four criteria make up this objective, as follows:

Acceptable Seismology/Geology

The Go/No Go subcriteria for this criterion included:

- 1 in 500 year event with a peak horizontal Peak Ground Acceleration (PGA) no greater than the range of 0.04-0.08 g_a;
- Ground movement < 1 mm (0.04 in);
- No capable fault with a 8-km (5-mi) radius of the site.

This criterion also involved six desirable, but non-essential, sub-criteria:

- The presence of minimal liquefiable materials is considered desirable.
- Lower PGA is preferred.
- The availability of well-documented and up-to-date seismological surveys is desirable.
- There is low or no potential for underlying karstification.
- A minimal amount of rock excavation is required.
- There is sufficient allowable bearing to minimize required ground improvements.

Size of Plot

The Go/No Go subcriteria for this criterion include:

- Site size supports a rectangular footprint of approximately 800 m (2,625 ft) by 600 m (1,969 ft) for a 3 million SWU facility.
- Future expansion capability exists for a 6 million SWU plant. (At this time, there is no intention to license, construct or operate a 6 million SWU plant.)

Desirable subcriteria for this criterion include:

- The degree of capability to support future expansion beyond a 6 million SWU facility (approximately 1,600 m (5,250 ft) by 600 m (1,969 ft) is considered. (At this time, there is no intention to license, construct or operate a 6 million SWU or larger plant.)

- The extent of the buffer area between the site and populated areas is considered.
- It is desirable for the site to require minimal or no adjustment to ideal plant layout to fit site and terrain.
- It is desirable for borrow and fill requirements to be met onsite or close by. Furthermore, this subcriterion looks for optimal site preparation costs due to variances in topography. It is also desirable if site topography optimizes the overall usability of the site for the site footprint, transportation access, and drainage.

Redundant Electrical Power Supply

The Go/No Go subcriterion for this criterion is that there be a dual dedicated power supply on separate feeders capable of delivering 20 Mega Volt-Ampere (MVA) for a 3 million SWU facility.

The four non-essential subcriteria for this criterion include:

- It is desirable for the local utility and/or government to be willing to share capital costs associated with the power supply to the facility substation. Factors to evaluate include utility willingness to construct feed lines, construct a substation, and maintain the feeder and substation.
- It is desirable for the power provider to provide the applicant an optimal rate structure. Factors to evaluate include optimal rate agreements, preferred customer status, a significant break in off-peak rates, and guarantees for quality and reliability.
- It is desirable that transmission feeders can supply power requirements for a 6 million SWU facility. (At this time, there is no intention to license, construct or operate a 6 million SWU plant.)
- It is desirable that the power supply have a guaranteed availability rate of greater than 99.5% and a +/-5% voltage regulation, and that the supplier be willing to guarantee quality of services. Factors to consider include historical performance of the utility, including performance in power restoration after severe weather outages; historical voltage regulation of the system; the capability to provide all power without buying from other suppliers; and the historical delivery performance to production and manufacturing facilities in the area.

Water Supply

The desirable subcriterion here is that groundwater or water from another source is readily available to provide ample water supply to the facility for both potable and process uses.

2.1.3.3.3.2 Environmental Acceptability

Six criteria make up this objective, as follows:

Site Characterization Surveys and Availability

The Go/No Go subcriterion for this criteria is that the site is not within the 500-year flood plain.

This criterion includes thirteen desirable subcriteria, as follows:

- It is desirable that existing surveys of quality are available for hydrology, meteorology, topography, archeology, and endangered species.

- The site should not be a habitat for federally-listed threatened or endangered species.
- It is desirable that there be a low probability of occurrence of archeological and/or cultural resources.
- It is desirable that there be a low probability for environmental justice issues.
- It is desirable that adjacent properties have no areas designated as protected for wildlife or vegetation that would be adversely affected by the facility.
- Waste water discharge (NPDES) permits should be readily achievable for projected plant discharges.
- It is desirable that few or no areas of the site be designated as wetlands, and that no requests for wetlands mitigation would be required.
- It is desirable that there be a low probability of high or excessive winds. Factors to consider include proximity of hurricane-prone zones, annual frequency of wind gusts greater than 80 km/hr (50 mi/hr); design wind speed, and tornado frequency.
- The facility should add no additional radiological sources to the environment.
- It is desirable that there be minimal risk from grass or forest fire events. Factors to consider include the proximity of fuel sources to the site, drought conditions, and wind.
- It is desirable that the natural site contours minimize the potential for localized flooding or ponding. Factors to consider include stream beds, natural and potential runoffs, runoff from adjacent areas, storm drainage systems in place, and requirements for retention ponds.
- It is desirable that there be a low potential for rockslides, mudslides, or other debris flow. This includes an evaluation of slopes on or near the facility greater than 9 m (30 ft) tall, near a vertical face, with no protective ground cover; and the possibility of upstream failure of dams, lakes or ponds.

Land Not Contaminated Through Previous Use

This criterion includes three Go/No Go criteria, as follows:

- The site is not contaminated with radiological material in soil or groundwater to a level that would inhibit licensing or transfer of property with clear identification of liabilities.
- The site is not identified as a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Resource Conservation and Recovery Act (RCRA) site contaminated with hazardous wastes or materials.
- The site does not have contamination that would require remediation prior to construction.

This criterion includes three desirable, but non-essential, criteria, as follows:

- It is desirable that well-documented site surveys and monitoring exists for radiological, chemical, and hazardous material contamination.
- There are no facilities in the area with existing release plumes (air or water), hazardous material, or radiation release that includes the site.

- This subcriterion considers whether future migration of contamination from adjacent or nearby sites is negligible.

Discharge Routes

This criterion includes two non-essential criteria:

- It is desirable that plant discharge and runoff controls be economically implemented for minimal effect to the environment.
- For sites with extant nuclear facilities, facility discharges should be readily identifiable from extant facility discharges.

Proximity of Hazardous Operations/High-Risk Facilities

This criterion includes four non-essential subcriteria, as follows:

- LES will consider the distance of the site from any facility storing, handling or processing large quantities of hazardous chemicals.
- LES will consider the distance of the site from one or more large propane pipelines.
- The site should not be located within 16 km (10 mi) of a commercial airport.
- The site should be outside the general emergency area for any nearby hazardous operations facility (other than an extant nuclear-related facility).
- The site should not be located within 8 km (5 mi) of an operating/manufacturing facility that inhibits site air quality. In addition, the site should have high air quality. The site terrain should not limit air dispersal. Finally, the surrounding community's air quality should be within regulatory requirements.

Ease of Decommissioning

This criterion consists of one non-essential consideration: site characteristics should not negatively affect decommissioning and decontamination activities.

Adjacent Sites' Medium/Long-Term Plans

This criterion consists of one non-essential consideration: planned major construction activities on adjacent sites are minimal over the next ten years. More specifically, no heavy industrial activities are planned within 1.6 km (1 mi) of the site boundary.

2.1.3.3.3.3 Schedule for Commencing Operations

Five criteria make up this objective, as follows:

Political Support

This criterion includes one Go/No Go subcriterion: federal, state, and local government officials do not oppose the facility.

The criterion also includes four non-essential criteria:

- Federal, state and local officials are advocates for the facility.
- Federal, state and/or local governments offer tax breaks and/or other incentives for the construction and operation of the facility.
- It is desirable for Federal, state and/or local governments finance road upgrades.
- It is desirable to have cooperation and assistance of federal, state and local government in obtaining necessary easements, leases, construction permits, operating permits, and disposing of low-level waste.

Public Support

This criterion includes two desirable, but non-essential, criteria:

- It is desirable that the majority of community merchants and citizens support the construction and operation of the facility in their locale.
- It is desirable for the local labor force to support the facility.

On or Near an Existing Nuclear Facility

This criterion consists of one non-essential consideration: that the site be located on (or near another) site with an existing or previous NRC license.

Moderate Climate

This criterion consists of one non-essential consideration: It is desirable that site construction delays due to weather conditions are minimal and average 15 days or less per year, considering temperature, rainfall, the potential for ice and sleet, and snowfall.

Availability of Construction Labor Force

This criterion consists of five desirable, but non-essential, subcriteria, as follows:

- The local area should have sufficient skilled construction labor to construct the facility on the desired schedule. Craft requirements include all major construction crafts (e.g., steelworkers, electricians, pipefitters, etc.)
- It is desirable if no major construction projects in the area are competing for the labor pool resources, such that resources would be limited.
- If construction crafts at the site are provided by union personnel, it is desirable if the labor union business agents commit to support plant construction on a preferential basis.
- It is desirable if there are existing craft apprenticeship programs.
- If construction crafts at the site are provided by union personnel, it is desirable that there be union support for the use of travelers for short-term assignments in areas of critical skill shortages.

2.1.3.3.3.4 Operational Efficiencies

Five criteria are grouped into this objective, as follows:

Availability of Skilled and Flexible Work Force for Plant Operations

This criterion consists of three desirable, but non-essential, subcriteria, as follows:

- It is desirable that there be a sufficient supply of qualified labor that readily can be trained for plant operations, maintenance, technical support, and waste management.
- It is desirable if the community has a technical school, technical or community college, or local nuclear facility that is willing to provide training for plant operations.
- It is desirable if local labor rules do not prohibit or discourage employee multi-tasking.

Extant Nuclear Site

This criterion consists of four desirable, but non-essential, subcriteria, as follows:

- It is desirable if the supply chain can be integrated by co-locating the facility with a fuel fabrication facility or a UF_6 production site.
- It is desirable to have an existing nuclear infrastructure that can be used to support the project, including security facilities and systems, waste treatment/disposal facilities, anti-contamination laundry, emergency response resources and equipment, etc., that might be shared.
- It is also desirable to have an existing non-nuclear infrastructure (e.g., dedicated water supply, steam facilities, etc.) that can be used for the facility.
- Specialized technical resources that can be used on a limited basis are also desirable.

Availability of Good Transport Routes

This criterion consists of four desirable, but non-essential, subcriteria, as follows:

- It is desirable to have a railhead located at the site.
- Close proximity to controlled-access highways and/or interstate highways is desirable.
- There should be traffic capacity for construction and operation activities, with minimal improvements required.
- There should be optimal and efficient highway and/or rail access for UF_6 feed suppliers to fuel fabricators.

Disposal of Operational Low-Level Waste

This criterion consists of a single non-essential consideration: It is desirable if site-specific issues (e.g., availability/access to nearby facilities for disposal of low-level waste, transportation modes, etc.) do not impede disposal of low-level waste.

Amenities for Work Force

This criterion consists of two desirable, but non-essential, sub-criteria, as discussed below:

- It is desirable that housing, hotels, and lodging be available for the seconded work force, as well as recreational facilities.

- It is desirable that there be cultural activities available at or near the area.

A swing-weighting method was used to develop the weights for each tier of the value hierarchy. The four objectives were ranked in order of relative importance. A weight of 100 was assigned to the most important objective, Operational Requirements. The other objectives were assigned weights reflecting their relative importance compared to Operational Requirements. A weight of 80 was assigned to Environmental Acceptability, 70 for Schedule for Commencing Operations and 60 for Operational Efficiencies. Table 2.1-8, Screening Criteria (Subsequent to First Screening) lists the criteria described above as well as the weights accorded to each criterion and sub-criterion.

Other Considerations

The commitment of capital for site preparation and facility construction is not very sensitive to alternative sites since it is heavily influenced by the costs of specialized equipment. Therefore, it was not explicitly considered in the alternative site selection process. Prevailing wage rates is not considered by LES to be an important site selection criteria and therefore was not considered in the alternative site selection process. LES did not explicitly consider other recurring and nonrecurring costs in the site selection process since they are not considered sensitive to any particular site.

2.1.3.3.4 Discussion

A description of each of the six sites considered in the second phase screening is provided in this section.

2.1.3.3.4.1 Criterion 1, Seismology/Geology

The site selection screening analysis for this criterion involved review of the subcriteria identified previously for the Phase 1 screening (i.e., peak ground acceleration (PGA), faulting, and ground movement), as well as consideration of six additional desirable but non-exclusionary subcriteria. These additional subcriteria are:

- Liquefaction Potential
- Up-to-Date Seismological Information
- Potential for Karstification
- Amount of Rock Excavation
- Differential Settlement
- Allowable Bearing

PGA was also added to the scoring process to differentiate sites with lower PGA values within the acceptable range because the lower PGA values would be more desirable from an operational standpoint.

A site-by-site summary of these conditions is presented below.

Bellefonte, AL

The proposed Bellefonte Site has geological and seismological conditions that are generally suitable for development. Requirements for PGA, ground movement, and fault location will likely meet design limits, assuming that geologic conditions are similar to the site conditions at the Bellefonte Nuclear Plant Site, where rock is generally located within 6.1 m (20 ft) of the ground surface. If deeper deposits of soft soils are present, then the PGA value at the ground surface could exceed the 0.08 gravitational acceleration (g_a) criterion. This can only be verified through soil borings onsite and through site-specific ground response evaluations. For site screening purposes, a PGA value of 0.06 g_a is believed to be reasonable for the Bellefonte Site.

Liquefaction potential is expected to be very low at this site because of the prevalence of cohesive soil in the area. Although nonliquefiable cohesive soils are more prevalent, occasional deposits of liquefiable silty sands have been reported at the nearby Bellefonte Nuclear Plant Site. In the absence of field explorations at the proposed site, the occurrence of the liquefiable deposits cannot be completely discounted. Site-specific field explorations will need to be conducted to establish whether soils are predominantly cohesive or whether liquefiable soils exist. However, even if liquefiable deposits are encountered at the site, the potential for liquefaction should still be very low because of the low PGA.

The existing seismological information provides an adequate basis for this screening evaluation. There is the potential for karstification. Sinkholes apparently developed in a nearby area during the construction of the Bellefonte Nuclear Plant. Explorations would be required to confirm that such conditions do not occur within the footprint of the proposed site. If thicker deposits of soft soil occur at the site, as they do in some areas of the Bellefonte Nuclear Plant Site, it may be difficult to meet allowable settlement and bearing capacity criteria without additional work on foundation preparation. Additional site explorations will be required to investigate these conditions. Rock was encountered near the ground surface in some areas within the Bellefonte Nuclear Plant site, and it is assumed that a similar condition could occur at the proposed site. If there is a potential for rock near the surface, rock excavation could be required. The rock excavation is not considered to be a significant design or construction concern because of the likely type and quality of the rock. Additional explorations will be required to define the location of rock.

The soil conditions at Bellefonte are assumed to consist of clays. It would not be unreasonable for these soils to have an allowable bearing pressure of 12,200 kg/m^2 (2,500 lbs/ft^2); however, additional exploration will be required to verify conditions. Relative to soil bearing conditions at the other five sites, this site should have the lowest rating.

Carlsbad, NM

The proposed Carlsbad site has geological and seismological conditions that are generally suitable for development. Requirements for PGA, ground movement, and fault location will likely meet design limits, assuming either rock or soil occurs at the site. Even if deep, soft soil conditions occur, the PGA value at the ground surface is estimated to meet the 0.08 g_a criterion.

Conditions for the desirable subcriteria also appear to be met. Liquefaction will not be an issue because of the prevalence of the deep groundwater conditions and the very low ground accelerations. Although no recent seismological information was found for the site, information was available for the WIPP, located approximately 32 km (20 mi) to the east. Detailed seismological information exists for the WIPP site and much of this could be useful. However, additional studies will be required for the Carlsbad site.

The potential for karstification at the site appears to be low, based on the geology at the WIPP site. However, the Carlsbad caverns are located in the general area, suggesting that further study is warranted. The potential for rock at or near the ground surface was not determined from the available information. If rock were to occur, it is expected to be sedimentary in origin, making it relatively easy to excavate. Soil conditions in the high desert environment are expected to be relatively good in terms of settlement and bearing support. Additional site explorations will be required to investigate these conditions. If settlement and bearing capacity concerns exist, it may be possible to remove the soft soil if rock is near the ground surface, or to implement some type of ground improvement method, such as use of stone columns or preloading.

The soil conditions at Carlsbad include sands, silts, and clays. The groundwater table is expected to be deep. For these conditions the allowable bearing capacity should be greater than 12,200 kg/m^2 (2,500 lbs/ft^2), but won't be as good as rock. Also, the location of the deep water table is expected to increase the capacity relative to similar soils with a higher water table. Because of the expected lower water table, this site was rated slightly higher than the Portsmouth site.

Eddy County, NM

Geological and seismological conditions at the proposed Eddy County Site appear to be suitable for development. Requirements for PGA, ground movement, and fault location should meet design limits, assuming that either rock or soil occurs at the site. Estimated values of PGA are approximately 0.04 g_a.

Conditions for the desirable subcriteria are also met based on the initial screening effort. Liquefaction will not be an issue because of the very low predicted ground acceleration and the very deep groundwater conditions. The available seismological information is excellent. Recent seismic hazard studies have been conducted for the DOE WIPP Site as part of the safety basis for the WIPP facility (DOE, 2003d). These studies include an evaluation of the probability of ground shaking and the location of active faults, using the latest seismic hazard assessment methods.

There are no reports of karstification in the available literature. Specific studies were conducted for the WIPP Site to evaluate this potential. The risks of dissolution were dismissed from consideration at the WIPP Site and, therefore, can be considered similarly for the Eddy County, New Mexico site. There is a potential for caliche within the depth of foundations. This cemented soil can usually be excavated with normal excavation equipment. The geology of this environment should provide low potential for differential settlement and high bearing support due to the dry conditions. Additional site explorations would be required to confirm these conditions before site development.

Hartsville, TN

This site appears to have geological or seismological conditions that are suitable for project development. PGA is acceptable, and no active faults were identified near the site. Ground movements associated with a seismic event could exceed 1 mm (0.04 in) if the frequency characteristics of the predominant earthquake result in ground motions with a frequency of less than 5 hertz (Hz). Although this frequency content appears reasonable for this area, additional evaluations will be required to confirm that this criterion is met.

Geological and seismological conditions at Hartsville suggest that subcriteria requirements will not cause significant design, construction, or performance concerns. The potential for liquefaction does not exist because of the prevalence of rock near the ground surface. There is some seismological information that will serve as good reference material; however, most of the information dates from the 1980s or before. Because of the prevalence of near-surface rock, differential settlement is expected to be minimal and bearing support for facilities should be good.

The only negative features for this site are the potential for Karst topography and the likelihood of rock excavation. Solution cavities with void heights of up to 3.05 m (10 ft) were noted in some locations within the project site. These cavities are located relatively near the ground surface (e.g., 15.2 m (50 ft), and therefore can be filled with grout, once located. The presence of near-surface rock could result in additional construction costs if excavation into the rock is required. Detailed geotechnical explorations are recommended to evaluate both of these issues.

The Hartsville site has rock located close to the ground surface. If the facility is located on competent rock, bearing capacities should exceed 19,500 kg/m^2 (4,000 lb/ft^2). This high bearing capacity is consistent with requirements for the highest rating.

Lea County, NM

The proposed Lea County Site has geological and seismological conditions that appear to be suitable for development. Requirements for PGA, ground movement, and fault location will likely meet design limits, assuming that either rock or soil occurs at the site. Estimated values of PGA are approximately 0.04 g_a, even if soil is encountered.

Conditions for the desirable subcriteria are also met based on the initial screening effort. Liquefaction will not be an issue because of the very low predicted ground acceleration and the very deep groundwater conditions. The available seismological information is limited to the recent seismic hazard work completed in the mid-1990s by the USGS; however, in view of the very low PGA values, the limited information is not considered an issue.

There are no reports of karstification in the available literature. Mention is made of desolution of salt beds in the region, which would result in a condition similar to karstification. However, this potential is not considered an issue at the site. There is a potential for cemented soil (i.e., caliche) within the depth of foundations. This cemented soil can usually be excavated with normal excavation equipment. The geology of this environment normally provides low potential for differential settlement and high bearing support due to the dry conditions. Additional site explorations would be required to confirm these conditions before site development.

Portsmouth, OH

The Portsmouth Site also meets the requirements for PGA, ground movement, and faulting. The presence of 9.1 m (30 ft) or more of alluvium lowers its rating slightly relative to other sites. There is a potential for liquefaction, differential settlement, and lower allowable bearing values because of the presence of sands, silts, and clays. The liquefaction potential should not cause any significant design or construction constraints because of the low levels of design acceleration. While the differential settlement will be potentially greater and allowable bearing pressure lower than similar design values for other sites, these conditions could be easily dealt with during design and construction by reducing foundation pressures used for design or by

using a ground improvement method that will reduce the potential for differential settlement and increase the allowable bearing pressure.

Neither rock excavation nor karstification appear to be issues that have to be considered for this site. As noted above, rock is located at depths of greater than 9.1 m (30 ft); therefore, excavations should not encounter rock. The types of rock in the area appear to have a low potential for karstification.

Only limited seismological information was found for the site. This information indicated that faults have been identified but the information did not provide an indication of the level and date of review. Detailed seismicity studies have been conducted for other DOE facilities and, therefore, future studies should determine if recent detailed information might be available. The US Geological Survey (USGS) national hazards map served as a basis for this screening effort. Although the USGS work includes recent information on seismic hazards for the region, it may not cover some of the site-specific issues that could be important for design.

The soil conditions at Portsmouth comprise interlayers of sands, silts, and clays. These conditions should result in allowable bearing pressures of at least 12,200 kg/m^2 (2,500 lb/ft^2) but less than 19,500 kg/m^2 (4,000 lb/ft^2). A rating of 7 was selected to reflect the better than average conditions.

2.1.3.3.4.2 Criterion 2, Size of Plot

The evaluation of this criterion analyzed the site characteristics for:

- Buffer zone from populated areas
- Plant layout on the site compared to the optimal layout
- Future expansion to a 6 million SWU plant (At this time, there is no intention to license, construct or operate a 6 million SWU plant.)
- Adequate space for construction laydown and shop areas during construction
- Borrow/fill capabilities during site preparation

Bellefonte, AL

The proposed Bellefonte Site consists of approximately 76 ha (188 acres) owned by the Jackson County Industrial Development Authority (JCIDA) and 50 ha (123 acres) owned by individuals who have approached the JCIDA to sell their property. A total of 126 ha (311 acres) is available for locating the plant. The property has adequate space for a rectangular 600 m (1,969 ft) by 800 m (2,625 ft) plant footprint, but will not support a rectangular 600 m (1,969 ft) by 1600 m (5,250 ft) footprint for the plant expansion due to the irregular shape of the property. However, adequate space is available for the plant expansion with some slight adjustments to the optimal plant layout. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.) An inactive railroad spur built for the Bellefonte Nuclear Plant separates approximately 44.5 ha (110 acres) from the rest of the property, but the spur is owned by Tennessee Valley Authority (TVA) and should not pose any problem. Although not heavily populated, some homes are located between the proposed site and the Bellefonte Nuclear Plant Site. The area surrounding the site is primarily farmland. The site is relatively flat and open with sufficient access and roads surrounding the property. Little or no borrow or fill will be

required but, if needed, can be accommodated onsite. The site also has more than adequate space for required construction shops and laydown areas.

Carlsbad, NM

Approximately 162 ha (400 acres) of land is available between the former Beker Industrial Corporation site and adjacent properties. The available acreage is more than adequate for both the proposed and expansion plants. However, some adjustment of the plant footprint may be required for the plant expansion because of the Lone Tree Draw running through the site. (At this time, there is no intention to license, construct or operate a 6 million SWU plant.) The surrounding land is used primarily for ranching and is only sparsely populated (less than 25 persons per 2.56 km^2 (1.0 mi^2). The site is flat and open and no borrow or fill will be required. Sufficient access is provided to the site via the adjacent interstate. The site also has sufficient space for required construction shops and laydown areas.

Eddy County, NM

The proposed site in Eddy County consists of 130 ha (320 acres) and is the southern half of Section 8 of Township 22S, Range 31E of the New Mexico Meridian. The site is bordered on the south by the DOE WIPP Site. The main WIPP access road is on the southeastern edge of the proposed site. The site is well buffered from residential areas. The closest town is Loving, New Mexico (population 1,326), which is approximately 29 km (18 mi) from the site. Two ranches are located within 16 km (10 mi) of the site.

