EDDY LEA
Energy Alliance, LLC.

April 28, 2007

Debbie Swichkow
NE-5
Forrestal Building
U.S. Department of Energy
1000 Independence Avenue
Washington, DC 20585

Reference: Final Detailed Siting Report
Eddy-Lea Siting Study
Grant No.: DE-FG07-07ID14799

Dear Ms. Swichkow

On behalf of the Eddy Lea Energy Alliance, LLC, (ELEA) it is my pleasure to provide you with our Final Detailed Siting Report and Final Communications Report prepared under DOE Contract DE-FG07-07ID14799. The attached reports represent the culmination of work performed over the last 90-days. The documents are being provided to you in hard copy, electronically via E-Link and on a CD. The CDs also are being express mailed to the contract office in Idaho. Consistent with your request, we have not e-mailed the documents due to their size.

ELEA has worked with its corporate partners, AREVA, and Washington Group International to determine the feasibility of siting the Global Nuclear Energy Partnership proposed Consolidated Fuel Treatment Center and Advanced Recycling Reactor on a 1,040 acre parcel of private land situated halfway between the cities of Carlsbad and Hobbs. Our research clearly indicates that the site meets and in most cases exceeds all of the criteria that DOE elaborated in the grant request. Moreover, through the public participation meeting process, we have overwhelming support for this project.

The attached materials present our findings. For ease of evaluation, we arranged the contents of the Detailed Siting Report in the DOE NEPA/EIS format. To correlate our report with areas required in the grant, we are including a Crosswalk as an attachment to this letter.

During our mid-term review, DOE asked us to address four topics specifically. These are summarized as follows:

- **Abundance of Water.** This land has access to enormous amounts of groundwater. An existing pipeline that is currently underutilized can deliver up to 6,000 gallons per minute (8,000,000 gallons per day).
- **Expansion Potential.** There is land adjacent to the south of the site that is owned by the Federal Government, Bureau of Land Management. This land could be released to us as it has no dedicated land use except for grazing.

- **Waste Disposal Capacity.** If currently pending licenses are granted, Waste control Specialists in Andrews County Texas (less than 50 miles form the Site) will have 11M cubic yards of low level radioactive mixed waste capacity. In addition, there is 1,338 acres of land permitted for treatment, storage and disposal.
- **Broader Economic Area.** Support for construction of facilities is far reaching with commitments from Trades Organizations as far away as Albuquerque, NM, Lubbock, TX and El Paso, TX to help meet labor craft requirements and to establish in county training programs.

Should you have any questions regarding this submittal, or require any additional information, please do not hesitate to contact me at (505) 393-3085.

Very Truly Yours,

Johnny Cope, Chairman
Eddy Lea Energy Alliance, LLC

Attachment (Crosswalk)

Enclosures (2)

cc
Bob Forrest
Janell Whitlock
Jim Maddox

Grant Item	Objective	Location in Detailed Siting Report
1	**Maps**	
a	Site location: State, county, latitude and longitude Universal Transverse Mercator (UTM) coordinates, township, range, and sections	Appendix 2A and Section 2.1 Appendix 2C
b	A map of the site showing site boundaries area and linear dimensions; exclusion area; existing site structures and facilities; major land uses (with land use classifications consistent with the U.S. Geological Survey (USGS) categories)	Appendix 2A and Section 2.1
c	A map of the proposed construction zone for one or more facilities; current zoning classification; sites for any planned buildings and structures (both temporary and permanent); and transportation routes adjacent to the site (including improved roads).	Map 2 in Appendix 2A and Section 2.1
d	A map of the site vicinity within about a 10-km (6-mi) radius of one or more facilities showing county and local municipality boundaries; place names; residential areas; schools; airports; industrial and commercial facilities; prisons; roads; railroads; major land uses (with land classification consistent with the USGS categories); current zoning classification; utility rights-of-way; rivers; flood plains, other bodies of water; wetlands; trust lands; historic sites; archaeological sites; Native American lands; military reservations; and designated Federal, State, and local parks and natural area. Orient true north at the top of the map.	Maps 3 to 15 in Appendix 2A and Section 2.1. Section 2.7.7 and Part 5 of Appendix 2J
e	A map of the region within an 80-km (50-mi) radius of the site showing major civil divisions; highways; transmission corridors that would serve the project; rivers, flood plains, other bodies of water; Native American lands; military reservations; designated Federal, State, and local parks and natural area; and nonattainment and maintenance areas defined under the Clean Air Act, as amended (Title 42 U.S.C. 7401, et seq.). Orient true north at the top of the map.	Map 16 in Appendix 2A. and Sections 2.1, 2.5.1, 2.7.7 and Part 5 of Appendix 2J
2	**Aquatic/Riparian Communities**	
a	Describe the fish and shellfish community in the source water body. List species and estimates of the numbers of fish and shellfish that is present in the portion of the water body that could be affected by consumptive water use. The distribution and value of commercial and sport fisheries shall be discussed. The locations of important habitats for fish and shell fish (e.g., spawning areas, nursery grounds, feeding areas, wintering area, and migration routes) within the area that could be affected by consumptive water use shall be fully described.	Section 2.6.2.
b	Describe the riparian ecological community in the source water body. For the portion of the water body that could be affected by consumptive water use, describe the associated riparian ecological community types, including (a) their extent and locations, (b) lists of plants and animal species they contain, and (c) estimates of the abundance of those species.	Section 2.4.1.
3	**Water Resources**	
a	Describe all groundwater aquifers potentially impacted by operation of on-site wells, including approximate areal extent, thickness, porosities, and hydraulic conductivities of aquifer strata. The descriptions shall discuss significant uncertainties and inhomogeneities.	Section 2.4.2
b	Describe existing and known future off-site and on-site wells, including average flowrate, peak flowrate, water use, and completion depth.	Section 2.4.2.2
c	Provide maps of steady-state piezometric surfaces estimated with on-site and off-site wells at peak pumpage, average pumpage, and no pumpage. These maps shall indicate the location of all wells and shall annotate each off-site well with the drawdown of the piezometric surface attributable to the on-site wells and with the drawdown of the piezometric surface attributable to the offsite wells. Describe the methods of analysis, including assumptions used.	Section 2.4.2
d	Describe the existing and known future groundwater rights (including Native American tribal groundwater rights).	Not Applicable
e	Describe any wetlands in the vicinity that might be impacted by a lowered water table.	Section 2.5.2
f	Describe potentially affected waters to which discharges from the proposed facilities could be made and describe their classification.	Section 2.4.1
g	Describe any existing environmental contamination with impacts or potential to impact the groundwater quality for the proposed site.	Section 2.4.3 and Section 2.11.4.2
h	If surface water is being proposed the applicant must state and provide proof of an unencumbered right to withdraw water.	Not Applicable
i	Describe any existing environmental contamination with impacts or potential to impact the surface water quality for the proposed site.	Section 2.11.4.2
j	Indicate the volume of surface water and ground water available and provide distance from the water source to the proposed site.	Section 2.4.3 and Section 2.7.4
4	**Terrestrial Habitat**	
4.1	If the GNEP facilities could potentially disturb any plant or wildlife habitat, determine whether any of the plant and animal species is important and describe those plant and animal species or wildlife habitat. Important species are those that either (1) have high public interest or economic value or both or (2) may be critical to	Section 2.6.1

Grant Item	Objective	Location in Detailed Siting Report
	the structure and function of the ecosystem or provide a broader ecological perspective of an area. Important habitats are defined as those that support important species.	
5	**Threatened or Endangered Species**	
a	Listed at 50 CFR 17.11 (Fish and wildlife) or 50 CFR 17.12 (birds)	Section 2.6.3
b	Listed as a threatened or endangered, or other species of concern by the host State	Section 2.6.3
c	Proposed for listing, or are current candidates for listing in the Federal Register	Section 2.6.3
d	Describe threatened or endangered species, or candidate species, and critical habitat that may be found on the site or in the vicinity of the site. This information shall support the determination of whether the facility is likely to adversely affect such species or habitat.	Section 2.6.3
6	**Regional Demography**	
a	Information related to the area's economic base, including construction industry and construction labor force, total regional labor force, unemployment levels, and future economic outlook.	Section 2.7.2 and Part 2 of Appendix 2J
b	Housing information, including the sales and rental markets in the region, number and types of units, turnover and vacancy rate, and trends in additions.	Section 2.7.3 and Part 1 of Appendix 2J
c	Information about the local educational system (regional primary and secondary schools and higher institutions), including present and projected capacity and percentage of utilization.	Section 2.7.4.5 and Part 1 of Appendix 2J
d	Public and private recreational facilities and opportunities, including resent and projected capacity and percentage of utilization	Section 2.7.4.7 and Part 3 of Appendix 2J
e	Regional tax structure and distribution of the present revenues to each jurisdiction and district.	Section 2.7.3 and Part 4 of Appendix 2J
f	Local plans concerning land use and zoning that are relevant to population growth, housing, and changes in land use patterns.	Section 2.7, Section 2.1.2
g	Social services and public facilities present and projected.	Section 2.7.4 and Part 3 of Appendix 2J
h	Define the present population density, including weighted transient population, averaged over any radial distance up to 32 km (20 miles) and up to 80 km (50 miles) of the proposed site (cumulative population at a distance divided by the area at that distance).	Section 2.7.1 and Section 2.7.6 (Environmental Justice) and Part 1 of Appendix 2J
i	Distance from proposed site to nearest population centers: 1) at least 20,000 people; 2) at least 50,000; and 3) at least 100,000.	Section 2.7.1 and Section 2.7.6 and Part 1 of Appendix 2J Section 2.1 and Map 16 in Appendix 2A
7	**Historic and Cultural Resources**	
	Identify any onsite or offsite historical, archaeological, and cultural properties that could be affected by the proposed facilities. On a copy of the site map prepared above, identify areas of potential effects if historical, archaeological, or cultural properties were found. All on-site historical, archaeological, and cultural properties and any off-site historic, archaeological, and cultural properties located in or near the facilities shall be identified and described in the text.	Section 2.7.8 and Appendix 2D
8	**Future Projects needs**	
	Describe and identify any known and reasonably foreseeable Federal and non-Federal projects and other actions in the vicinity of the site that may contribute to the cumulative environmental impacts of the proposed GNEP facilities.	Section 2.1.2.6
9	**Geology/Seismology**	
	Describe proposed site locations, including geologic and seismic characteristics, surface faulting, ground motion (including peak ground acceleration and a chance of exceeding this peak), and foundation conditions. Describe the seismic zone and capable faults, as defined in 10 CFR 100, within 200 miles of proposed site location.	Section 2.3 and Appendices 2E and 2F
10	**Weather/Climatology**	
a	Temperatures: average, monthly and annual, extremes.	Section 2.2.1
b	Precipitation: average annual and monthly as well as maximum and minimum recorded annual and monthly.	Section 2.2.1
c	Wind speeds: average annual, highest annual.	Section 2.2.1
d	Hurricane: annual probability, maximum wind speed, tangential velocity, translational velocity, external pressure drop, and site designation, if any, by the U.S. Land Falling Hurricane Probability Project.	Section 2.2.1
e	Tornado: annual probability, maximum wind speed, tangential velocity, translational velocity, external pressure drop, and the number and intensity of tornados classified as F2 or higher that have occurred within 1,000 square miles of the proposed site over the last 5 years.	Section 2.2.1

EDDY LEA
Energy Alliance, LLC.

Grant Item	Objective	Location in Detailed Siting Report
f	Identify positions of air quality nonattainment and maintenance areas for the National Ambient Air Quality Standards (NAAQS) relative to the proposed site and probable areas where workers will reside. Note the likely commuter routes for the workers. If there are no nonattainment and maintenance areas within 80 km (50 mi) of the proposed site and residential locations of workers, this shall be explained and no further analysis is required.	Section 2.2.2
fi	Identify the pollutant or pollutants for which the area is in nonattainment or maintenance, as well as the severity of nonattainment.	Section 2.2.2
fii	Determine the meteorological conditions typically associated with poor air quality with regional climatology.	Section 2.2.2
11	**Hydrology/Flooding**	
	Describe the maximum probable flood, the flood source(s), and any current or planned activities that could reasonably be expected to affect the maximum probable flood.	Section 2.5.1
12	**Regulatory and Permitting**	
	Identify local, regional, state and national regulatory and environmental permits required for this facility, including legislative or regulatory prohibitions that might prevent siting such a facility.	Section 2.10
13	**Construction Costs**	
	Relative cost to heavy construction projects in the area, as compared to the RSMeans U.S. 30-city average.	Section 2.1.2.3
14	**Storage Capability**	
	Identify the sites storage capability for the volume of nuclear materials associated with commercial scale operations.	Section 2.1 Section 2.1.6.4
15	**Other Facilities**	
	Potential hazardous facilities and activities within 5 miles of a proposed site, and major airports within 10 miles of a proposed site should be identified	Section 2.1.2.3
16	**Cleanup/Remediation**	
a	Indicate whether or not the proposed site or any portion thereof, is on the National Priorities List. The National Priorities List can be found at http://www.epa.gov/superfund/sites/npl/npl.htm.	Section 2.11 and Appendices G, H and I
b	Indicate whether or not the proposed site or any portion thereof, r is included in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database. The CERCLIS can be found at http://www.epa.gov/enviro/html/cerclis/cerclis_query.html.	Section 2.11 and Appendices G, H and I

Table of Contents

Table of Contents (continued)

Section **Title** **Page**

List of Figures

List of Figures (continued)

List of Tables

List of Tables (continued)

List of Acronyms

AADT	Annual Average Daily Traffic
ACHP	Advisory Council on Historian Preservation
AMSL	Above Mean Sea Level
ARAP	Aquatic Resource Alteration Permits
ARR	Advanced Recycling Reactor
AQB	Air Quality Bureau
BLM	U.S. Bureau of Land Management
BNSF	Burlington Northern Santa Fe Railroad
CAA	Clean Air Act
CEMRC	Carlsbad Environmental Monitoring and Research Center
CERCLIS	Compensation and Liability Information Systems
CERLA	Comprehensive Environmental Response, Compensations, and Liability Act
CFTC	Consolidated Fuel Treatment Center
CGP	Construction Stormwater General Permit
CWA	Clean Water Act
DOC	U.S. Department of Commerce
DOE	Department of Energy
DOI	U.S. Department of Interior
DOT	United States Department of Transportation
DSR	Detailed Siting Report
DWR	Drinking Water Regulations
EIS	Environmental Impact Statement
ELEA	Eddy Lea Energy Alliance, LLC
EMS	Emergency Medical Services
EPA	U.S. Environmental Protection Agency
EPD	Engineered Products Department
EPM	Earthquake Probability Map
ESA	Endangered Species Act
ESA	Phase I Environmental Site Assessment
FAA	U.S. Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FWS	U.S. Fish and Wildlife Service
GNEP	Global Nuclear Energy Partnership
HELP	Home Education Livelihood Program
HPWD	High Plains Underground Water Conservation District
HVAC	Heating, Ventilation, and Air Conditioning
IAEA	International Atomic Energy Agency
IBC	International Building Code
ISA	Integrated Safety Analysis
LDBC	Lie Down and Be Counted
LES	Louisiana Energy Services
LLRW	Low-Level Radioactive Waste
LWR	Light Water Reactor
MBL	Mobile Bioassay Laboratory
MOU	Memorandum of Understanding
MSGR	Multiple-Section General Permit
NAAQS	National Ambient Air Quality Standards
NEF	National Enrichment Facility

Acronyms (continued)

NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NMAC	New Mexico Administrative Code
NMDGF	New Mexico Department of Game and Fish
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
NMED/AQB	New Mexico Environment Department/Air Quality Bureau
NMED/DWB	New Mexico Environment Department/Drinking Water Bureau
NMED/EDH/FP	New Mexico Environment Department/Environmental Health Division/Food Program
NMED/EHD/LWP	New Mexico Environment Department/Environmental Health Division/Liquid Waste Program (Septic Systems)
NMED/EIB	New Mexico Environment Department/Environmental Improvement Board
NMED/EMNRD	New Mexico Energy, Minerals and Natural Resources Department
NMED/HWB	New Mexico Environment Department/Hazardous Waste Bureau
NMED/RCB	New Mexico Environment Department/Radiological Control Bureau
NMED/WQB	New Mexico Environment Department/ Water Quality Bureau
NMIMT	New Mexico Institute of Mining and Technology
NMPM	New Mexico Principal Meridian
NMRL/CID	New Mexico Regulation and Licensing/Construction Industries Division
NMRPR	New Mexico Radiation Protection Regulations
NMSA	New Mexico Statutes Annotated
NMSE	New Mexico Office of the State Engineer
NMSHPO	New Mexico State Historic Preservation Office
NMSLO	New Mexico State Land Office
NMSU	New Mexico State University
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPR	No Permit Required
NR	National Register of Historic Places
NRC	Nuclear Regulatory Commission
NSR	New Source Review
NWS	National Weather Service
OCD	New Mexico Oil Conservation Division
OCP	Organochlorine Pesticides
OSE	New Mexico Office of the State Engineer
OSHA	Occupational Safety and Health Administration
PAH	Polyaromatic Hydrocarbons
PCB	Polycholorinated Biphenyl
PCI	Pollution Control Inc.
PEIS	Programmatic Environmental Impact Statement
PGA	Peak Horizontal Ground Acceleration
PSHA	Probabilistic Seismic Hazard Assessment
QRA	Quivira Research Associates
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
ROW	Right-Of-Ways

Acronyms (continued)

RSVP	Retired Senior and Volunteer Program
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
Site	Eddy Lea Energy Alliance Global Nuclear Energy Partnership site
SNL	Sandia National Laboratories Carlsbad Operations
SNMCAC	Southeast New Mexico Community Action Corporation
SSA	Soccorro Seismic Anomaly
SSRD	Site Selection Reference Data
SVOC	Semivolatile Organic Compounds
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TIC	Total Inorganic Carbon
TKN	Total Kjedahl Nitrogen
TN	Total Nitrogen
TNMR	Texas New Mexico Railroad
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substance Control Act
TSS	Total Suspended Solids
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Services
USGS	U.S. Geological Survey
USNRCS	U.S. National Resources Conservation Service
VOC	Volatile Organic Compounds
WCS	Waste Control Specialists
WIPP	Waste Isolation Pilot Plant
WQCC	New Mexico Water Quality Control Commission
WUSRCC	Western United States Regional Climate Center

Appendices

1A	Report of ELEA GNEP Public Participation Meetings
1B	Data Quality and Authenticity; Site Selection Reference Data Forms
2A	Maps
2B	Ecologic Component for EDDY LEA Energy Alliance Project
2C	ELEA GNEP Screening Criteria and Process
2D	Cultural Resources in the Eddy-Lea Energy Alliance Project Area, Lea County, New Mexico for Gordon Environmental
2E	NEIC Earthquake Search Results
2F	Report on Evaporiate Stability in the Vicinity of the Proposed GNEP Site, Lea County, NM
2G	Phase I Environmental Site Assessment of the Site for the ELEA
2H	Site Soil Data
2I	Laboratory Analytical Results, Eddy Lea Energy Alliance, LLC GNEP Site
2J	Social and Demographic Information

Executive Summary

The Eddy-Lea Energy Alliance (ELEA), AREVA, and WGI are working together to determine the feasibility of siting GNEP's proposed Consolidated Fuel Treatment Center (CFTC) and Advanced Recycling Reactor (ARR) on a parcel of land situated halfway between the cities of Carlsbad and Hobbs. The research we have conducted clearly indicates that the site meets and in most cases exceeds all of the criteria that DOE elaborated in the initial grant request. Moreover, through the public participation meeting process, we have overwhelming support for this project. Occasionally you find the perfect combination of site suitability and public support. That's what the ELEA site offers to DOE.

In the grant contract, DOE requested an Executive Summary that provides information in three major areas. To be fully compliant with requirements, we have structured this section as follows:

- How the research adds to the understanding of the area investigated
- Technical effectiveness and economic feasibility of methods or techniques
- How the project is of benefit to the public

In addition to these requirements, the DOE requested that we provide a comparison of actual accomplishments with goals and objectives of the project. That is also contained in the next few pages. Figure 1 depicts the factors that make the ELEA site an ideal choice for siting GNEP facilities.

Figure 1. Factors Making the ELEA Site the Ideal Choice for Siting GNEP Facilities

Availability of Water. This land has access to an abundant supply of groundwater.

Public Support. Based on the public participation meetings and other facilities sited in this area, there is overwhelming public support for GNEP.