The property readily supports a rectangular 600 m (1,969 ft) by 800 m (2,625 ft) plant footprint and also supports the rectangular footprint for the expanded plant. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.) The site is basically flat and will require minimal borrow/fill. Significant space is available for construction laydown.

Hartsville, TN

The proposed Hartsville site is approximately 106 ha (262 acres) consisting of 101 ha (249 acres) owned by the Four Lake Regional Industrial Development Authority and 5.3 ha (13 acres) currently owned by TVA. The property has adequate space for a rectangular 600 m (1,969 ft) by 800 m (2,625 ft) plant footprint.

The plant layout is generally rectangular in shape; however, adjustments to facility layout are required due to the uneven terrain. Borrow/fill is available on the site. Significant space is available for construction laydown.

Lea County, NM

The proposed site in Lea County consists of approximately 220 ha (543 acres) in Section 32 of Township 21S, Range 38E of the New Mexico Meridian. The site is bordered on the south by New Mexico Highway 234. The property on the east border is WCS and the Wallach Sand and Gravel Company gravel pits are northwest of the proposed site. The Lea County Landfill is south of the proposed site, across New Mexico Highway 234.

The site is well buffered from residential areas. The nearest population center is Eunice, New Mexico, which is about 8 km (5 mi) from the site, and the closest residence is about 4.3 km (2.63 mi) from the site.

The property readily supports a rectangular 600 m (1,979 ft) by 800 m (2,625 ft) plant footprint and also supports the rectangular footprint for the expanded plant. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.) The site is basically flat and will require minimal borrow/fill. Significant space is available for construction laydown.

Portsmouth, OH

The proposed Portsmouth Site consists of 138 ha (340 acres) in the northeast quadrant of the DOE property. Population densities were not calculated, but the site is buffered from populated areas. No homes or commercial businesses are located on the proposed site or surrounding DOE property and the nearest population center (Piketon, population of 1,907 in 2000) is located approximately 8 km (5 mi) from the proposed site. There is adequate space for the desired 600 m by 800 m (1,969 ft by 2,625 ft) footprint on the site; however, the site's terrain has elevation levels with variations greater than 18.3 m (60 ft) in the area of the plant footprint that could result in modification to the desired layout. Additionally, the footprint of the plant encroaches upon designated ponds and wetlands, which requires some mitigation or changes to the plant layout. The site is acceptable for a plant expansion, but the plant layout would require extensive revision because the site is irregular in shape. Also, an existing firing range would require removal prior to plant expansion, and the existing ponds/wetlands would have to be addressed for expansion planning. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.) The site has adequate space for required construction shops and laydown areas. Areas for borrow/fill are available, but the probable plant area could require significant site preparation and balancing of cut/fill due to the significant variations in elevations in the site area.

2.1.3.3.4.3 Criterion 3, Redundant Electrical Power

The evaluation of this criterion analyzed the electrical power supply system capabilities for the sites. Specific issues evaluated included:

- Capability to provide total plant power requirements (20 megavolt amperes (MVA) for a 3 million SWU plant (essential criteria) and 40 MVA for a 6 million SWU plant) on separate feeders for redundancy, quality, and reliability of service. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)
- Willingness of the local utility to provide optimal rate structure,
- Willingness of local utility to share in capital cost necessary to provide power to the site.
- High availability rate and willingness of supplier to guarantee quality of service.

Bellefonte, AL

TVA transmission lines are located on the Bellefonte Site. Both the local utility, a cooperative that receives power from TVA, and TVA have pledged to provide the redundant feeder capacity for the base plant and the expanded plant. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.) TVA operates the Browns Ferry, Sequoyah, and Widows Creek Power Plants that supply power to the area. The highest quality of power and reliability will be available through the TVA system, especially with the multiple sources of power production. Preferred customer rates are expected based on discussions with

the local utility. TVA has indicated a general willingness to support the proposed plant to the maximum extent. The 161 kV and 450 kV lines through the proposed site will have to be relocated at considerable expense. TVA indicated willingness to discuss the business arrangement for accomplishing the tower relocation. TVA and the local utility will supply the required substation.

Carlsbad, NM

Xcel Energy would provide power to the Carlsbad site. Redundant power supply appears to be available, although feeders will have to be provided from the redundant source. It is unclear whether the local utility would pay for the construction of the feeder. Electrical rates in the area are lower than the national average.

Eddy County, NM

Xcel Energy will provide power to the Eddy County Site. Redundant power supply is available, although feeders will have to be provided from the redundant source. Existing redundant power is provided currently to the WIPP. Xcel Energy Company has a 1.8 recovery factor for the Class A quality power it provides to the WIPP facility. The utility has indicated a willingness to provide an optimal rate structure, depending upon the commitment from the facility.

Hartsville, TN

TVA feeders are located on the Hartsville Site. The local utility, a cooperative that receives power from TVA, with the backing from TVA, has pledged to provide the redundant feeder capacity for the base plant and the expanded plant. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.) The highest quality of power and reliability will be available through the TVA system, which has several production plants supporting the power grid around the site. Preferred customer rates are expected based on discussions with the local utility and TVA has indicated its willingness to provide the required distribution infrastructure to the site (i.e., substation, etc.).

Lea County, NM

Xcel Energy will provide power to the Lea County Site and currently supplies power to the Waste Control Specialists (WCS) disposal facility, which is near the proposed site. Xcel has stated that they can provide redundant power to the site, which would likely come from a 137 kVA transmission line located some 8 to 11 km (5 to 7 mi) from the proposed site. Xcel indicated that historically their power availability rate has been greater than 99.5% and they can supply $\pm$5% voltage regulation. The utility has indicated a willingness to provide a favorable rate structure, depending upon the commitment from the facility.

Portsmouth, OH

The Portsmouth Site is currently supplied electricity by the Ohio Valley Electric Corporation (OVEC) under a long-term contract that runs through 2005. OVEC operates two coal-fired power plants (Kyger Creek and Clifty Creek on the Ohio River) that were built for and dedicated to serving the Portsmouth Site. OVEC has five feeder lines into the Portsmouth Site serving three substations onsite. However, OVEC has committed all its power capability and can only provide transmission services to the site. American Electric Power (AEP) is the regional power provider to the site and is performing an engineering assessment to affirm capability and reliability to the site. Initial indications are that AEP has adequate capability to provide power for the expanded facility and their records indicate sufficient quality of service. AEP operates and

maintains the Don Marquis Substation, which is adjacent to the DOE property and is approximately 3.2 km (2 mi) from the site proposed for this project. It is expected that AEP will provide preferred customer rates to the site, but AEP has not yet completed their evaluation. There is a potential significant expense for substations/breakers since OVEC currently feeds the site at 345kV and AEP would need to construct new feeders and substation.

2.1.3.3.4.4 Criterion 4, Water Supply

This criterion evaluated the capability to provide sufficient water to the plant at a reasonable cost.

Bellefonte, AL

The Bellefonte Site has sufficient available water supply. The Scottsboro water utility, which has more than adequate supply from their existing water plant, will provide a nominal 30-cm (12-in) line to the site for potable water needs. A fire water tank will be provided in or near the area. A sufficient supply of process water is available from the adjacent Town Creek or can be provided from wells.

Carlsbad, NM

The Carlsbad Site has sufficient available water supply from nine deep wells; most of their capacity is currently unused.

Eddy County, NM

The Eddy County Site is adjacent to the WIPP. The Carlsbad City Water System provides water to the WIPP Site through a water main with a 4.540 L/min (1,200 gal/min) capacity, about 2.27 M m^3/yr (600 M gal/yr) potential. This capability far exceeds the required usage for the base enrichment plant design. There are no significant users of the system other than the WIPP, whose consumption is approximately 1,140 L/min (300 gal/min) for staff use and for emergency water tanks. The city water line follows the WIPP North Access Road that crosses the southeast corner of the proposed Eddy County Site. A lateral line from this water main could be extended easily to the proposed site to provide a more than adequate water supply.

Hartsville, TN

The Hartsville Site has sufficient available water supply. The proposed industrial park at the TVA site is currently served by an existing nominal 15-cm (6-in) water line and 378,500-L (100,000-gal) storage tank. However, the utility has funding in place and is planning to upgrade the existing line to a nominal 200 cm or 25 cm (8 in or 10 in). The utility will also provide a larger capacity fire-water tank.

Lea County, NM

Water can be supplied to the Lea County Site from the city of Eunice, New Mexico. Eunice receives its water supply from approximately 32 km (20 mi) away, at Hobbs, New Mexico. A new water main currently is being installed to supply water from Hobbs to Eunice. Local officials estimate that approximately 1,890 L/min (500 gal/min) of water could be supplied from this new line to commercial/industrial uses such as an enrichment plant. A lateral extension from this

main water line would need to be extended approximately 5.6 km (3.5 mi) to the proposed Lea County Site.

Portsmouth, OH

The Portsmouth Site has sufficient water supply and distribution system, but would require a valve station to provide water to the proposed site. Distance from the tie-in point to the proposed site is just over 1.6 km (1 mi).

2.1.3.3.4.5 Criterion 5, Environmental Protection

This criterion evaluated a suite of characteristics related to environmental protection and permitting. Characteristics evaluated are discussed below, under the following headings:

- Existing Characterization Surveys
- Protected Species, Adjacent Protected Properties, Archeological/Cultural Resources
- Environmental Justice
- National Pollutant Discharge Elimination System (NPDES) Permits
- Air Permits
- Permits to Impact Wetlands and Other Waters of the US or the State
- New Radiological Hazard, Fire Hazard, High Wind Hazard, Ponding Potential, Potential For Rock/Mud Slides

2.1.3.3.4.5.1 Existing Characterization Surveys

Bellefonte, AL

There are no existing surveys for this site. Some information developed for the TVA Bellefonte Nuclear Plant, located across an inlet of the Guntersville Reservoir from the site, may be applicable to the project, but the usefulness of this information is unknown at present.

Carlsbad, NM

There are no existing surveys for the Carlsbad Site. Existing information from the WIPP, approximately 32 km (20 mi) away, may be applicable to the site given the homogeneity of the landscape in the area. Characterization of the site would be required to support the license application.

Eddy County, NM

There are no existing surveys for the Eddy County Site. Existing information from the WIPP facility (adjacent to the site) should be applicable to the site, given the extensive amount of data collected and homogeneity of the landscape in the area. Characterization of the site would be required to support the license application.

Hartsville, TN

The Hartsville Site is within the boundary of the previously proposed nuclear power plant site. TVA has conducted abundant surveys of the site and this information is available to support the

project. Additionally, an Environmental Assessment was completed in 2002 by TVA for transfer of the property to the Four Lake Regional Industrial Development Authority.

Lea County, NM

There are no existing surveys for the site. However, archeological and rare species surveys for a proposed landfill site immediately south of the proposed project site should be partially applicable. Studies done for the WCS facility, near the site across the Texas State Line, also should be applicable, particularly with regard to meteorological data and flora/fauna characterizations. Site characterization would be required to support the license application. Subsequent to site selection, this site has been characterized.

Portsmouth, OH

Two existing reports that address the area of the existing DOE facility near where the proposed facility would be sited were reviewed. A DOE report (Evaluation of Site Conditions for 138 ha (340 acres) of Department of Energy Land, Northeast Portion of the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio) characterized potential contamination of the proposed site. A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) characterization (Quadrant IV RFI Final Report for Portsmouth Uranium Enrichment Plant, Piketon, Ohio) has been performed for the area near the proposed facility site. However, no characterization or surveys have been performed for the specific site under consideration. Additional surveys and characterization will probably be required.

2.1.3.3.4.5.2 Protected Species, Protected Properties, Archeological/Cultural Resources

Bellefonte, AL

The Bellefonte Site comprises abandoned agricultural fields, hayfields, active cropland, old home sites, and early re-growth woodland. None of the developed and agricultural areas provide suitable habitat for protected species. The early regrowth woodland occupies approximately 1.2 ha (3 acres) in the southeastern corner of the site. The woodland has not been cleared within the past 10 years and is densely overgrown with brush. It does not provide suitable habitat for any protected species known to occur in the project vicinity. The intermittent stream crossing the southern part of the site is too densely overgrown in the sub-canopy layer to serve as a foraging flight corridor for gray bats. State wildlife management areas (WMAs) are located along Guntersville Reservoir near the proposed project site.

Portions of the Bellefonte Site lie within historic boundaries of a Cherokee Indian Reservation. The possibility exists that prehistoric artifacts may be found within the proposed site. Additionally, two cemeteries are located within the site boundaries. These are small private cemeteries near the eastern edge of the property that can be avoided during site development.

Carlsbad, NM

There are no existing surveys for the Carlsbad Site. Existing information from the WIPP, approximately 32 km (20 mi) away, indicates that protected species can occur in the area.

Existing surveys for the WIPP indicate that there is a high likelihood for archeological sites in the general area. Studies at the WIPP site and other studies in the area indicate an average of one

site every 18.2 ha (45 acres) may be encountered. No protected properties are near the Carlsbad Site.

Eddy County, NM

There are no existing protected species surveys for the Eddy County Site. Existing information from the WIPP (WEST, 2002; DOE, 1996) indicate that no protected species occur on the WIPP Site. Given the homogeneity of the landscape between the proposed site and the WIPP Site and the narrow habitat requirements for the protected species known to occur in Eddy County, it is unlikely that protected species occur on this site.

Existing surveys for the WIPP (adjacent to the site) indicate that there is a high likelihood for archeological isolated occurrences in the general area. Studies at the WIPP Site and other studies in the area indicate finding an average of one isolated occurrence every 18 ha (45 acres), but no significant or potentially significant sites were found. While it appears unlikely that significant cultural or archeological resources would exist on the site, site-specific data are lacking.

Hartsville, TN

The 106-ha (262-acre) site proposed for use has been surveyed previously and found to contain no protected species or potentially suitable habitat for protected species. Potentially suitable habitat for protected species was identified on other portions of the TVA property, but not within the proposed site.

The site is adjacent to a Tennessee State Mussel Sanctuary and a United States Army Corps of Engineers (USACE) Reservoir Reservation. Two additional Mussel Sanctuaries and one State WMA also occur in the vicinity of the Hartsville Site. The site of a proposed water and sewer system associated with this project is located within the Hartsville WMA and crosses the Goose Creek portion of the USACE Reservoir Reservation.

Previous surveys conducted at the site have not identified any archeological or cultural resource issues for the Hartsville Site.

Lea County, NM

No protected species surveys have been completed for the site. However, surveys completed for the Lea County Landfill adjacent to the site found no protected species in the area. Therefore, there should be no protected species issues at the site.

No archeological/cultural resources surveys have been completed for the site. An archeological survey for the Lea County Landfill Site immediately south of the proposed project site indicate that the probability of significant archeological sites is low.

No protected properties are near the Lea County Site.

Portsmouth, OH

Previous studies indicated no known occurrences of protected species and no high quality potentially suitable habitat for protected species at the proposed site. However, surveys are 6+ years old and new data on the distribution of protected species in Ohio have been developed in the intervening period. Additionally, the proposed site contains reasonably mature hardwood forest and a stream corridor, indicative of potentially suitable summer (foraging, roosting, and maternity) habitat for Indiana bats, a Federally protected species. The US Fish and Wildlife Service (USFWS) will require additional surveys for Indiana bat (must be completed between

May 15 and August 15, when bats may be rearing young on the site). USFWS also will restrict timing of tree clearing activities (no tree clearing between April 15 and September 15, when Indiana bats may reside on or migrate through the site). No additional protected species issues are known to exist on the site.

Big Beaver Creek lies north of the proposed site and has potential to receive water for discharges from the proposed facility. Big Beaver Creek is designated a warm water habitat stream by the State of Ohio, and any discharges to the stream must not result in a lowering of any of the water quality criteria below that acceptable for a warm water habitat stream. The Wayne National Forest is near the proposed site to the southeast.

Previous archeological/cultural resource studies conducted on the grounds of the DOE facility have identified three sites within the boundaries of the proposed site that are potentially eligible for listing on the National Register of Historic Places (NRHP). These sites include a cemetery and two historic farm sites. Coordination with the Ohio State Historic Preservation Office will be required for these sites. Results of Phase II may lead to listing or recovery/preservation activities. Additionally, the Ohio State Historic Preservation Office has expressed concern over whether the historic value of the Portsmouth enrichment facility would be diminished through transfer of portions of the site from Federal control and development of these areas.

2.1.3.3.4.5.3 Environmental Justice

Subsequent to site selection, an Environmental Justice review for the Lea County, New Mexico site was performed as described in ER Section 4.11, Environmental Justice. For the purpose of the alternative site evaluation, detailed Environmental Justice analyses were not performed for each site.

Bellefonte, AL

The site appears to pose no significant issues in regard to Environmental Justice. A portion of the site lies within the boundaries of a historic Cherokee Indian reservation and Jackson County has a higher percentage of Native Americans than the national average. A low-income manufactured housing residential park is located adjacent to the northeastern boundary of the site.

Bellefonte is located in Jackson County, Alabama. Jackson County has an 8.1% minority population, with Native Americans making up 1.8% of the population (twice the national average). Median household income is $30,791, which is $1 above the state average, and 14.7% of the population lives below the poverty level.

Based upon the results of a 1997 Environmental Impact Statement (EIS) for the Bellefonte Nuclear Plant and the 2000 Census, it does not appear that a disparate impact evaluation would be required.

Carlsbad, NM

The Carlsbad Site is located in a sparsely populated area in Eddy County, New Mexico. Data collected for the WIPP indicate that the Hispanic population in the local area is above the national average but lower than the state average. Concerns over impacts to this population segment may raise Environmental Justice issues at the site.

Eddy County, NM

Data collected for the WIPP Site (DOE, 2001a) included an 80-km (50-mi) radius of influence (ROI), which encompassed the adjacent Eddy County Site. Within the designated ROI, the percentage of Hispanics and the percentage of persons living below poverty level were above the national average and the state averages for New Mexico and Texas. The relative isolation of the proposed facility should avoid impacts to these population groups.

Hartsville, TN

Analysis conducted by TVA indicated there are no Environmental Justice or socioeconomic issues for the Hartsville site. There should be no necessity for a disparate impact evaluation. Hartsville is located in Trousdale and Smith Counties in Tennessee. Trousdale County has a 13.4% minority population and 15.7% of the population living below the poverty level. Median household income is $27,319 (85% of the state average). Smith County has a 4.6% minority population and 12.6% of the population living below the poverty level. Median household income is $32,077, slightly above the state average.

Lea County, NM

Data collected for the WIPP (DOE, 2001a) included an 80-km (50-mi) ROI that included the Lea County Site. Within the designated ROI, the percentage of Hispanics and the percentage of persons living below poverty level were above the national average and the state averages for New Mexico and Texas. The relative isolation of the proposed facility should avoid impacts to these population groups.

Portsmouth, OH

Previous studies (1990 Census data) at Portsmouth Gaseous Diffusion Plant (PORTS) indicate no Environmental Justice issues or a need for an evaluation of disparate impact. The Reindustrialization Environmental Assessment conducted for the DOE facility supports that there is not a disparate impact. Review of 2000 Census data indicates no substantial changes from the 1990 Census analysis. Minority populations in Pike County constitute only 3.3% of the total population. The percentage of the population classified as low income in Pike County is 18.2%, less than 10% above the state average. Average household income in Pike County is $27,989, which is 78% of the state average. Scioto County has a 5.1% minority population and 21.0% of the population living below the poverty level. Average household income is $25,801 (72% of state average). Jackson County has a 2.1% minority population and 16.4% of the population living below the poverty level. Average household income is $27,774 (77% of state average). Ross County has an 8.3% minority population and 14.6% of the population living below the poverty level. Average household income is $33,580 (93% of state average).

2.1.3.3.4.5.4 NPDES Permits

Bellefonte, AL

An NPDES permit is achievable for this site, but there are constraints. Permitting is handled through the Alabama Department of Environmental Management (ADEM). ADEM currently, at the time of alternative site evaluation, was not issuing permits to rivers identified as Class II in the State due to a dispute regarding appropriate anti-degradation review. Obtaining an NPDES permit for this site may be delayed if ADEM has not resolved the dispute regarding anti-

degradation review at the time of filing. Public water supplies are located downstream along the Tennessee River that may result in more stringent discharge limits and necessitate some level of pretreatment prior to discharge.

If discharge water can be disposed through municipal sewers, no NPDES permit would be needed. This would depend on local sewer infrastructure and demand at the time of permitting.

Carlsbad, NM

NPDES permits for construction-related stormwater discharge, industrial stormwater discharge, and possibly a facility discharge will be required. These permits are obtained through EPA. There are no identified impediments and obtaining a NPDES permit for this site should be achievable.

Eddy County, NM

NPDES permits for construction-related stormwater discharge, industrial stormwater discharge, and possibly a facility discharge will be required. There are no identified impediments, and obtaining an NPDES permit for this site should be readily achievable through USEPA; the State of New Mexico does not administer the NPDES program.

Hartsville, TN

An NPDES permit is achievable for this site, but there are constraints. Permitting is through the Tennessee Department of Environment and Conservation (TDEC). A Tennessee State Mussel Sanctuary is adjacent to the site. Two additional Mussel Sanctuaries and one State WMA also occur in the vicinity of the Hartsville Site. Sensitive aquatic species are likely to be present in these areas and may result in more stringent discharge limits and necessitate some level of pretreatment prior to discharge.

If discharge water can be disposed through municipal sewers, no NPDES permit would be needed. This would depend on local sewer infrastructure and demand at the time of permitting.

Lea County, NM

NPDES permits for construction stormwater discharge, industrial stormwater discharge, and possibly a facility discharge will be required. While there are neighboring facilities, the facilities should not constrain the NPDES permit. There are no identified impediments, and obtaining an NPDES permit for this site should be readily achievable through USEPA; the State of New Mexico does not administer the NPDES program.

Portsmouth, OH

An NPDES permit is achievable for this site, but there are constraints. Big Beaver Creek adjacent to the Portsmouth Site is the likely receiving water for discharges and has been designated a warm water habitat. Any discharges to Big Beaver Creek cannot result in a lowering of the water criteria supporting its designated use. This may constrain NPDES permitting and necessitate some level of pretreatment prior to discharge.

Air Permits

All six sites are located in areas that currently attain their designated air quality.

Bellefonte, AL

No air permitting constraints were identified for this site. Permitting is through ADEM. Two large air discharge sources are located within 16 to 32 km (10 to 20 mi), including Mead Paperboard (pulp and paper facility), and TVA's Widow's Creek Steam Plant. These are not expected to affect the permitting effort for the site. Air permits for either a 3 million SWU or 6 million SWU facility should be readily achievable. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)

Carlsbad, NM

No air permitting constraints were identified for this site. The proposed site is in an attainment zone. There are no air emitting facilities nearby. Air permits through the New Mexico Environment Department should be readily achievable for either a 3 million SWU or 6 million SWU facility. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)

Eddy County, NM

The proposed site is in an attainment zone. The only facility nearby is the WIPP, and it is not expected to affect the permitting effort for the site. Air permits for either a 3 million SWU or 6 million SWU facility should be readily achievable from the New Mexico Environment Department. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)

Hartsville, TN

No air permitting constraints were identified for this site. The Hartsville area currently meets its designated ambient air quality standards. Permits should be obtainable without undue delay. There are no nearby significant sources that would contribute to air emissions. Air permits for either a 3 million SWU or 6 million SWU facility should be readily achievable. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)

Lea County, NM

There are numerous emission sources (e.g., oil and gas extraction wells, Wallach Concrete, Inc., etc.) in the county. These existing sources may affect conditions on new air permits obtained from the New Mexico Environment Department permits for either a 3 million SWU or 6 million SWU facility. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)

Portsmouth, OH

No air permitting constraints were identified for this site. The area surrounding the proposed facility currently meets ambient air quality standards. Air permits through the Ohio Environmental Protection Agency (OEPA) District Office responsible for Pike County (OEPA Southeast District Office). Air permits for either a 3 million SWU or 6 million SWU facility should be readily achievable. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)

2.1.3.3.4.5.5 Permits to Impact Wetlands and Other Waters of the US or the State

Bellefonte, AL

There are no wetlands on the site. One intermittent stream crosses near the southern end of the site. There may be no impacts to this stream during site development. If some relocation of the stream is required, the surrounding land is currently in agricultural production and there should be no constraining environmental issues in the relocation process.

Carlsbad, NM

There are no wetlands on the site. Dry arroyos are classified as Waters of the US and the State in New Mexico. The Lone Tree Draw crosses the western part of the site from southwest to northeast. This feature would require USACE 404 permitting and State 401 certification. Lone Tree Draw may constrain site development.

Eddy County, NM

There are no wetlands or other waters of the United States on the site. Neither a Clean Water Act Section 404 permit nor a State Section 401 Water Quality Certification will be required to construct on the site.

Hartsville, TN

There are no jurisdictional waters within the proposed facility site. The presence of a Tennessee State Mussel Sanctuary adjacent to the site in the Cumberland River may result in required protective measures for these waters.

Lea County, NM

There are no wetlands or other waters of the United States on the site. A recent survey determined that an arroyo does not exist at the site. Neither a Clean Water Act Section 404 permit nor a State Section 401 Water Quality Certification will be required to construct on the site. A recent

Portsmouth, OH

Four wetlands, three ponds, and two streams are located in the vicinity of the proposed project footprint according to the Reindustrialization Environmental Assessment. However, 1994 aerial photographs indicate heavy ground disturbance in the area proposed for siting that may have altered previously existing waters. All existing information is more than 5 years old and new characterizations and delineations of boundaries of waters are likely to be required to support permitting.

Based on available information, the proposed project may result in the fill of 0.4 to1.2 ha (2 to 3 acres) of waters and relocation of up to 914 linear m (3,000 linear ft) of stream. These impacts would require an Individual Section 404 permit from the USACE (3 to 6 mos as specified for Hartsville) and individual antidegradation review by the OEPA (typically 6 mos to 1 yr).

2.1.3.3.4.5.6 New Radiological Hazard, Fire Hazard, High Wind Hazard, Ponding Potential, Potential for Rock/Mud Slides

Bellefonte, AL

The site is in an area where the construction design is to withstand 112 km/hr (70 mi/hr) winds. The proposed facility will constitute a new radiological source for the area. There is no significant fire hazard on or adjacent to the site. There is insufficient fuel load to sustain a major fire. Due to local topography, there is no potential for ponding at the site. The Bellefonte Site has no potential for rock or mud slides.

Carlsbad, NM

The site will be a new radiological hazard. There is no significant fire hazard at the site; the area is predominately desert scrub, and trees are not present. Desert range land does not support a sufficient fuel load to sustain a major fire. The proposed site is in an area designated for buildings designed for 112 km/hr (70 mi/hr) winds. Data collected for the WIPP indicate that the area has potential for violent convection storms and associated short-term winds, straight-line or cyclonic, in excess of 112 km/hr (70 mi/hr). Due to local topography, there is no ponding potential at the site, and there is no potential for rock or mud slides.

Eddy County, NM

The site is adjacent to an existing radiological hazard but that facility (the WIPP) does not handle uranium hexafluoride (UF_6). The proposed project will provide a new radiological hazard to the area through the handling of a different source of radiation. The proposed site is in an area designated for buildings designed for 112 km/hr (70 mi/hr) winds. Data collected for the WIPP indicate the area has potential for violent convectional storms. The WIPP Safety Analysis Report (DOE, 2003d) indicates a recurrence interval for 132 km/hr (82 mi/hr) winds of every 100 years in southeastern New Mexico, although no winds of this speed or greater velocity have been recorded. Tornado frequency has been estimated as 1 in every 1,235 years (DOE, 2003d). There is no significant fire hazard. The area is predominately desert scrub, and trees are absent. Desert range land will burn but does not support a sufficient fuel load to sustain a major fire. The site topography and soil characteristics do not promote ponding. The topography is level, and there is no potential for rock/mud slides.

Hartsville, TN

The Hartsville Site is in an area where the construction design is to withstand 112 km/hr (70 mi/hr) winds. Maximum recorded sustained wind speed in the area is 117 km/hr (73 mi/hr). The proposed facility will constitute a new radiological source for the area. There is a slight fire hazard, as forested and dense brushy land occurs on and adjacent to the site. As the site will be maintained, the risk should not be great once the facility is in operation. Due to local topography, there is no potential for ponding at the site. Also, due to local topography, the Hartsville Site has no potential for rock or mud slides.

Lea County, NM

The site is near an existing radiological hazard, but that facility (WCS) does not handle UF_6. The proposed project will provide a new radiological hazard to the area through the handling of a different source of radiation. Additionally, the WCS Site temporarily stores low-level waste and

does not currently provide long-term storage or disposal of radioactive waste. Therefore, the relative risk from the new facility would be slightly greater than at Eddy County.

The proposed site is in an area designated for buildings designed for 112 km/hr (70 mi/hr) winds. The area has potential for violent convectional storms. The WIPP Safety Analysis Report (DOE, 2003d) indicates a recurrence interval for 132 km/hr (82 mi/hr) winds of every 100 years in southeastern New Mexico, although no winds of this speed or greater velocity have been recorded. Tornado frequency in the area has been estimated as 1 in every 1,235 years (DOE, 2003d). There is no significant fire hazard. The area is predominately desert scrub, and trees are absent. Desert range land will burn but does not support a sufficient fuel load to sustain a major fire. The site topography and soil characteristics do not promote ponding. The topography is level, and there is no potential for rock/mud slides.

Portsmouth, OH

The Portsmouth Site has site-specific data indicating that maximum winds are 121 km/hr (75 mi/hr, below the threshold of 128 km/hr (80 mi/hr). The site is in an area where the construction design is to withstand 112 km/hr (70 mi/hr) winds. The proposed facility will not constitute a new radiological source for the area. There is a slight fire hazard, as forested land occurs on and adjacent to the site. As the site will be maintained, the risk should not be great once the facility is in operation. There is potential ponding at the four wetlands along the northern boundary of the site and also at the three isolated ponds within the site. Depending onsite layout, this could impact construction. Due to local topography, the Portsmouth Site has no potential for rock or mud slides.

2.1.3.3.4.6 Criterion 6, Land Not Contaminated

The evaluation of this criterion analyzed the potential sites for issues associated with land contamination. All sites met the Go/No Go portion of this criterion and were evaluated for three key issues:

- Level of documentation on contamination that exists on the site
- Existence of neighboring air or groundwater plumes
- Potential for future migration of contamination from neighboring sites

Bellefonte, AL

An EIS for the Bellefonte Conversion Project at the nearby Bellefonte Nuclear Plant Site was completed in October 1997. There are no known plumes affecting the proposed site. However, two facilities with fairly substantial reported Toxics Release Inventory emissions are located 3.2 to 4.0 km (2 to 2.5 mi) from the proposed site. Several facilities handling chemicals and/or wastes are located within 3.2 to 4.0 km (2 to 2.5 mi) of the proposed site, but have a very low potential to present future groundwater contamination and/or air emissions concerns.

Carlsbad, NM

No information is available regarding potential contamination at the site. The proposed site is the location of a former ammonia/nitrogeneous fertilizer plant and, therefore, has the potential to contain some existing contamination. However, an existing contamination plume or the potential for future migration are unlikely because there are no industrial neighbors to the site.

Eddy County, NM

The current and historical use of the site was/is range land for grazing. Environmental sampling was conducted as part of the WIPP monitoring and permitting process, and there is no indication of hazardous or radioactive contamination. Environmental monitoring, including soil sampling, is performed annually along the southern edge of the proposed site, adjoining the WIPP, and north, northeast, and northwest of the site. There are no known air or groundwater plumes within 3.2 km (2 mi) of the site, and no future migration is anticipated from the nearby WIPP site.

Hartsville, TN

Existing documentation covering the proposed site is available in an EIS and Environmental Report (ER) from the mid-1970s license application for the Hartsville Nuclear Plant and an Environmental Assessment completed in March 2002 for transfer of 223 ha (550 acres) at the TVA site for development as an industrial park. The proposed site is not contaminated and there are no neighboring plumes. There are no adjoining sites with a potential for future migration of contamination; however, if new industries locate adjacent to the proposed site in the industrial park, there is a slight potential for future contamination.

Lea County, NM

The previous use of the site was range land for grazing. Limited environmental data have been collected at the nearby WCS Site as part of its licensing/permitting process and at the Lea County Landfill site south of the site as part of its permitting process. There is no indication of hazardous or radioactive contamination at the proposed site, but environmental sampling data are not available for the site (at the time of site selection). There are no known air or groundwater plumes within 3.2 km (2 mi) of the site, and no future migration of contamination is anticipated from nearby facilities (e.g., WCS, Lea County Landfill and Wallach Quarry) within 3.2 km (2 mi).

Portsmouth, OH

An RFI has been performed near this site and limited additional characterization was performed at the site for transfer of the property. Minimal soil and groundwater contamination was detected during these investigations. Currently, the OEPA and DOE disagree whether the property is contaminated and this difference in opinion has affected the transfer of the proposed site to the Southern Ohio Development Initiative (SODI) and will prevent transfer of the proposed site to any party until the matter is resolved. This site also scores lower because of a firing range isolated in the middle of the site with the potential of lead-contaminated soil, as well as a low potential for neighboring plumes and future migration from the adjacent sanitary landfill and other USEC facilities at the DOE site.

2.1.3.3.4.7 Criterion 7, Discharge Routes

This criterion identified whether waste water and stormwater could be easily disposed and any necessary controls could be easily implemented. An additional aspect of this criterion was whether other nuclear waste streams were located in the area and if those waste streams could be easily differentiated from that of the proposed facility.

Bellefonte, AL

There are no existing NPDES-permitted discharges at the proposed site, although there are NPDES-permitted discharges at the neighboring TVA Bellefonte Plant Site. At the time of alternative site selection, the State was not issuing NPDES permits to rivers identified as Class II in the State, e.g., Tennessee River, due to a dispute regarding appropriate anti-degradation review, but this issue was expected to be resolved in the near future. Public water supplies are located downstream along the Tennessee River that may result in more stringent discharge limits. Stormwater runoff should be easy to control and discharge from the facility. There are no radiological waste streams in the area.

Carlsbad, NM

There are no existing NPDES-permitted discharges at the proposed site. Stormwater runoff should be easy to control and discharge from the facility. There are no existing radiological waste streams that may need to be differentiated from the facility waste stream.

Eddy County, NM

There are no existing NPDES-permitted discharges at the proposed site. Stormwater runoff should be easy to control and discharge from the facility. There are no existing radiological waste streams that may need to be differentiated from the facility waste stream. The only discharge from the adjacent WIPP Site is to lined, evaporative sewage lagoons.

Hartsville, TN

There are no existing NPDES-permitted discharges at the proposed site. Stormwater runoff should be easy to control and discharge from the facility. There are no radiological waste streams in the area.

Lea County, NM

There are no existing NPDES-permitted discharges at the proposed site. Stormwater runoff should be easy to control and discharge from the facility. There are no existing radiological waste streams that may need to be differentiated from the facility waste stream. The only discharge at the nearby WCS Site is to an onsite ditch that only extends approximately 460 m (500 yd) within their property on the Texas side.

Portsmouth, OH

There are NPDES-permitted waste water discharges in the area, but not on the proposed site. However, since all existing NPDES permits are issued to USEC, it is unlikely USEC would readily accommodate the proposed facility discharge requirements. Stormwater runoff should be easy to control and discharge from the facility. The nearby landfill may result in groundwater contamination that could be difficult to differentiate from the waste stream of the proposed facility.

2.1.3.3.4.8 Criterion 8, Proximity to Hazardous Operations/High Risk Facilities

The evaluation of this criterion established the risk to the proposed facility from any nearby facilities. For analysis purposes, extant nuclear-related facilities were not considered a detriment.

Bellefonte, AL

There are no large hazardous chemical storage or handling facilities within 8 km (5 mi) of the proposed site. There are no major propane distribution pipelines near the site. The Bellefonte Site is within 8 km (5 mi) of the Scottsboro Airport, but this facility has no commercial flights. Madison County Airport (nearest commercial airport) is more than 48 km (30 mi) away. The site is not within the general emergency area of any hazardous operations facility. There are no existing facilities that are expected to impact the air quality of the proposed site.

Carlsbad, NM

No major propane pipeline or any hazardous chemical storage or handling facilities was identified within 3.2 km (2 mi) and 8 km (5 mi), respectively, of the Carlsbad Site; although a natural gas transmission facility is within 4.8 km (3 mi). The site is located within 16 km (10 mi) of the Carlsbad Airport, which has limited commercial flights. The site is not within the general emergency area of any nearby hazardous operations facility. A natural gas transmission facility, located within 4.8 km (3 mi) of the site, has major source air emissions (nine stacks) that could impact the air quality of the proposed site.

Eddy County, NM

There are no facilities storing or handling large quantities of hazardous chemicals within 8 km (5 mi). However, the adjacent WIPP Site handles large quantities of transuranic wastes. There are no major propane pipelines within 3.2 km (2 mi) of the site, although a high-pressure gas line runs through the WIPP Site, approximately 0.8 km (0.5 mi) south of the site. There are no commercial airports within 16 km (10 mi), and the site is not located in a general emergency area. Other than the WIPP facility, there are no facilities within 8 km (5 mi) that would provide a nearby emissions source that could potentially affect air quality.

Hartsville, TN

There are no hazardous chemical storage or handling facilities within 8 km (5 mi) of the proposed site, but there are two natural gas small pump stations within 3.2 km (2 mi). There are no major propane distribution pipelines near the site. The nearest airport with commercial traffic is more than 48 km (30 mi) away. The site is not within the general emergency area of any hazardous operations facility. There are no facilities that would provide a nearby emissions source that may affect air quality.

Lea County, NM

There are no facilities storing or handling large quantities of hazardous chemicals within 8 km (5 mi). However, the nearby WCS Site treats and disposes hazardous wastes and treats and temporarily stores low-level radioactive and low-level mixed wastes. There are no major propane pipelines within 3.2 km (2 mi) of the site. There are no commercial airports within 16 km (10 mi), and the site is not located in a general emergency area. Neighboring industry, e.g., Wallach Concrete, Inc., oil and gas extraction wells, etc., have particulate and organic emissions that could potentially have a negative impact on air quality at the proposed facility. A 25.4-cm (10-in) diameter, underground carbon dioxide pipeline, running southeast-northwest, traverses the site. The pipeline is owned by Trinity Pipeline, LLC. The pipeline conveys CO_2 at a pressure of 13.8 N/mm^2 (2,000 lbs/in^2) and has an accident exclusion zone of 320 m (1,050 ft). The pipe will need to be rerouted because of the exclusion zone. The rerouted pipeline will be of a safety concern.

Portsmouth, OH

No large hazardous chemical storage or handling facilities were identified within 8 km (5 mi) of this site. No large propane pipelines are within 3.2 km (2 mi) of the site. The TETCO interstate propane distribution line is more than 3.2 km (2 mi) north of the site. Portsmouth is within 12.9 km (8 mi) of the Pike County Airport, but this airport does not have commercial flights. The site is not within the general emergency area of any hazardous operations facility. There are no nearby facilities that could potentially impact the air quality.

2.1.3.3.4.9 Criterion 9, Ease of Decommissioning

The evaluation of this criterion analyzed potential sites for characteristics that would make demolition and decommissioning more difficult. All sites score high for this criterion, although the existing DOE site could slightly complicate decommissioning at the Portsmouth Site. With proper controls, stormwater can be managed acceptably at all sites. No issues with property transfer and redevelopment or residual contamination are expected.

2.1.3.3.4.10 Criterion 10, Adjacent Sites' Medium-/Long-Term Plans

The evaluation of this criterion analyzed the potential that construction activities adjacent to sites would cause nuisance issues, including noise, dust, and traffic.

Bellefonte, AL

TVA completed a Final Environmental Impact Statement (FEIS) in 1997 for conversion of the nearby Bellefonte Nuclear Plant to a fossil-fueled power plant; however, TVA is not planning to move forward with this conversion in the near future. However, if they do move forward, nuisance issues should be temporary. No additional development adjacent to the proposed site is anticipated at this time.

Carlsbad, NM

Little future development surrounding the site is anticipated during the next 10 years; therefore, no nuisance issues associated with construction activities adjacent to the site are anticipated.

Eddy County, NM

Little or no future development activity is anticipated in the area surrounding the site during the next 3 to 5 years; therefore, no nuisance issues associated with construction activities adjacent to the site are anticipated.

Hartsville, TN

TVA designated 223 ha (550 acres) of their Hartsville Nuclear Plant site for an industrial park. The proposed site is only approximately 106 ha (262 acres). The local development organization plans to develop the remaining acreage. Because the remaining acreage could house a number of different industries, the nuisance issues could be sporadic over an extended period of time; however, for the most part, the nuisance issues are not anticipated to be significant. If the remaining acreage is developed over a fairly short period of time, there could be negative impacts on the adjacent small roads due to increased traffic.

Lea County, NM

Construction activities are anticipated to continue at the neighboring facilities, e.g., Wallach Concrete, Inc., Lea County Landfill, and the WCS Landfill; and these activities could cause nuisance issues, such as dust. However, minimal noise and traffic issues are anticipated as a result of these ongoing activities.

Portsmouth, OH

At the Portsmouth Site, future development is expected and being encouraged through the DOE Reindustrialization Program and the SODI. Nuisance issues will likely be moderate, due to the large extent of the PORTS site. Possibility exists for a new gas centrifuge enrichment facility to be built by USEC on the DOE property.

2.1.3.3.4.11 Criterion 11, Political Support

This criterion evaluated advocacy of local community, State and Federal officials; willingness to provide incentives and tax breaks; commitment to provide assistance in obtaining permits; and sharing of costs for infrastructure and road improvements.

Bellefonte, AL

The local and State governments were very positive in 1997 for the possible tritium project at the TVA Bellefonte Site and have indicated strong support for the proposed facility. The State has also indicated their willingness to help in obtaining necessary permits. TVA has also indicated their support for any site in the TVA region and has stated they will work to support development around the Bellefonte Site. State incentives are available for new industry in the area. To date, the incentives are in accordance with normal State practices. There is good road access to the proposed site around the entire perimeter and road improvements are not needed.

Carlsbad, NM

The local and State governments have indicated strong support for the proposed facility and assistance from the State in obtaining necessary permits is anticipated. State incentives are available for new industry in the area in accordance with statutory authorization signed by the Governor of New Mexico in March 1999. These incentives could include tax reductions for a uranium enrichment facility. There is good road access to the proposed site, and road improvements are not needed. The State has also indicated its willingness to help in obtaining necessary permits.

Eddy County, NM

The local and State governments have indicated strong support for the proposed facility. Strong support also has been expressed by members of the New Mexico Congressional Delegation. State incentives are available for new industry in the area in accordance with statutory authorization signed by the Governor of New Mexico in March 1999. These incentives could include tax reductions for a uranium enrichment facility. There is good road access to the proposed site, and minimal road improvements are needed. The State has also indicated its willingness to help in obtaining necessary permits.

BLM must complete the NEPA process before the site could be made available. The outcome of this process is uncertain. The overall duration of the process is also unknown. If the process

was to take a significant amount of time, it could impact the economic analysis for the uranium enrichment plant.

Hartsville, TN

During the siting study, prior to announcement of the proposed site, the local and State governments and TVA indicated strong support for the proposed facility. The State also indicated its willingness to help in obtaining necessary permits. However, subsequent to initial site selection, conditions at the Hartsville Site indicated that there was no longer any political advocates for the site, and local officials either opposed siting the facility in Hartsville or withhold their positions pending submittal of the license application. Initially, incentives were available for new industry in the area in accordance with normal State practices. There now appears to be only minimal state incentives for the facility, and no local incentives.

Revenue generated by LES for the enrichment of uranium will not be exempt from the gross receipts tax in Tennessee and would be taxed at a rate of 7% for the state and 2.25% for the local government. In some other states, these revenues are tax exempt or taxed at a lower rate than Tennessee. Also, Tennessee would impose a resources excise tax on special nuclear material at a rate of $1.30 cents per separative work unit. Other states either do not impose a resource excise tax or base the tax on the amount of natural resources the plant consumes. Tennessee, in addition, assesses franchise and business taxes, whereas some other states do not or assess a minimal flat fee. Likewise, the current condition is such that there is no cooperation in permitting. Impediments to zoning of the site to allow for construction of the new enrichment facility have been raised by local officials.

Lea County, NM

The local and State governments have indicated strong support for the proposed facility. Strong support also has been expressed by members of the New Mexico Congressional Delegation. State incentives are available for new industry in the area in accordance with statutory authorization signed by the Governor of New Mexico in March 1999. These incentives could include tax reductions for a uranium enrichment facility. There is generally good road access to the proposed site, with minimal road improvements needed. The State has also indicated its willingness to help in obtaining necessary permits.

Portsmouth, OH

The Portsmouth Site has outstanding support by local officials, State officials (including the Governor), and U. S. Senators. DOE signed an agreement with USEC on June 17, 2002, that gives USEC a right of first refusal for any use of DOE property at the Portsmouth reservation. The DOE has funds available in the amount of $10,000 per employee for payment to firms who hire employees displaced from the DOE site. Additional funds are available to train these workers. The State has committed to tax breaks and incentives.State officials have also committed to prioritizing support for obtaining required construction and operating permits. LES will most likely be required to pay for improvements to the access road to the site, especially in regards to entrance portals that separate workers from entrance to the remainder of the DOE reservation and USEC facility.

2.1.3.3.4.12 Criterion 12, Public Support

This criterion evaluated support of the local communities and various labor groups for the project at the time of site selection.

Bellefonte, AL

Strong community support is anticipated for proposed facility as evidenced by strong support of the proposed tritium facility in 1997. The area is non-union and labor does not speak as one voice. However, indications are that labor groups will be strong advocates.

Carlsbad, NM

Strong community support is anticipated for the proposed facility as evidenced by the strong support for the WIPP. Similarly, labor groups would also be expected to support the facility location in Carlsbad.

Eddy County, NM

Strong community support is anticipated for the proposed facility, as evidenced by the strong support for the WIPP and the proposed new Plutonium Production Pit Facility. Based on past experience with other nuclear facilities proposed for sites in the county, community leaders expect that labor groups will support the facility location in Eddy County. However, due to the status of the siting study, contact with the community has been limited.

Hartsville, TN

During the siting study, prior to announcement of the proposed site, discussions with various community representatives were generally positive. However, a citizens opposition group has been formed. Acceptance by the local community and business community is currently questionable and there is indication that the business community has mixed support for the LES enrichment plant. Subsequent to site selection, the labor unions in the general area confirmed strong support for this project.

Lea County, NM

Strong community support is anticipated for the proposed facility. This strong community support was subsequently confirmed following site selection (NRC, 2003f). General discussions with various community representatives have been positive and have indicated that labor groups would also be expected to support the facility location in Lea County. However, due to the status of the siting study, contact with the community has been limited.

Portsmouth, OH

The communities around the Portsmouth Site all appear supportive of the plant and would probably become advocates. Initial discussions with labor groups (Paper, Allied-Industrial, Chemical and Energy Workers International Union [PACE] and the Tri-States Building Council) indicate that they will support the plant being located at the Portsmouth Site.