Existing Nuclear Infrastructure. Through WIPP and the LES facility, there is a growing nuclear infrastructure in this area with directly transferable skills to build and operate GNEP-type facilities.

Expansion Potential. There is land adjacent to the south of the site that is owned by the Federal Government, Bureau of Land Management. This land could be released to us as it has no dedicated land use except for grazing.

Waste Disposal Capacity. WCS has 11M cubic yards of mixed LLRW capacity. In addition, there is 1338 acres of land permitted for treatment, storage and disposal , which sits within an additional 14,500 acres. Most likely, CFTC and ARR facilities can use this site for storage and disposal.

How the Research Adds to the Understanding of the Area Investigated

Prior to investigating the Site, the research team knew that the Site met specific criteria offered in a DOE Siting Study Grant. Figure 2 provides a synopsis of how our research provides a solid understanding of the requirements stated in the grant. As shown, we meet and/or exceed the geologic, regulatory, and land use requirements stated in the Grant, providing DOE with land that is ideally suited to site the CFTC and ARR facilities. Additionally, of importance is that there is land immediately adjacent to the south of the site that is owned by the Federal Government, Bureau of Land Management (BLM). This land could be released to ELEA through the land exchange process as it has no dedicated use in a 1-3 year timeframe. ELEA Project Manager, Mark Turnbough also managed a project for the Sand Point Landfill, which was permitted for Carlsbad and Eddy County. BLM land was acquired for that facility in about 12 months using this process.

Figure 2. Our Site Meets Grant Requirements.

Grant Ref. Number	Description	How We Meet Objective
1	Site Data	The Site is available for use to host the two GNEP facilities with adequate land. No other claims on the land are present that would make the area unavailable for construction of the facilities.
2	Aquatic and Riparian Ecological Communities	There are no aquatic and riparian communities that would be adversely impacted by siting the facilities.
3	Water Resources	There are no surface water resources or groundwater that would be adversely impacted by the project.
4	Critical and Important Terrestrial Habitats	There are no critical and important habitats that could be adversely impacted at the Site.
5	Threatened, Endangered, Special Concern Species	There are no threatened, endangered or special concern species that could be adversely impacted at the Site.
6	Regional Demography	The demographic information indicates that there are well developed social and physical infrastructures in the region that can accomodate the construction and operation of the GNEP facilities and there is little likelihood of disparate (Environmental Justice) impacts due to the GNEP facilities.
7	Historical, Archaeological and Cultural Resources	There are likely no unique historic and cultural resources at the Site that could be adversely impacted by the construction of the facilities.
8	Future Projects	Withdrawal of the land would not unduly impact other uses of the land and could provide a benefit to the land. There are no known foreseeable federal and non-federal projects and other actions in the vicinity of the site that may contribute to the cumulative environmental impacts of the proposed GNEP facilities.
9	Geology/Seismology	The geology and seismology are favorable to the siting of these facilities at the Site.
10	Weather/Climatology	The weather and climatology are favorable to the siting of these facilities at the Site.
11	Hydrology/Flooding	The site is not located in a 100 or 500 year flood plain.
12	Regulatory and Permitting	There are no known concerns that would prevent the federal, state, and local regulatory and permitting requirements from being fulfilled for the construction of the GNEP facilities at the Site. Other facilities and uses can be accommodated while using the Site for construction of the GNEP facilities.
13	Construction Costs	Construction costs in this area are reasonable for the CFTC and ARR facilities.
14	Storage Capability	There is ample storage capability at the site; as well, we have access to the WCS, which has significant land available for storage.
15	Other Facilities	There are no other hazardous facilities and activities within 5 miles of proposed site. No major airports are within 10 miles of proposed site.
16	NPL/CERCLIS	There are no listings of the Site on the National Priorities List or on the Federal Comprehensive Environmental Response, Compensation and Liability Information System.

Technical Effectiveness and Economic Feasibility of Methods or Techniques Investigated/Demonstrated

Also of import is the area itself. The corridor of innovative and existing facilities that would enhance the location of GNEP at the ELEA site builds on the nuclear expertise that currently exists in the Permian Basin throughout Central and South East New Mexico, as well as West Texas. This corridor extends from WIPP in Carlsbad and The Carlsbad Environmental Mnitoring Research Center (CEMRC) to the LES uranium enrichment facility in Eunice, New Mexico, and the site of Waste Control Specialists (WCS) Andrews County, Texas: a disposal site for low-level radioactive waste that will accommodate the depleted uranium waste from LES.

In addition, there is a significant amount of academic support in Central and South Eastern New Mexico, as well as West Texas. The New Mexico State Legislature appropriated funds to begin a nuclear research facility in Hobbs, (staffed by New Mexico Institute of Mining), and the University of Texas is planning to construct a research reactor in Andrews County. Work on the research reactor is in concert with Sandia and Los Alamos National Laboratories.

The ELEA team was able to rely extensively on a body of well-developed public documentation for the characterization of the Site. This information included documents from the Department of Energy Waste Isolation Pilot Plant, the Department of Interior Bureau of Land Management, the US Fish and Wildlife Service and published documents from other recognized experts.

Because of the availability of such information the team was able to substantially focus its field reconnaissance to verifying the information that was in many cases already available. Thus confirmatory sampling plans were developed for field verification, resulting in a cost-effective approach to the project.

Accomplishments versus Goals and Objectives of the Grant

Met/Exceeded Grant Criteria. ELEA has met or exceeded all of the criteria identified in the study as important to DOE.

Positive Public Support. We conducted four public participation meetings in the potentially affected areas and received only positive comments.

Positive Stakeholder Support. We have received stakeholder support from a variety of sources including Senator Pete Domenici as well as state and federal legislators from the region. Support from officials like the Senator is critical for DOE to move forward in the siting process for both CFTC and ARR facilities.

Project benefits to the public

The benefits to the public based on this Detailed Siting Study is that the DOE will be able to move forward with the preparation of its Programmatic Environmental Impact Statements and understand in context the project environmental impacts to the Site, if chosen, for development of the CFTC and the ARR.

During the course of the 90-days, we held public meetings in four locations: Hobbs, Lovington, Las Cruces and Carlsbad. ELEA Project Manager Mark Turnbough led the meetings, where he presented program and site specific aspects of GNEP, addressed stakeholder questions, and actively solicited public opinion regarding the overall program.

In each of these meetings the proposed construction of the GNEP facilities received resounding support from the public. Adequate characterization of the Site facilitates public confidence that siting the GNEP facilities at the ELEA Site would be a sound alternative for the DOE's consideration.

1.0 Background

1.0 Background

The detailed siting report prepared by the ELEA Team meets all requirements set forth in the contract, providing an ideal location to site the Consolidated Fuel Treatment Center and Advanced Recycling Reactor. Resounding public support and abundance of water make the site even more attractive to siting the facilities in this area.

1.1 Purpose of this Document

The Eddy Lea Energy Alliance, LLC (ELEA) prepared this Detailed Siting Report (DSR) in response to a grant issued by the United States (U.S.) Department of Energy (DOE) (Grant DE-FG07-07ID14799). The objective of the grant is to obtain a DSR that provides site information to determine suitability for hosting the proposed GNEP facilities; the Consolidated Fuel Treatment Center (CFTC) and Advanced Recycling Reactor (ARR) at the ELEA Global Nuclear Energy Partnership (GNEP) site (Site). The location of the Site is in Lea County, New Mexico, halfway between the cities of Carlsbad and Hobbs (Figure 1.1-1).

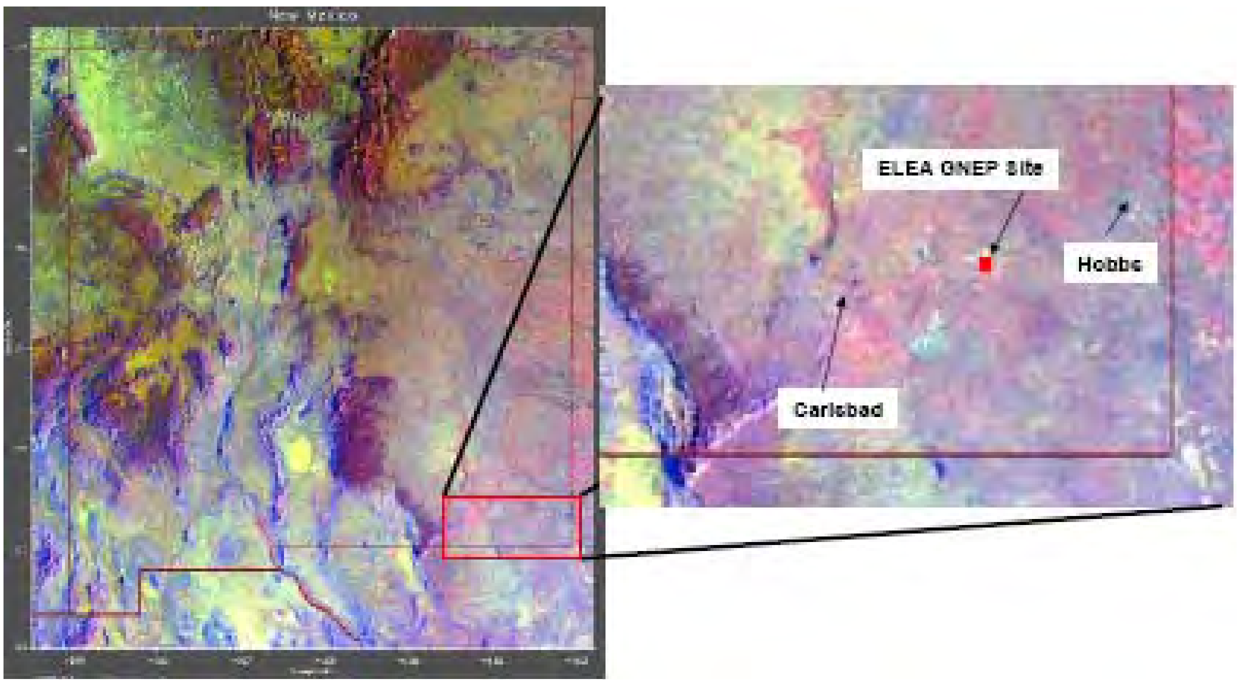


Figure 1.1-1 Location of the Site Superimposed on a New Mexico Landform Map (Sterner, 1995) ©Applied Physics Laboratory, Used with Permission

This DSR provides baseline information that will allow the DOE to assess the potential environmental impacts of the proposed action to construct the CFTC and ARR at the Site. The DOE has indicated its intent to prepare a Programmatic Environmental Impact Statement (PEIS) in the near future that evaluates the environmental impacts. This DSR provides input to the PEIS.

1.2 Proposed Action Covered by the Detailed Siting Report

The proposed action that is being considered for the Site is the construction, operation, and decommissioning of two facilities that are vital components of the DOE's GNEP initiative. The CFTC would include a series of processes that recover the energy-producing elements of uranium and transuranics from used nuclear fuel. The process separates waste products that can be packaged for disposal and recovers the remaining material to make reactor fuel for commercial use. Recycling of used fuel recovers unused energy and reduces demand for fresh uranium. The ARR would involve "fast reactors" that can destroy transuranics. Recycling in advanced recycling reactors would address technical issues in licensing a nuclear waste repository by reducing the heat generation, radio-toxicity, and volume of waste materials. Figure 1.2-2 depicts a "closed" fuel cycle as envisioned by the GNEP initiative.

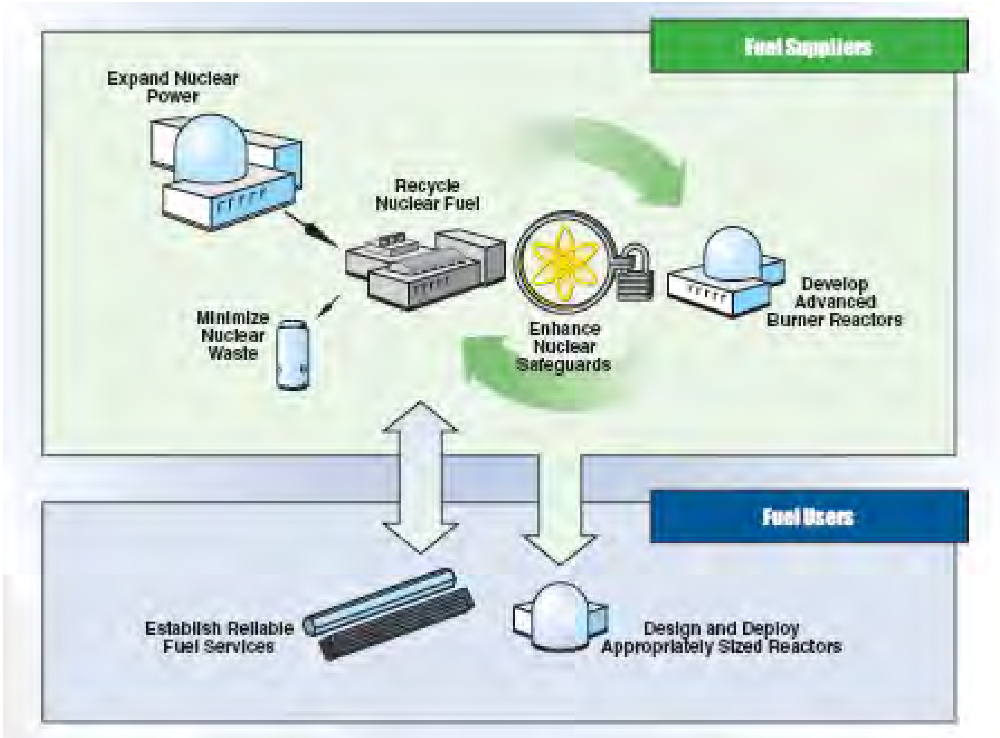


Figure 1.2.-2 Diagram Depicting the GNEP Vision of a Closed Fuel Cycle

1.3 The Need for the GNEP Initiative

As part of the Advanced Energy Initiative, the GNEP seeks to develop worldwide cooperation on enabling expanded use of economical, nuclear energy to meet growing electricity demand. This requires a nuclear fuel cycle that:

- Enhances energy security
- Reduces proliferation risk
- Reduces the production of carbon emissions and greenhouse gases

It would achieve its goal by having nations with secure, advanced nuclear capabilities provide fuel services – fresh fuel and recovery of used fuel – to other nations who agree to employ nuclear energy for power generation purposes only. The closed fuel cycle model envisioned by this partnership requires development and deployment of technologies that enable recycling and consumption of transuranics, as well as a significant reduction in the volume of long-lived radioactive waste.

GNEP will implement the critical technologies needed to change the way used nuclear fuel is managed – to build recycling technologies that enhance energy security in a safe and environmentally responsible manner. Some of the benefits envisioned as the result of the GNEP initiative include:

- Providing abundant energy without generating carbon emissions or greenhouse gases
- Recycling used nuclear fuel to minimize waste and reduce proliferation concerns
- Safely and securely allowing developing nations to deploy nuclear power to meet energy needs
- Maximizing energy recovery from still-valuable used nuclear fuel
- Reducing the number of required U.S. geologic high-level waste repositories to only one for the remainder of this century

1.4 Scope of the Detailed Siting Report

To fulfill its responsibilities under the grant, the ELEA has prepared this DSR to provide information that will enable DOE to determine that the Site is suitable for the construction and operation of the CFTC and the ARR. The information in this DSR represents the best and most current information regarding the Site. Existing information is extensive as the result of site investigations conducted for the Waste Isolation Pilot Plant (WIPP) and the National Enrichment Facility (NEF). The ELEA relied heavily on these existing data and supplemental site-specific field investigation to confirm what is generally known about the region of interest. Topics covered in this DSR include the following:

- Site location and description including boundaries, dimensions, structures, and land-use
- Verification and validation of Construction Zones
- Compilation of information for a 6-mile radius and a 50-mile radius showing county and local municipality boundaries, place names, residential areas, schools, airports, industrial and commercial facilities, prisons, roads, railroads, major land uses, current zoning classification, utility rights-of-way (ROW), rivers, flood plains, other bodies of water, wetlands, trust lands, historic sites, archaeological sites, Native American lands, military reservations, and designated federal, state, and local parks and natural areas and nonattainment and maintenance areas defined under the Clean Air Act, as amended (Title 42 U.S.C. 7401, et seq.).
- Confirmation of aquatic and riparian communities
- Confirmation of surface water resources
- Confirmation of groundwater resources
- Confirmation of the absence of critical and important habitats
- Verification of endangered and threatened species status
- Collection of demographic information concerning the area's economic base, housing, local educational systems, recreational facilities and opportunities, tax structure, and distribution of the present revenues to each jurisdiction and district, land uses and zoning, social services, and public facilities present and projected, present population density and information to support an analysis of environmental justice and the likelihood of disparate impacts due to the GNEP facilities at the Site
- Information/data on historic and cultural resources
- Information/data on future projects needs
- Description and identification of any known and reasonably foreseeable federal and non-federal projects and other actions in the vicinity of the site that may contribute to the cumulative environmental impacts of the proposed GNEP facilities
- Validation of Site and Regional geology
- Documentation of the Regional Climatology
- Documentation of the Site and Regional Meteorology
- Validation of the flood plain potential
- Identification of federal, state, and local regulatory and permitting requirements
- Verification of other facilities and uses
- Description of visual resources
- Description of noise impacts
- Identification and description of any National Priorities List (NPL) listing
- Identification and description of any Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database items

1.5 Public Participation Activities

The Grant contains requirements for conducting public information meetings during the 90-day grant period. These are intended to inform local stakeholders of the GNEP purposes and to record their comments and concerns. Four meetings were held to assure broad coverage in southeastern New Mexico and West Texas. Notice of Public Participation Meetings were published in local newspapers resulting in both the public, and those personally invited, participating. At all four meetings, the presentations included specific description of the ELEA, who is represented within the ELEA, and presentations from the ELEA corporate partners, Areva, and Washington Group International. The first meeting was held in Lovington, New Mexico on March 21, 2007. Lovington was selected since it is the County Seat of Lea County, has traditionally expressed an interest in nuclear initiatives in Southeast New Mexico, and has an informed populace that could provide meaningful input. Participation included city and county officials, members of the public, and one activist group. None of the statement opposed the GNEP Initiative, although the activists' group offered several insightful questions concerning transportation and site suitability for consideration. The second meeting was held in Hobbs, New Mexico on March 22, 2007. The meeting complemented the PEIS scoping meeting that DOE held earlier in late February and provided the attendees with Site–specific information. Public support was overwhelmingly positive with commitments made by both trade organizations, as well as local colleges and universities to support the GNEP Initiative with training and educational programs. The third meeting was held in Carlsbad, New Mexico on March 28, 2007. As with the Hobbs meeting, the focus was to complement the information provided at the PEIS scoping meetings and to allow further input for citizens. Attendance in Carlsbad was also high and the support was unanimous. Many citizens and civic leaders in Carlsbad reflected on the positive experience on the community from the WIPP and stated they envisioned the same positive outcome from the GNEP program. The final meeting was held in Las Cruces, New Mexico on April 5, 2007. This meeting targeted a smaller audience and focused on colleges and universities in the area. At this meeting, endorsement from a New Mexico State Representative, from several departments of New Mexico State University, and local trade organizations reflected the general acceptance of nuclear energy as the long-term solution to problems created by burning fossil fuels. The outcome of these meetings is the conclusion that Southeast New Mexico and Western Texas are ready to advance the role of nuclear power by hosting critical facilities. The commitment from the citizens and their elected leaders is to support the new projects with infrastructure, a trained labor force, and educated operations staff. Summaries of each of these meetings are attached as Appendix 1A.

1.6 Data Quality and Authenticity

In order to assure the availability of reliable data and information for use in the PEIS process, data used in preparing the DSR is accompanied by a statement validating the data quality and authenticity. References cited in this DSR that were used in the compilation of site information in Chapter 2 have an accompanying Site Selection Reference Data Form (SSRD) in Appendix 1B. References fall into four general categories:

- Documents prepared by an Agency of the federal, state, or Local government. In this case, the information is validated on an SSRD as conforming to the agency's document preparation and publication processes.
- Documents prepared by independent scientists, engineers, or researchers. These are examined on a case-by-case basis by the responsible ELEA team member and a statement of the validity of the information is presented based on the professional judgment of the ELEA team member.
- Documents prepared by National Laboratories, Corporations, Standards Organizations, or other organizations with in-house document preparation and review procedures. In this case, the SSRD relies on the in-house processes for quality control.
- New information developed by the ELEA team. In this case, the methods for quality control are listed on the SSRD.