2.1.3.3.4.13 Criterion 13, On or Near an Existing Nuclear Facility

This criterion evaluated whether the proposed site was located on or near a nuclear facility with an existing or previous NRC license. The Portsmouth Site is located at a nuclear facility with an existing NRC certification. The Bellefonte Site is located adjacent to a nuclear facility with an

existing NRC construction permit. The Carlsbad Site is not located on or near a nuclear facility with an NRC license. The Hartsville Site is located on property that previously held an NRC construction permit for a nuclear power station. The Eddy County Site adjoins the DOE WIPP Site. Although the WIPP facility is not licensed by the NRC, the facility went through a stringent NEPA, as well as regulatory permitting, process prior to initiating underground disposal of transuranic wastes. The Lea County Site is near the WCS Site, which has a radioactive materials license from a NRC Agreement state, Texas, as well as various regulatory permits.

2.1.3.3.4.14 Criterion 14, Moderate Climate

Evaluation of the criterion for moderate climate included consideration of the annual mean, average low, and average high temperatures; annual average rainfall; frequency of heavy precipitation; annual average snowfall; average number of days with 2.5 mm (1 in) or more of snow on the ground; ice and sleet potential; and the potential for tornadoes and/or hurricanes.

Bellefonte, AL

The annual mean temperature for the Bellefonte Site is 15°C (59°F), with monthly mean high and low temperatures of 26.1°C (79°F) and 3.89°C (39°F), respectively. The Bellefonte Site is in a region of moderate precipitation, receiving an annual average of 145 cm (57 in), with an annual average of 10 cm (4 in) of snow and very low potential for ice or sleet. The area has a very low tornado potential, and hurricanes do not occur in the area. Lost construction or outdoor operational days are anticipated to be moderate (less than 15 days per year).

Carlsbad, NM

The annual mean temperature for the Carlsbad area is 16.1°C (61°F), with monthly mean high and low temperatures of 25.6°C (78°F) and 8.33°C (47°F), respectively. The Carlsbad Site is in an arid region, with average annual rainfall of 41 cm (16 in) and very low potential for snow, ice or sleet. Although severe thunderstorms with heavy rainfall do occur in the area, the storms are usually of short duration. The area has a very low tornado potential, and hurricanes do not occur in the area. Lost construction or outdoor operational days are anticipated to be minimal.

Eddy County, NM

The annual mean temperature for southeast New Mexico, based on data for Carlsbad, is 16°C (61°F), with monthly mean high and low temperatures of 26°C (78°F) and 8°C (47°F), respectively. The Eddy County Site is in an arid region, with average annual rainfall of 41 cm (16 in) and very low potential for snow, ice, or sleet. Although severe thunderstorms with heavy rainfall do occur in the area, the storms are usually of short duration. The area has a very low tornado potential, and hurricanes do not occur in the area. Lost construction or outdoor operational days are anticipated to be minimal.

Hartsville, TN

The annual mean temperature for the Hartsville site is 15°C (59°F), with monthly mean high and low temperatures of 25°C (77°F) and 3.3°C (38°F), respectively. The Hartsville site is in a region of moderate precipitation, receiving an annual average of 140 cm (55 in), with an annual average of 25 cm (10 in) of snow. On average, 2.5 cm or more (one or more in) of snow are on the ground for 5 days per year. In addition, the site has the potential for occasional ice or sleet during the winter. The area has a very low tornado potential, and hurricanes do not occur in the the

area. Lost construction or outdoor operational days are anticipated to be moderate (less than 15 days per year).

Lea County, NM

The annual mean temperature for southeast New Mexico, based on data for Carlsbad, is 16°C (61°F), with monthly mean high and low temperatures of 26°C (78°F) and 8°C (47°F), respectively. The Lea County Site is in an semi-arid region, with average annual rainfall of approximately 40 cm (16 in) and very low potential for snow, ice, or sleet. Although severe thunderstorms with heavy rainfall do occur in the area, the storms are usually of short duration. The area has a very low tornado potential, and hurricanes do not occur in the area. Lost construction or outdoor operational days are anticipated to be minimal.

Portsmouth, OH

The annual mean temperature for the Portsmouth Site is 11.7°C (53 °F), with monthly mean high and low temperatures of 23.9°C (75° F) and 12.22°C (28°F), respectively. The Portsmouth Site is in a region of moderate precipitation, receiving an annual average of 102 cm (40 in). The site is in an area with a frequency for rainfall of greater than 2.5 cm (1 in) per day 4 to 12 days per year. The average annual snowfall for the Portsmouth area is 51 cm (20 in) and there is a potential for occasional ice or sleet during five winter months. The site is in an area where 2.5 cm (1 in) of snow or more could be expected on the ground for 12 to 25 days per year. The area has a very low tornado potential, and hurricanes do not occur in the area. Lost construction or outdoor operational days are anticipated to be moderate (approximately 15 days per year).

2.1.3.3.4.15 Criterion 15, Availability of Construction Labor Force

This criterion evaluated availability of sufficient craft labor, the potential for competing with other large projects in the area for construction craft, support by the labor organizations in establishing this project for preferential commitment of resources, availability of craft apprenticeship programs, and the support of labor to use travelers as needed to staff peak construction periods.

Bellefonte. AL

The labor force in the area of the Bellefonte site is non-union and provided by building contractors. Labor statistics indicate sufficient labor availability. Indications are that labor groups will be strong advocates. There are currently no planned competing projects. Apprenticeship programs are not readily available because the labor force is non-union; however, contractors will train resources as necessary to accomplish the work. Contractors can hire travelers as appropriate from any surrounding area.

Carlsbad, NM

Since the Carlsbad area may not have sufficient local craft labor to support the construction, other construction workers would come from outside the area (from either 274 km (170 mi) away in El Paso or 443 km (275 mi) away in Albuquerque). There are currently no planned competing projects, but the labor pool is weaker than the other sites, even without a competing project. The support for the project by local workers is anticipated to be positive. Information to evaluate apprenticeship programs was not readily available. There is support for travelers, since most of the construction workers will come from outside the area.

Eddy County, NM

The Eddy County area does not have sufficient local craft labor to support the construction, and the majority of construction workers would come from outside the area (El Paso, Albuquerque, Andrews, etc.) – which is typical for the oil industry in this area. There are currently no planned competing projects. The support for the project by local workers has not been determined by contact with labor representatives, but is expected to be positive. There is support for travelers, since most of the construction workers will come from outside the area. It is expected that construction craft would be well qualified due to the requirements of the oil industry in the area.

Hartsville, TN

The labor force in the area of the Hartsville Site is non-union and provided by building contractors support is expected to be positive. Labor statistics indicate sufficient labor availability. There are currently no planned competing projects. Apprenticeship programs are not readily available because the labor force is non-union; however, contractors will train resources as necessary to accomplish the work. Contractors can hire travelers as appropriate from any surrounding area.

Lea County, NM

Since the Lea County area may not have sufficient local craft labor to support the construction, other construction workers would come from outside the area (El Paso, Albuquerque, Andrews, etc.) – which is typical for the oil industry in this area. There are currently no planned competing projects. The support for the project by local workers has not been determined by contact with labor representatives, but is expected to be positive. Information to evaluate apprenticeship programs was not readily available. There is support for travelers, since most of the construction workers will come from outside the area. It is expected that construction craft would be well qualified due to the requirements of the oil industry in the area.

Portsmouth, OH

There appears to be sufficient craft resources and skills to construct the plant at the Portsmouth site. There are no identified competing projects at this time, but USEC has indicated that they may build a centrifuge plant at the site. Apprenticeship programs exist and the Tri-States Building Council encourages support of the programs by contractors and plant owners. The Tri-State Building Council would consider support of travelers on an as needed basis.

2.1.3.3.4.16 Criterion 16, Availability of Skilled and Flexible Workforce for Plant Operations

This criterion evaluated the availability of sufficient skilled labor force to operate the plant, the availability and support of technical schools or trade schools to train qualified candidates, and the operating organizations' support for multi-tasking of employees. Employee multi-tasking refers to employee's ability to perform general job functions rather than a single job function.

Bellefonte, AL

There is a sufficient labor pool to support plant operations; however, it is expected that few in the labor force have worked in a nuclear facility. There is a technical school adjacent to the site, which has indicated their support, including use of facilities and/or faculty for training and qualification of workers. In addition, a community college is located nearby. Multi-tasking of employees appears to be acceptable.

Carlsbad, NM

The labor pool in the immediate vicinity of the Carlsbad Site may not have sufficient resources to support the requirements for operating the plant; however, the surrounding labor pool is sufficient. There are trained nuclear workers at the WIPP; however, the skill set required is different for the two facilities. A major university, other post-secondary schools, and a technology training center in Carlsbad are available to assist with training and qualification of workers. Support for multi-tasking of employees is unclear.

Eddy County, NM

The labor pool in the immediate vicinity of the Eddy County Site may not have sufficient resources to support the requirements for operating the plant; however, the surrounding labor pool is sufficient. There are trained nuclear workers at the WIPP; however, the skill set required is different for the two facilities. A major university, other post-secondary schools, and a technology training center in Carlsbad are available to assist with training and qualification of workers. Multi-tasking of employees appears to be acceptable.

Hartsville, TN

There is a sufficient labor pool at or near the Hartsville Site to support plant operations; however, it is expected that few in the labor force have worked in a nuclear facility. A technical school is located within a few miles of the proposed site and is available for use in training of workers. The local development organization indicates that the technical school will provide space and faculty as appropriate to assist in development of the industrial park. Multi-tasking of employees appears to be acceptable.

Lea County, NM

The labor pool in the immediate vicinity of the Lea County Site may not have sufficient resources to support the requirements for operating the plant; however, the surrounding labor pool is sufficient. There are a small number of trained nuclear workers at the nearby WCS disposal facility, and workers from the WIPP may be available to support the operations staff. However, the skill set required is different for this facility than for an enrichment plant. Major universities and other post-secondary schools are located in Midland-Odessa and Lubbock, while a local junior college in Hobbs is available to assist with training and qualification of workers. Multi-tasking of employees appears to be acceptable.

Portsmouth, OH

There is a sufficient qualified labor pool at or near the Portsmouth Site to support plant operations. A significant number of operations personnel were laid off by USEC as a result of cessation of enrichment activities at the site. These workers are well qualified and have been formally qualified to work on several nuclear watch stations that would be relevant to operating positions at the new plant. Training centers and technical schools are available in the area to assist in training and qualification programs. The DOE also has funding available to help defray the costs of training displaced workers from PORTS. This funding can be used at the technical schools. Multi-tasking of employees is not the norm, but would be considered on a case-by-case basis.

2.1.3.3.4.17 Criterion 17, Extant Nuclear Site

Evaluation of the criterion for Extant Nuclear Site included consideration of several subcriteria, including supply chain integration and optimization through co-location with a fuel fabricator and/or UF_6 production facility, availability of existing nuclear and non-nuclear infrastructure, and availability of specialized technical resources that can be utilized on a limited basis.

Bellefonte, AL

The proposed site is not co-located with a fuel fabricator or UF_6 production facility, nor is the proposed site co-located on or near an existing nuclear facility. The proposed site is located essentially adjacent to the TVA Bellefonte Nuclear Plant site; however, there is no nuclear infrastructure at the proposed site or adjacent Bellefonte Nuclear Plant that could be utilized and only limited available non-nuclear infrastructure (i.e., utilities). There are no specialized nuclear resources nearby; however, there is a technical school and community college nearby that could provide specialized technical resources. Specialized nuclear resources might be available to the facility from TVA nuclear plants in northern Alabama and east Tennessee and/or the DOE facilities in Oak Ridge, Tennessee.

Carlsbad, NM

The proposed site is not co-located with a fuel fabricator or UF_6 production facility, nor is the proposed site located on or near an existing nuclear facility. This site is located farthest from existing fuel cycle facilities of the four sites. The proposed site is situated approximately 32 km (20 mi) from the WIPP site; however, there is no nuclear infrastructure at the proposed site or the WIPP that could be utilized, and only limited available non-nuclear infrastructure (i.e., utilities). Specialized nuclear resources might be available from the WIPP or Los Alamos, but they may be limited and may not include the required skill sets. There is a major university, other post-secondary schools, and a technology training center in Carlsbad that could provide specialized technical resources.

Eddy County, NM

The proposed site is not co-located with a fuel fabricator or UF_6 production facility. The site is located over 1,600 km (1,000 mi) from any existing fuel cycle facilities. The proposed site is situated adjacent to the WIPP, which is a transuranic waste disposal facility, and some nuclear infrastructure could be shared between these facilities. Only limited non-nuclear infrastructure is available (i.e., utilities). Specialized nuclear resources might be available from the WIPP or Los Alamos. There is also a university, other post-secondary schools, and a technology training center in Carlsbad that could provide specialized technical resources.

Hartsville, TN

The proposed site is not co-located with a fuel fabricator or UF_6 production facility, nor is the proposed site co-located on or near an existing nuclear facility. It is located at a site that previously sought and received a construction permit from the NRC. The proposed site is located on the TVA Hartsville Nuclear Plant site; however, there is no nuclear infrastructure at the proposed site that could be utilized and only limited available non-nuclear infrastructure (i.e., utilities). There are no specialized nuclear resources nearby; however, there is a technical school nearby that could provide specialized technical resources. Specialized nuclear resources might be available to the facility from TVA nuclear plants in east Tennessee and/or the DOE facilities in Oak Ridge, Tennessee.

Lea County, NM

The proposed site is not co-located with a fuel fabricator or UF_6 production facility. This site is located over 1,600 km (1,000 mi) from any existing fuel cycle facilities. The proposed site is situated near the WCS disposal facility, which has a radioactive materials license from the State of Texas and a minimal nuclear infrastructure to support low-level waste storage. Only limited non-nuclear infrastructure is available (i.e., utilities). Specialized nuclear resources might be available from the WIPP or Los Alamos. There also are universities in Midland-Odessa and Lubbock and a Junior College in Hobbs, New Mexico that could provide specialized technical support to the site.

Portsmouth, OH

Although not co-located with a fuel fabricator or UF_6 production facility, the Portsmouth Site is co-located at a nuclear facility (i.e., uranium enrichment facility). A wide range of existing nuclear infrastructure is located at the DOE site, but most are currently under lease to the USEC through 2004. A wide range of existing non-nuclear infrastructure is located at the DOE site but, again, most is currently under lease to USEC through 2004. However, DOE retains responsibility for an existing sanitary landfill, construction spoils disposal area, and borrow areas, which might be available to LES to utilize during construction activities. Limited specialized technical resources are available through DOE and/or DOE's subcontractor under personal services agreements; these resources are primarily related to waste transportation and disposal. Laid-off USEC technical resources might also be available but would probably have to be hired or contracted individually.

2.1.3.3.4.18 Criterion 18, Availability of Good Transportation Routes

Evaluation of this criterion considered access to railroads (distance to a railhead, and whether a railhead was available), controlled-access highways or interstates, and navigable waterways; capacity of the existing roads to handle the construction and operations traffic; and optimum and efficient transportation routes to fuel fabrication and UF_6 production facilities.

Bellefonte, AL

A Norfolk Southern Railroad runs within 1.6 km (1 mi) of the proposed site and an existing rail spur runs through the site to the Bellefonte Nuclear Plant site. However, the spur would need to be upgraded or a new one constructed. The nearest controlled-access highway (US-72) runs adjacent to the site, along the northern side of the property. The nearest interstate access (I-24) is approximately 48 km (30 mi) to the northeast. In addition to the excellent access to controlled-access roads, the Tennessee River is navigable with barge access within approximately 3.2 km (2 mi) (at TVA's Bellefonte Nuclear Plant site). The existing roads around the site can handle additional construction and operations traffic/load. The proposed site is approximately 459 km (285 mi) from the nearest fuel fabricator and within 805 km (500 mi) of two additional fuel fabricators. The UF_6 production facility in Metropolis, IL, is approximately 451 km (280 mi) from the proposed site.

Carlsbad, NM

The Burlington Northern-Santa Fe Railroad runs through the northwest corner of the proposed site. A controlled-access highway (U. S. Highway 62) runs adjacent to the southeast corner of the site. The existing roads to the site can handle additional construction and operations traffic/load. The proposed site is approximately 2310 km (1,435 mi) from the nearest fuel

fabricator and approximately 1,795 km (1,115 mi) from the UF_6 production facility in Metropolis, IL.

Eddy County, NM

A railroad spur serving the WIPP Site is located approximately 3.2 km (2 mi) south of the proposed site and connects to the Burlington Northern and Santa Fe Railroad, approximately 10 km (6 mi) to the west. The WIPP North Access Road crosses the southeastern corner of the site and connects to a 4-lane, controlled-access highway (US 62/180), approximately 21 km (13 mi) north of the site. The existing roads to the site can handle additional construction and operations traffic/load. The proposed site is approximately 2,270 km (1,410 mi) from the nearest fuel fabricator and approximately 1,750 km (1,090 mi) from the UF_6 production facility in Metropolis, IL. The site is over 965 km (600 mi) from the nearest navigable waterway and major port access.

Hartsville, TN

The nearest railroad to the proposed site is approximately 29 km (18 mi) away, near Lebanon, TN. A 2-lane rural state highway (SR 25) runs adjacent to the site and an access road (River Road) runs from the proposed site to the highway. The nearest controlled access highway is 10 km (6 mi) away and the nearest interstate access (I-40) is approximately 35 km (22 mi) away (south of Lebanon, TN). The Cumberland River, which is essentially adjacent to the proposed site, is navigable and TVA has barge access at the site. The site access road is expected to be adequate to handle the additional construction and operations traffic/load with the government-funded, typical improvements that are scheduled over the next few years. The proposed site is approximately 427 km (265 mi) from the nearest fuel fabricator and within 805 km (500 mi) of two additional fuel fabricators. The UF_6 production facility in Metropolis, IL is approximately 322 km (200 mi) from the proposed site.

Lea County, NM

A rail spur runs along the northern edge and through the northeast corner of the proposed site. New Mexico Highway 234 runs along the southern edge of the site and connects to a 4-lane, controlled-access highway (New Mexico Highway 18) approximately 4 km (2.5 mi) west of the site. The existing roads to the site can handle additional construction and operations traffic/load. The proposed site is approximately 2,264 km (1,406 mi) from the nearest fuel fabricator and approximately 1,674 km (1,040 mi) from the UF_6 production facility in Metropolis, IL. The site is over 960 km (600 mi) from the nearest navigable waterway and major port access.

Portsmouth, OH

An existing rail spur connected to the main lines of both the Norfolk Southern Railroad and the CSX Railroad runs along the northern edge of the proposed site. The nearest controlled access highway (US-32) is within 1.6 km (1 mi) of the proposed site with a four-lane access road (North Access Road) 0.4 to 0.8 km (0.25 to 0.5 mi) of the proposed site. The existing roads have the capacity to handle the construction and operational traffic; however, the existing gravel road within the proposed site, which runs to the fire training facility and borrow areas, would need to be improved or another access road constructed into the site approximately 0.8 km (0.5 mi). In addition to the excellent access to controlled-access roads, the Ohio River is a navigable waterway with a port facility located 1.6 km (1 mi) west of Portsmouth, OH, approximately 35 km (22 mi) south of the proposed site. The proposed site is within 483 km (300 mi) of the nearest fuel fabricator facility and within 644 km (400 mi) of the UF_6 production facility in Metropolis, IL.

2.1.3.3.4.19 Criterion 19, Disposal of Operational Low-Level Waste

Evaluation of the criterion for Disposal of Operation Low-Level Waste considered the distance to available low-level waste disposal facilities, transportation modes, and whether shipments are currently made from the site to the disposal facility(ies). There are only three active, licensed commercial low-level waste disposal facilities in the United States, and these facilities are located in Barnwell, SC; Hanford, WA; and Clive, UT (Envirocare). However, due to the compacts in place with the three states where the disposal facilities are located, not all generators can use each of the three facilities.

Bellefonte, AL

The proposed site is located approximately 580 km (360 mi) from the Barnwell facility, but the Barnwell site will only accept wastes from non-Atlantic Compact states until 2008. The proposed site is approximately 2,970 km (1,845 mi) from the Envirocare facility; the Hanford facility will not accept wastes from Alabama. Both rail and truck transportation modes would be available for shipping the low-level waste but low-level wastes are not routinely shipped from the proposed site or neighboring Bellefonte Nuclear Plant site.

Carlsbad, NM

The Carlsbad Site is located approximately 1,578 km (980 mi) from the Envirocare facility and approximately 2,463 km (1,530 mi) from the Hanford facility. Both rail and truck transportation modes are available for shipping the low-level waste. Low-Level Waste is not routinely shipped from the proposed site or the nearby WIPP facility. New Mexico is not allowed to ship waste to the Barnwell facility.

Eddy County, NM

The Eddy County Site is located approximately 1,654 km (1,028 mi) from the Envirocare facility and approximately 2,503 km (1,555 mi) from the Hanford facility. Both rail and truck transportation modes are available for shipping the low-level waste. Community organizations, such as the Carlsbad Environmental Monitoring and Research Center and the Environmental Evaluation Group, in the Carlsbad area cooperatively transport low-level waste to the waste disposal site in Washington. New Mexico is not allowed to ship waste to the Barnwell facility.

Hartsville, TN

The proposed site is located approximately 749 km (465 mi) from the Barnwell facility, but the Barnwell site will only accept wastes from non-Atlantic Compact states until 2008. The proposed site is approximately 2,842 km (1,765 mi) from the Envirocare facility; the Hanford facility will not accept wastes from Tennessee. Truck transportation is available for shipping the low-level waste, but rail transportation is not presently available without transferring the wastes at a nearby location from truck to rail. In addition, low-level wastes are not routinely shipped from the proposed site or Hartsville Nuclear Plant site.

Lea County, NM

The Lea County Site is located approximately 1,636 km (1,016 mi) from the Envirocare facility and approximately 2,574 km (1,599 mi) from the Hanford facility. Both rail and truck transportation modes are available for shipping the low-level waste. Low-level waste is routinely shipped from the adjoining WCS facility. New Mexico is not allowed to ship waste to the Barnwell facility.

Portsmouth, OH

The Portsmouth site is located approximately 829 km (515 mi) from the Barnwell facility, but the Barnwell site will only accept wastes from non-Atlantic Compact states until 2008. The Portsmouth site is approximately 2,970 km (1,845 mi) from the Envirocare facility; the Hanford facility will not accept wastes from Ohio. Both rail and truck transportation modes are available for shipping the low-level waste and low-level wastes are shipped routinely from the DOE Portsmouth site to Envirocare for disposal.

2.1.3.3.4.20 Criterion 20, Amenities for Workforce

The purpose of this criterion was to evaluate amenities that would enable a workforce to live comfortably near the site. Amenities evaluated include housing, lodging, hospitals, recreation, and cultural aspects such as universities, theaters, museums, etc.

Bellefonte, AL

The town of Scottsboro, with a population of 14,762, is located approximately 10 km (6 mi) to the southwest of the proposed site. Large population centers proximate to the site include Chattanooga, Tennessee, and Huntsville, Alabama, both within 89 km (55 mi) of the proposed site. Adequate housing is anticipated in Scottsboro, along with restaurants, several hotels/motels, limited entertainment, and shopping centers. The surrounding area offers abundant recreational opportunities, including the Guntersville Reservoir; and the Chattanooga and Huntsville areas offer additional recreational and cultural opportunities. Huntsville has two universities, three hospitals, a large technical base associated with the Army missile program, and the NASA Marshall Space Flight Center.

Carlsbad, NM

Carlsbad is located approximately 10 km (6 mi) southwest of the proposed site, with a population of 25,625. The nearest large population center is El Paso, Texas, approximately 274 km (170 mi) southwest of the site. A number of hotels/motels and restaurants are located within Carlsbad. Local recreational and cultural activities include boating and water activities on Lake Carlsbad and the Pecos River, hiking and backpacking in the nearby Guadalupe Mountains and Carlsbad Caverns National Park, a local museum, community theater, and community concert and art associations. Since the site is not located near a large population base, amenities are limited.

Eddy County, NM

Carlsbad (population 25,625) is located approximately 42 km (26 mi) west of the Eddy County Site. The nearest large population center is El Paso, Texas (population 563,662), approximately 306 km (190 mi) southwest of the site. A number of hotels/motels and restaurants are located within Carlsbad. Local recreational and cultural activities include boating and water activities on Lake Carlsbad and the Pecos River, hiking and backpacking in the nearby Guadalupe Mountains and Carlsbad Caverns National Park, a local museum, community theater, and community concert and art associations. Since the site is not located near a large population base, amenities are limited.

Hartsville, TN

Population centers proximate to the site include Lebanon (population 20,235 in 2000), located approximately 32 km (20 mi) southwest of the site, and Gallatin (population 23,230 in 2000),

located approximately 32 km (20 mi) west of the site. Abundant housing is anticipated in the towns of Hartsville, Lebanon, and Gallatin and the surrounding area, along with numerous restaurants, hotels/motels, entertainment, and shopping centers/malls. In addition, Nashville is located approximately 73 km (45 mi) to the southwest of the proposed site and offers numerous arts, entertainment, cultural, and recreational opportunities. Several hospitals and universities are located in the Nashville area.

Lea County, NM

The Lea County Site is located approximately 8 km (5 mi) from Eunice, New Mexico (population 2,562), and 32 km (20 mi) from Hobbs, New Mexico (population 28,657). The nearest large population center is Odessa (population 90,043)-Midland (population 94,996), Texas, approximately 103 km (64 mi) southeast of the site. A number of hotels/motels and restaurants are located within Hobbs. Limited local recreational and cultural activities are available in Hobbs, e.g., Harry McAdams State Park, and in Odessa-Midland, e.g., golf, professional minor league baseball, rodeos, museums, art galleries, symphony, and theatres. Recreational and cultural activities are also available in the Carlsbad area 145 km (90 mi) to the west, including boating and water activities on Lake Carlsbad and the Pecos River, hiking and backpacking in the nearby Guadalupe Mountains and Carlsbad Caverns National Park, a local museum, community theater, and community concert and art associations. Since the site is not located near a large population base, amenities are limited.

Portsmouth, OH

Larger population centers proximate to the site include Portsmouth (population 25,000), 32 km (20 mi) south of the site, and Chillicothe (population 23,000), 40 km (25 mi) north. Adequate housing is anticipated to be available in both Portsmouth and Chillicothe. Many restaurants, pubs, and shopping malls are located in Chillicothe. Columbus, located just over 113 km (70 mi) from Piketon, is the nearest town with a large population base.

2.1.3.3.5 Conclusions

The Eddy County Site scored highest in the evaluation, closely followed by the Lea County Site. However, the Eddy County Site is currently owned by the US Bureau of Land Management (BLM). In order to accomplish transfer of the property, BLM must complete an environmental assessment through the NEPA process which will require, at a minimum, 9 to 12 months. There is no guarantee of the result of the process outcome and there is a potential that it cannot be transferred to LES. As such, the Eddy County Site is not reasonably available for siting the new enrichment facility on a schedule consistent with the business objectives of the project. Accordingly, the preferred site for the enrichment facility is the Lea County Site.On the question of whether the Lea County Site should be rejected in place of an alternative site, the NRC has stated that the test to be employed is “whether an alternative site is obviously superior to the site which the applicant had proposed.” The Atomic Safety and Licensing Appeal Board equated the term “obviously” with “clearly and substantially” thus re-emphasizing the high standard used by the NRC in comparing alternative site analyses with that done for the proposed site. In short, NEPA does not require that a facility be built on the single best site for environmental purposes.

In this case, it is plain that, of the sites considered, none is clearly and substantially superior to the Lea County Site. On balance, the Eddy County and Lea County Sites are qualitatively and

quantitatively similar. With respect to environmental considerations in particular, the two sites were scored identically with respect to several sub-criteria, including “protected species,” “archeology/cultural,” “environmental justice,” “protected properties,” “NPDES permits,” “wind hazard,” “fire hazard,” “ponding hazard,” and “rock/mudslide hazard.” Overall, the Lea County Site scored higher than the Eddy Site with respect to several criteria, including “political support” and “access to highways.” Even with respect to those criteria for which the Eddy County Site was scored higher than the Lea County Site, it must be noted that the scoring differences were sufficiently narrow as to be insignificant, given the uncertainty that is inherent in an analysis that is based on largely qualitative, and somewhat subjective, factors.

The Bellefonte Site ranked third overall, followed by the Hartsville site. The Carlsbad and Portsmouth Sites scored fifth and sixth, respectively. The results are listed in Table 2.1-9, Scoring Summary, and shown on Figure 2.1-7, Contributions by Grouped Criteria, and Figure 2.1-8, Contributions by Criteria.

A summary of each of the six sites is provided below.

2.1.3.3.5.1 Bellefonte, AL

Overall, the Bellefonte Site is acceptable, and ranked third in this evaluation. The site is readily available and consists of 126 ha (311 acres). Seismic criteria for the site appear satisfactory, but additional site-specific characterization is necessary to identify soft soils. With respect to environmental considerations, few existing surveys exist for the site. With respect to most environmental matters considered, the site appears to pose no significant adverse issues. However, it appears that historic preservation issues may arise because portions of the site are within the historic boundaries of a Cherokee Indian Reservation. Finally, TVA would have to relocate several transmission lines that currently cross the site. Bellefonte, while an acceptable site, is not the preferred site for this project.

2.1.3.3.5.2 Carlsbad, NM

The Carlsbad Site ranked fifth in the site evaluation. While the site scores well in regard to seismic considerations and availability of transportation routes, little environmental characterization and survey data exists for the site. Even without this data, certain environmental concerns have been identified. For example, while the Carlsbad Site is located in a sparsely populated area, there are some concerns with respect to a possible disparate impact of a facility here on local minority populations. In addition, the presence of an arroyo on the site would necessitate additional environmental approvals and may constrain site development. On the economic front, the labor pool is weaker at Carlsbad than at other sites considered due to its remote location. For these and other reasons, the Carlsbad Site is not the preferred site for this project.

2.1.3.3.5.3 Eddy County, NM

From a numerical standpoint, the Eddy County Site scored highest in the alternative site evaluation. The site scores very high with respect to seismicity. There is detailed environmental information available for the adjacent WIPP Site that is relevant to this site used in this assessment. This information demonstrated that the site scored very well in nearly all of the environmental protection sub-criteria (with the exception of archeological/cultural resources).

However, as discussed above, the Eddy County Site is not reasonably available for siting the new enrichment facility on a schedule consistent with the business objectives of the project due to issues associated with transfer of the property from BLM. For this reason, the Eddy County Site is not the preferred site for this project.

2.1.3.3.5.4 Hartsville, TN

The Hartsville Site ultimately ranked fourth in the site evaluation. Geological and seismic conditions at the site are generally favorable, although the site exhibits the potential for karsification and the likelihood of rock excavation. The site scored well with regard to environmental, labor and transportation issues. However, after conducting an evaluation of technical and environmental considerations at the site, several concerns were identified from a business standpoint which render Hartsville impractical from a business perspective. In particular, unlike in other states, revenue generated by LES for the enrichment of uranium will not be exempt from the gross receipts tax in Tennessee, and the state also will impose a resources excise tax on special nuclear material. Moreover, the site would need to be rezoned for the facility, and the likelihood of rezoning being approved by the local government was low. Accordingly, the Hartsville Site is not the preferred site for this project.

2.1.3.3.5.5 Lea County, NM

From a numerical standpoint, the Lea County Site ranked second overall, closely following the Eddy County Site. However, the Lea County Site is the preferred site for this project for several reasons. The site scores very well with respect to seismicity. As discussed above, with respect to environmental consideration in particular, the Eddy County and Lea County sites were scored identically with respect to several subcriteria, including “protected species,” “archeology/cultural,” “environmental justice,” “protected properties,” “NPDES permits,” “wind hazard,” “fire hazard, “ponding hazard,” and “rock/mudslide” hazard. Overall, the Lea County Site scored higher than the Eddy Site with respect to several criteria including “political support” and “access to highways.” From a business perspective, political and community support is strong for the facility. For all of these reasons, no other site is obviously superior to the Lea County Site.

2.1.3.3.5.6 Portsmouth, OH

The Portsmouth Site ranked sixth of six sites in the Second Phase Screening. The site scores reasonably well overall, but presents certain difficulties both from an environmental and an economic standpoint that are not present at other sites. On the environmental front, the site layout is adequate, but significant site preparation would be required. NPDES permitting could be constrained due to existing conditions placed on the body of water that would receive discharges. In addition, the proposed project could result in the fill of certain waters, and relocation of a stream. An existing firing range in the middle of the site may have to be removed, and contributes to soil contamination. Perhaps the more significant constraint on this site, however, is the fact that this site consists of acreage on DOE property. DOE recently entered into an agreement with the USEC that no land or facilities on the property will be sold or leased without USEC concurrence. USEC concurrence is not forthcoming, thus rendering the site not reasonably available for use in the project. For these reasons, the Portsmouth Site is not the preferred site for this project.

2.1.3.3.5.7 Sensitivity Analysis

Sensitivity analysis was performed on the results to ensure that the site selection was not sensitive to small changes in the relative weights of objectives or criteria. (The process for assigning weights for objectives, criteria, and subcriteria is described earlier.) For example, sensitivity analysis assesses the probable effect onsite selection if Environmental Acceptability was weighted higher than Operational Requirements. Sensitivity analysis is performed by keeping the scores for each site constant, while varying the weight of a single objective or criteria.

Figures 2.1-9 through 2.1-12 show the sensitivity to weights for each of the four major objectives. Figure 2.1-9, Sensitivity of Site Selection to Objective – Operational Requirements shows sensitivity of the weight assigned to Operational Requirements; Figure 2.1-10, Sensitivity of Site Selection to Objective – Environmental Acceptability shows the sensitivity to the weight assigned to Environmental Acceptability; Figure 2.1-11, Sensitivity of Site Selection to Objective – Schedule for Commencing Operations shows the sensitivity to the weight assigned to Schedule for Commencing Operations; and Figure 2.1.12, Sensitivity of Site Selection to Objective – Operational Efficiencies shows the sensitivity to the weight assigned to Operational Efficiencies.

As shown on Figures 2.1-9 through 2.1-12, the selection of Eddy County and Lea County as the preferred sites is robust, or insensitive to small changes in objective or criteria weights. The sensitivity graphs shown on Figures 2.1-9 through 2.1-12 illustrate how the preferred alternative may change with an increase in the weight of one objective. In each figure, the colors represent the sites' rank for that particular objective and may change if the sites' rank changes in a subsequent objective (i.e., the site ranked highest for each objective is shown in blue, the second ranked site is shown in green, etc.). The x-axis measures increasing or decreasing weight of an objective and the y-axis measures overall decision score. The red vertical line on each of these graphs shows the "status-quo" of weights for each objective.

Sensitivity of Site Selection to Objective – Operational Requirements

Figure 2.1-9 shows that the selection of the preferred sites is insensitive to a change in the weight of Operational Requirements. If the weight of Operational Requirements was increased to the maximum (far right on graph), they would still be the preferred sites. If the weight of Operational Requirements was decreased to the minimum (far left on graph), they would still be the preferred sites along with Bellefonte.

Sensitivity of Site Selection to Objective – Environmental Acceptability

Figure 2.1-10 shows that the selection of the preferred sites is relatively insensitive to a change in the weight of Environmental Acceptability. If the weight of Environmental Acceptability was increased to the maximum (far right on graph), Hartsville would be the preferred site. However, at the extreme minimum, the Eddy County and Lea County sites would be preferred.

Sensitivity of Site Selection to Objective – Schedule for Commencing Operations

Figure 2.1-11 shows that the selection of the preferred sites is not sensitive to a change in the weight of Schedule. If the weight of Schedule was increased to the maximum (far right on graph), Eddy County and Lea County sites would still be the preferred sites. At the extreme minimum, the Eddy County site would be the preferred site with Lea County and Hartsville coming in second.

Sensitivity of Site Selection to Objective – Operational Efficiencies

Figure 2.1-12 shows that the selection of the preferred sites is not sensitive to a change in the weight of Operational Efficiencies.

Sensitivity analysis was also performed on each criteria (those shown on Figure 2.1-8, Contributions by Criteria). No criteria was shown to be sensitive to small changes in weights, further indicating that the selection of the preferred sites is a robust decision.

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Table 2.1-6 Summary of Environmental Impacts For The Proposed Action

Page 1 of 2

Environmental Impact	Proposed Action [1]	ER Reference Section
Land Use	Minimal considering more than half the site will remain undeveloped and current activities on nearby properties.	4.1
Transportation	~1,400 deliveries (and shipments/yr; traffic patterns impact predicted to be inconsequential.	4.2
Geology and Soils	Minimal; potential, short-term erosion during construction, but enhanced afterwards due to soil stabilization.	4.3
Water Resources	None from operation to surface or groundwater; stormwater (195,800 m^3/yr; 51.7 Mgal/yr) from the two stormwater runoff basins, controlled by NPDES permit.	4.4
Ecological Resources	Minimal impact. Not RTE species present.	4.5
Air Quality	Minimal; vehicle and fugitive emissions less than NAAQS regulatory limits during construction or operation.	4.6
Noise	Not significant; should remain within HUD guidelines of 65 dBA L_{dn} and EPA limit of 55 dBA L_{dn}	4.7
Historic and Cultural	Minimal in that all NHPR sites can be avoided or mitigated, if required.	4.8
Visual/Scenic	None out of character with existing site features.	4.9
Socioeconomic	Positive impact to economy; minimal impact to local public services.	4.10
Environmental Justice	No disproportionate impact.	4.11
Public and Occupational Exposure	Minimal; dose equivalents below NRC and EPA regulatory limits.	4.12
Waste Management (Rad/NonRad)	Within offsite licensed facility capacities; reduced waste streams due to new and high efficient technology.	4.13
- Gaseous	Well below regulatory limits/permits.	3.12
- Liquid	2,535 m^3/yr (669,884 gal/yr)	3.12
- Solid	86,950 kg/yr (191,800 lb/yr) of low-level wastes[2]	3.12

Table 2.1-6 Summary of Environmental Impacts for the Proposed Action
Page 2 of 2

Environmental Impact	Proposed Action [1]	ER Reference Section
- Mixed	50 kg/yr (110 lb/yr)	3.12
- Hazardous	1,770 kg/yr (3,930 lb/yr)	3.12
- Non-hazardous	172,500 kg/yr (380,400 lb/yr)	3.12

1 Projected impacts are based on preliminary design and assumed to be bounding. Impacts are expected to occur for the life of the plant.

2 Excludes depleted UF_6.

Table 2.1-7 Matrix Of Results From First Phase Screening

Site	Criterion 1 Seismology/Geology[1]	Criterion 2 Site Characterization Surveys[2]	Criterion 3 Size of Plot[3]	Criterion 4 Land Not Contaminated[4]	Criterion 5 Moderate Climate[5]	Criterion 6 Redundant Electrical Power[6]
Ambrosia Lake, NM	**No Go**	Go	Go	Go	Acceptable	Go
Barnwell, SC	**No Go**	Go	Go	Go	Acceptable	Go
Bellefonte, AL	Go	Go	Go	Go	Acceptable	Go
Carlsbad, NM	Go	Go	Go	Go	Acceptable	Go
Clinch River Industrial Site, TN	**No Go**	Go	**No Go**	Go	Acceptable	Go
Columbia, SC	**No Go**	**No Go**	Go	Go	Acceptable	Go
Eddy County, NM	Go	Go	Go	Go	Acceptable	Go
Erwin, TN	Go	Go	**No Go**	Go	Acceptable	Go
Hartsville, TN	Go	Go	Go	Go	Acceptable	Go
Lea County, NM	Go	Go	Go	Go	Acceptable	Go
Metropolis, IL	**No Go**	Go	**No Go**	Go	Acceptable	Go
Paducah, KY	**No Go**	Go	Go	Go	Acceptable	Go
Portsmouth, OH	Go	Go	Go	Go	Acceptable	Go
Richland, WA	**No Go**	Go	Go	Go	Acceptable	Go
Wilmington, NC	Go	Not Evaluated[7]	**No Go**	Not Evaluated[7]	Acceptable	Go

Notes:

[1]Go/No Go Criteria: Peak ground acceleration (PGA) 0.04 – 0.08 g_a, ground movements <1 mm, and no capable fault within 80-km (5-mi) radius of site
[2]Go/No Go Criterion: Not located within 500-year flood plain
[3]Go/No Go Criterion: Supports a rectangular footprint of approximately 800 m (2,625 ft) by 600 m (1,969 ft) and expandable for a 6,000 tSW plant
[4]Go/No Go Criteria: Site not contaminated at levels that would inhibit licensing or property transfer, or would require remediation
[5]No Essential Subcriterion
[6]Go/No Go Criterion: Redundant electrical capability
[7]A site was not provided for evaluation.

Gray shading indicates site did not pass the initial phase screening.

Table 2.1-8 Screening Criteria (Subsequent To First Screening)

Criteria	Weight	Subcriteria (Weight)
OPERATIONAL REQUIREMENTS	**100**	
Acceptable Seismology/Geology	100	
Essential (Go/No Go) Criteria:		
• 1 in 500 year event with a peak horizontal ground acceleration no greater than the range of 0.04 – 0.08g_a (dependent upon the frequency content of the typical response spectra).		NA – Go/No Go without scale
• Ground movements < 1mm (0.04 in).		NA – Go/No Go without scale
• No capable fault (per NRC definition) within 8 km (5-mi) radius of site.		NA – Go/No Go without scale
Desirable (Non-Exclusionary) Criteria:		
• **Liquefaction Potential** – Minimal liquefiable materials present.		50
• **Peak Ground Acceleration** – Lower PGA preferred.		100
• **Survey Available** – Well documented and up-to-date seismological surveys are available.		60
• **Karstification** – Low or no potential for underlying karstification.		80
• **Rock Excavation** – Minimal amount of rock excavation required.		30
• **Differential settlement –** Low differential settlement to minimize required ground improvements.		50
• **Allowable bearing –** Sufficient allowable bearing to minimize required ground improvements.		30
Size of Plot (on existing site or available within new boundary)	80	
Essential (Go/No Go) Criteria:		
• Site size supports a rectangular footprint of approximately 800 m (2,625 ft) x 600 m (1,969 ft) for a 3 million SWU facility.		NA – Go/No Go without scale
• Future expansion capability exists for a 6 million SWU plant. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)		NA – Go/No Go without scale
Desirable (Non-Exclusionary) Critiera):		
• **Future Expansion** – Degree of capability to support future expansion beyond a 6 million SWU facility (approximately 1,600 m (5,250 ft) x 600 m (1,969 ft). (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)		100
• **Buffer Area** – Extent of buffer area between site and populated areas.		80
• **Plant Layout -** Site requires minimal or no adjustment to ideal plant layout to fit site and terrain.		90
• **Construction Laydown –** Accommodates construction laydown areas and temporary facilities without limiting plant layout.		40

Criteria	Weight	Subcriteria (Weight)
• **Borrow/Fill -** Borrow/fill requirements can be met onsite or close by. Site preparation costs due to variances in site topography are optimal (cut/fill balanced without significant earthmoving requirements or use of borrow pits). Site topography optimizes the overall usability of the site for the site footprint, transportation access, and drainage.		30
Redundant Electrical Power Supply	75	
Essential (Go/No Go) Criteria:		
• Dual dedicated power supply on separate feeders with capability of delivering 20 MVA for a 3 million SWU facility.		NA – Go/No Go without scale
Desirable (Non-Exclusionary) Criteria):		
• **Transmission feeders** – Transmission feeders can supply power requirements for a 6 million SWU facility. (At this time, there is no intention to license, construct or operate a greater than 3 milllion SWU plant.)		50
▪ **Government Cost Sharing** – Local utility and/or government willing to cost share in capital costs associated with power supply to the facility substation. Factors to evaluate include: - Utility willingness to construct feed lines. - Utility willingness to construct substation. - Utility willingness to maintain feeder and substation.		10
• **Optimal Rate Structure -** Power provider willingness to provide optimal rate structure as a favored client. Factors to evaluate include: - Optimal rate agreements with load factors, transmission costs, equipment maintenance, and repair, etc. that are advantageous to the plant. - Preferred customer status. - Significant break in off-peak rates. Guarantees for quality and reliability.		60
• **Quality –** Power supply has a guaranteed availability rate of greater than 99.5% and a +/- 5% voltage regulation and willingness of the supplier to guarantee quality of service. Factors to consider: - Historical performance of utility, including down times. - Performance in restoration after severe weather outages. - Historical voltage regulation of system. - Capability to provide all power without buying from other suppliers. - Historical delivery performance to production and manufacturing facilities in the area.		100
Water Supply Desirable (Non-Exclusionary) Criteria: Groundwater or water from another source is readily available to provide ample water supply to the facility for both potable and process uses.	10	NA
ENVIRONMENTAL ACCEPTABILITY	**80**	
Site Characterization Surveys and Availability	**100**	
Essential (Go/No Go) Criteria):		
• Site is not within the 500-year flood plain.		NA – Go/No Go without scale

Table 2.1-8 Screening Criteria (Subsequent to First Screening)
Page 3 of 7

Criteria	Weight	Subcriteria (Weight)
Desirable (Non-Exclusionary) Criteria): • **Existing surveys** – Existing quality surveys are available for:		100
- Hydrology - Meteorology (rain, wind, tornadoes, temperatures, etc.) - Topography - Archeology - Endangered species		80
• **Protected Species -** Site is not a habitat for federal listed threatened or endangered species.		80
• **Archeology/Cultural -** Low probability of archeological/cultural resources.		70
• **Environmental Justice -** Low probability of environmental justice issues.		90
• **Protected Properties -** Adjacent properties have no areas designated as protected for wildlife or vegetation that would be adversely affected by the facility.		20
• **NPDES Permits -** Waste water discharge permit (NPDES) readily achievable for projected discharge of the plant.		70
• **Air Permitting -** Air Permit/NESHAPS readily achievable for projected discharge of both a 3 million SWU and a 6 million SWU facility. (At this time, there is no intention to license, construct or operate a greater than 3 million SWU plant.)		70
• **Wetlands and Other Waters –** Few or no areas designated as wetlands. No requests for wetlands mitigation required.		70
• **Wind -** Low probability of high/excessive winds. Factors to consider include: - Proximity of hurricane-prone zones - Annual frequency of wind gusts greater than 80 km/hr (50 mi/hr) exceeding 10 - Design wind speed (176-160 km/hr; 160-112 km/hr; <112 km/hr) (110-100 mi/hr, 100-70 mi/hr; <70 mi/hr) - Tornado frequency		50
• **New Radiological Source -** New plant adds no additional radiological sources to the environment.		10
• **Fire -** Minimal risk from grass or forest fire events. Factors to consider include: - Proximity of fuel sources - Drought conditions - Wind		10
• **Ponding -** Natural site contours minimize potential of localized flooding or ponding Includes evaluation of: – Stream beds – Natural and potential runoffs – Runoff from adjacent areas – Storm drainage systems in place – Requirements for retention ponds		80