In addition, the ELEA arranged for independent review of several portions of the DSR by Sandia National Laboratories-Carlsbad Operations (SNL). SNL performed most of the geological and hydrological characterization for the WIPP site and are considered by many to be the experts on the geohydrological aspects of southern Eddy and Lea Counties. Their review covered geology, site stability (karst and seismology), and hydrology.

1.7 Conclusions

The ELEA has offered a 1,040 acre site for the construction of the CFTC and ARR. Summarized in Table 1.7-1. The Site meets or exceeds basic requirements including infrastructure requirements, identified by the DOE as essential in the support of the construction and operation of the GNEP facilities.

- Public support for nuclear activities and the GNEP facilities specifically is excellent.
- Public participation meetings were well attended and comments were overwhelmingly supportive.
- Trade organizations and local colleges and universities made commitments to assure ample skilled labor for the construction and operation of the facilities.
- Local elected officials demonstrated support for the GNEP facilities at the Public Participation Meetings (PPM).
- A major 4-lane, divided federal highway runs within one-half mile of the Site and a rail spur lies three miles to the west.
- Numerous power transmission lines exist within the region assuring plentiful electricity to meet the demands of high-output facilities.
- Proximity to the Ogallala Aquifer and the presence of a 24-inch diameter water line also assures a plentiful supply of water for plant operation. The Ogallala is estimated to contain 14,000,000 acre-feet of recoverable water in the Lea county portion.
- The land is privately owned, which is considered to be an advantage from the stand point of acquisition for construction of the facilities.
- There is federal land adjacent to the Site should expansion of the facility be needed.
- The region is sparsely populated with a few nearby ranches and a transient population associated with oil and gas exploration and production, potash mining, and ranching.
- Two major nuclear facilities lie within 50 miles of the Site. The WIPP is 14 miles to the south and the Waste Control Specialists (WCS) site is 35 miles to the southeast.
- Proximity to WCS provides nearby disposal of hazardous Toxic Substance Control Act (TSCA) waste.
- Highway 62/180 that serves the site is a well established radioactive waste transportation corridor established by the DOE for shipping transuranic mixed waste.
- The nearest population centers are the Village of Loving, 30 miles; Carlsbad, 32 miles; Hobbs, 34 miles.
- The Site and the immediate vicinity contain no significant sources of potable water, either as groundwater or surface water.
- Current land uses consist of grazing and one operating gas well.
- The area soils are sandy and well drained, with a well-developed caliche layer occurring as shallow as 10"-12" below the surface in some areas of the Site.
- The Site is naturally drained and does not lie in a 100- or 500-year flood plain.
- The area contains no perennial streams, and the only bodies of water in or around the Site are ephemeral playas. Playas are barren, flat, generally dry, undrained basins. Laguna Gatuna is an ephemeral playa that parallels the east side of the Site with portions of the Laguna being contained in the Site boundary.
- The Site is sparsely vegetated with little water and limited land uses.
- Biota of this area represent desert grasslands with range grasses, sandsage, and honey mesquite serving as local dominants.
- There are no non-attainment areas in the vicinity and no obstacles to obtaining needed permits and licenses to construct and operate the plants.

Table 1.7-1 Comparison of Site Environmental Characteristics to DOE Siting Criteria

Area Reviewed	Comparison of Site Environment
Aquatic and Riparian Ecological Communities	No aquatic or riparian habitat is situated within the Site. Therefore, there are no licensing or permitting issues associated with these type of ecological communities. See Section 2.6.2 for further details.
Water Resources	No important surface water or groundwater features are located at the Site. See Sections 2.4.1 and 2.4.2 for further details.
Critical and Important Terrestrial (Plant and Animal) Habitats	No important or unique terrestrial habitats are situated within the Site. Therefore, there are no licensing or permitting issues associated with critical and important terrestrial habitats. See Section 2.6.1 for further details.
Threatened or Endangered and Special Concern Species	Based on the information developed and reviewed for this DSR, no threatened or endangered species or their critical habitats were identified within the Site. Therefore, there are no licensing or permitting issues associated with threatened or endangered species. See Section 2.6.3 for further details.
Regional Demography	Based on the demographic information provided in Section 2.7, the local and regional demographics support the suitability of the Site for licensing and permitting purposes.
Historical, Archaeological, and Cultural Resources	Information on historic, archaeological, and cultural resources is provided in Section 2.7.8. Any cultural sites that are eligible for listing on the National Registry of Historic Places will be avoided or data recovery will be performed. These efforts would be coordinated with the New Mexico State Historic Preservation Officer (SHPO).
Future Projects/Cumulative Environmental Impacts	There are no known future projects for the Site vicinity that could add additional impacts to constructing, operating and decommissioning the proposed facilities.
Geology/Seismology	The Site and regional geology and seismology are described in Section 2.3. The information supports the suitability of the Site from both a geologic and seismologic standpoint for the facilities.
Weather/Climatology	Information on the Site climatology and severe weather is presented in Section 2.2. The information supports the suitability of the Site for this type of facility.
Hydrology/Flooding	Information on Site flood potential is presented in Section 2.5.1. The conclusion of the assessment is that the potential for flooding at the Site is extremely minimal.
Cleanup/Remediation	A Phase I Environmental Site Assessment (ESA) of the Site has been performed and is summarized in Section 2.11. The portion of the property used for oil-field brine and oil-field solids (drill cuttings, mud and tank bottoms) disposal is avoided by the proposed facilities construction zone. Any existing oil-industry related contamination would be readily discernable from any facility releases. Therefore, the Site is suitable for the proposed facilities.
Visual Resources	Because of the remote location and the classification of the land, the proposed facilities will not adversely impact the visual resources as discussed in Section 2.1.3.
Noise	The proposed facilities will not be constrained by noise restrictions as disclosed in Section 2.9.
Local Support	Local support for the facility is strong and would not adversely impact licensing and permitting of the Site. Local support is documented in Appendix 1A.

2.0 Existing Environment

2.0 Existing Environment

The ELEA Team has conducted the research required to provide DOE with the proof that we meet and / or exceed all requirements set forth in the initial grant request, including overwhelming public support and an abundance of water. Meeting these objectives is a critical first step to identifying a site for the Consolidated Fuel Treatment Center and the Advanced Recycling Reactor facilities. Moreover, this area has an energy corridor that exists as a result of WIPP, LES, and WCS, giving us the infrastructure required to take on a task of the magnitude of GNEP. Occasionally, there exists the perfect combination of site suitability and public support – that's what the ELEA site offers to DOE.

2.1 Site Description, Land Use, and Aesthetics

The purpose of this section is to describe the physical location and characteristics of the Site and the current land uses. This information is necessary to evaluate land use impacts and to determine if the proposed facilities create land use or infrastructure conflicts. Based on the information collected, the commitment of land to the proposed facilities has negligible impact on land use and is consistent with the purposes designated for the land by the ELEA. Development of facilities will result in the relocation of several pipelines, a telephone cable, and one county road. Relocation can be accomplished with minimal disruption to the users of these facilities.

The information in this section is also necessary to evaluate the availability of infrastructure (power, transportation, water) to support construction and operations. The information available for the Site and reported herein shows that there is a well maintained four-lane highway that serves the Site from both of the nearby major population centers (Carlsbad and Hobbs). This highway has an annual average daily traffic (AADT) (both directions) of 3,286 vehicles (2005 data), (NNMDOT, 2007). An industrial railroad lies 3 miles to the west and a spur would have to be constructed to serve the Site. The railroad currently serves local potash mines by transporting ore to refineries and finished product to markets, refineries, and the agricultural sector. Construction would be across public lands and would be along ROW obtained from the state and federal agencies. Construction of railroads is not inconsistent with agency land use, although additional NEPA analysis would likely be required for ROW on Federal lands. The construction route would be relatively level and would not have to cross major highways. Similarly, a short extension of the Double Eagle water line, requiring a federal ROW would be needed if use of the existing aqueduct proves infeasible. Electric power is available from both the north and south. Power lines and a substation would be needed to serve the Site. The lines would be brought in from the north or the south a distance of one mile to the center of the Site from either direction.

Additionally, the information in this section is needed to evaluate the impacts of the proposed facility on nearby residents and facilities. Land uses in the area are limited to oil and gas exploration and production, oil and gas related services industries, livestock grazing, and limited recreational activity. Information collected regarding the Site shows that the only nearby residents are ranchers that occupy several ranches as close as 1.5 miles away. A larger transient population exists in the form of potash mine workers, oil field workers, employees of an oil field waste treatment facility and an industrial landfill. One restaurant is nearby (3.5 miles) that serves travelers on Highway 62/180. The nearest population center is the village of Loving, New Mexico, 30 miles to the southwest. Impacts from normal operations and the most severe accidents on local populations are expected to be negligible due to the lack of nearby resident population.

This section also presents information regarding aesthetic values in the area. Information collected indicates that the Site is classified by the Bureau of Land Management (BLM) as a Visual Class IV, meaning that level of change allowable to the characteristic landscape can be high, and that these changes may dominate the view and be the major focus of viewer attention. Therefore, the proposed facilities are not expected to have adverse aesthetic impacts.

The Site offered by ELEA and the subject of this DSR is located on a 1,040 acre site described as Section 13, Township 20 South, Range 32 East; and West 1/2 Section 18, Township 20 South, Range 33 east and a 40-acre tract in the southwest corner of Section 17, Township 20 South, Range 33 East. The Site is situated 0.52 miles north of U.S. Highway 62/180. The Site is privately owned under option to ELEA and is bordered by federal and state lands on all sides. Of interest is BLM Section 24 immediately to the south of the Site. If additional area is needed for the GNEP facilities, the BLM has a well established process that would allow the ELEA to acquire additional acreage through purchase or land exchange. Acquiring Section 24 would make another 640 acres available; 400-acres of which are north of U.S. Highway 62/180. Securing additional lands could be useful for the purpose of assuring that ample space is available for storage of waste from the GNEP facilities. The acquisition process takes 24 to 36 months (Lofton, 2007).

The Site was chosen from among six candidate sites within the two county regions. The ELEA developed and used 31 separate screening criteria to determine which site should be offered. The Site described in this DSR best met the 31 criteria. The screening criteria and process are described in Appendix 2C.

During the investigation of this Site, published data required to complete the grant application were identified and validated by a team of subject matter experts and determined to be accurate and appropriate for the purpose. Much of these data were used to support DOE's preparation of an Environmental Impact Statement (EIS) for WIPP, various permit applications for WIPP and the licensing process for the recently NRC-licensed NEF facility near Eunice, New Mexico. Many of the reference documents were compiled by federal or state agencies under programs that assure the accuracy of the data used.

In addition, new studies and investigations were used in preparing this DSR to serve two fundamental purposes:

- The studies validated the regional data as appropriate for the Site
- Investigations of site-specific factors that were not available in a regional database were necessary to complete the site description
- Data collected by the ELEA GNEP team were collected under subcontractor Quality Assurance/Quality Control programs based on Environmental Protection Agency (EPA) guidance, DOE guidance, or established industry standards

2.1.1 Site of the Proposed Facilities

The Site is located in southeastern New Mexico in Lea County, 32 miles east of Carlsbad, New Mexico, and 34 miles west of Hobbs, New Mexico. Both locations are nearby population centers to the Site. Larger population centers are Roswell, New Mexico, 74 miles to the northwest; Odessa, Texas, 92 miles to the southeast; and Midland, Texas, also to the southeast at 103 miles. The nearest international airport is located between Midland and Odessa, Texas 98 miles to the southeast (See Figure 2.1.1-1).

Figure 2.1.1-1 Site Vicinity

2.1.1.1 Boundaries, Dimensions, Structures, and Land-Use

The Site consists of mostly undeveloped land (See Figure 2.1.1.1-1) used for cattle grazing with the only boundary being a four-strand barb wire fence along the south side of the property until it nears Laguna Gatuna where it turns south to the highway (BLM, 2007a).

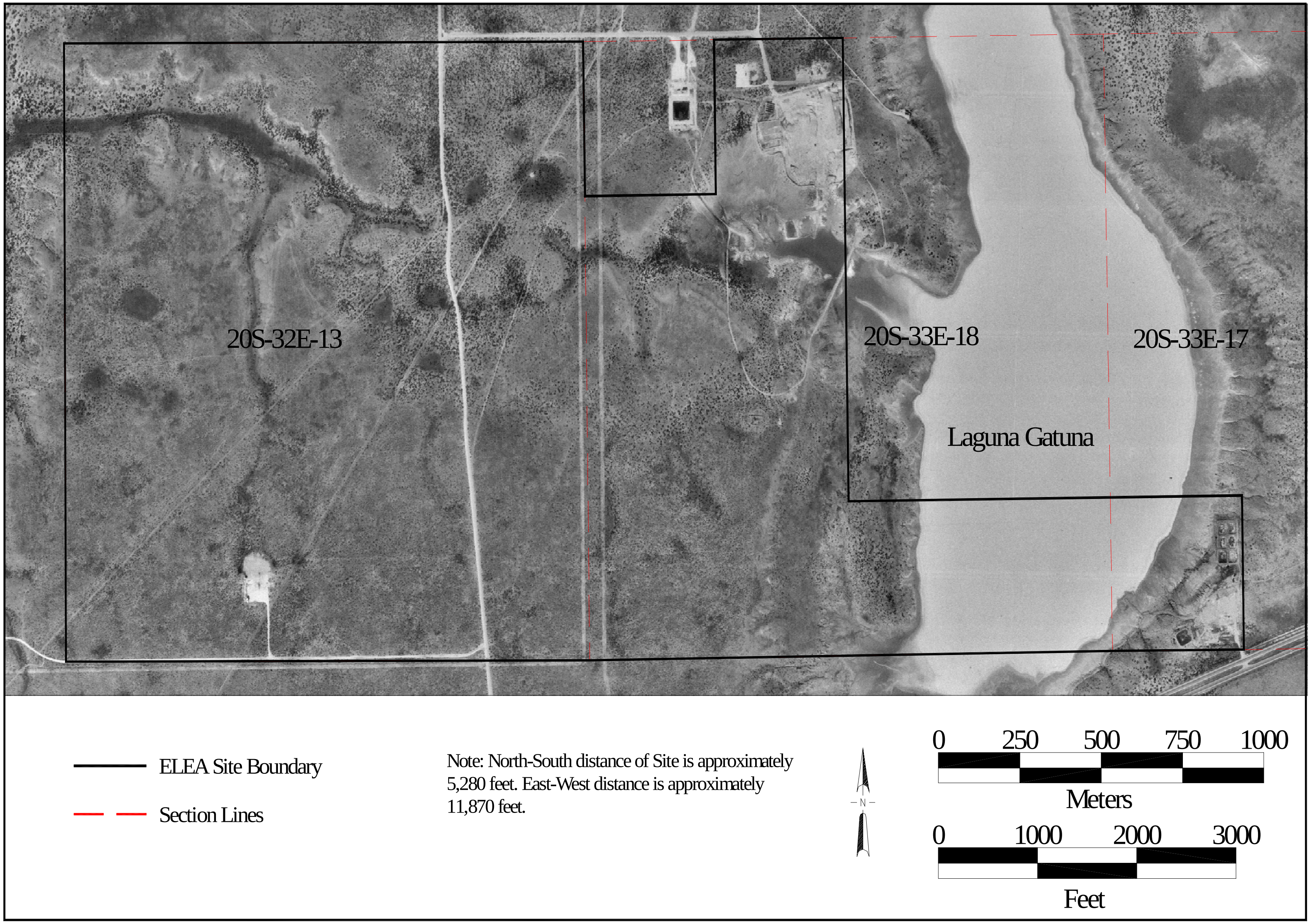


Figure 2.1.1.1-1 ELEA Site Boundary

This fence is the boundary between two grazing allotments administered by the U.S Department of Interior, BLM. The majority of allotments are grazed year-round with some type of rotational grazing.

The Site is comprised of 1,040 acres of patented land spread across three sections of land running west to east. The legal description of the Site is as follows (ELEA, 2006):

- A tract of land located in Section 13, Township 20 South, Range 32 East containing 640 acres, more or less
- The Surface Estate only of Lot 2, 3, and 4; the East Half of the West Half (E 1/2 W 1/2); and the South Half of the Southeast Quarter (S 1/2 SE 1/4), all in Section 18, Township 20 South, Range 33 East, New Mexico Principal Meridian (NMPM)
- The Surface Estate only of a tract of land located in the Southwest Quarter of Section 17, Township 20 South, Range 33 East, N.M.P.M. and more particularly described as beginning at the Southwest corner of said Section 17, thence S89º 59' E, 1322.50 feet; thence N0º 3' W, 1320 feet; thence N89º 59' W, 1322.50 feet; and thence S0º 3' E, 1320 feet to the point of beginning

The following are situated on the Site: (See Appendix 2A: Map 1, ELEA Site roads, Structures, and Utilities)

- A communications tower in the southwest corner of the Site
- A producing gas and distillate well with associated tank battery is located near the communications tower
- A small water drinker (livestock) is located along the aqueduct in the northern half of the property
- Oil recovery facility (abandoned) that still has tanks and associated hardware left in place in the northeast corner
- An oil recovery facility with tanks and associated hardware still in place in the far southeast corner

Surrounding the Site are BLM lands and two small parcels of state land. The surface estate is privately owned (Lea County, 2007), and the subsurface minerals are owned by the state of New Mexico. Mineral rights available for leasing are potash, and oil/gas. Figure 2.1.1.1-2 shows the oil/gas leasing on the Site (NM State Land Office, 2007). Figure 2.1.1.1-3 shows the potash mineral leasing (BLM, 2007b).

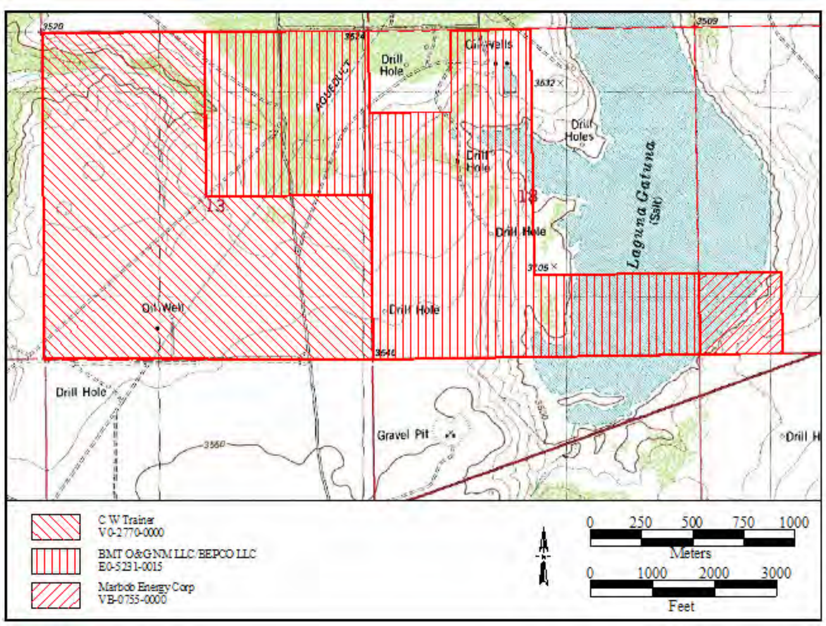


Figure 2.1.1.1-2 Oil/Gas Leases

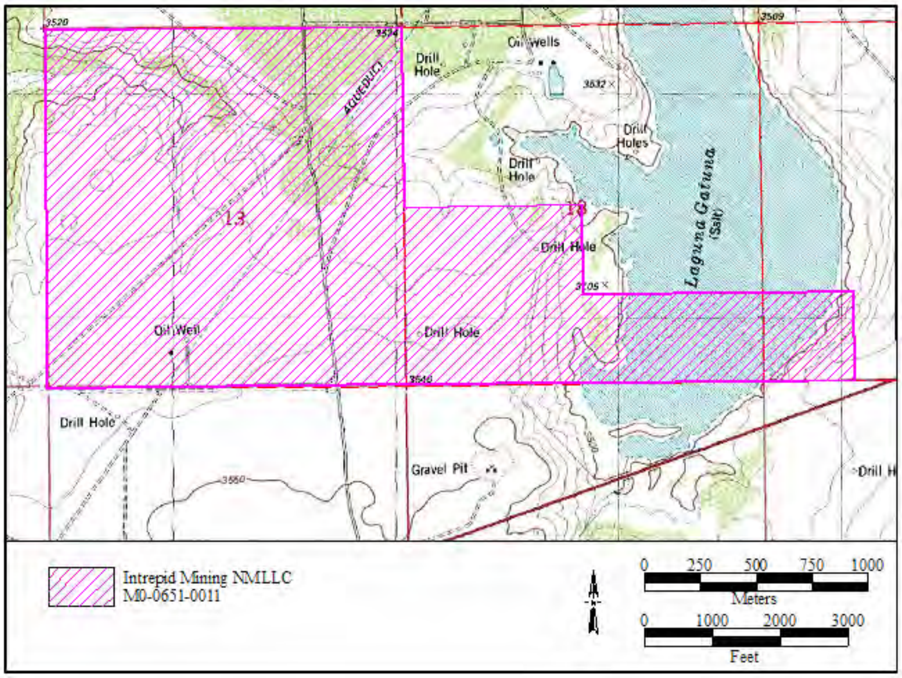


Figure 2.1.1.1-3 Potash Leases

There are several existing ROW in the Site. These existing ROW include pipelines, roads, well pads, power lines, telephone lines, and a communications tower (BLM, 2007d). See Appendix 2A, Map 1 in for the location of the existing right -of-ways.

2.1.1.2 Construction Zones

ELEA has determined that 695 acres is available without significant site preparation to construct the GNEP facilities. Map 2 shows the siting of the construction zone available on the Site. There have been 283 acres set aside for surface water run-off protection areas which includes the portion of the property in the Laguna Gatuna playa. Fifty-four acres have been removed from the construction area for partially reclaimed oil/gas facilities and the one producing gas well (ELEA, 2006). If additional area is needed for the GNEP facilities, the BLM has a well established process that would allow the ELEA to acquire additional acreage through purchase or land exchange. Acquiring Section 24 would make another 640 acres available; 400-acres of which are north of U.S. Highway 62/180. The acquisition process takes 24 to 36 months (Lofton, 2007).

2.1.1.3 Infrastructure

This description of infrastructure includes transportation, water, electric power, waste management facilities, and analytical laboratory services in the vicinity of the Site.

2.1.2 Land Use

2.1.2.1 Six-Mile Radius

Lands within six miles of the Site are privately owned, state lands, or BLM lands (See Appendix 2A: Maps 1-15). Land use within six miles of the Site falls into two categories; livestock grazing and mineral extraction. Map 6 shows all of the BLM grazing allotments in the vicinity. Only one small area is not being leased to grazing (potash tailings dam). There are five ranch headquarters located in the area which are associated with five of the grazing allotments.

Mineral extraction in the area consists of underground potash mining and oil/gas extraction. Both industries support major facilities on the surface, although mining surface facilities are confined to a fairly small area. Intrepid Mining, LLC owns both mines located within 6 miles of the Site. The Intrepid North mine, located to the west, is no longer actively mining potash underground. However, the surface facilities are still being used in the manufacture of potash products. The Intrepid East facility is still mining its underground potash ore (Intrepid Mining Co, 2007). See Appendix 2A, Map 7 details the extent of the mined out areas of the two potash mines. The mining facilities do not impact the Site.

Oil/gas extraction provides most of the activity in the vicinity. See Appendix 2A, Maps 3, 4, 5, and 10 show the infrastructure for the oil/gas industry in the area. Roads are built and maintained to provide access to the various wells. Pipelines are installed to move the product efficiently from one area to the next. Where pipelines are not used access for heavy trucks to haul the oil and produced water is required. Compressor stations are needed to pump the product through the pipelines. Electric power is required at the individual well pads to provide the electricity necessary to operate the pumps, compressors, and other equipment as needed (UT, 1986). There are two major facilities related to oil/gas activity in the area. The Zia Gas Plant is located northwest of the Site, while Controlled Recovery Incorporated is southwest of the Site.

The nearest residents to the Site is located at the Salt Lake Ranch, 1.5 miles north of the Site. There are additional residences at the Bingham Ranch, two miles to the south and at the Controlled Recovery Inc. complex, three miles to the southwest. There is an average population of less than 20 residents among 5 ranches within a 6-mile radius. This is a population density of less than 5 residents per square mile (Hughes, 2007; Sterner, 1995, 2007; USA Photomaps, 2007).

2.1.2.2 Fifty-Mile Radius

Within 50 miles of the Site, except for the communities located in the area, the land use and ownership is essentially the same as within the six mile radius (See Appendix 2A: Map 16). Along with the mining, grazing, and oil/gas activity, agriculture is a major activity. Along the Pecos River agricultural activities are conducted from south of Loving, New Mexico, to north of Roswell, New Mexico. The farm lands in this region are irrigated primarily with water from the Pecos River and supplemented with well water.

To the east of the ELEA Site, agricultural activities occur on the high plains of the Llano Estacado. Irrigation is supported by water wells tapping available aquifers. The irrigation methods and layout of these fields are quite different from those used along the Pecos River. Most of these lands are irrigated with center-pivot sprinkler systems.

Oil/gas activity occurs throughout the area where allowed. Mining is confined to the area east of Carlsbad, New Mexico. Livestock grazing is permitted throughout the region except for the Carlsbad Caverns National Park, which is southwest of the Site.

Regional airports are available in Carlsbad, Hobbs, and Roswell, New Mexico, with services provided by regional air carriers. Small, general aviation airports are available in Artesia, Jal, and Lovington, New Mexico.

There are three state parks and two national facilities in the vicinity and all are located on or near the Pecos River. Living Desert State Park is in Carlsbad. Brantley Lake State Park is northwest of Carlsbad on the Pecos River, and Bottomless Lakes State Park, also on the Pecos River, is east of Roswell (NMEMNRD, 2007). Bitter Lake National Wildlife Refuge is east of Roswell (USGS, 1974) and Carlsbad Caverns National Park is southwest of Carlsbad (USGS, 1976).

The major roads in the area consist of county and state roads interconnecting the various population centers. U.S. Route 285 runs south to north along the Pecos River. U.S. Route 62/180 runs southwest to the northeast through Carlsbad and Hobbs, New Mexico. U.S. Route 82 travels west to east from Artesia through Lovington, New Mexico. U.S. Route 380 traverses west to east from Roswell through Tatum, New Mexico. See Appendix 2A, Map 16 shows the major roads, parks, population centers, and other items of interest within 50 miles of the Site.

2.1.2.3 Other Facilities and Uses of Site

This section describes facilities near the Site and their uses. The section also addresses the relative cost of heavy construction in the area.

Figure 2.1.2.3-1, shows the location of other facilities in relation to the Site. Facilities of interest in the area include major airports within 10 miles of the Site boundary and hazardous facilities (NMED Web portal) within 5 miles of the boundary. There are no major airports within 10 miles of the Site. However, an abandoned landing strip (1,000 feet long) is located five miles west of the Site. There are 12 industrial facilities ("potentially hazardous facilities") located within five miles of the Site boundary. The industrial facilities consist of four compressor stations, a booster station, two gas plants, two potash mines, a major natural gas transmission pipeline, a hydrocarbon remediation landfarm, and an industrial solid waste landfill.

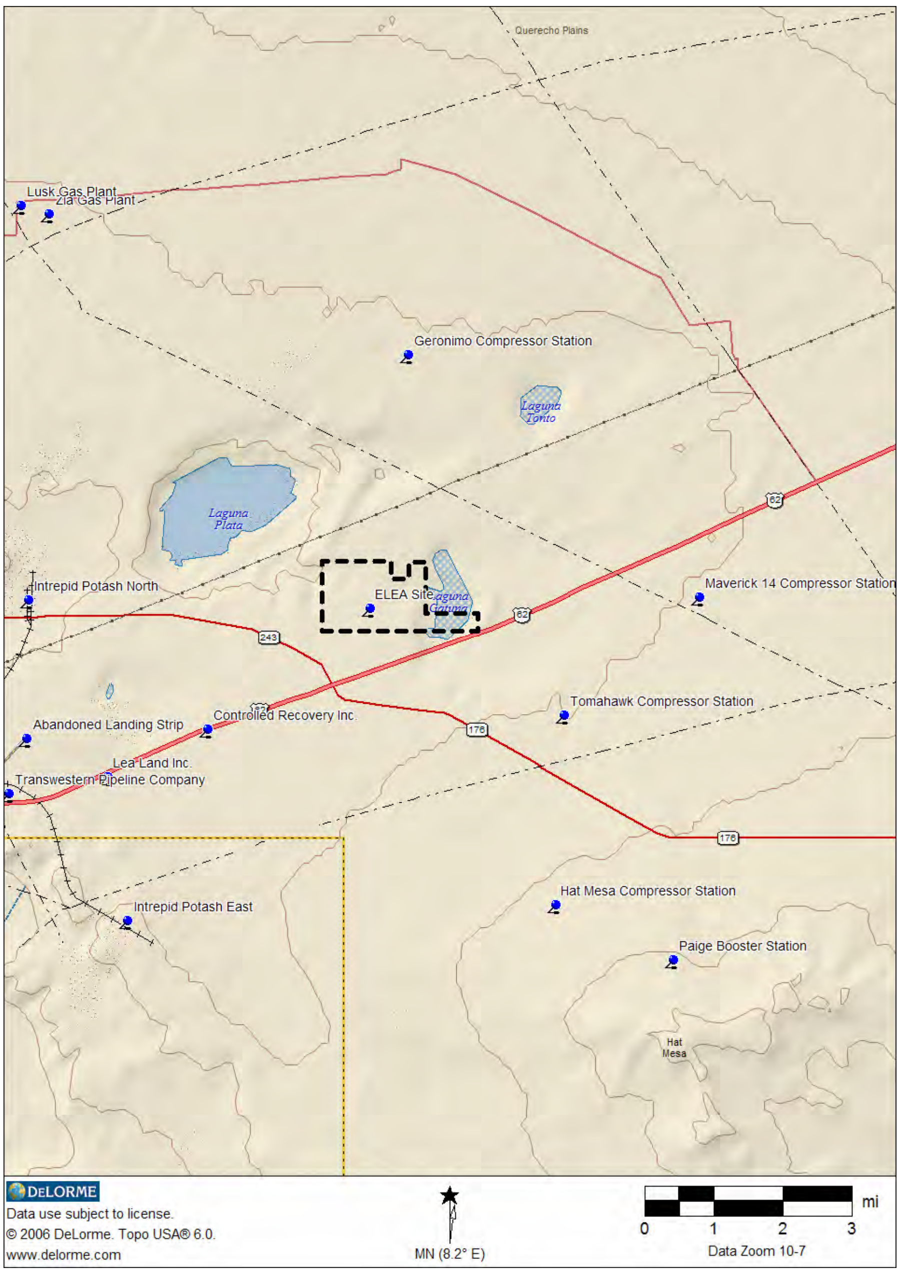


Figure 2.1.2.3-1 Other Facilities near the Site

Facility name and use is outlined in Table 2.1.2.3-1.

Table 2.1.2.3-1 Facility Description and Use

Facility Name	Facility Use
Paige – Hat Mesa Compressor Station	Natural Gas Transmission
Geronimo Compressor Station	Natural Gas Transmission
Tomahawk Compressor Station	Natural Gas Transmission
Maverick 14 Compressor Station	Natural Gas Transmission
Transwestern Pipeline and Compressor Station Yard	Pipeline Transportation of Natural Gas
Hat Mesa Compressor Station	Natural Gas Transmission
Lusk Natural Gas Plant	Natural Gas and Gas Products
Zia Gas Plant	Crude Petroleum and Natural Gas Extraction
Lea Land Incorporated	Non-Hazardous Industrial Solid Waste Landfill
Controlled Recovery Incorporated	Hydrocarbon Remediation Landfarm
Intrepid Potash North Plant	Potash Mining-Mill Facility
Intrepid Potash East Plant	Potash Mining

Heavy Construction Cost

The construction cost of building a facility is generally determined using the *RSMeans U.S. 30-city average*. The average establishes a cost index that is used to estimate construction cost from city to city and region to region. The cities used to establish the cost index are, for the most part, large cities with a plentiful selection of construction contractors and construction materials.

The city cost index must be adjusted when determining construction cost in a rural or remote micropolitan areas, such as Carlsbad and Hobbs. Heavy construction costs in the area are typically 15 to 20 percent higher than the *RSMeans U.S. 30-city average*, (Johns, 2007) applicable in large cities such as Albuquerque, New Mexico or Dallas, Texas. The higher construction costs are the result of fewer local contractors capable of constructing complex facilities and the fact that construction materials are not as readily available as in a large city.

2.1.2.4 Grazing

Rangelands comprise a substantial portion of the Site and provide forage for livestock. The grazing allotments administered by the BLM in the vicinity of the Site are shown on Map 6. Pasture rotation with some of the pastures being rested for at least a portion of the growing season, is standard management practice for grazing allotments. Vegetative monitoring studies to collect data on the utilization of the land, and the amount of precipitation by pasture from each study allotment are conducted annually on federal lands to compare production with consumption. Currently, the BLM permits 9 animal unit months per 640 acres (BLM, 2007). An animal unit month is one cow and one calf for one month. Because the Site is privately held, it does not fall under the BLM range management rules, although the rules apply to adjacent lands that are managed by the same rancher. The entire Site is used for grazing.

2.1.2.5 Oil and Gas and Minerals Activities

The oil and gas industry is well established in the region of the Site, with producing oil and gas fields, support services, and compressor stations. Nearly all phases of oil and gas activities have occurred in the locality. These phases include seismic exploration, exploratory drilling, field development (comprised of production and injection wells) and other sundry activities associated with hydrocarbon extraction. One gas and distillate well is present on the Site along with numerous plugged and abandoned wells. The minerals (including oil and gas) beneath the Site are owned by the state of New Mexico and are leased to production companies for development (See Appendix 2A, Maps 10 and Figure 2.1.2-2). Further oil and gas development is not allowed by the New Mexico Oil Conservation Division (OCD) due to the presence of potash ore beneath the Site. However, development of the GNEP facilities could disrupt oil and gas in the future, although drilling methods would allow access to resources from outside the Site.

Potash minerals are used to produce one of the major ingredients in fertilizers. There are twelve potash ore zones of Permian Age in the Carlsbad Mining District, all in the Salado formation. There were two potash mining and refining operations in the area: Mosaic Potash and Intrepid Mining NM, LLC. Potash has been evaluated at the Site (See Appendix 2A, Map 8). Intrepid has rights to potash beneath the Site as shown in Appendix 2A, Map 9 and Figure 2.1.2-3. Mining has not progressed as far as Site and is not likely to during the construction, operation, and decommissioning of the GNEP facilities (See Appendix 2A, Map 7).

Caliche, as the term is used in the Southwestern United States, refers to a buff, white, or reddish brown calcareous material of secondary accumulation, commonly found in layers on or near the surface of soils in the arid and semiarid regions. “Calcrete,” “duricrust,” and “hardpan” are other terms used to describe caliche in its various forms. Caliche is considered a locally significant construction material due to its compaction properties. Deposits of caliche are frequently used for the construction of well pads, surfacing roads, and as a compacted base-course for buildings and paved roads. Several pits which produce a caliche are located in the vicinity. Access to caliche on federal lands is made achieved by way of Free Use Permits granted by the BLM. No caliche production occurs on the Site.

2.1.2.6 Future Project Needs

There are no known plans for the development of either federal or non-federal facilities in the area that would add to the impacts created by the construction, operation, and decommissioning of the GNEP facilities at the Site. The nearest nuclear facility, the WIPP, is a zero release facility. That is, it has no normal operations or processes that create airborne or waterborne releases of radionuclides. WIPP does release volatile organic compounds and diesel emissions in small quantities under permits issued by the Hazard Waste Bureau and the New Mexico Air Quality Bureau, respectively. An excellent environmental baseline has been established by the WIPP prior to operations and ongoing monitoring will detect releases from non-normal events.

The NEF which is under construction near Eunice, NM, is too distant from the Site (34 miles) to create cumulative impacts.

2.1.3 Aesthetics

The BLM provides a means for determining visual values in their Visual Resource Management (VRM) Manual 8410 (BLM, Undated). This inventory-like system of evaluation consists of three determinations:

- Scenic Quality
- Sensitivity Level Analysis
- Delineation of Distance Zones

Based on these three categories, the BLM places land into one of four visual resource inventory classes. Classes I and II are the most valued, Class III is of moderate value and Class IV is of least value. The Site is determined to be in the range of a Class III-IV location as demonstrated below.

The Site exhibits a very nondescript appearance with open, vacant land. This is common for areas in the Querecho Plains of southeastern New Mexico. Surrounding landscapes are similar in appearance with the exception of man-made structures located at neighboring properties. The only activities currently occurring at the Site are cattle grazing and oil and gas production.

2.1.3.1 Scenic Quality

Scenic quality is a measure of the visual appeal of a tract of land. In the visual resource inventory process, lands are given an A, B, or C rating based upon the apparent scenic quality which is determined using seven factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Evaluators followed the visual resource inventory process and evaluated the Site from key observation points. Based upon this process, the Site received the lowest scenic-quality rating. This rating means that the level of change to the characteristic landscape can be high, and allows for the greatest level of landscape modification.

2.1.3.2 Sensitivity Level Analysis

Sensitivity levels are a measure of public concern for scenic quality. Public lands are assigned high, medium, or low sensitivity levels by analyzing the various indicators of public concern. These types of indicators include type of users, amount of use, public interest, adjacent land use, special areas, and other factors specific to the location.

Since the Site is located in a sparsely populated area more inclined to be used for cattle grazing or oil and gas exploration and production, the sensitivity level analysis for this location was determined to be low.

2.1.3.3 Delineation of Distance Zones

Landscapes are subdivided into three distance zones based on relative visibility from travel routes or observation points. These three zones are foreground-middleground, background, and seldom seen. The Site is not visible from any city, township, borough or identifiable population center. The Site boundary is located one-half mile north of Highway 62/180. Visibility of the Site is confined to east and west traffic on Highway 62/180 and is similar from either direction.

Half of the Site lies within the foreground-middleground due to the Site exhibiting a slight crest in the center of the location. The remaining half of the Site lies in the seldom seen zone on the opposite side of the crest from the highway. Neighboring properties include various oil and gas well locations surrounding the Site, a restaurant one and a half miles to the west of the Site, a hydrocarbon remediation landfarm to the southwest of the Site, and an area potash mine to the west of the Site along with a communication tower.

2.2 Climate and Air Quality

2.2 Climate and Air Quality

This section presents information on the climate, weather, and air quality at the Site. This information is needed in order to develop air dispersion models for evaluating the impacts of normal operations and potential accidents on human health and the environment. Air models are also used to evaluate the effects of construction activities. In addition, this information will be used in the design of the facilities with regard to wind, rain, and snow loadings on structures and the establishment of a design basis tornado.

Climate and weather are believed to be conducive to siting nuclear facilities. Precipitation is low and violent storms are infrequent. Spring winds may cause dust during construction periods. However, the natural vegetation at the Site generally reduces the amount of windblown dust. It is not possible to definitively assess the impact without a specific facility design, however it is believed that impacts will be small based on the analysis performed the NEF which has similar climatic and weather conditions (NRC, 2005). The NEF demonstrates that construction can be accomplished in a manner that assures vehicle emissions are below the National Ambient Air Quality Standards (NAAQS) for criteria pollutants and that particulate matter from windborne dust is also below the NAAQS.

2.2.1 Climate

The Site climate is typical of a semi-arid region, with generally mild temperatures, low precipitation and humidity, and a high evaporation rate. During the winter, the weather is often dominated by a high pressure system located in the central part of the western U.S. and a low pressure system located in north-central Mexico. During the summer, the region is affected by a low pressure system normally located over Arizona.

Climate information from Hobbs, New Mexico obtained from the Western Regional Climate Center was used. In addition, National Oceanic and Atmospheric Administration (NOAA) Local Climatological Data (LCD) recorded at Midland-Odessa Regional Airport, TX and at Roswell, NM, were used. Use of the Hobbs, Midland-Odessa, and Roswell observations for a general description of the meteorological conditions at the Site was deemed appropriate as they are all located within the same region and have similar climates. Midland-Odessa is the closest first-order National Weather Service (NWS) station to the Site. Figure 2.2.1-1 presents a map of the region. In the following summaries of meteorological data, the averages are based on:

- Hobbs station (WRCC, 2007a) averages are based on a 30-year record (1971 to 2000) unless otherwise stated (a cooperative station, with limited data; e.g., no humidity or snowfall data).
- Midland-Odessa station (NOAA, 2005a) averages are based on a 30-year record (1971 to 2000) unless otherwise stated (a first order National Weather Service station).