Criteria	Weight	Subcriteria (Weight)
• **Slides -** No/low potential for rockslides, mudslides, or other debris flow. Includes evaluation of: - Slopes on or near facility greater than 9.1 m (30 ft) in height or near vertical face (greater than 60%) with no protective ground cover. - Possibility of upstream failure of dams, lakes, or ponds.		50
Land Not Contaminated Through Previous Use	**90**	
Essential (Go/No Go Criteria):		
• Site is not contaminated with radiological material in soil or groundwater to a level that would inhibit licensing or transfer of property with clear identification of liabilities.		NA – Go/No Go without scale
• Site is not identified as a CERCLA or RCRA site contaminated with hazardous wastes or materials.		NA – Go/No Go without scale
• Site does not have contamination that would require remediation prior to construction.		NA – Go/No Go without scale
<u>Desirable (Non-Exclusionary) Criteria:</u>		
• **Documentation -** Well documented site surveys and monitoring for radiological, chemical, and hazardous material contamination.		50
• **Neighboring Plume -** No facility in the area with existing release plume (air or water) of hazardous material or radiation release that includes site.		100
• **Future Migration** – Future migration of contamination from adjoining or nearby sites negligible.		80
Discharge Routes	**40**	
<u>Desirable (Non-Exclusionary) Criteria</u>:		
• **Facility Discharges -** Plant discharge and runoff controls are economically implemented for minimal affect to the existing environment.		100
• **Differentiation -** For sites with extant nuclear facilities, facility discharges are readily identifiable from extant facility discharges.		50
Proximity of Hazardous Operations/High Risk Facilities	**30**	
<u>Desirable (Non-Exclusionary) Criteria</u>:		
• **Hazardous Chemical Facility –** Distance from any facility storing, handling or processing large quantities of hazardous chemicals.		100
• **Propane Pipeline –** Distance from large propane pipeline.		100
• **Airport -** Site is not located within 16 km (10 mi) of commercial airport.		60
• **General Emergency Area -** Site should be outside the general emergency area for any nearby hazardous operations facility (other than extant nuclear related facility)		60
• **Air Quality -** Site should not be located near paper mill or other operating/manufacturing facility that inhibits site air quality. Site has high level of ambient air quality. No facility within 8 km (5 mi) of site has significant air discharge of material affecting quality. Terrain does not limit air dispersal. Community air quality is significantly within regulations at the present time.		30

Table 2.1-8 Screening Criteria (Subsequent to First Screening)

Criteria	Weight	Subcriteria (Weight)
Ease of Decommissioning Desirable (Non-Exclusionary) Criteria: • **Ease of Decommissioning -** Site characteristics (e.g., hydrology) do not negatively affect D&D activities.	**20**	NA
Adjacent Site's Medium/Long-Term Plans (e.g., construction, demolition, site restoration) Desirable (Non-Exclusionary) Criteria: • **Adjacent Site's Long-Term Plans -** Planned major construction activities in adjacent sites are minimal over the next 10 years. No heavy industrial activities planned within 1.6 km (1 mi) of the site boundary.	**10**	NA
SCHEDULE FOR COMMENCING OPERATIONS	**70**	
Political Support Essential (Go/No Go) Criteria: • Federal, State, and local government officials do not oppose the facility.	**100**	NA – Go/No Go without scale
Desirable (Non-Exclusionary) Criteria:		
• **Advocates -** Federal, State, and local officials are advocates for the facility.		100
• **Incentives -** Federal, State, and/or local governments offer tax breaks and/or other incentives for the construction and operation of the facility.		50
• **Road Improvements -** Road upgrades are financed by the Federal, State, and/or local governments.		10
• **Cooperation in Permitting –** Cooperation and assistance by Federal, State, and local government in obtaining necessary easements, leases, construction permits, operating permits, and disposition of low-level waste.		50
Public Support Desirable (Non-Exclusionary) Criteria:	**100**	
• **Community Support -** Majority of community merchants and citizens support the construction and operation of the facility in their locale.		90
• **Labor Support -** Local labor force supports the facility.		60
On or Near an Existing Nuclear Facility Desirable (Non-Exclusionary) Criteria: • **On or Near an Existing Nuclear Facility –** Located on or near a site with an existing or previous NRC license.	**80**	NA

Criteria	Weight	Subcriteria (Weight)
Moderate Climate Desirable (Non-Exclusionary) Criteria: • Site construction delays due to weather conditions are minimal and average 15 days or less per year, considering: - Temperature (range and average) - Rainfall (total and frequency) - Ice/Sleet potential - Snowfall (total and accumulation)	**80**	NA
Availability of Construction Labor Force Desirable (Non-Essential) Criteria:	**75**	
• Sufficient Labor Force – Local area has sufficient skilled construction labor pool to construct the facility on desired schedule. Craft requirements include all major construction crafts (e.g., steelworkers, electricians, pipefitters, operators, finishers, etc.).		100
• Competing Projects - No major construction projects in the area competing for the labor pool resources that would significantly limit resource availability.		80
• Labor Support - If construction crafts at the site are provided by union personnel, commitment by labor union business agents to support the plant construction on a preferential basis. Willingness of unions to sign a Project Labor Agreement that is owner/client protective.		60
• Craft Apprenticeship - Existing craft apprenticeship programs.		10
• Support for Travelers - If construction crafts at the site are provided by union personnel, union support for use of travelers for short-term assignments in areas of critical skill shortages.		30
OPERATIONAL EFFICIENCIES	**60**	
Availability of Skilled and Flexible Workforce for Plant Operations Desirable (Non-Exclusionary) Criteria:	**100**	
• **Sufficient Labor Pool -** Sufficient supply of qualified labor that can readily be trained for plant operations, maintenance, technical support, and waste management.		100
• **Technical School -** Community has technical school, technical/community college, or local nuclear facility that is willing to provide candidates and training classes for the plant operations.		50
• **Multi-task Employees -** Local labor rules do not prohibit or discourage multi-tasking of employees.		50
Extant Nuclear Site Desirable (Non-Exclusionary) Criteria:	**80**	
• **Supply Chain -** Supply chain integration and optimization by co-location with a fuel fabrication facility or a UF_6 production site.		90
• **Nuclear Infrastructure -** Existing nuclear infrastructure that can be used to support the project, including security facilities and systems, waste treatment/disposal facilities, anti-contamination laundry, emergency response resources and equipment, medical dispensary, etc., that might be shared.		100

Table 2.1-8 Screening Criteria (Subsequent to First Screening)
Page 7 of 7

Criteria	Weight	Subcriteria (Weight)
• **Non-nuclear Infrastructure -** Existing non-nuclear infrastructure (e.g., dedicated water supply, water treatment facilities, steam facilities, etc.) that can be used for the new facility. • **Technical resources -** Specialized technical resources that can be used on a limited basis.		70 40
Availability of Good Transport Routes (for centrifuge deliveries from Europe and UF_6 cylinder transportation) Desirable (Non-Exclusionary) Criteria: • **Rail -** Railhead located at the site. • **Access to Highways -** Close proximity access to controlled access highways (parkways) and/or interstate highways. • **Construction Traffic -** Traffic capacity for construction and operation activities with minimal improvements.	**60**	10 100 10
• **Transport Routes -** Optimal and efficient highway and/or rail for UF_6 feed suppliers (environmental impact, safety, costs, and security) to fuel fabricators (environmental impact, safety, costs, and security).		10
Disposal of Operational Low-Level Waste Desirable (Non-Exclusionary) Criteria: • **Disposal of Low-Level Waste –** Site-specific issues (e.g., availability/access to nearby facilities for disposal of low-level waste, transportation modes, etc.) do not impede disposal of low-level waste.	**60**	NA
Amenities for Workforce Desirable (Non-Exclusionary) Criteria: • **Housing and Recreation -** Housing, apartments, hotels, and lodging available for seconded workforce. Recreational facilities (entertainment, shopping, and restaurants) available in or near the area. • **Culture** – Cultural activities available at or near the area.	**20**	100 50

Table 2.1-9 Scoring Summary

Weight	Major Objective	Weight	Criteria	Weight	Subcriteria	Bellefonte	Carlsbad	Eddy County	Hartsville	Lea County	Portsmouth
100	**Operational Requirements**										
		100	Acceptable Seismology/Geology								
				50	Liquefaction Potential	8	10	10	10	10	8
				100	Peak Ground Acceleration	7	10	10	10	10	10
				60	Surveys Available	7	5	10	7	5	7
				80	Karstification	0	10	10	0	10	8
				30	Rock Excavation	8	6	6	5	6	10
				50	Differential Settlement	5	8	8	10	8	5
				30	Allowable Bearing	5	8	8	10	8	7
		80	Size of Plot								
				100	Future Expansion	8	9	10	10	10	8
				80	Buffer Area	8	10	10	10	10	9
				90	Plant Layout	8	9	10	8	10	8
				40	Construction Laydown	10	10	10	10	10	10
				30	Borrow/Fill	10	10	10	10	10	7
		75	Redundant Electrical Power Supply								
				50	Transmission Feeders	10	7	10	10	10	7
				10	Govt. Cost Sharing	9	7	10	10	10	5
				60	Optimal Rate Structure	7	5	7	7	7	5
				100	Quality	10	5	10	10	10	10
		10	Water Supply		Water Supply	10	9	8	10	7	9

Weight	Major Objective	Weight	Criteria	Weight	Subcriteria	Bellefonte	Carlsbad	Eddy County	Hartsville	Lea County	Portsmouth
80	**Environmental Acceptability**										
		100	Environmental Protection								
				100	Existing Surveys	3	0	7	9	4	7
				80	Protected Species	10	5	10	10	10	8
				70	Archeology/ Cultural	7	3	5	10	5	5
				90	Environmental Justice	9	7	7	10	7	10
				20	Protected Properties	7	10	10	5	10	9
				70	NPDES Permits	7	7	10	7	10	7
				70	Air Permitting	7	7	10	7	8	7
				70	Wetlands and Other Waters	10	5	10	9	8	2
				50	Wind	10	7	7	10	7	10
				10	New Radiological Hazard	0	0	7	0	6	10
				10	Fire	10	10	10	8	10	8
				80	Ponding	10	10	10	10	10	9
				50	Slides	10	10	10	10	10	10
		90	Land not Contaminated								
				50	Documentation	9	0	8	10	5	5
				100	Neighboring Plume	8	10	10	10	10	8
				80	Future Migration	9.5	10	10	10	10	9
		40	Discharge Routes								
				100	Facility Discharges	9	8	10	9	10	5
				50	Differentiation	10	10	10	10	10	7
		30	Proximity of Hazardous Operations								
				100	Hazardous Chemical Facility	10	5	7	10	5	10

Weight	Major Objective	Weight	Criteria	Weight	Subcriteria	Bellefonte	Carlsbad	Eddy County	Hartsville	Lea County	Portsmouth
				100	Propane Pipeline	10	10	10	10	10	10
				60	Airport	10	10	10	10	10	10
				60	General Emergency Area	10	10	10	10	10	10
				30	Air Quality	10	5	7	10	5	10
		20	Ease of Decommissioning		Ease of Decommissioning	10	10	10	10	10	9
		10	Adjacent Sites' Long-Term Plans		Adjacent Sites' Long-Term Plans	9	10	10	8	8	5
70	**Schedule for Commencing Operations**										
		100	Political Support								
				100	Advocates	9	10	10	0	10	6
				50	Incentives	8	9	10	2	10	8
				10	Road Improvements	10	10	10	10	10	8
				50	Cooperation in Permitting	9	8	8	0	10	6
		100	Public Support								
				90	Community Support	9	9	9	2	9	8
				60	Labor Supports	9	9	9	9	9	9
		80	On or Near Existing Nuclear Facility		On or Near Existing Nuclear Facility	7	0	0	10	5	10
		80	Moderate Climate		Moderate Climate	7	9	9	6	9	5
		75	Construction Labor Force								
				100	Sufficient Labor Force	9	7	7	9	7	9
				80	Competing Projects	10	10	10	10	10	8
				60	Labor Support	9	5	5[a]	9	5[a]	9

Table 2.1-9 Scoring Summary

Weight	Major Objective	Weight	Criteria	Weight	Subcriteria	Bellefonte	Carlsbad	Eddy County	Hartsville	Lea County	Portsmouth
				10	Craft Apprenticeship	7	5	5[a]	7	5[a]	8
				30	Support for Travelers	10	10	10	10	10	8
60	**Operational Efficiencies**										
		100	Workforce for Plant Operations								
				100	Sufficient Labor Pool	9	8	8	9	8	10
				50	Technical School	9	10	10	9	8	10
				50	Multi-task Employees	9	5	5	9	5	5
		80	Extant Nuclear Site								
				90	Supply Chain	0	0	0	0	0	0
				100	Nuclear Infrastructure	0	0	8	0	5	3
				70	Non-nuclear Infrastructure	5	5	5	5	5	5
				40	Technical Resources	5	5	5	5	5	5
		60	Good Transport Routes								
				10	Rail	9	10	4	0	10	10
				100	Access to Highways	10	10	9	9	10	9
				10	Construction Traffic	10	10	10	7	10	8
				10	Transport Routes	9.5	2	2	10	2	8
		60	Disposal of Low-Level Waste		Disposal of Low-Level Waste	4	6	6	4	6	5

Table 2.1-9 Scoring Summary
Page 5 of 5

Weight	Major Objective	Weight	Criteria	Weight	Subcriteria	Bellefonte	Carlsbad	Eddy County	Hartsville	Lea County	Portsmouth
		20	Amenities for Workforce								
				100	Housing and Recreation	8	3	3	9	3	7
				50	Culture	9	2	2	10	2	5

[a] The established rule for the decision-making analysis was to score a site a "5" if data were not available for evaluation.

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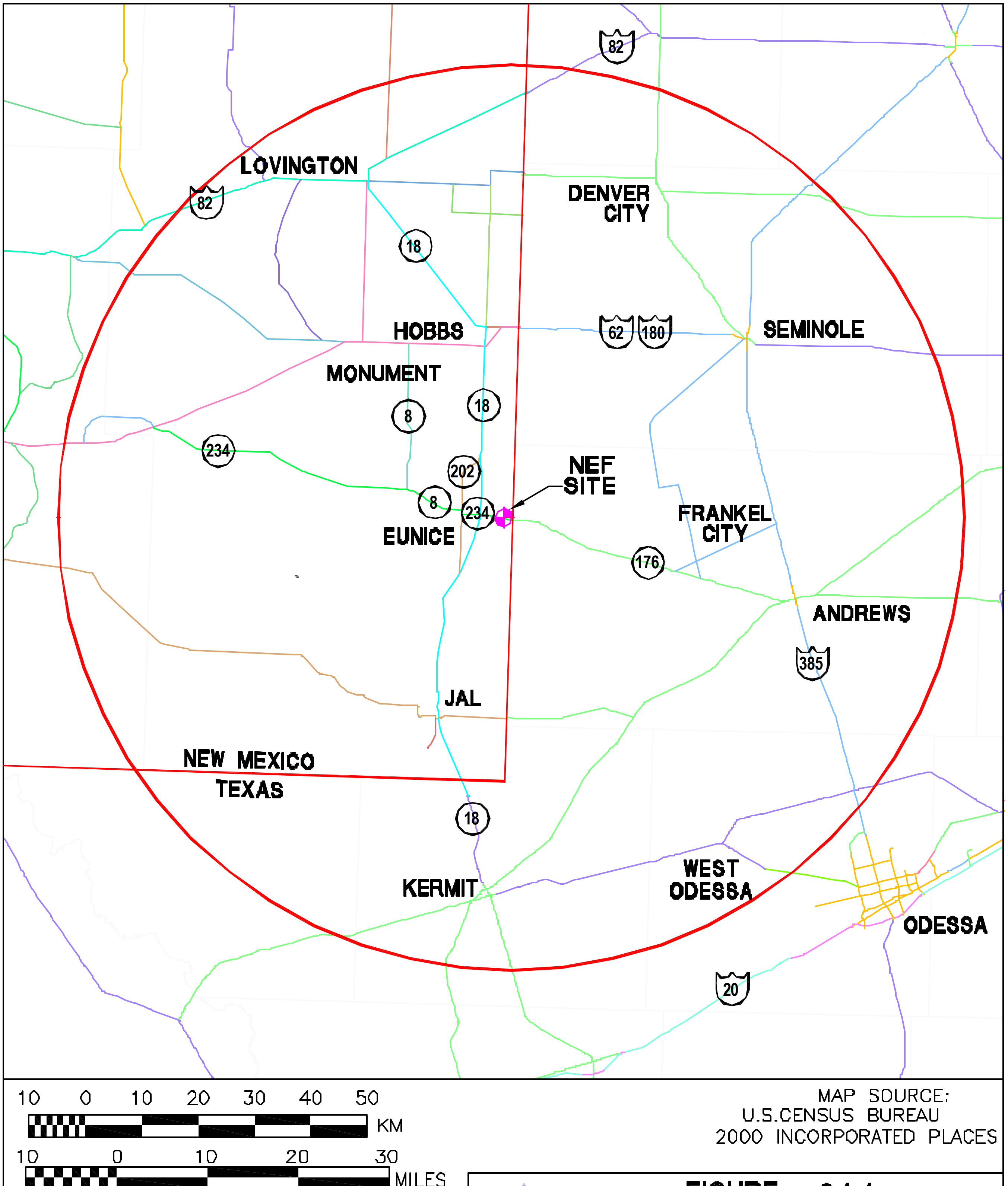
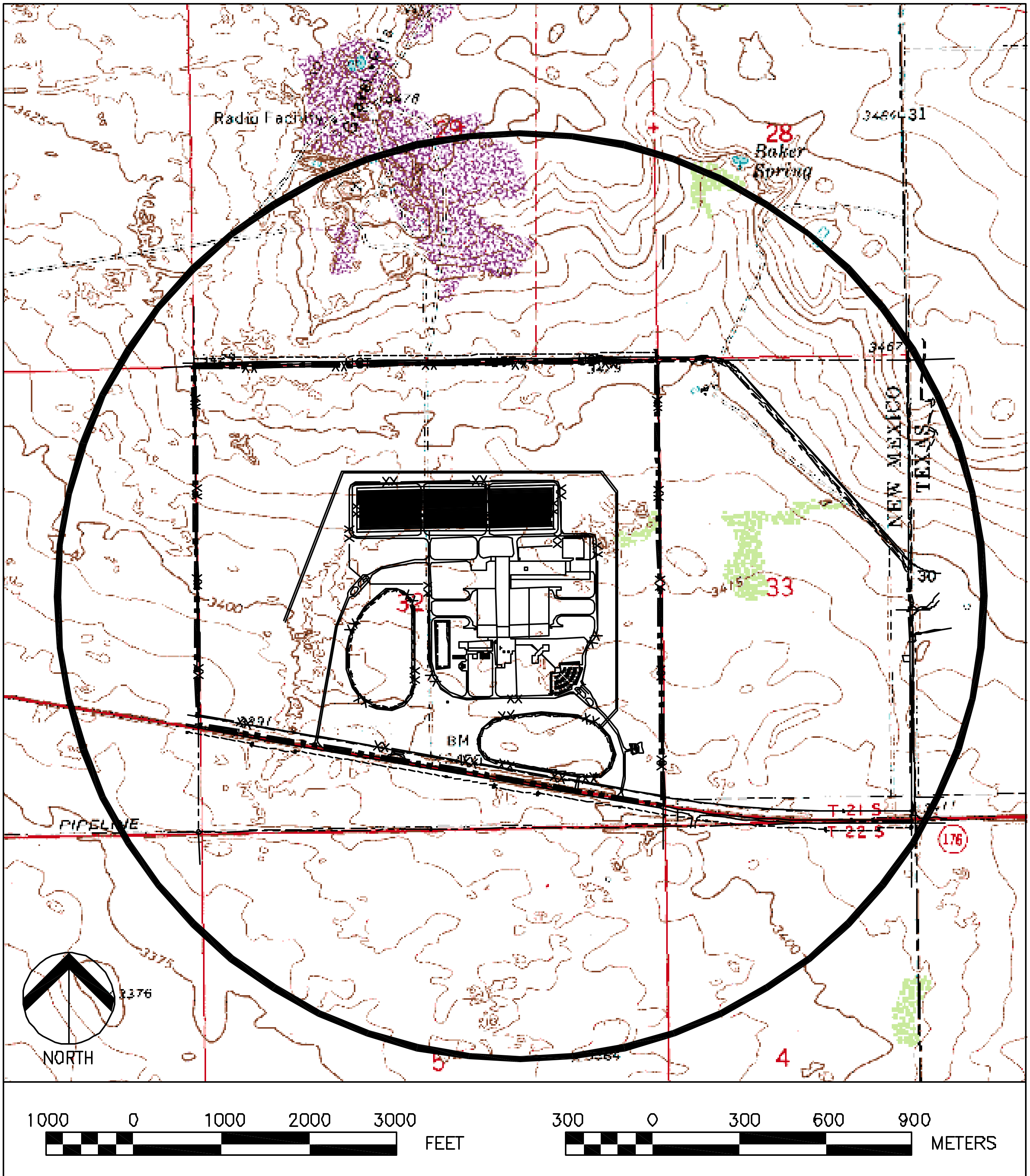
FIGURES



MAP SOURCE:
U.S.CENSUS BUREAU
2000 INCORPORATED PLACES

REFERENCE NUMBER
New Mexico Figures.dwg

FIGURE 2.1-1
80-KILOMETER (50-MILE) RADIUS
WITH CITIES AND ROADS
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



MAP SOURCE:
USGS 7.5 MINUTE
EUNICE NE QUADRANGLE
TEX.–N. MEX. 1:24000

CONTOUR INTERVAL:
5 FEET

LOCKWOOD GREENE
ENGINEERING & CONSTRUCTION

REFERENCE NUMBER
7.5Min Figures.dwg

FIGURE 2.1-2

SITE AREA AND FACILITY LAYOUT MAP
1.6-KILOMETER (1-MILE) RADIUS
ENVIRONMENTAL REPORT

REVISION DATE: DECEMBER 2003

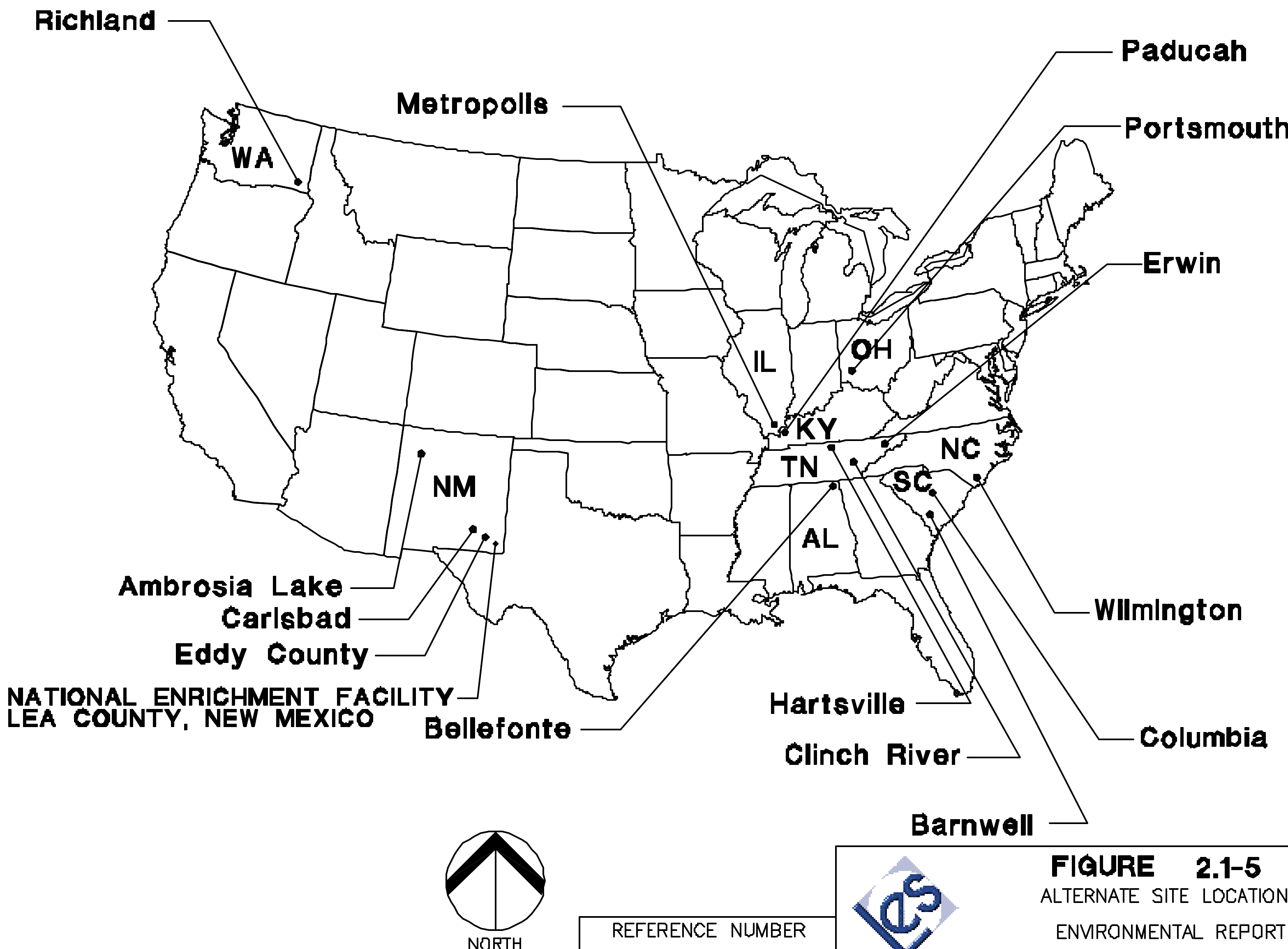
MAP SOURCE:
AERIAL PHOTOGRAPH
INDEPENDENT MAPPING SERVICES
AUGUST 2003

NORTH

REFERENCE NUMBER
Photo Figures.dwg

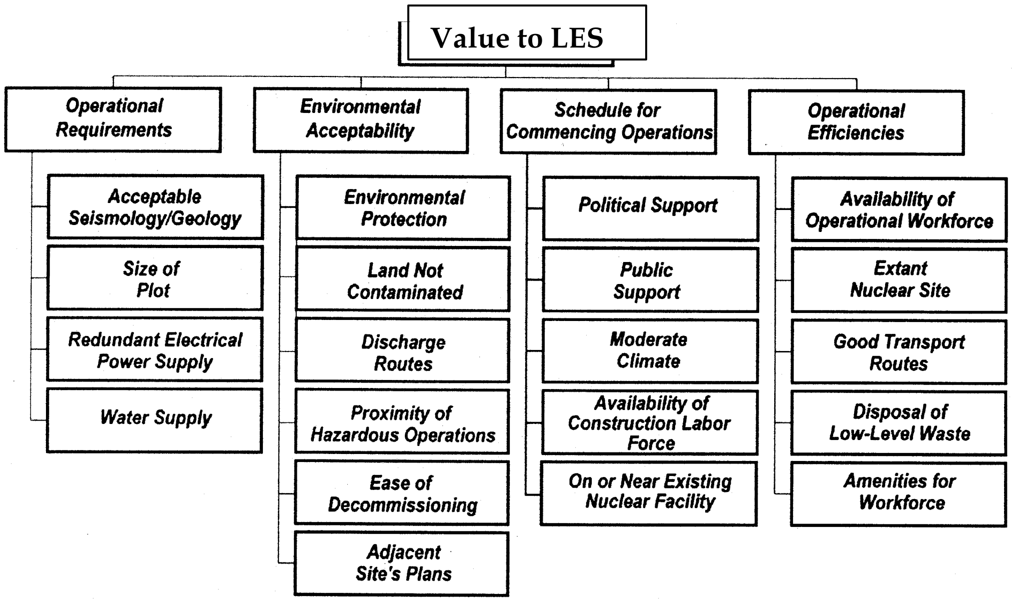
FIGURE 2.1-3
EXISTING CONDITIONS
SITE AERIAL PHOTOGRAPH
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003

Figure removed under 10 CFR 2.390.