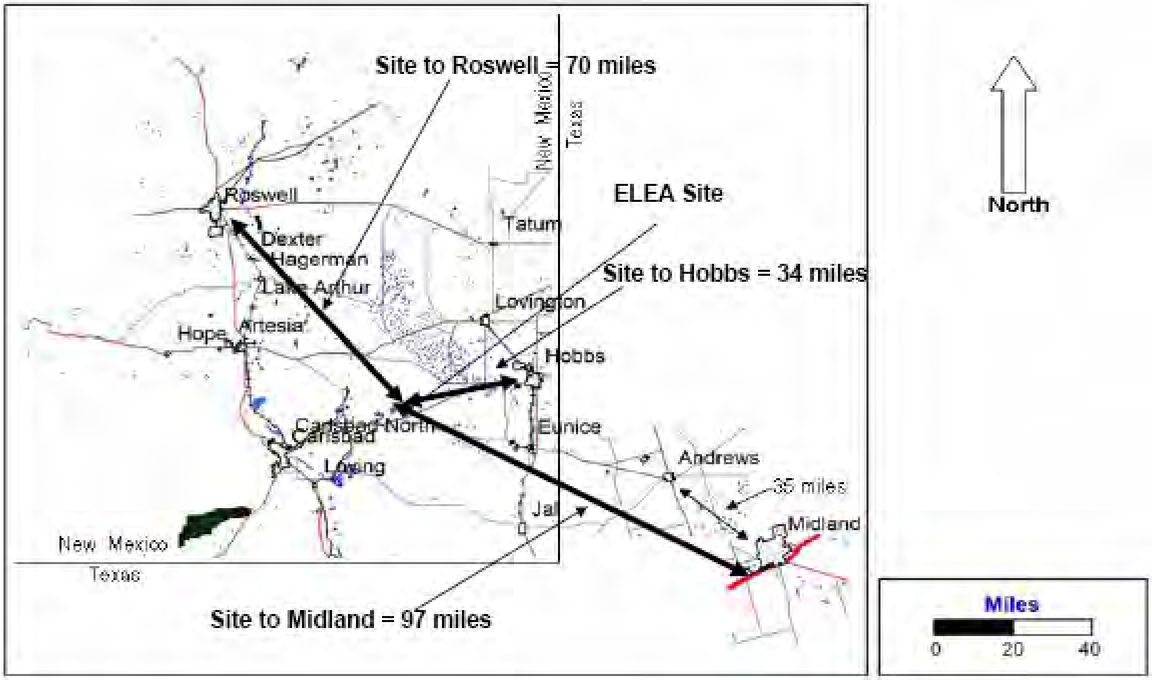


Figure 2.2.1-1 Map of Region Showing Weather Stations Used in Analysis

- Roswell station (NOAA, 2005b) averages are based on a 30-year record (1971 to 2000) unless otherwise stated (a first order National Weather Service station).

A DOE station is operated at the WIPP (14 miles south of the Site) to support their program. However, because of the short duration of the WIPP station record, commencing in 1986, the data were not used here for describing the general climate. For more information see the WIPP Annual Site Environmental Reports (DOE, 1999, 2000, 2001, 2002a, 2003, 2004b, 2006).

2.2.1.1 Temperatures

A summary of 30 years of temperature data (Table 2.2.1.1-1) collected at the Hobbs, New Mexico, Cooperative Observer's Station shows a mean annual temperature of 62.2° Farenheit (F) with the mean monthly temperature ranging from 42.9°F in January to 80.1°F in July (WRCC, 2007). The highest mean maximum temperature for the period from 1971-2000 is 102.1°F and the lowest mean minimum temperature is 22.8°F. There are an average of 2,849 heating[1] degree days and 1,842 cooling degree days[2] per year; national averages of 4,055 heating1 and 1,368 cooling degree days[2] per year (NOAA, 2007).

[1] With respect to fuel consumption, one heating degree day is given for each degree that the daily mean daily temperature departs below the base temperature of 65°F.
[2] With respect to fuel consumption, one cooling degree day is given for each degree that the daily mean daily temperature departs above the base temperature of 65°F.

Table 2.2.1.1-1 HOBBS, New Mexico, Temperature Data 1971-2000

Month	Mean Monthly Temperature °F	Highest Mean Temperature °F	Lowest Mean Temperature °F	Highest Mean Maximum Temperature °F	Lowest Mean Minimum Temperature °F
January	42.9	47.8	36.6	64.7	22.8
February	48.0	54.6	42.5	71.3	28.5
March	54.8	61.6	48.7	79.1	33.9
April	62.6	67.8	57.0	83.8	41.5
May	70.9	77.9	66.6	94.5	50.5
June	77.9	84.8	73.7	101.5	59.5
July	80.1	86.0	74.8	102.1	62.7
August	78.3	82.0	72.9	96.4	61.1
September	72.3	77.5	66.0	92.6	54.2
October	63.2	66.6	56.9	84.4	41.7
November	51.3	56.4	44.9	73.5	30.8
December	44.0	48.9	37.6	65.4	22.8
Annual	62.2	86.0	36.6	102.1	22.8

Thirty-year mean monthly average temperatures in Midland-Odessa (NOAA, 2005a) range from 43.2°F in January to 81.7°F in July. The lowest daily minimum temperature (over a 57-year period) was –11°F in February 1985 and the highest daily maximum temperature (over a 57-year period) was 116°F in June 1994. The 30-year mean relative humidity ranges from 27 to 80 percent. Highest humidities occur mainly during the early morning hours (NOAA, 2005a). For the Midland-Odessa data, the daily and monthly averages and extremes of temperature, and the monthly averages of mean relative humidity, are listed in Table 2.2.1.1-2 and Table 2.2.1.1-3, respectively.

Thirty-year mean monthly average temperatures in Roswell (NOAA, 2005b) range from 40.0°F in January to 80.8°F in July. The lowest daily minimum temperature (over a 33-year period) was –9°F in January 1979 and the highest daily maximum temperature (over a 33-year period) was 114°F in June 1994. The 30-year mean relative humidity ranges from 22 to 75 percent. Highest humidities occur mainly during the early morning hours (NOAA, 2005b). For the Roswell data, the daily and monthly averages and extremes of temperature, and the monthly averages of mean relative humidity, are listed in Table 2.2.1.1-4 and Table 2.2.1.1-5, respectively.

Table 2.2.1.1-2 Midland-Odessa, Texas, Temperature Data

Month	Mean Monthly Temperature[1] °F	Mean Daily Maximum Temperature[2] °F	Mean Daily Minimum Temperature[2] °F	Highest Daily Maximum Temperature[3] °F	Lowest Daily Minimum Temperature[3] °F
January	43.2	57.0	30.1	84	-8
February	48.6	62.0	34.0	90	-11
March	55.9	69.7	40.6	95	9
April	63.7	78.8	49.5	101	20
May	72.8	86.7	59.1	108	34
June	79.6	93.0	67.0	116	47
July	81.7	94.5	69.4	112	53
August	80.4	93.2	68.4	107	54
September	73.9	86.5	61.9	107	36
October	64.4	77.6	51.7	101	24
November	52.3	65.9	39.2	90	11
December	44.8	58.8	31.8	85	-1
Annual	63.4	77.0	50.2	116	-11

[1]30-year period (1971 – 2000)
[2]57-year period (1944 – 2000)
[3]58-year period (1943 – 2000)

Table 2.2.1.1-3 Midland-Odessa, Texas, Relative Humidity Data 1971-2000

RH %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	58	55	46	45	51	54	52	55	60	60	59	58	54
00 LST*	64	62	54	53	60	63	58	62	68	70	68	65	62
06 LST	72	71	65	67	75	78	73	76	80	80	76	72	74
12 LST	47	44	35	33	38	42	42	44	49	47	45	46	43
18 LST	42	36	28	27	31	34	35	38	43	44	45	44	37

*LST = Local Standard Time

Table 2.2.1.1-4 Roswell, New Mexico, Temperature Data

Month	Mean Monthly Temperature[1] °F	Mean Daily Maximum Temperature[2] °F	Mean Daily Minimum Temperature[2] °F	Highest Daily Maximum Temperature[3] °F	Lowest Daily Minimum Temperature[3] °F
January	40.0	54.8	26.6	82	-9
February	45.7	60.2	30.9	85	3
March	52.9	67.9	37.2	93	9
April	60.5	76.5	45.6	99	23
May	69.6	85.5	55.4	107	34
June	78.0	93.6	64.1	114	47
July	80.8	94.4	66.8	111	0
August	78.9	92.1	66.6	107	54
September	72.0	85.8	59.5	103	40
October	61.4	76.2	47.5	99	14
November	48.9	63.8	35.0	88	4
December	40.7	55.5	27.0	81	-8
Annual	60.8	75.5	46.8	114	-9

[1]30-year period (1971 – 2000)
[2]52-year period (1949 – 2000)
[3]33-year period (1968 – 2000)

Table 2.2.1.1-5 Roswell, New Mexico, Relative Humidity Data
1971-2000

RH %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	57	50	42	37	40	44	48	53	55	52	52	56	49
00 LST*	71	66	58	54	59	65	69	74	75	70	68	68	66
06 LST	50	44	34	30	33	35	40	44	47	43	44	48	41
12 LST	41	33	26	22	24	27	32	36	39	36	38	41	33
18 LST	62	55	45	41	44	48	54	60	62	59	59	61	54

*LST = Local Standard Time

2.2.1.2 Precipitation

The 30-year mean annual total rainfall in Hobbs is 18.15 inches. Precipitation ranges from an average of 0.48 inches in March to 3.13 inches in September. Record maximum and minimum monthly totals are 13.83 inches in May 1992 and zero in January 2000. The highest 24 hour precipitation total over a 92-year period is 7.5 inches (WUSLHS, 2006). Table 2.2.1.2-1 lists the monthly averages and extremes of precipitation for Hobbs (WRCC, 2007).

The 30-year mean annual total rainfall in Midland-Odessa is 14.8 inches. Precipitation amount ranges from an average of 0.42 inches in March to 2.31 inches in September. Record maximum and minimum monthly totals (over a 58-year period) are 9.70 inches in September 1980 and a trace amount in March 1994, respectively. The highest 24-hour precipitation total (over a 52-year period) was 5.99 inches in May 1968 (NOAA, 2005a). Table 2.2.1.2-2 lists the monthly averages and extremes of precipitation for Midland-Odessa.

The 30-year mean annual rainfall total in Roswell is 13.34 inches. Record maximum and minimum monthly totals (over a 33-year period) are 6.88 inches in July 1991 and a trace amount in May 1996, respectively (NOAA, 2005b). The highest 24-hour precipitation total (over a 33-year period) was 4.91 inches (NOAA, 2005b). Table 2.2.1.2-3 lists the monthly averages and extremes of precipitation for Roswell.

Table 2.2.1.2-1 HOBBS, New Mexico, Precipitation Data
1971-2000

Precip inches	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	0.51	0.66	0.48	0.78	2.58	2.03	2.42	2.52	3.13	1.45	0.87	0.72	18.15
Max	2.03	2.21	2.98	2.86	13.83	5.37	9.41	9.06	12.99	8.15	4.33	5.08	13.83
Min	0	0	0	0	0	0	0.22	0.11	0.08	0	0	0	0

Table 2.2.1.2-2 Midland-Odessa, Texas, Precipitation Data

Precip inches	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average[1]	0.53	0.58	0.42	0.73	1.79	1.71	1.89	1.77	2.31	1.77	0.65	0.65	14.8
Max[2]	3.66	2.55	2.86	2.85	7.63	3.93	8.5	4.43	9.7	7.45	5.42	3.3	9.7
Min[2]	0.0	0.0	T	0.0	0.02	0.01	T	0.05	0.0	0.0	0.0	T	0.0
Max in 24 hours[3]	1.15	1.32	2.2	1.62	4.75	3.07	5.99	2.41	4.37	3.59	2.17	0.9	5.99

T = trace
[1]30-year period (1971 – 2000)
[2]58-year period (1943 – 2000)
[3]52-year period (1949 – 2000)

Snowfall over a 30-year period in Midland-Odessa averages 5.1 inches per year. Maximum monthly snowfall/ice pellets (over a 57-year period) of 9.8 inches fell in December 1998. The maximum amount of snowfall/ice pellets (over a 51-year period) to fall in 24 hours was 9.8 inches in December 1998 (NOAA, 2005a). Table 2.2.1.2-4 lists the monthly averages and maximums of snowfall/ice pellets.

Snowfall over a 30-year period in Roswell averages 11.9 inches per year. Maximum monthly snowfall/ice pellets (over a 26-year period) of 21.0 inches fell in December 1997. The maximum amount of snowfall/ice pellets (over a 26-year period) to fall in 24 hours was 16.5 inches in February 1988 (NOAA, 2005b). Table 2.2.1.2-5 lists the monthly averages and maximums of snowfall/ice pellets.

Table 2.2.1.2-3 Roswell, New Mexico, Precipitation Data

Precip inches	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average[1]	0.39	0.41	0.35	0.58	1.30	1.62	1.99	2.31	1.98	1.29	0.53	0.59	13.34
Max[2]	1.03	2.02	2.84	2.89	4.57	5.02	6.88	6.48	6.58	5.91	2.95	3.07	6.88
Min[2]	0.03	0.0	0.0	0.01	T	0.02	0.01	0.07	0.05	T	0.0	0.0	0.0
Max in 24 hours[2]	0.67	1.41	2.22	2.24	1.77	3.05	4.91	3.94	2.71	3.89	1.33	1.1	4.91

T = trace
[1]30-year period (1971 – 2000)
[2]33-year period (1968 – 2000)

Table 2.2.1.2-4 Midland-Odessa, Texas, Snowfall Data

Snowfall inches	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average[1]	2.2	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.*	0.5	1.4	5.1
Max[2]	9.0	3.9	5.9	2.0	T	T	T	T	T	0.6	8.0	9.8	9.8
Max in 24 hours[3]	6.8	3.9	5.0	2.0	T	T	T	T	T	0.6	6.0	9.8	9.8

T = trace; 0.* indicates the value is between 0.0 and 1.3 cm (0.0 and 0.5 in)
[1]30-year period (1971 – 2000)
[2]57-year period (1944 – 2000)
[3]51-year period (1952 – 2000)

Table 2.2.1.2-5 Roswell, New Mexico, Snowfall data

Snowfall inches	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average[1]	3.1	2.6	0.9	0.4	0.*	0.0	0.0	0.0	0.0	0.3	1.3	3.3	11.9
Max[2]	10.4	16.9	6.8	5.3	0.8	1.0	0.0	0.0	1.0	4.2	12.3	21.0	21.0
Max in 24 hours[2]	(7.3)	(16.5)	(6.8)	(4.0)	(2.0)	(1.0)	(0.0)	(0.0)	(1.0)	(3.1)	(6.3)	(9.7)	(16.5)

0.* indicates the value is between 0.0 and 1.3 cm (0.0 and 0.5 in)
[1]30-year period (1971 – 2000)
[2]26-year period (1975 – 2000)

2.2.1.3 Wind Speeds

Monthly mean wind speeds and prevailing wind directions at Midland-Odessa are presented in Table 2.2.1.3-1. The annual mean wind speed was 11.0 mph and the prevailing wind direction was wind from 180 degrees with respect to True North (NOAA, 2005a). Monthly mean wind speeds and prevailing wind directions at Roswell are presented in Table 2.2.1.3-2. The annual mean wind speed was 8.2 mph and the prevailing wind direction was wind from 160 degrees with respect to True North (NOAA, 2005b). The maximum five-second wind speed was 70 mph from 200 degrees with respect to True North at Midland-Odessa and 64 mph from 250 degrees with respect to True North at Roswell.

Five years of data (1987-1991) from the Midland/Odessa National Weather Service site were used to generate joint frequency distributions of wind speed and direction as a function of atmospheric stability class. Depending on the amount of incoming solar radiation and other factors, the atmosphere may be more or less turbulent at any given time. Meteorologists have defined atmospheric stability classes, each representing a different degree of turbulence in the atmosphere. When moderate to strong incoming solar radiation heats air near the ground, causing it to rise and generate large eddies, the atmosphere is considered unstable, or relatively turbulent. Unstable conditions are associated with atmospheric stability classes A and B. When solar radiation is relatively weak or absent, air near the surface has a reduced tendency to rise, and less turbulence develops. In this case, the atmosphere is considered stable, or less turbulent, and the stability class would be E or F. Stability classes D and C represent conditions of more neutral stability, or moderate turbulence. Neutral conditions are associated with relatively strong wind speeds and moderate solar radiation. This data summary is provided in Table 2.2.1.3-3 through Table 2.2.1.3-9.

Table 2.2.1.3-1 Midland-Odessa, Texas, Wind Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Speed[1] mph	10.4	11.2	12.4	12.6	12.4	12.2	10.7	9.9	9.9	9.9	10.3	10.1	11.0
Prevailing Direction[2] degrees from True North	180	180	180	180	180	160	160	160	160	180	180	180	180
Max 5-second speed[3] mph	54.0	52.0	54.0	59.0	55.0	63.0	69.0	64.0	70.0	52.0	48.0	54.0	70.0

[1]49-year period (1952 – 2000)
[2]34-year period (1967 – 2000)
[3]9 -year period (1992 – 2000)

Table 2.2.1.3-2 Roswell, New Mexico, Wind Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Speed[1] (mph)	6.9	8.1	9.5	9.8	9.6	9.6	8.5	7.7	7.6	7.3	7.2	6.9	8.2
Prevailing Direction[2] degrees from True North	160	160	160	160	150	160	150	140	160	160	160	360	160
Max 5-second speed[3] mph	54.0	54.0	55.0	64.0	58.0	62.0	59.0	55.0	51.0	52.0	53.0	51.0	64.0

[1]42-year period (1959 – 2000)
[2]26-year period (1975 – 2000)
[3]9 –year period (1992 – 2000)

Table 2.2.1.3-3 Midland/Odessa Five Year (1987-1991) Annual Joint Frequency Distribution for all Classes Combined as Percent of Time
Jan. 1, 1987-Dec. 31, 1991
Wind Speed mph
Calm = 2.53%

Direction	1-3	4-7	8-12	13-18	19-24	≥ 24.5	Total
N	0.28	1.64	1.69	1.32	0.53	0.13	5.59
NNE	0.17	0.68	1.19	1.30	0.48	0.14	3.96
NE	0.15	0.67	1.51	1.82	0.64	0.14	4.92
ENE	0.12	0.89	1.73	1.70	0.40	0.06	4.90
E	0.16	1.46	2.75	1.67	0.22	0.04	6.30
ESE	0.17	1.38	2.48	1.30	0.18	0.03	5.54
SE	0.16	2.18	2.96	1.91	0.31	0.04	7.57
SSE	0.30	2.70	3.64	3.25	0.87	0.11	10.87
S	0.39	4.11	6.46	7.44	1.92	0.23	20.55
SSW	0.23	1.90	2.99	1.89	0.31	0.02	7.34
SW	0.14	1.04	2.21	1.77	0.27	0.05	5.49
WSW	0.16	0.83	1.56	1.49	0.45	0.18	4.67
W	0.20	0.77	1.35	1.21	0.48	0.40	4.41
WNW	0.18	0.57	0.66	0.63	0.18	0.12	2.33
NW	0.21	0.78	0.82	0.52	0.16	0.09	2.58
NNW	0.18	1.17	0.85	0.53	0.19	0.05	2.98
SubTotal	3.21	22.78	34.85	29.75	7.58	1.83	100.00

Table 2.2.1.3-4 Midland/Odessa Five Year (1987-1991) Annual Joint Frequency Distribution for Stability Class A as Percent of Time
Jan. 1, 1987-Dec. 31, 1991
Wind Speed mph
Calm = 0.06%

Direction	1-3	4-7	8-12	13-18	19-24	>24.5	Total
N	1.75	9.36	0.00	0.00	0.00	0.00	11.11
NNE	1.75	4.09	0.00	0.00	0.00	0.00	5.85
NE	0.00	4.68	0.00	0.00	0.00	0.00	4.68
ENE	1.17	7.02	0.00	0.00	0.00	0.00	8.19
E	1.75	8.77	0.00	0.00	0.00	0.00	10.53
ESE	1.75	4.68	0.00	0.00	0.00	0.00	6.43
SE	1.17	5.85	0.00	0.00	0.00	0.00	7.02
SSE	0.00	5.85	0.00	0.00	0.00	0.00	5.85
S	1.75	9.36	0.00	0.00	0.00	0.00	11.11
SSW	1.17	5.26	0.00	0.00	0.00	0.00	6.43
SW	0.00	7.02	0.00	0.00	0.00	0.00	7.02
WSW	0.58	3.51	0.00	0.00	0.00	0.00	4.09
W	0.00	2.92	0.00	0.00	0.00	0.00	2.92
WNW	0.00	1.17	0.00	0.00	0.00	0.00	1.17
NW	0.58	4.09	0.00	0.00	0.00	0.00	4.68
NNW	0.00	2.92	0.00	0.00	0.00	0.00	2.92
SubTotal	13.45	86.55	0.00	0.00	0.00	0.00	100.00

Table 2.2.1.3-5 Midland/Odessa Five Year (1987-1991) Annual Joint Frequency Distribution For Stability Class B as Percent of Time
Jan. 1, 1987-Dec. 31, 1991
Wind Speed mph
Calm = 0.11%

Direction	1-3	4-7	8-12	13-18	19-24	>24.5	Total
N	1.24	2.66	1.36	0.00	0.00	0.00	5.25
NNE	1.05	1.55	1.17	0.00	0.00	0.00	3.77
NE	0.99	1.98	1.36	0.00	0.00	0.00	4.33
ENE	0.87	2.84	2.22	0.00	0.00	0.00	5.93
E	0.37	4.26	3.83	0.00	0.00	0.00	8.47
ESE	1.05	3.09	2.72	0.00	0.00	0.00	6.86
SE	0.56	2.97	2.78	0.00	0.00	0.00	6.30
SSE	0.93	3.34	3.96	0.00	0.00	0.00	8.22
S	1.55	5.93	8.53	0.00	0.00	0.00	16.01
SSW	0.74	3.28	3.65	0.00	0.00	0.00	7.66
SW	0.87	2.60	3.03	0.00	0.00	0.00	6.49
WSW	0.74	2.66	2.66	0.00	0.00	0.00	6.06
W	0.99	3.15	1.05	0.00	0.00	0.00	5.19
WNW	0.68	1.55	0.80	0.00	0.00	0.00	3.03
NW	1.11	1.30	0.87	0.00	0.00	0.00	3.28
NNW	0.93	1.67	0.56	0.00	0.00	0.00	3.15
SubTotal	14.65	44.81	40.54	0.00	0.00	0.00	100.00

Table 2.2.1.3-6 Midland/Odessa Five Year (1987-1991) Annual Joint Frequency Distribution for Stability Class C as Percent of Time
Jan. 1, 1987-Dec. 31, 1991
Wind Speed mph
Calm = 0.12%

Direction	1-3	4-7	8-12	13-18	19-24	>24.5	Total
N	0.17	1.04	2.38	0.38	0.15	0.06	4.18
NNE	0.06	0.69	1.67	0.71	0.10	0.02	3.24
NE	0.10	0.71	1.82	0.88	0.21	0.06	3.78
ENE	0.00	1.00	1.78	0.82	0.08	0.02	3.70
E	0.04	1.04	3.14	0.96	0.13	0.00	5.31
ESE	0.08	0.79	2.82	1.15	0.13	0.00	4.97
SE	0.06	0.69	3.43	2.09	0.19	0.02	6.48
SSE	0.02	1.25	5.06	3.82	1.00	0.10	11.23
S	0.12	1.97	10.10	7.82	1.82	0.36	22.20
SSW	0.10	1.57	5.10	2.38	0.25	0.02	9.41
SW	0.02	1.13	4.56	2.20	0.21	0.04	8.17
WSW	0.06	0.82	3.45	1.17	0.42	0.13	6.06
W	0.10	0.75	1.92	1.46	0.40	0.19	4.81
WNW	0.08	0.69	1.09	0.48	0.13	0.02	2.49
NW	0.13	0.40	0.98	0.40	0.08	0.00	1.99
NNW	0.08	0.61	0.92	0.15	0.15	0.06	1.97
SubTotal	1.19	15.15	50.23	26.88	5.46	1.09	100.00

Table 2.2.1.3-7 Midland/Odessa Five Year (1987-1991) Annual Joint Frequency Distribution for Stability Class D as Percent of Time
Jan. 1, 1987-Dec. 31, 1991
Wind Speed mph
Calm = 0.18%

Direction	1-3	4-7	8-12	13-18	19-24	>24.5	Total
N	0.04	0.51	1.39	2.45	0.98	0.24	5.61
NNE	0.06	0.29	1.37	2.35	0.91	0.26	5.24
NE	0.03	0.36	1.76	3.30	1.18	0.26	6.89
ENE	0.03	0.47	1.93	3.09	0.75	0.12	6.38
E	0.03	0.49	2.49	3.00	0.40	0.07	6.47
ESE	0.06	0.43	2.07	2.25	0.31	0.05	5.17
SE	0.02	0.42	2.32	3.20	0.56	0.08	6.60
SSE	0.05	0.44	2.79	5.39	1.44	0.19	10.31
S	0.06	0.68	4.29	12.52	3.28	0.37	21.19
SSW	0.01	0.33	1.67	3.09	0.54	0.03	5.67
SW	0.00	0.21	1.17	2.90	0.47	0.09	4.85
WSW	0.01	0.19	0.82	2.60	0.76	0.32	4.71
W	0.02	0.22	0.80	1.99	0.84	0.73	4.60
WNW	0.02	0.13	0.37	1.10	0.31	0.23	2.16
NW	0.01	0.14	0.43	0.92	0.29	0.17	1.96
NNW	0.03	0.21	0.55	0.99	0.33	0.08	2.19
SubTotal	0.49	5.52	26.21	51.14	13.35	3.29	100.00

Table 2.2.1.3-8 Midland/Odessa Five Year (1987-1991) Annual Joint Frequency Distribution for Stability Class E as Percent of Time
Jan. 1, 1987-Dec. 31, 1991
Wind Speed mph
Calm = 0.00%

Direction	1-3	4-7	8-12	13-18	19-24	>24.5	Total
N	0.00	1.70	3.43	0.00	0.00	0.00	5.14
NNE	0.00	0.82	1.29	0.00	0.00	0.00	2.11
NE	0.00	0.85	1.78	0.00	0.00	0.00	2.63
ENE	0.00	1.04	2.34	0.00	0.00	0.00	3.38
E	0.00	1.83	5.12	0.00	0.00	0.00	6.95
ESE	0.00	1.68	5.28	0.00	0.00	0.00	6.95
SE	0.00	3.02	6.76	0.00	0.00	0.00	9.78
SSE	0.00	3.32	7.80	0.00	0.00	0.00	11.12
S	0.00	4.87	14.71	0.00	0.00	0.00	19.58
SSW	0.00	1.86	7.45	0.00	0.00	0.00	9.31
SW	0.00	0.83	5.08	0.00	0.00	0.00	5.92
WSW	0.00	0.77	3.36	0.00	0.00	0.00	4.12
W	0.00	0.54	3.62	0.00	0.00	0.00	4.16
WNW	0.00	0.46	1.66	0.00	0.00	0.00	2.13
NW	0.00	0.64	2.43	0.00	0.00	0.00	3.07
NNW	0.00	1.25	2.39	0.00	0.00	0.00	3.65
SubTotal	0.00	25.47	74.53	0.00	0.00	0.00	100.00

Table 2.2.1.3-9 Midland/Odessa Five Year (1987-1991) Annual Joint Frequency Distribution for Stability Class F as Percent of Time
Jan. 1, 1987-Dec. 31, 1991
Wind Speed mph
Calm = 2.07%

Direction	1-3	4-7	8-12	13-18	19-24	>24.5	Total
N	1.36	5.93	0.00	0.00	0.00	0.00	7.29
NNE	0.59	1.62	0.00	0.00	0.00	0.00	2.21
NE	0.62	1.09	0.00	0.00	0.00	0.00	1.71
ENE	0.50	1.50	0.00	0.00	0.00	0.00	2.00
E	0.88	4.03	0.00	0.00	0.00	0.00	4.91
ESE	0.60	4.55	0.00	0.00	0.00	0.00	5.15
SE	0.88	8.77	0.00	0.00	0.00	0.00	9.65
SSE	1.72	11.55	0.00	0.00	0.00	0.00	13.27
S	2.09	17.39	0.00	0.00	0.00	0.00	19.47
SSW	1.34	7.75	0.00	0.00	0.00	0.00	9.10
SW	0.78	3.83	0.00	0.00	0.00	0.00	4.60
WSW	0.86	2.79	0.00	0.00	0.00	0.00	3.65
W	1.02	2.50	0.00	0.00	0.00	0.00	3.52
WNW	0.98	2.00	0.00	0.00	0.00	0.00	2.98
NW	1.07	3.50	0.00	0.00	0.00	0.00	4.57
NNW	0.91	5.01	0.00	0.00	0.00	0.00	5.93
SubTotal	16.20	83.80	0.00	0.00	0.00	0.00	100.00

Table 2.2.1.3-10 presents the frequency of occurrence of each atmospheric stability class. Figure 2.2.1.3-1 presents the annual wind rose for the Midland/Odessa National Weather Service site for the years 1987-1991.

Table 2.2.1.3-10 Percent Frequency of Occurrence of Atmospheric Stability Classes
Jan. 1, 1987-Dec. 31, 1991

Stability Class	Number of Occurrences	Percent Frequency of Occurrence1
A	171	0.4
B	1,618	3.8
C	5,216	12.3
D	22,124	52.1
E	7,809	18.4
F	5,803	13.7
Total	42,471	

[1]Rounded up

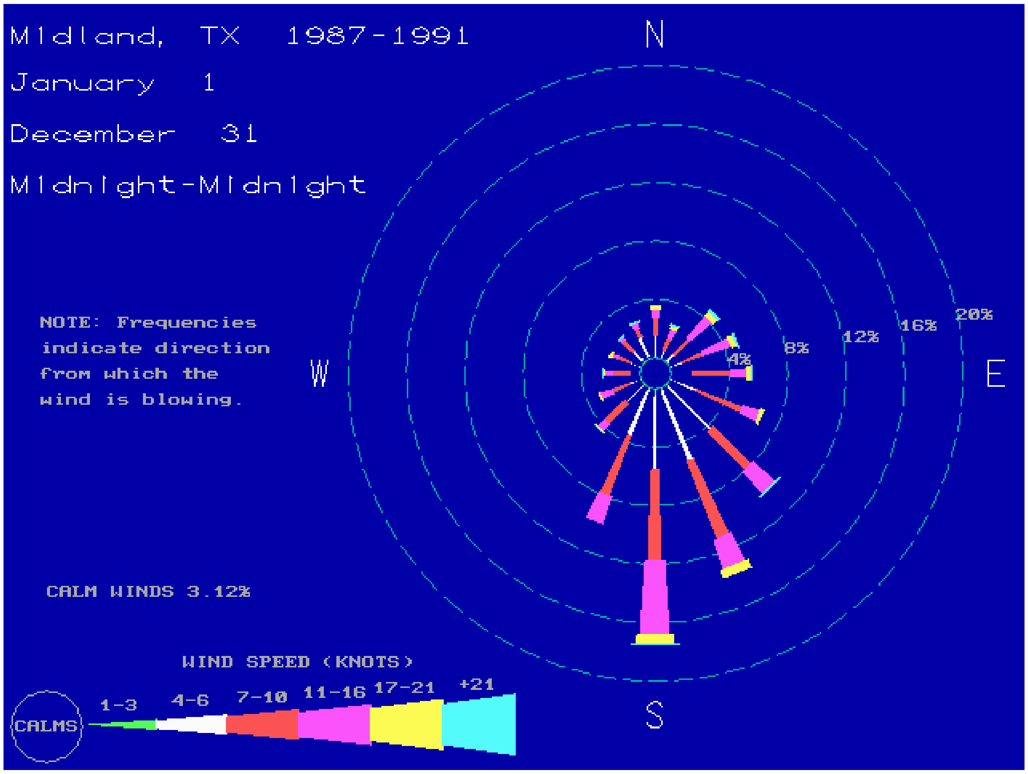


Figure 2.2.1.3-1 Midland/Odessa Annual Wind Rose (1987-1991)

Per Title 14, Chapter 7, Part 2 (14.7.2 NMAC), New Mexico has adopted the 2003 International Building Code (IBC). Per IBC 2003, Section 1609 (ICC, 2003), 90 mph basic wind speed is the basis for wind design loads for structures located at the Site. This wind speed is a nominal design 3-second gust at 33 feet above ground for open terrain with scattered obstructions (Exposure C Category).

2.2.1.4 Storms

Thunderstorms

Thunderstorms occur during every month of the year but are most common in the spring and summer months. Thunderstorms occur an average of 36.1 days/year in Midland/Odessa (based on a 57-year period of record as indicated in NOAA (2005a)). The seasonal averages are: 10.6 days in spring (March through May); 17.4 days in summer (June through August); 6.8 days in fall (September through November); and 1.3 days in winter (December through February).

Tornadoes

Tornadoes are commonly classified by their intensities. The F-Scale classification of tornadoes is based on the appearance of the damage that the tornado causes. There are six classifications, F0 to F5, with an F0 tornado having winds of 40-72 miles per hour and an F5 tornado having winds of 261-318 miles per hour (Geer, 1996). Note that as of February 1, 2007, an enhanced F-scale for tornado damage went into effect in the United States. The switch to the enhanced F-scale involves:

1. Changing the averaging interval for wind speed estimates from the fastest quarter-mile wind speed to a maximum three-second average wind speed.
2. Changing the minimum tornado wind speed from 40 mph to 65 mph.
3. Changing the wind speed intervals associated with each F scale class.

The enhanced F-scale uses three-second wind gusts estimated at the point of damage based on a judgment of eight levels of damage to 28 indicators. The enhanced F-scale has six classifications, EF0 to EF5, with an EF0 tornado having three-second gusts of 65-85 miles per hour and an EF5 tornado having three-second gusts of over 200 miles per hour (NOAA, 2007b).

Based on a United States-wide study performed on a state by state basis, the average tornado probability for any F-scale tornado for the Site is between 1E-06 and 2E-04, as is presented graphically in Figure 2.2.1.4-1 (EAI, 2007). The range of probability includes both New Mexico and Texas.

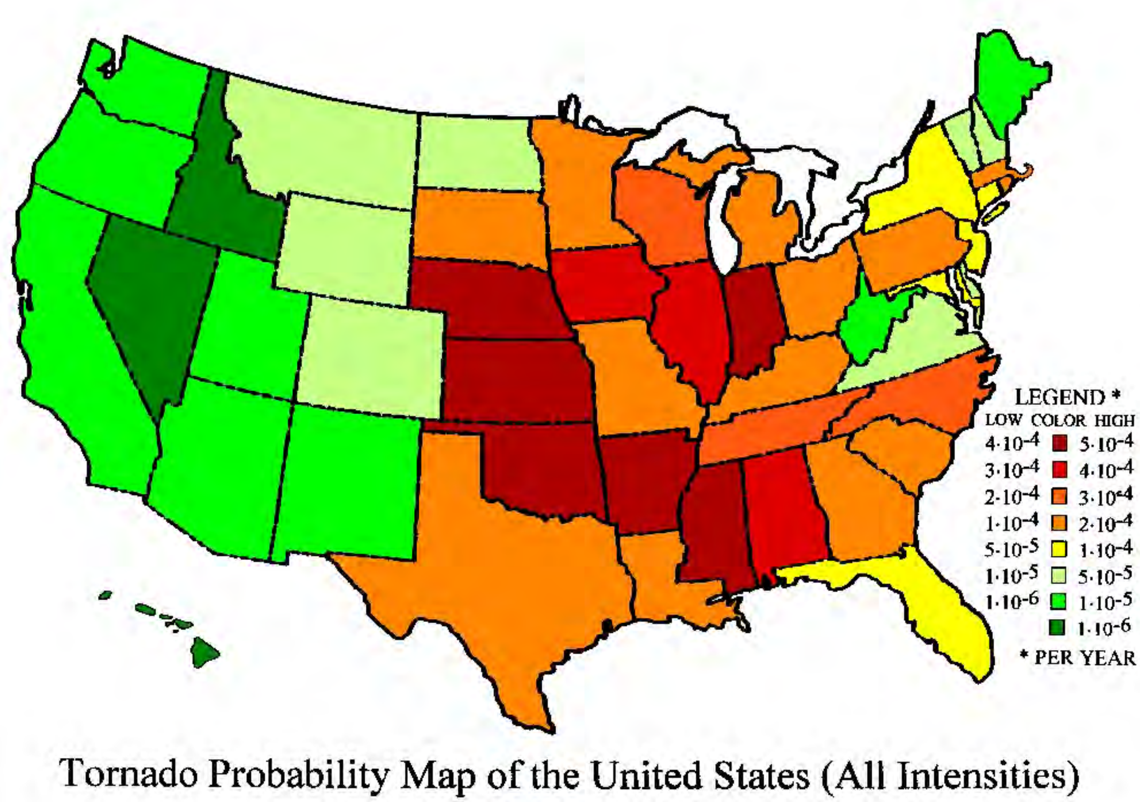


Figure 2.2.1.4-1 Tornado Probability Map

The tornado characteristics, with an annual probability of 1E-07, for the region in which the Site is located are (NRC, 2006):

Maximum Wind Speed mi/hr	Tangential Velocity mi/hr	Translational Velocity mi/hr	External Pressure Drop psi/s
260	208	52	0.8

No tornadoes of F2 or higher scale have occurred within 1,000 square miles (comprised of portions of Eddy and Lea counties) of the Site in the five years ending October 31, 2006 (NCDC, 2007). Figure 2.4.1.4-2 presents a map of the region on which the area within 1,000 square miles of the Site is portrayed as a circle having a radius of 18 miles.

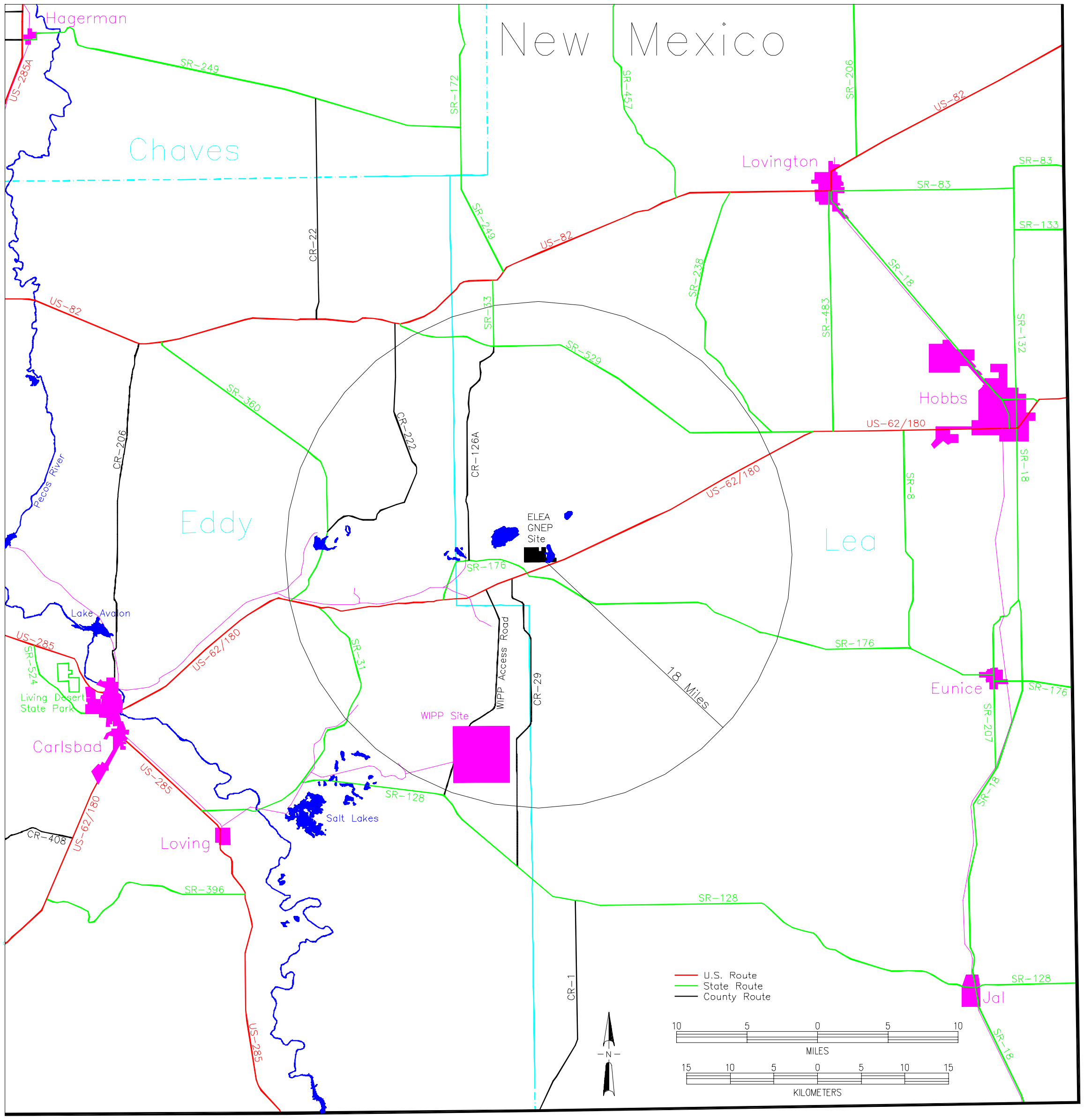


Figure 2.2.1.4-2 1,000-Mile Area Around Proposed Site

Hurricanes

Hurricanes, or tropical cyclones, are low-pressure weather systems that develop over the tropical oceans. Hurricanes are fueled by the relatively warm tropical ocean water and lose their intensity quickly once they make landfall. Since the Site is located 500 miles from the coast, it is most likely that any hurricane that tracked towards it would have dissipated to the tropical depression stage, that is, wind speeds less than 39 miles/hr, before it reached the Site. The U.S. Landfalling Hurricane Probability Project (E-Transit, 2007) did not assign a site designation for any portion of the Site.