REFERENCE NUMBER
USA Figures.dwg

FIGURE 2.1-5
ALTERNATE SITE LOCATIONS
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



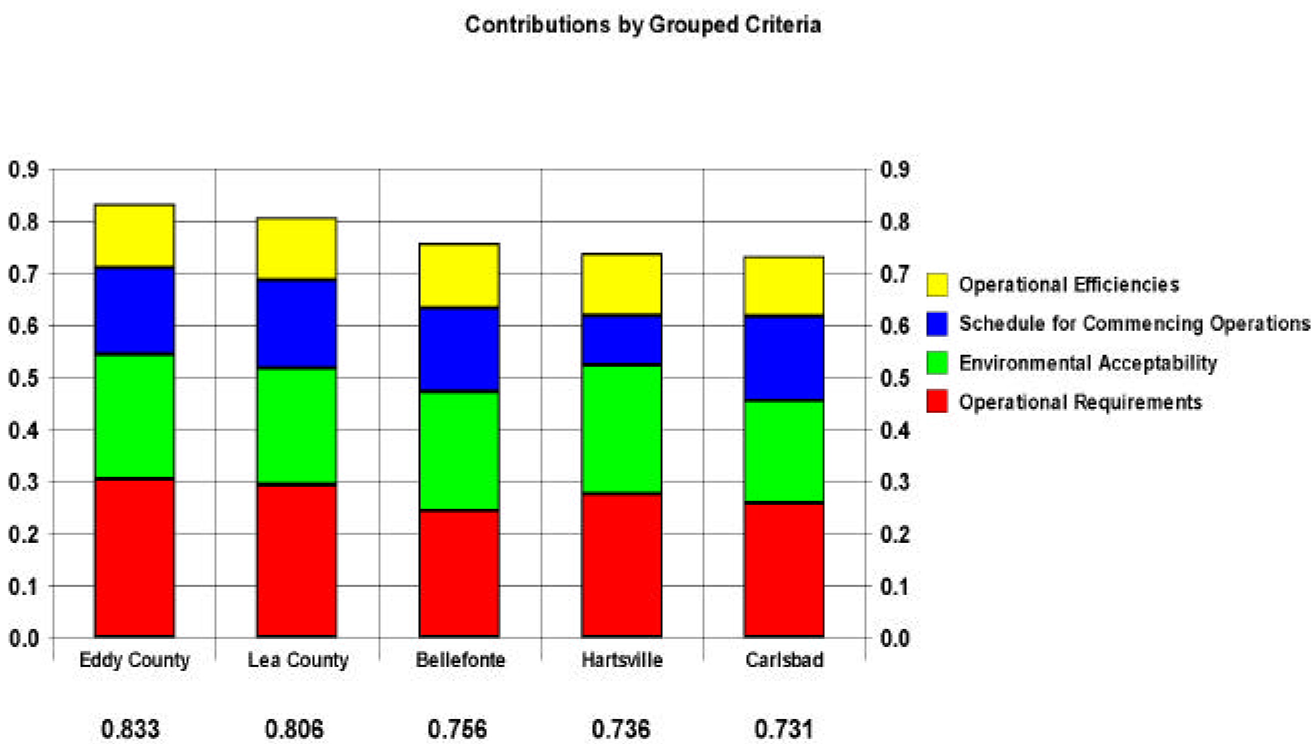
The value hierarchy represents objectives that create value for URENCO. They are defined and organized according to the principles of Multi-Attribute Utility Analysis, with performance metrics for each alternative.

REFERENCE NUMBER
Figure 2.1–6.doc

FIGURE 2.1-6

VALUE OF HIERARCHY FOR SITE SELECTION
ENVIRONMENTAL REPORT

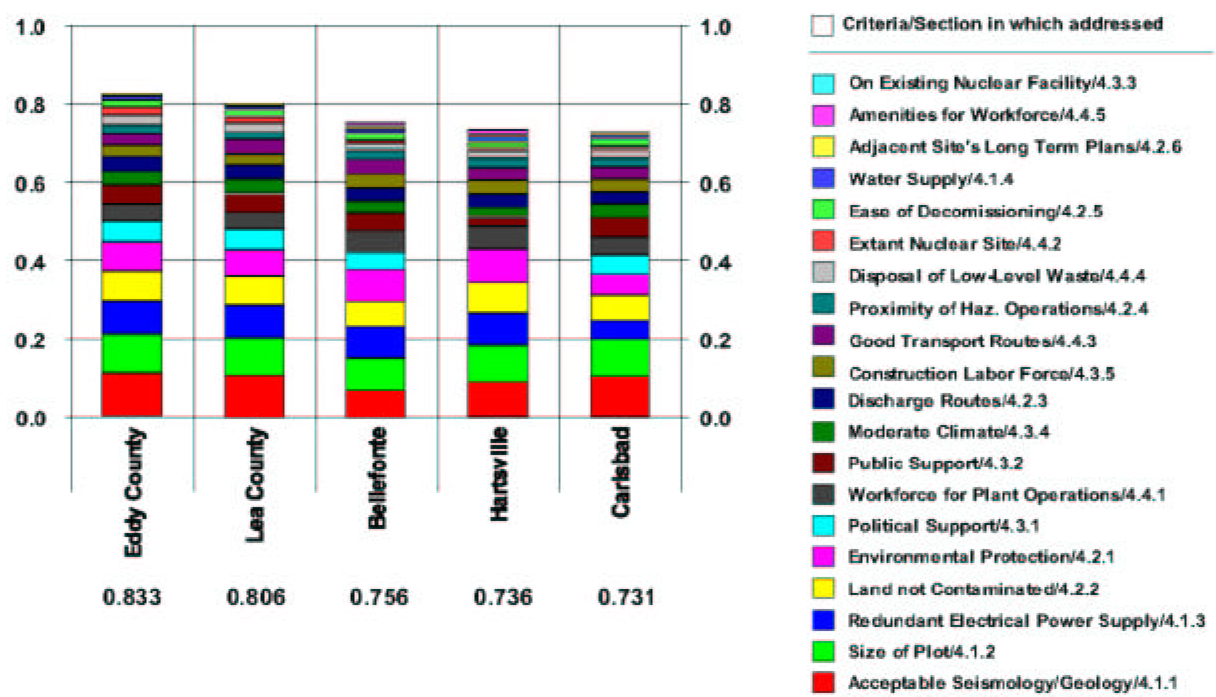
REVISION DATE: DECEMBER 2003



REFERENCE NUMBER
Figure 2.1–7.doc

FIGURE 2.1-7
CONTRIBUTIONS BY GROUPED CRITERIA

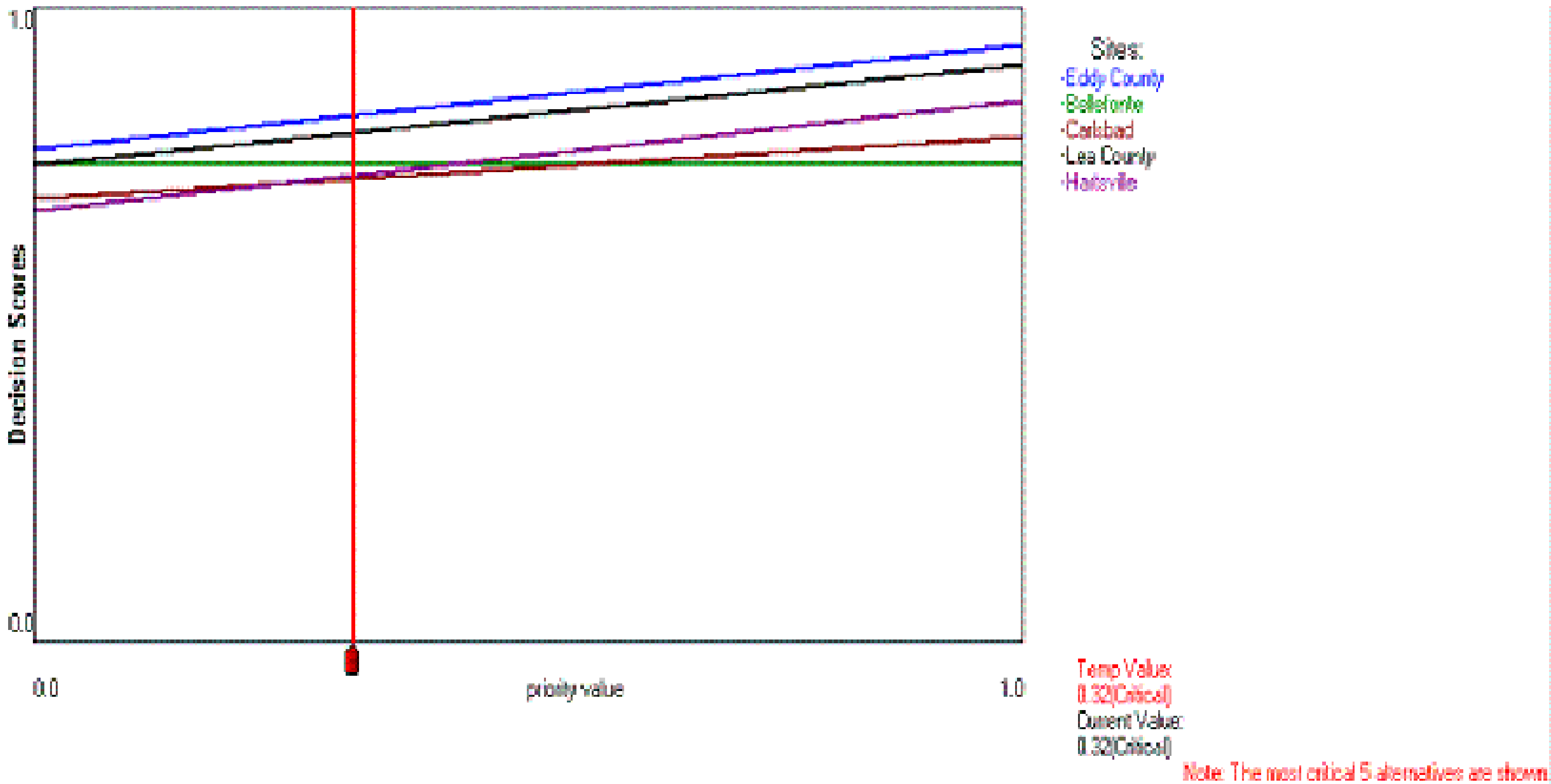
ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



REFERENCE NUMBER
Figure 2.1–8.doc

FIGURE 2.1-8
CONTRIBUTIONS BY CRITERIA

ENVIRONMENTAL REPORT
REVISION DATE: DECEMBER 2003



REFERENCE NUMBER
Figure 2.1−9.dwg

FIGURE 2.1-9
SENSITIVITY OF SITE SELECTION TO OBJECTIVE – OPERATIONAL REQUIREMENTS
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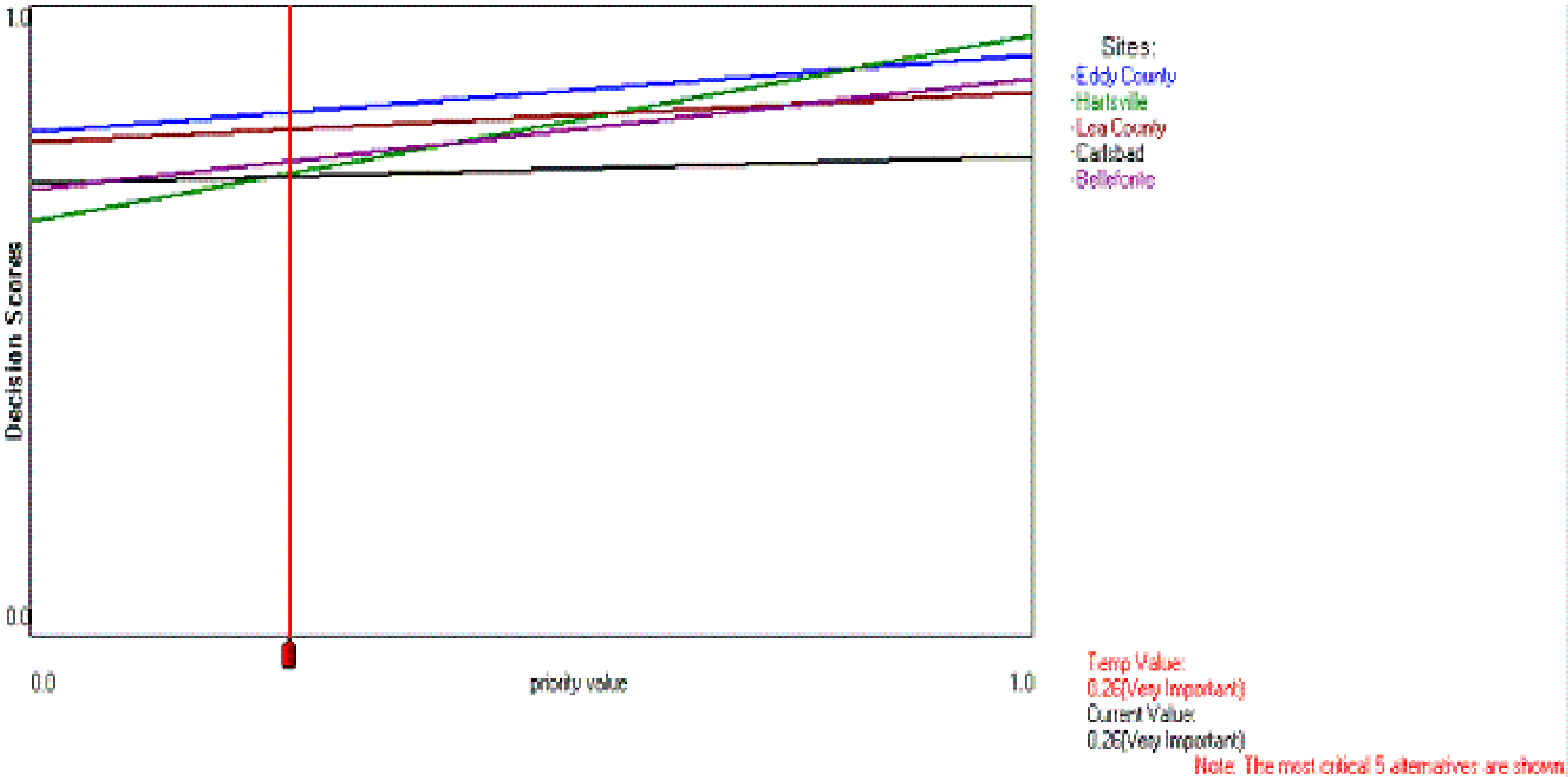

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Figure 2.1-10.dwg

FIGURE 2.1-10

SENSITIVITY OF SITE SELECTION TO OBJECTIVE – ENVIRONMENTAL ACCEPTABILITY
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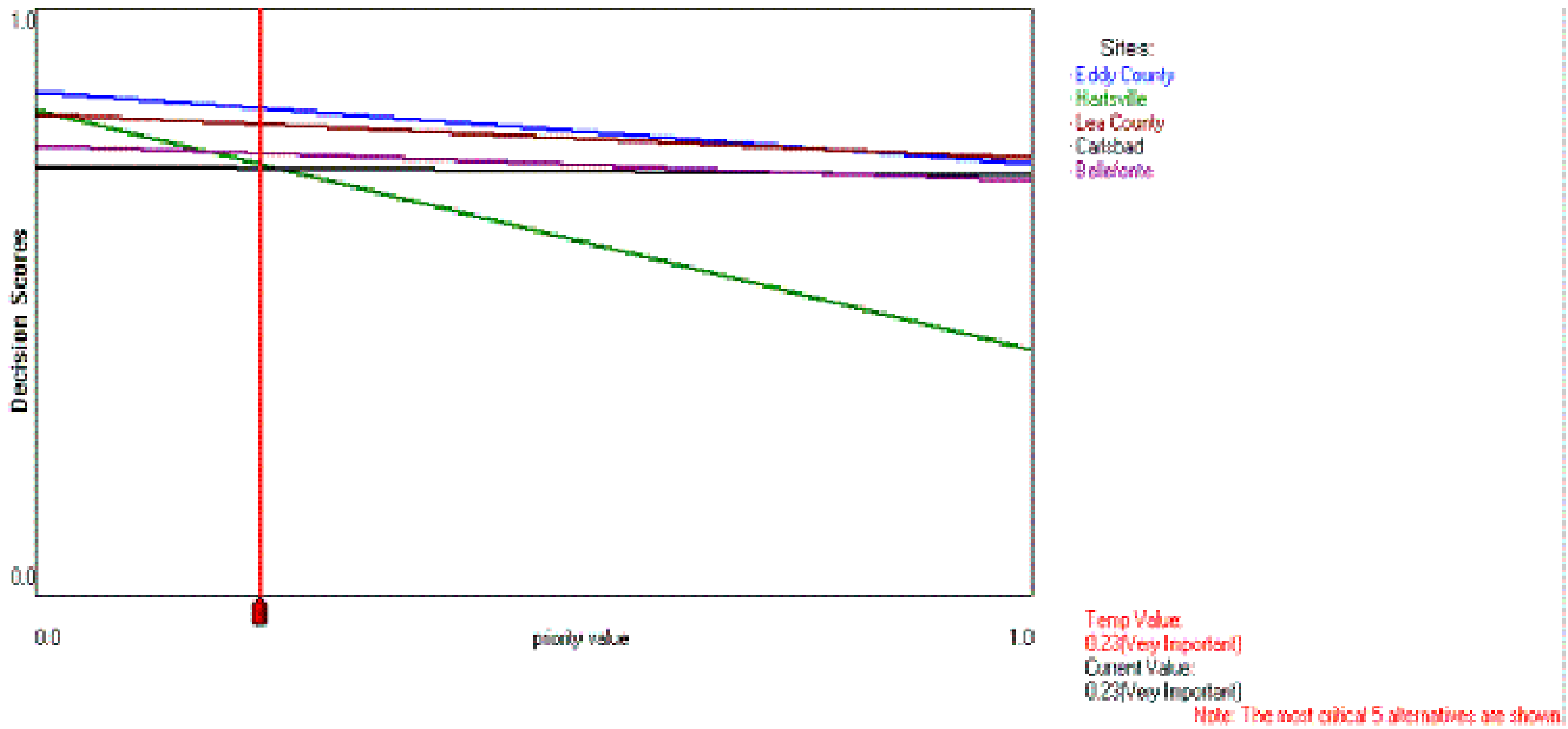

REFERENCE NUMBER
Figure 2.1-11.dwg

FIGURE 2.1-11
SENSITIVITY OF SITE SELECTION TO OBJECTIVE – SCHEDULE FOR COMMENCING OPERATIONS
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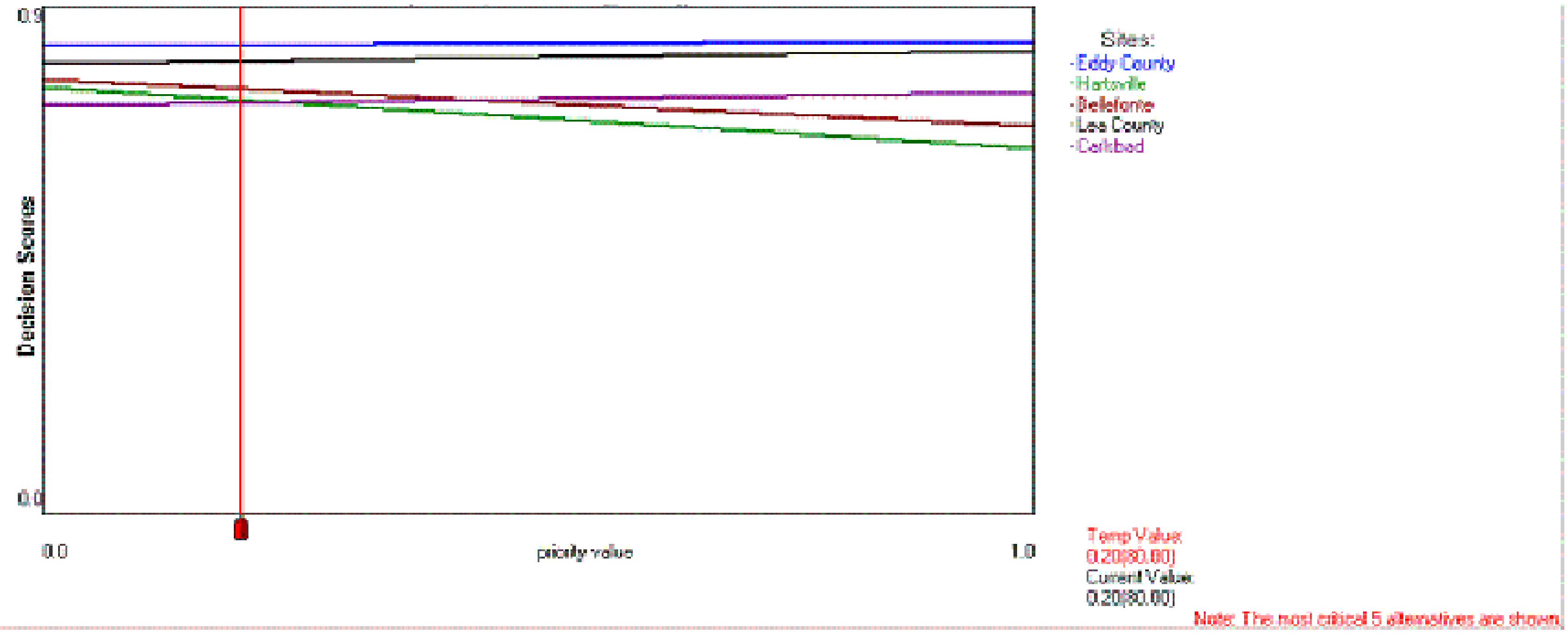

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Figure 2.1-12.dwg

FIGURE 2.1-12

SENSITIVITY OF SITE SELECTION TO OBJECTIVE – OPERATIONAL EFFICIENCIES

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2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED

As set forth in ER Section 1.1, Purpose and Need for the Proposed Action, LES considered primary alternatives to the proposed action, i.e., alternatives to the construction and operation of the NEF. These alternatives include alternative sources of low-enriched uranium (LEU) currently available and potentially available to US nuclear utilities in the future, such as the future deployment of a gaseous centrifuge plant by USEC; expansion by Urenco of its centrifuge capability in Europe; increased sales of HEU-derived LEU under the US-Russia HEU Agreement; and increased availability of LEU derived from US-owned HEU. The alternatives considered do not meet the underlying need for the proposed NEF, which is to provide additional reliable and economical uranium enrichment capacity in the United States, in accordance with US energy and security policy objectives. The alternatives considered similarly fail to meet the important related commercial objectives of enhancing security of supply and eliminating dependence on a single domestic enricher. Additionally, various combinations of technical, economic, and political uncertainties associated with the alternatives identified in ER Section 1.1.2 warrant their elimination from further consideration in this ER. However, for completeness, the environmental impacts of several of the alternatives are compared to those of the proposed action in ER Section 2.4, Comparison of the Affected Environment.