2.2.2 Air Quality

The United States EPA uses six criteria pollutants as indicators of air quality. Maximum concentrations, above which adverse effects on human health may occur, have been set. These concentrations are referred to as the NAAQS. Areas either meet the national primary or secondary air quality standards for the criteria pollutants (attainment) or do not meet the national primary or secondary air quality standards for the criteria pollutants (nonattainment). The criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead.

One exceedance of the NAAQS maximum 24-hour limit was reported in Hobbs, New Mexico, for particulate matter in 2003 due to a natural event – a dust storm. Corrective actions were taken by the state of New Mexico. Note that one exceedance of this limit is allowed per year.

Based on EPA information (EPA, 2007a), all of the region within 50 miles of the Site is not in a nonattainment area for all of the criteria pollutants (Figure 2.2.2-1). This region is comprised of all or portions of the following counties: Lea County, New Mexico; Chaves County, New Mexico; Eddy County, New Mexico; Andrews County, Texas; Gaines County, Texas; Yoakum County, Texas; Loving County, Texas; Reeves County, Texas; and Culberson County, Texas. Figure 2.2.2-2 shows this region, including the probable areas where workers will reside and the likely commuter routes for the workers. Probable residential areas for workers include Hobbs, Carlsbad, Lovington, Artesia, Eunice, and Loving. The likely commuter route is Highway 62/180.

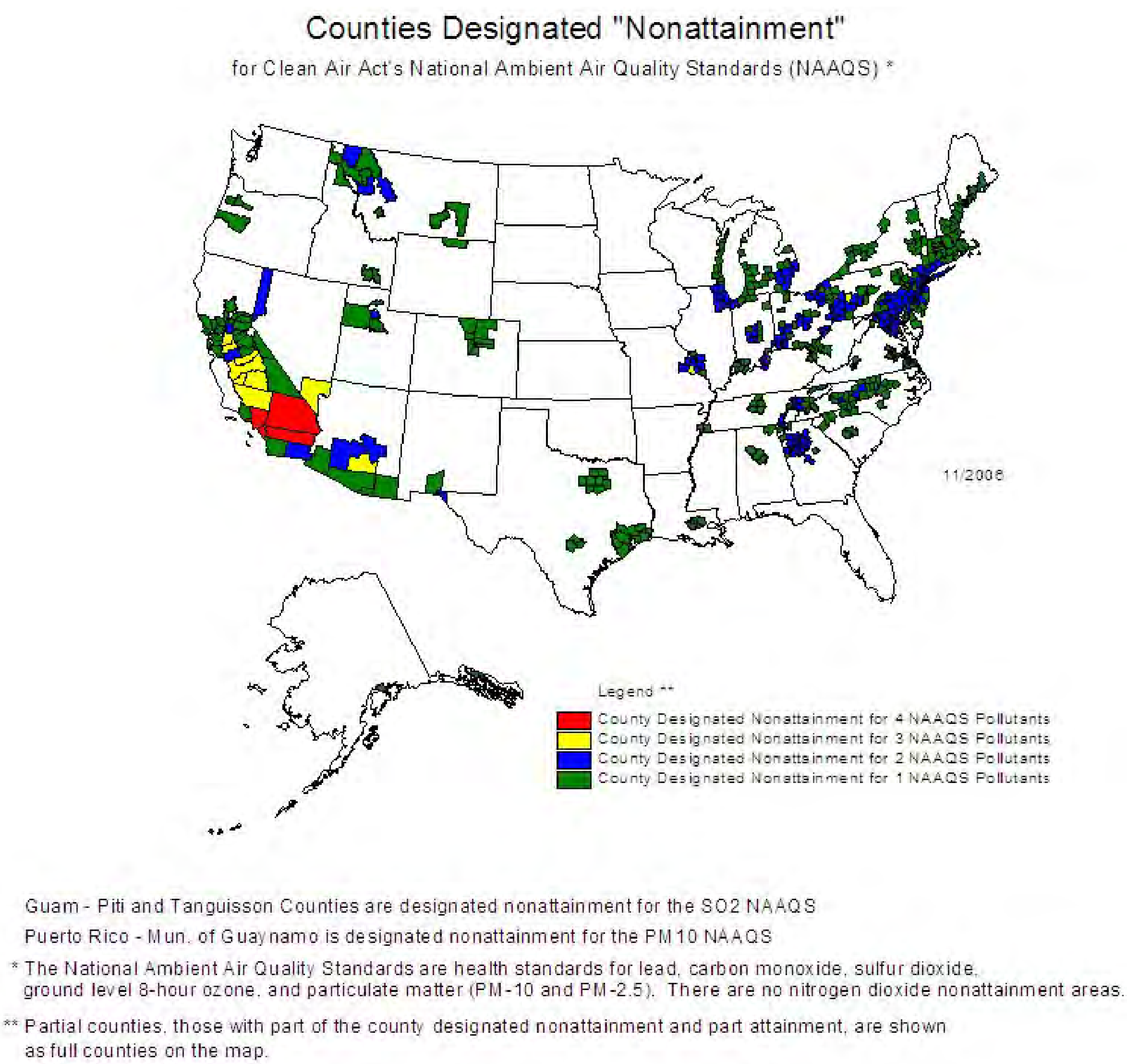


Figure 2.2.2-1 EPA Criteria Pollutant Nonattainment Map

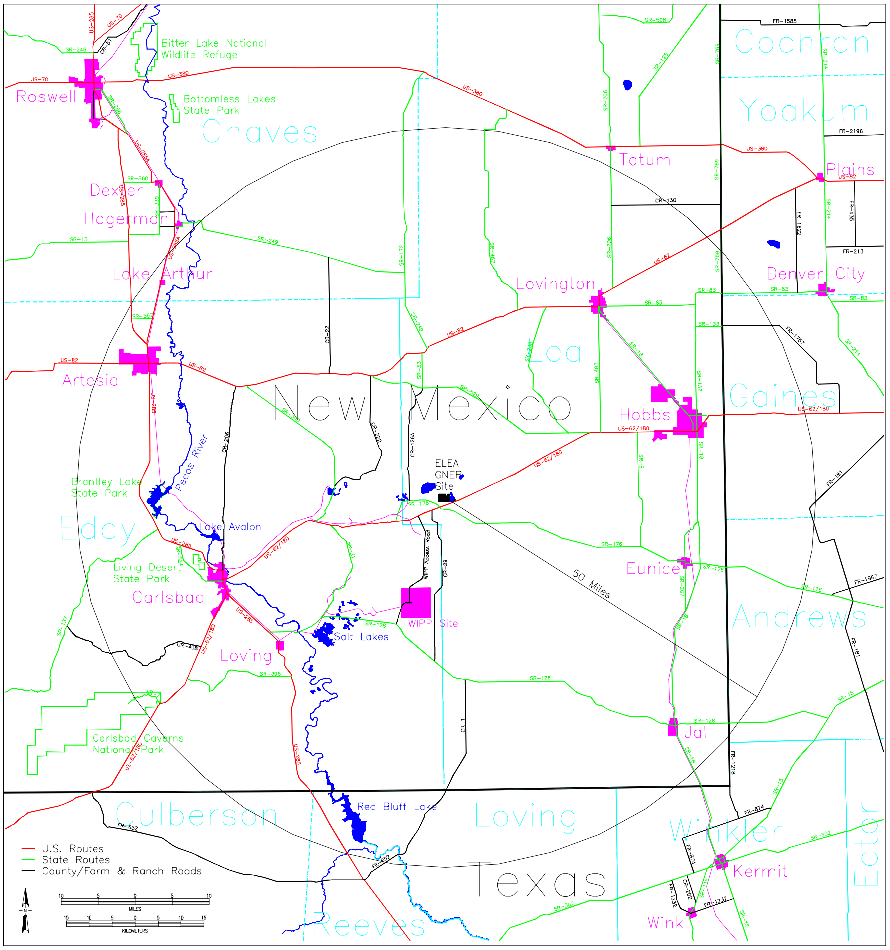


Figure 2.2.2-2 Fifty-Mile Ring Around Proposed Site

There are no nonattainment or maintenance areas within 50 miles of the Site and residential locations of workers; therefore, according to the scope of this project, no further analysis is required. Table 2.2.2-1 lists the NAAQS (EPA, 2007b).

Table 2.2.2-1 National Ambient Air Quality Standards National Ambient Air Quality Standards

Pollutant	Standard Value*		Standard Type
Carbon Monoxide (CO)			
8-hour Average	9 ppm	(10 mg/m^3)	Primary
1-hour Average	35 ppm	(40 mg/m^3)	Primary
Nitrogen Dioxide (NO2)			
Annual Arithmetic Mean	**0.053 ppm**	**(100 µg/m^3)**	**Primary & Secondary**
Ozone (O_3)			
1-hour Average	0.12 ppm	(235 µg/m^3)	Primary & Secondary
8-hour Average**	0.08 ppm	(157 µg/m^3)	Primary & Secondary
Lead (Pb)			
Quarterly Average	1.5 µg/m^3		Primary & Secondary
Particulate (PM 10) Particles with diameters of 10 micrometers or less			
Annual Arithmetic Mean	50 µg/m^3		Primary & Secondary
24-hour Average	150 µg/m^3		Primary & Secondary
Particulate (PM 2.5) Particles with diameters of 2.5 micrometers or less			
Annual Arithmetic Mean**	15 µg/m^3		Primary & Secondary
24-hour Average**	65 µg/m^3		Primary & Secondary
Sulfur Dioxide (SO_2)			
Annual Arithmetic Mean	0.03 ppm	(80 µg/m^3)	Primary
24-hour Average	0.14 ppm	(365 µg/m^3)	Table Primary
3-hour Average	0.50 ppm	(1300 µg/m^3)	Secondary

*Parenthetical value is an approximately equivalent concentration.
**The ozone 8-hour standard and the PM 2.5 standards are included for information only. A 1999 federal court ruling blocked implementation of these standards, which EPA proposed in 1997. EPA has asked the U.S. Supreme Court to reconsider that decision. The Updated Air Quality Standards website has additional information.

2.3 Geology and Soils

2.3 Geology and Soils

This section provides information on the geological features of the Site, including the Site and regional geology, physiography, structure, stratigraphy, and stability, including seismicity. This information is needed to evaluate potential impact to the proposed facilities from geological processes, the impact of the facilities on geological and soil resources, and to determine the suitability of the Site for construction and operation.

Construction of the facilities would disrupt the soils on up to 600 acres of the Site. Areas where soils are removed may be subject to increased erosion during the period of construction. Mitigative measures are available to minimize soil erosion by wind or rain. The area is relatively flat such that excavated soils may be used to fill in low areas to bring them up to grade. The resulting change from slightly sloping to flat would represent a small impact to the area. Preliminary geotechnical investigations indicate that the soils would be able to support the facility.

Site stability is not affected by processes related to dissolution. Results for an in depth study show the probability that evaporite dissolution has occurred or will occur in the future is negligible and that there is no evidence of karst at the Site.

The area is in a seismically quiet region, with nearby earthquakes being of small magnitude and generally caused by oil field injection activities. No threat of liquefaction or other earthquake-related hazards exist at the Site. Seismic activity is well documented as the result of an extensive network of seismometers established for the WIPP facility.

2.3.1 Physiography

The Site lies at the boundary between the Lower Pecos Valley and Llano Estacado sections of the Great Plains physiographic province (Hawley, 1986). Hawley defines a physiographic province as a region with a pattern of landforms that are distinct from those of adjacent provinces. Physiographic provinces are formed by distinct combinations of underlying geological frameworks and topographic and hydrographic conditions that have interacted through geologic time. The Site lies in the transition zone between the Lower Pecos Valley, which is underlain by Permian bedrock units containing gypsiferous and saline evaporites; limestone, dolomite, and clastic mudstone; shales and sandstones; and the Llano Estacado, which is underlain by alluvium and eolian deposits of the Tertiary Ogallala Formation and having a resistant caliche caprock.

Nicholson and Clebsch (1961) identified a number of physiographic subdivisions of the Lower Pecos Valley in the area of the Site in southern Lea County. Kelly (1979) identified other physiographic features in eastern Eddy County. These features and subdivisions are illustrated in the map in Figure 2.3.1-1. This map identifies a number of important physiographic features in the vicinity of the Site, including the Llano Estacado and Mescalero Ridge, the Laguna Valley, Nash Draw, Clayton Basin, and San Simon Swale. Nash Draw and Clayton Basin are situated along a north-south trending belt where soluble evaporite deposits of the Rustler Formation are exposed or thinly mantled by unconsolidated alluvial deposits. Nash Draw was described by Vine (1963) as a sinuous depression four miles wide and 18 miles long and identified as an undrained surface depression which probably formed as a result of dissolution of anhydrite, gypsum, and halite beds in the Permian Rustler and upper Salado Formations. Powers et al. (1978) commented that many of the larger depressions in the vicinity of Nash Draw probably are coalesced smaller solution depressions or sinks. Clayton Basin appears to be a northward extension of Nash Draw and is located in a similar geologic setting. San Simon Swale is located 15 miles east of Nash Draw and is thought to have formed by a combination of solution subsidence in Ogallala calcretes and surface erosion of an ancestral tributary to the Pecos River (Bachman and Johnson, 1973). More than 600 feet of post-Ogallala sediments have been penetrated by exploratory drilling in San Simon Swale, indicating significant subsidence in this feature (Powers et al., 1978).

Powers et al. (1978) characterized Laguna Plata, Laguna Gatuna, and other depressions in the area of the Site as "blowouts", having been formed by wind erosion, rather than by solution subsidence. This conclusion is supported by the presence of large downwind sand dune fields identified by Bachman (1974).

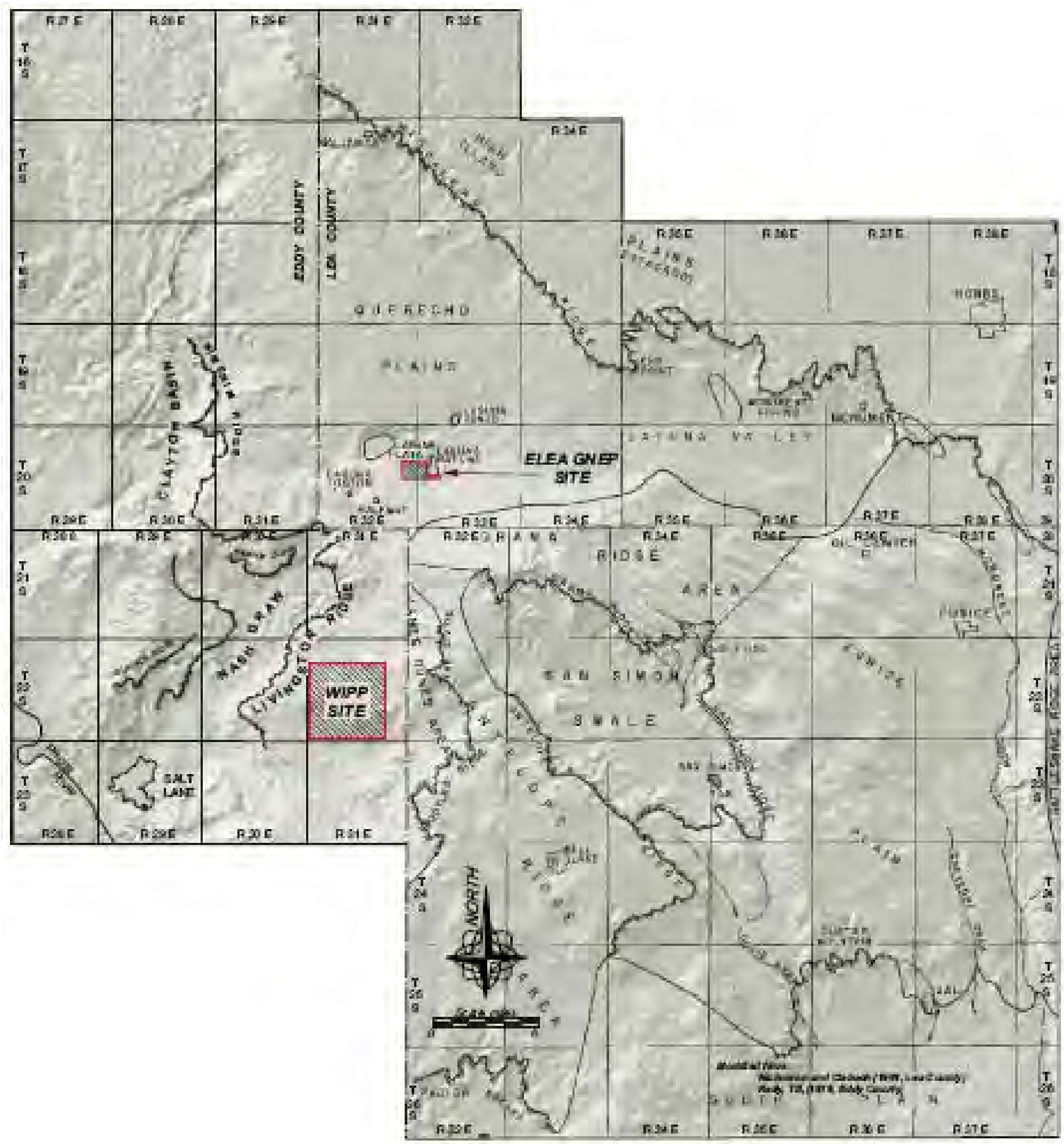


Figure 2.3.1-1 Physiographic Features in the Vicinity of the Site

2.3.2 Stratigraphy and Structure

2.3.2.1 Depth to Bedrock

The entire Site is underlain by Triassic bedrock consisting of shale, siltstone, and minor, fine-grained, poorly sorted sandstone. Most of the proposed operational area is relatively flat and the shale bedrock is covered by a laterally extensive veneer of 25 feet of Quaternary pediment deposits consisting of well sorted eolian sand and sandy-gravelly materials near the bedrock interface. In the operational exclusion areas on the northwest and east sides of the tract, pediment deposits are incised by ephemeral drainages, or by Laguna Gatuna. In these areas (Figure 2.3.2.1-1), the shale bedrock is exposed or nearly exposed.