LES also considered various secondary alternatives to the proposed action. These include alternative enrichment technologies, design alternatives, and alternative sites.

With respect to alternative technologies, LES considered the gaseous diffusion technology as an alternative method for enriching uranium, in so far as it is the only presently commercially viable process that allows for enrichment of uranium on the scale sought by LES for the proposed NEF. LES concluded that the gas centrifuge process is superior because the production of the same amount of separative work units (SWU) by the gaseous diffusion process requires approximately 50 times more electricity. Indeed, as evidenced by its Lead Cascade Project, USEC intends to replace its use of the gas diffusion technology with the use of a gas centrifuge technology.

With respect to alternative designs, LES considered six system design changes from the Claiborne Enrichment Center to the NEF that would reduce the impact to the environment (see ER Section 2.1.3.2, Alternative Designs). The systems changed to improve plant efficiency and reduce environmental impact include the Cascade System, Feed System, Product Take-Off System, Product Liquid Sampling System, Product Liquid Sampling System, Product Blending System, and Tails Take-Off System. Beyond minor changes, there are no other significant design alternatives that could lower the impact of the NEF on the environment.

With respect to alternative sites, six sites passed the first phase Go/No Go criteria (see ER Section 2.1.3.3). Eddy County and Lea County scored the highest (first and second, respectively) followed by Bellefonte third and Hartsville fourth, with Carlsbad and Portsmouth scoring fifth and sixth, respectively. Although the Eddy County Site scored highest, it is to be noted that the Eddy County Site is currently owned by the U. S. Bureau of Land Management (BLM), not by Eddy County or the City of Carlsbad. The Carlsbad Field Office of the BLM has stated that they will work hard to complete the National Environmental Policy Act (NEPA) process for transferring (or swapping) the land within 9 to 12 months, but they cannot guarantee the outcome of the NEPA process. There is a potential that the subject site may not be available for siting the new enrichment plant.

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2.3 CUMULATIVE EFFECTS

Cumulative impacts are those impacts that result from the incremental impact of an action added to other past, present, and reasonably foreseeable actions in the future. In conducting this analysis, LES considered past, current and potential facilities and activities that could have some potential for cumulative impacts.

The anticipated cumulative impacts of the proposed operation of NEF are expected to be inconsequential, thus any incremental accumulative impacts caused by NEF should also be inconsequential. Development as an enrichment facility would also avoid impacts to other more environmentally sensitive sites.

There are several local County and private activities in geographic proximity that could potentially combine with the NEF operations to produce a larger impact than the NEF alone. These facilities are: 1) the Waste Control Specialist, LLC facility that is 1.6 km (1.0 mi) due east from NEF; 2) the Wallach Concrete, Inc. quarry that is located just north of NEF; 3) the Lea County landfill which is across New Mexico Highway 234, approximately 1.6 km (1 mi) south; the Sundance Industries "produced water" treatment facility collocated with the Wallach quarry; and 5) the oil and gas industries that are pervasive throughout southeastern New Mexico. A summary assessment of the potential for cumulative impacts is shown in Table 2.3-1, Potential Cumulative Effects for the NEF.

The potential local cumulative effects with the greatest likelihood of occurring are: decrements in air quality (increases in Total Suspended Particulate (TSP)) from combined WCS, Lea County landfill and TSP releases that can occur during NEF construction; increased environmental noise levels from the Lea County landfill and Wallach Concrete, Inc. quarry operations combined with NEF construction; and small increases in the environmental radiation public dose and radiological waste inventories should WCS seek and obtain a low-level radiation waste burial site (10 CFR 61) license (CFR, 2003r). The former two cumulative impacts are transient and will potentially exist only during the 8-year NEF construction period. The latter cumulative effect is speculative since it is unknown at this time if WCS will apply for or be granted a 10 CFR 61 license. Even if these cumulative impacts come to fruition, the cumulative impacts will be limited by regulatory limits and/or the lack of general public receptors residing near these facilities.

A fourth potential cumulative effect is that from the DOE Waste Isolation Pilot Plant (WIPP), located approximately 80 km (50 mi) west of the NEF. The WIPP facility is storing transuranic wastes. Since these wastes are drastically different in composition and activity levels, approximately 80 km (50 mi) away, as well as the WIPP wastes being stored in deep underground salt mine shafts, it is not plausible that a cumulative effect would occur between WIPP and the NEF.

The only other non-local cumulative impact is the cumulative dose to the general public from transportation of UF_6 as feed, product or depleted material and solid waste. Also, there is a dose to the onlooker, worker and driver. LES calculations (see Section 4.2.7, Radioactive Material Transportation) have showed the "worst-case" dose to have minimal impact. Dose equivalent to the general public from the "worst case", for instance, equalled 2.33×10^{-6} Sv (2.33×10^{-4} rem). Similarly, the dose equivalent to the onlooker, driver and worker totaled 1.05×10^{-3}, 9.47×10^{-2}, 6.98×10^{-4} Sv (1.05×10^{-1}, 9.47 and 6.98×10^{-2} rem), respectively. These values

are well below the regulatory limits established by the NRC (10 CFR 20) or the EPA (40 CFR 190), (CFR, 2003q; CFR, 2003f).

The sum total of all local and non-local cumulative impacts and effects are expected to be insignificant or very minor when compared to the established federal, state and local regulatory limits. Negative cumulative effects will be balanced by positive cumulative effects, such as the expansion of job opportunities that will diversify the employment opportunities and expand the local tax base and revenues.

TABLES

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Table 2.3-1 Potential Cumulative Effects for the NEF
Page 1 of 2

ER Section Reference	Effect on:	NEF Effect	Cumulative Effects
4.1	Land Use	Insignificant	None, based on current and expected future activities. NEF is compatible with current land usage
4.2	Transportation	Minor, 1,400 additional heavy truck shipments per year	Cumulative effect will not be noticeable on the highway to the site because of existing traffic volume and mix
4.3	Geology & Soils	Minimal	None
4.4	Water Resources	Minor and not likely to affect water resources. Site groundwater will not be used	Not expected due to depth of groundwater and lack of surface waters.
4.5	Ecological	Minimal	None, no local habitats for RTE species
4.6	Air Quality	Minimal. Increased TSP emissions during construction	Potentially minor cumulative TSP effects when combined with WCS and Lea County landfill operations
4.7	Noise	Not significant. Increased noise levels during construction, but few nearby receptors	Potentially minor cumulative environmental noise effects when combined with WCS and Lea County landfill operations
4.8	Historic and Cultural	Minor negative effects that can be avoided or mitigated	No measurable change since effects are confined to onsite
4.9	Visual/Scenic Resources	Generally positive because of natural landscaping. None out of character with existing features.	Not significant since positive effects are confined to onsite

Table 2.3-1 Potential Cumulative Effects for the NEF
Page 2 of 2

ER Section Reference	Effect on:	NEF Effect	Cumulative Effects
4.10	Socioeconomic	Positive	Cumulative effects will be positive when combined with other local industries and increase job opportunities, income and tax revenues.
4.11	Environmental Justice	No disproportionate impact or effect.	None
4.12	Public & Occupational Health	Increased environmental radiation exposure that are below limits.	Potentially minor cumulative environmental radiation levels should WCS obtain a 10 CFR 61 license
4.13	Waste Management	Minimal. Minor increased quantities of hazardous and radiological wastes	Potentially minor cumulative waste effects (total local inventory) should WCS obtain a 10 CFR 61 license. Unlikely that any cumulative effect would result from the WIPP facility.

2.4 COMPARISON OF THE PREDICTED ENVIRONMENTAL IMPACTS

As noted in ER Section 1.1.2., there are various scenarios if the NEF is not built, i.e., the no-action alternative scenarios. However, only three of the eight scenarios discussed are relevant when comparing domestic environmental impacts (B, C and D). The other scenarios (A, E, F, G, and H) are irrelevant when comparing domestic environmental impacts because they either include the proposed action (A) or require an analysis of environmental impacts in Europe (E, F and G), which is outside of the scope required to be considered in the National Environmental Policy Act, or is a scenario that must be recognized as being highly speculative (H). The anticipated affect to the environment for these no-action alternative scenarios, Scenarios B, C, and D, are described below.

Table 2.4-1, Comparison of Potential Impacts for the Proposed Action and the No-Action Alternative Scenarios, summarizes the potential impacts of each scenario and compares them against the proposed action in terms of domestic capacity and supply. It also lists the summary of individual environmental categories used in Chapter 4, Environmental Impacts.

Table 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternative Scenarios, compares each scenario against the proposed action for Chapter 4 environmental categories in relative terms, i.e., impacts are the same, greater than, or less than those anticipated for the proposed action. Chapter 4 contains the detailed description of potential impacts of the proposed action on individual resources of the affected environment.

Proposed Action

Under the proposed action, LES deploys a 3 million SWU/yr centrifuge enrichment plant (NEF), and USEC deploys a 3.5 million SWU/yr centrifuge enrichment plant. USEC is assumed to cease enrichment production at the Paducah Gaseous Diffusion Plant (GDP) when the centrifuge plant comes on line.

Scenario B – No NEF; USEC Deploys Centrifuge Plant and Continues to Operate Paducah GDP

Under this scenario, there is a 3 million SWU per year supply deficit, but is made up by USEC, operating a 3.5 million SWU per year centrifuge enrichment plant and continuing to operate the Paducah GDP at 3 million SWU per year or less. This would, however, have a significant negative impact on operational efficiencies at the Paducah GDP. It would also continue to have negative environmental impacts due to the high energy costs of operating the Paducah GDP and the related air quality impacts from operating the coal-fired electric power stations that supply the required electrical needs of the plant.

While providing for indigenous US supply, the resulting concerns associated with the age of the Paducah GDP, its significant requirements for electric power, the low level at which it would have to be operated, and the lack of multiple competitive sources of indigenous US supply, would not alleviate concerns among US purchasers of enrichment services regarding either long-term security of supply or reasonable economics. Scenario B is not viewed by LES as an attractive long-term solution.

Scenario C – No NEF; USEC Deploys Centrifuge Plant and Increases Centrifuge Plant Capability

Under this scenario, there is a 3 million SWU per year supply deficit for which other sources of supply must compensate. This supply capability is made up by USEC, who would proceed to build and operate a 3.5 million SWU per year centrifuge enrichment plant, continue to operate the Paducah GDP on an interim basis longer than currently planned, and then rapidly increase its centrifuge enrichment plant capability to 6.5 million SWU per year. Negative environmental impacts would continue for a limited time with the operation of the Paducah GDP, as in Scenario B.

Scenario C provides for indigenous US supply. However, there are concerns 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 at a commercial level nor will the outcome be known for a number of years. There also would remain an ongoing absence of multiple competitive sources of indigenous US supply. Accordingly, this may not alleviate concerns among US purchasers of enrichment services regarding either long-term security of supply or reasonable economics. Given the dependence on a single yet to be proven technology and the ongoing presence of a single indigenous US enricher, Scenario C is not viewed by LES as the most advantageous long-term solution.

Scenario D – No NEF; USEC Does Not Deploy Centrifuge Plant and Operates Paducah GDP at Increased Capacity

Under this scenario, there is a 6.5 million SWU per year supply deficit for which other sources of supply must compensate. USEC would then continue to operate the Paducah GDP at 6.5 million SWU per year. Given the unfavorable economics of continued GDP operation, this would be viewed as having a high economic cost associated with it and continued negative environmental impacts.

At some point in time, it is reasonable to assume that the Paducah GDP must ultimately be replaced. Accordingly, Scenario D does not represent a permanent solution, but only a postponement of the time when new uranium enrichment capacity must be constructed in the US. The cost of such a postponement is likely to be high and the risk of supply disruption in the US would increase as the Paducah GDP continues to age. While providing for indigenous US supply, the resulting concerns associated with the age of the Paducah GDP, its significant electric power requirements, and the lack of multiple competitive sources of indigenous US supply, would not alleviate concerns among US purchasers of enrichment services regarding either long term security of supply or reasonable economics. Scenario D is not viewed by LES as a viable long-term solution.

Summary

Not building the NEF could have the following consequences:

- A uranium enrichment supply deficit for which other sources of supply must compensate.
- Continued operation of an aging technology at a high-cost, electric power intensive facility, the Paducah GDP, or new technologies that have a larger production capacity, but concentrated in one location.
- Foster the continuation of a single, indigenous supplier, thereby eliminating competition.

- Diminish the objective of long-term security of supply.

Accordingly, LES considers that the NEF would be a complementary and competitive supplier for uranium enrichment service and would provide a means to offset both foreign enrichment supplies and the more energy-intensive production from the only US gaseous diffusion plant, with lesser environmental impacts.

While the no-action alternative scenarios would avoid any impacts to Lea County, New Mexico and Andrews County, Texas areas due to construction and operation of the NEF, it would lead to impacts at other locations. If the proposed NEF is not built, there will be a continued and increasing need for uranium enrichment services. The no-action alternative scenarios, as discussed above, would allow for at least three domestic options in regard to continued uranium enrichment supply, Scenarios B, C and D.

As summarized in Table 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternative Scenarios, the affects to the environment of all no-action alternative scenarios are anticipated 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. Hence, it is reasonable to reject the no-action alternative scenarios because the affect to the environment from the proposed action is minimal, as demonstrated in ER Chapter 4, Environmental Impacts, and the benefits desirable, as demonstrated in ER Chapter 7, Cost-Benefit Analysis.

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TABLES

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Table 2.4-1 Comparison Of Potential Impacts For The Proposed Action And The No-Action Alternative Scenarios

Potential Impact	Proposed Action[1]	Alternative Scenarios		
		B No NEF, USEC Deploys Centrifuge Plant and Continues to Operate Paducah GDP	**C No NEF, USEC Deploys Centrifuge Plant and Increases Centrifuge Plant Capability**	**D No NEF, USEC Does Not Deploy Centrifuge Plant and Operates Paducah GDP at Increased Capacity**
Domestic Capacity	Provides 3 million SWU/yr supply (NEF only)	3 million SWU/yr deficit; make up from continued operation of Paducah GDP at 3 million SWU/yr	3 million SWU/yr deficit; make up by USEC building gaseous centrifuge plant (GCP), operating Paducah on interim basis longer than planned, and then rapidly increasing GCP capability to 6.5 million SWU/yr	6.5 million SWU/yr deficit; make up from continued operation of Paducah GDP at 6.5 million SWU/yr
Domestic Supply	Fosters competition; two suppliers; secures long-term supply; reduces security of supply concerns by providing replacement supply for inefficient and noncompetitive gaseous diffusion enrichment plants	One supplier only; does not alleviate security of supply; unproven commercially demonstrated technology; reliance on aging high-cost, inefficient GDP technology	One supplier only; does not alleviate security of supply; unproven commercially demonstrated technology	One supplier only; not permanent, only maintains status quo; does not alleviate security of supply concerns because of reliance on aging, high-cost, inefficient GDP technology
Summary of Environmental Impacts (see Table 2.4-2 for list of categories)	Total Scoring[2]: 0	Total Scoring[2]: -4	Total Scoring[2]: -5 to -2	Total Scoring[2]: -7

[1]Proposed action assumes both LES and USEC deploy centrifuge plants and GDP is shutdown when USEC centrifuge plant comes on line. The proposed action receives a neutral score of zero (i.e., baseline impact on the environment).

[2]Scoring Methodology (all Alternative Scenarios compared against Proposed Action). Positive score means less impacts on the environment than proposed action. Negative score means greater impacts on the environment than proposed action.

Table 2.4-2 Comparison of Environmental Impacts For The Proposed Action And The No-Action Alternative Scenarios
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Environmental Category	**Proposed Action**[2]	**Alternative Scenarios**[1,3]		
		B No NEF, USEC Deploys Centrifuge Plant and Continues to Operate Paducah GDP	**C No NEF, USEC Deploys Centrifuge Plant and Increases Centrifuge Plant Capability**	**D No NEF, USEC Does Not Deploy Centrifuge Plant and Operates Paducah GDP at Increased Capacity**
Land Use	Minimal for NEF (see ER Section 4.1)	Less impact since only one of two gas centrifuge plants (GCPs) are built Scoring: +1	Same impact if undisturbed land, less impact if already disturbed land Scoring: 0 or +1 (use +0.5)	Less impact Scoring: +1
Transportation	Minimal for NEF (see ER Section 4.2)	Greater impact if at Paducah because concentrating shipments at one location or same impact if at other location Scoring: -1 or 0 (use -0.5)	Greater impact because concentrating shipments at one location Scoring: -1	Greater impact because concentrating shipments at one location Scoring: -1
Geology and Soils	Minimal for NEF (see ER Section 4.3)	Less impact since only one of two GCPs are built Scoring: +1	Same impact if undisturbed land, less impact if already disturbed land Scoring: 0 or +1 (use +0.5)	Less impact Scoring: +1
Water Resources	Minimal for NEF; low water use (see ER Section 4.4)	Greater impact because of greater water use by GDP and high water use to meet GDP electricity needs Scoring: -1	Greater impact for short term because of greater water use by GDP and high water use to meet GDP electricity needs; same or greater impact for the long term Scoring: -1 or -0.5	Significantly greater impact than Alternative Scenario B because of increased GDP capacity Scoring: -1.5

Table 2.4-2 Comparison of Environmental Impacts For The Proposed Action And The No-Action Alternative Scenarios

		Alternative Scenarios[1,3]		
Environmental Category	**Proposed Action[2]**	**B No NEF, USEC Deploys Centrifuge Plant and Continues to Operate Paducah GDP**	**C No NEF, USEC Deploys Centrifuge Plant and Increases Centrifuge Plant Capability**	**D No NEF, USEC Does Not Deploy Centrifuge Plant and Operates Paducah GDP at Increased Capacity**
Ecological Resources	Minimal for NEF (see ER Section 4.5)	Greater impact since continued GDP operation and associated electric generation demand increases impact on ecological resources Scoring: -1	Same or greater impact if concentrating at one location Scoring: -0.5	Significantly greater impact than Alternative Scenario B because of increased electric energy demand to support increased GDP capacity Scoring: -1.5
Air Quality	Minimal for NEF; less than regulatory limits (see ER Section 4.6)	Greater impact since continued GDP operation and associated electric generation demand increases impact on air quality Scoring: -1	Greater impact in short term because of continued GDP operation and associated electric generation demand; same or greater impact in long term due more production at one location Scoring: -1 or -0.5	Significantly greater impact than Alternative Scenario B because of increased electric energy needs to support increased GDP capacity Scoring: -1.5
Noise	Minimal for NEF; within HUD and EPA limits (see ER Section 4.7)	Greater impact due to operation of electric generation to support GDP Scoring: -1	Greater impact in short term due to operation of electric generation to support GDP and concentration in one location; same or greater impact in long term due to concentration in one location Scoring: -1 or -.5	Significantly greater than Alternative Scenario B because of increased electric energy demand to support increased GDP capacity Scoring: -1.5
Historic and Cultural	Minimal for NEF; impacts can be avoided or mitigated (see ER Section 4.8)	Same or less impact Scoring: +0.5	Same or less impact Scoring: +0.5	Less impact since no new facility is constructed Scoring: +1

		Alternative Scenarios[1,3]		
Environmental Category	**Proposed Action[2]**	**B No NEF, USEC Deploys Centrifuge Plant and Continues to Operate Paducah GDP**	**C No NEF, USEC Deploys Centrifuge Plant and Increases Centrifuge Plant Capability**	**D No NEF, USEC Does Not Deploy Centrifuge Plant and Operates Paducah GDP at Increased Capacity**
Visual/Scenic	Minimal for NEF; no visual impacts out of character with existing site (see ER Section 4.9)	Less impact since only one of two GCPs are built Scoring: +1	Same or less impact Scoring: +0.5	Less impact since no new facility is constructed Scoring: +1
Socioeconomic	Positive impact to economy due to NEF (see ER Section 4.10)	Less impact positive impact since only building one versus two plants Scoring: -1	Same or less positive impact Scoring: -0.5	Less positive impact since not building two new plants Scoring: -1
Environmental Justice	No disproportionate impact for NEF (see ER Section 4.11)	Same impact Scoring: 0	Same impact Scoring: 0	Same impact Scoring: 0
Public and Occupational Exposure	Minimal for NEF; doses below NRC and EPA regulatory limits (see ER Section 4.12)	Greater impact due to more effluents and operational exposure at GDP Scoring: -1	Greater impact in short term due to more effluents and operational exposure at GDP; same or greater impact in long term Scoring: -1 or -.5	Even greater impact than Alternative Scenario B because of increased GDP capacity Scoring: -1.5
Waste Management	Minimal for NEF; reduced waste streams due to new and highly efficient technology (see ER Section 4.13)	Greater impact because GDP waste stream larger Scoring: -1	Greater impact in short term because GDP waste stream larger; same in long term Scoring: -1 or 0	Even greater impact than Alternative Scenario B because of increased GDP capacity Scoring: -1.5

[1]If impact was unknown, the impact was conservatively assumed to be the same or less than proposed option.

[2]Proposed action assumes both LES and USEC deploy centrifuge plants and GDP is shutdown when USEC centrifuge plant comes on line. The proposed action receives a neutral score of zero (i.e., baseline impact on the environment).

[3]Scoring Methodology (all Alternative Scenarios compared against Proposed Action). Positive score means less impacts on the environment than proposed action. Negative score means greater impacts on the environment than proposed action.

Less +1
Same or less +0.5
Same 0
Same or less positive -0.5
Same or greater -0.5
Less positive -1
Greater -1
Significantly greater -1.5