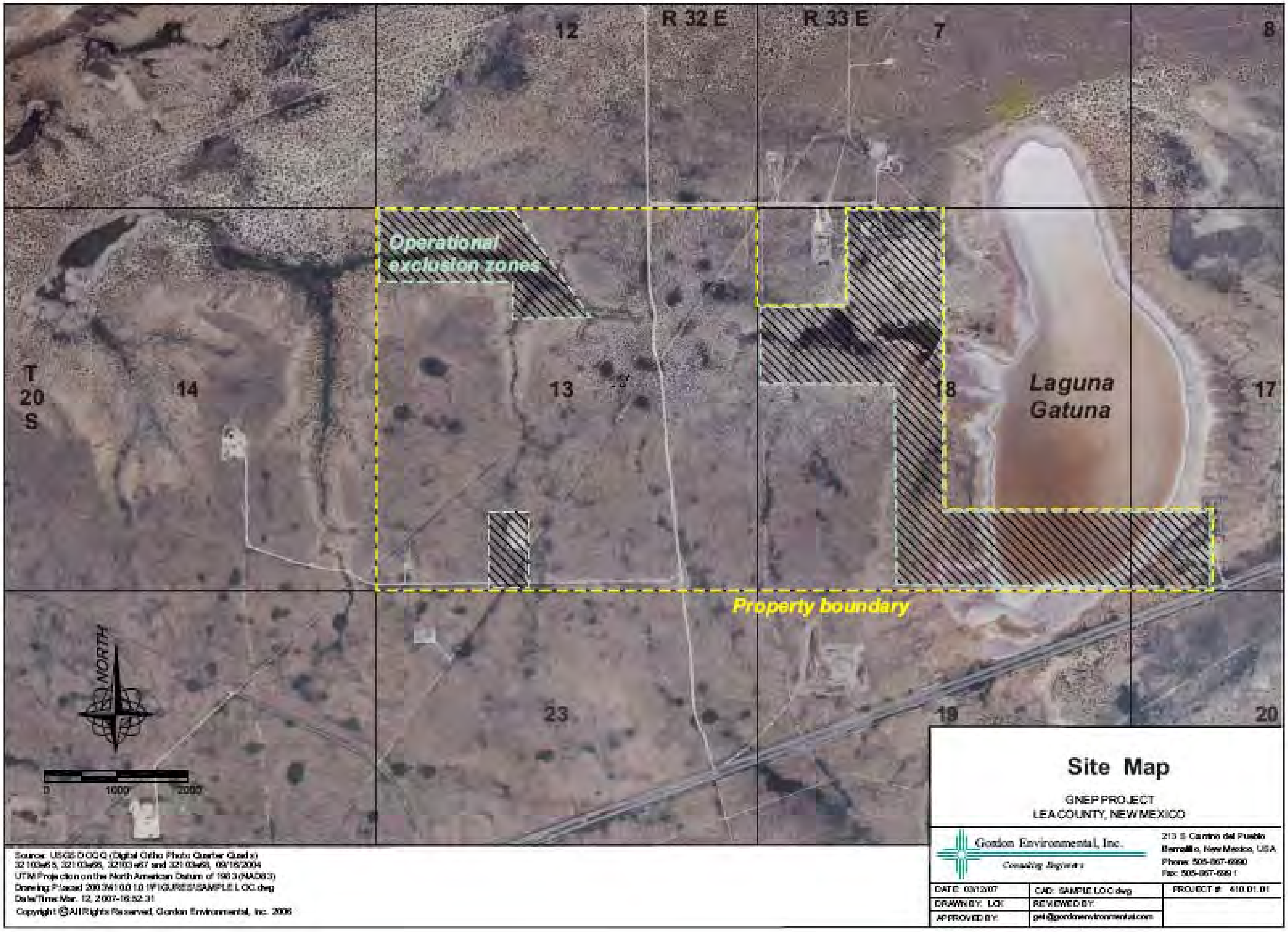


Figure 2.3.2.1-1 Site Map Showing the Construction Zone

The pediment surface has been sufficiently stable through recent geologic time to allow formation of a significant caliche caprock weathering zone. This caliche zone is sufficiently extensive in the region to warrant identification in geological literature of the vicinity, being named the Mescalero caliche (Bachman, 1973). In the vicinity of the Site, the Mescalero caliche is a tightly bound and erosion-resistant unit, forming a ledge or cusp that bounds the north and west margins of Laguna Gatuna and the tributary drainage to the west.

Across the Site, the pediment deposits and Mescalero caliche cap are relatively uniform. The total thickness of the pediment unit is 25 feet; the thickness of the caliche cap is 8-10 feet. Borings for piezometers ELEA-1 and ELEA-2 penetrated near-identical thickness of pediment and caliche. Lithologic logs for the borings are included in Figures 2.3.2-2a and 2.3.2-2b; locations are shown in Figure 2.3.2.1-3. During site reconnaissance, three test pits penetrating the Mescalero caliche were inspected. The thickness of caliche in these pits was consistent with thickness measurements in the piezometer borings. The test pits were located 100 feet south and east of the boundaries of the Pronghorn Saltwater Disposal Inc. site (Figure 2.3.2.1-4). A photo of one of the test pits is shown below in Figure 2.3.2.1-5.

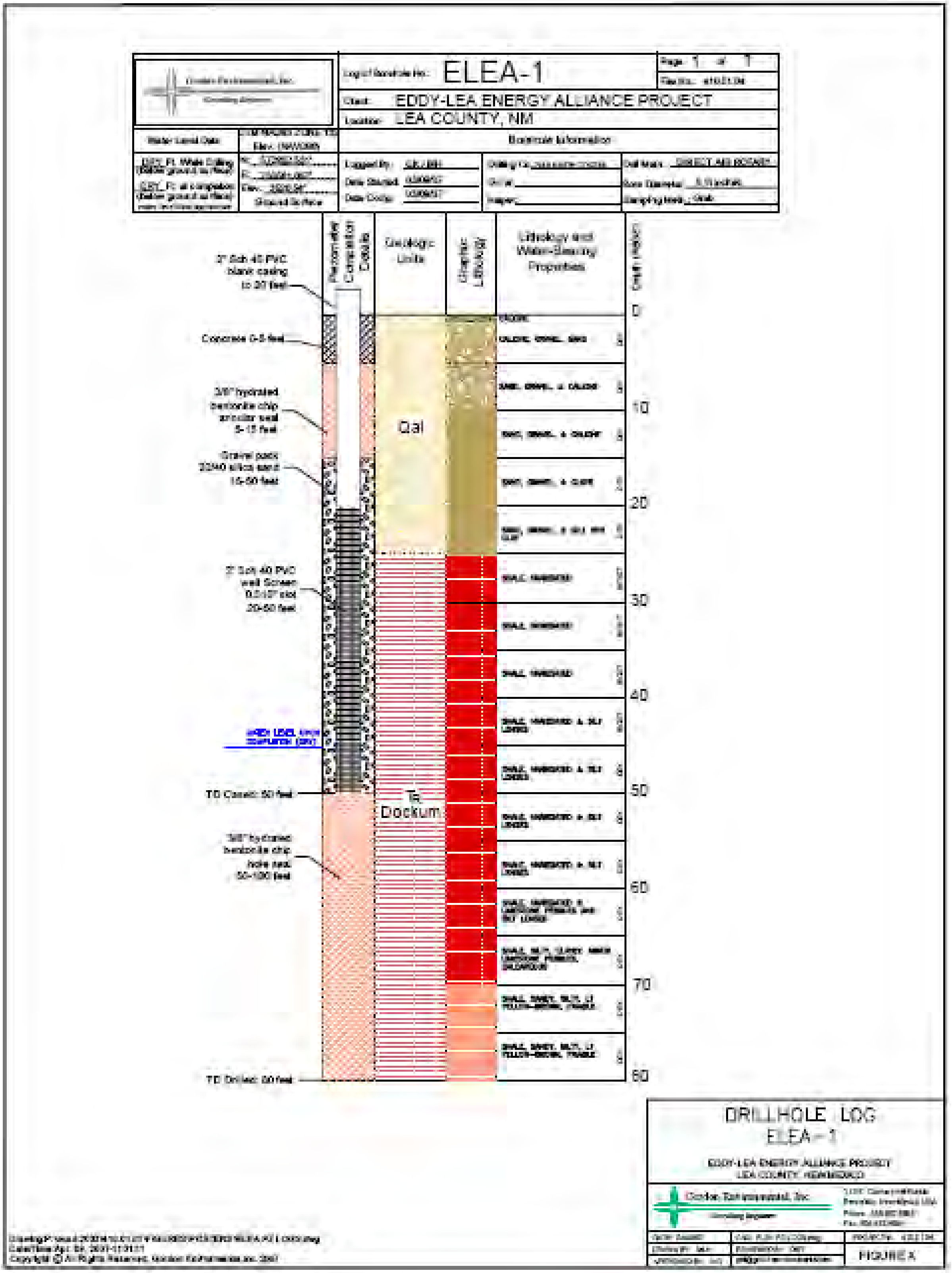


Figure 2.3.2.1-2a Drillhole Log ELEA-1

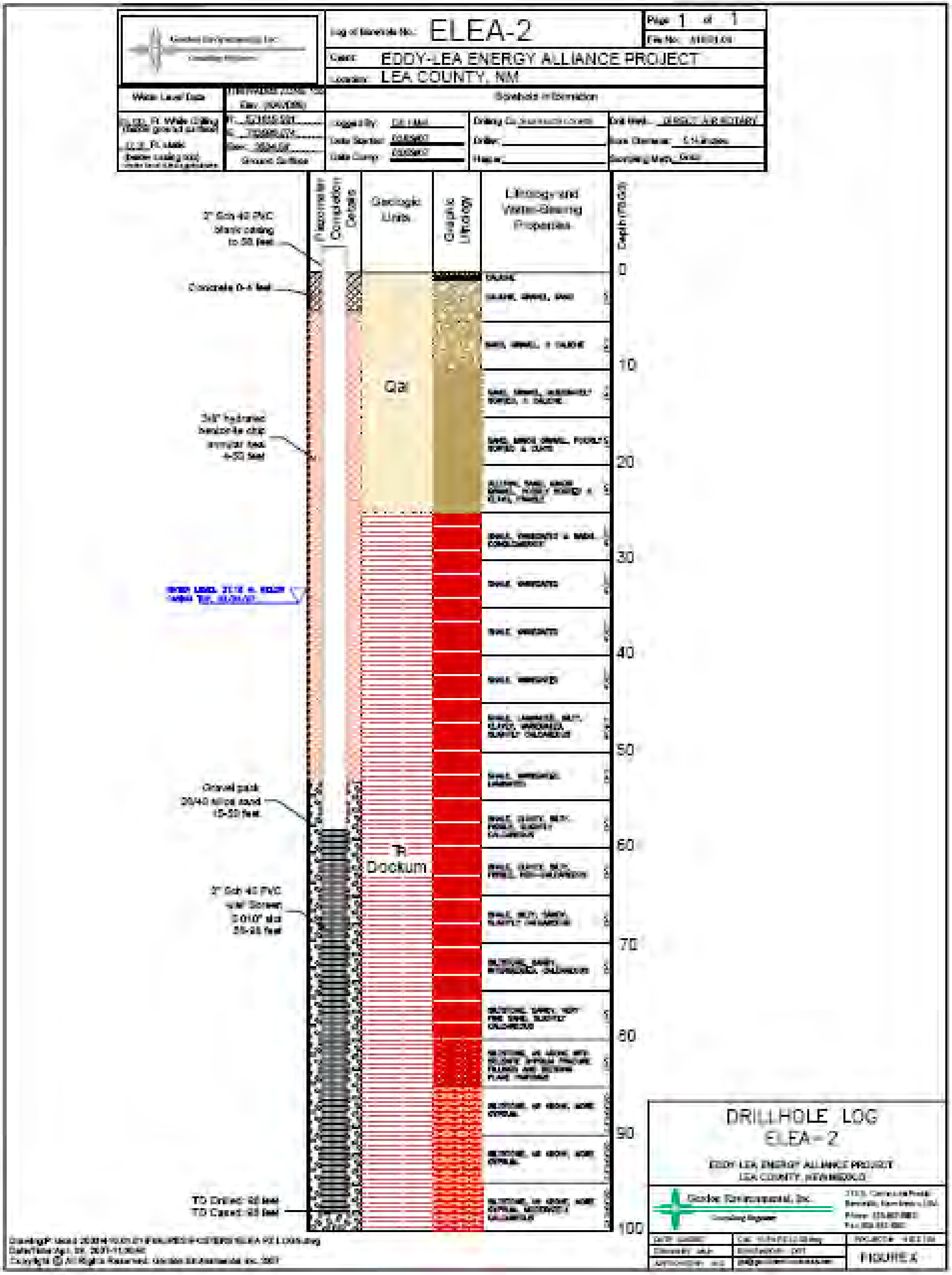


Figure 2.3.2.1-2b Drillhole Log ELEA-2

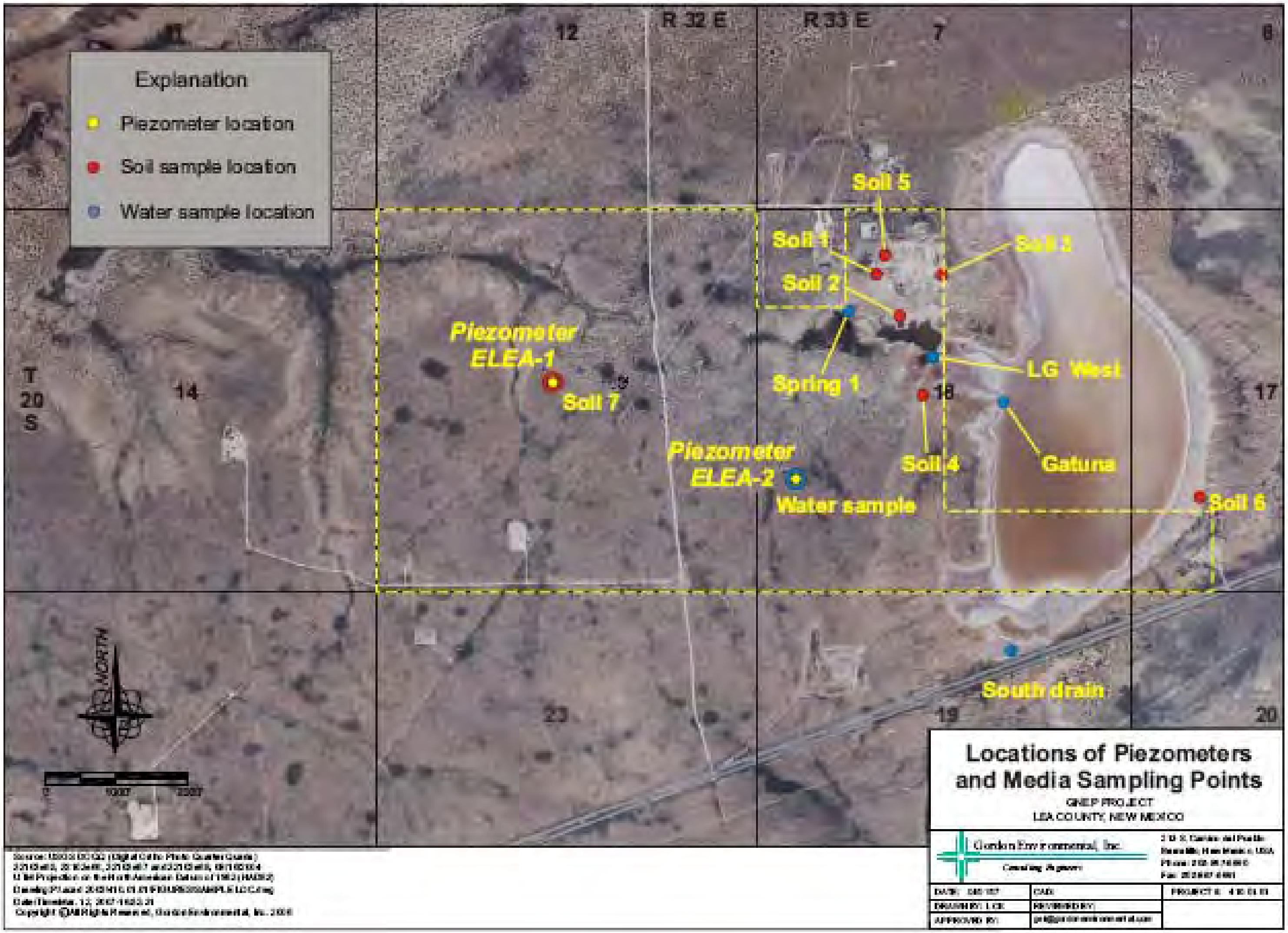


Figure 2.3.2.1-3 Location of Piezometer and Media Sampling Points

Figure 2.3.2.1-4 Oilfield Disposal Sites and Impact Areas

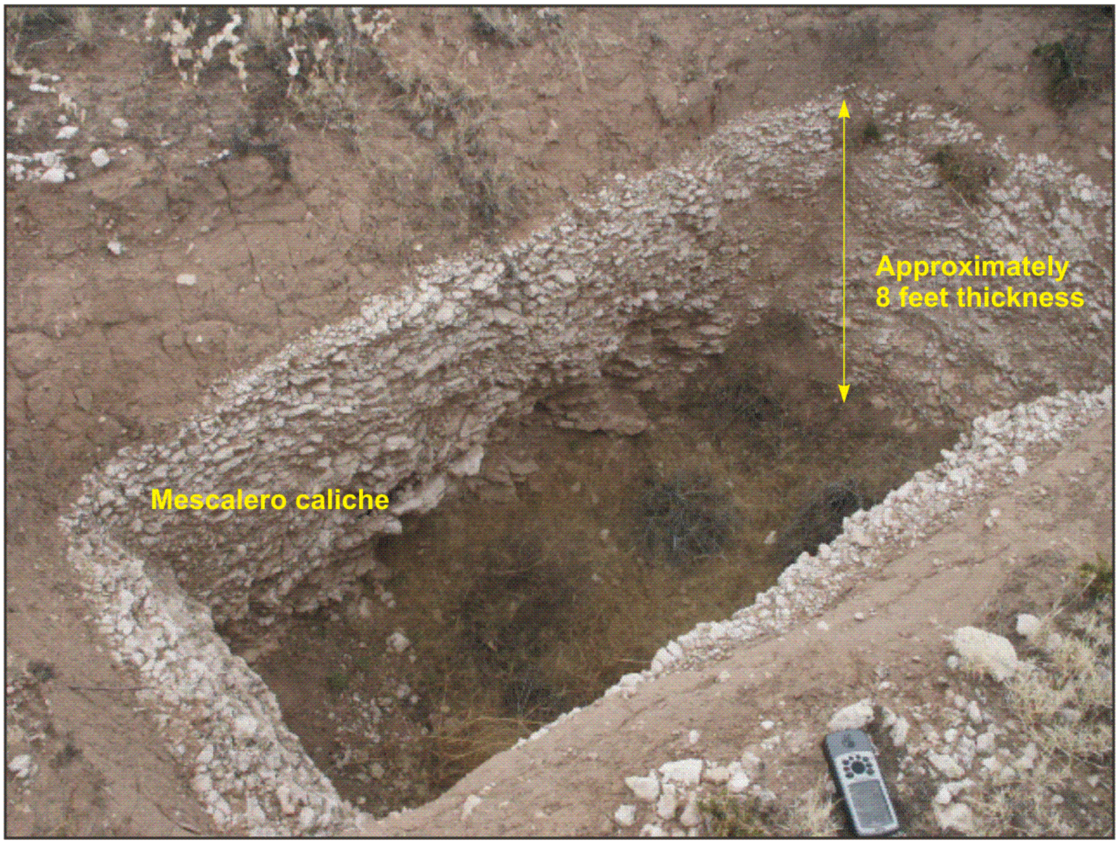


Figure 2.3.2.1-5 Photo of Mescalero Caliche in Test Pit South of the Pronghorn Saltwater Disposal Inc Facility

2.3.2.2 Stratigraphy

Rocks that outcrop in eastern Eddy County and western Lea County in the vicinity of the Site include Permian, Triassic, Tertiary, and Quaternary deposits (Hendrickson and Jones, 1952). Discussion of stratigraphy here focuses on rocks of Permian and younger age. Post-Pennsylvanian geologic units of the area are identified on the stratigraphic nomenclature chart in Figure 2.3.2.2-1 (Hendrickson and Jones, 1951 and Hawley et al., 1993).

Permian stratigraphy in the Delaware Basin is highly influenced by the Capitan Reef Complex and its control on depositional environments in the middle Permian. Significant reef developments are present through 7,000 vertical feet of middle Permian strata along the reef complex. Middle Permian sediments on the south or basin side of the reef (fore-reef, or basin facies) are principally clastic sandstones and shales; mid-Permian sediments on the north or shelf side of the reef (back-reef, or shelf facies) are primarily carbonates. This relationship is depicted in the geologic cross section in Figure 2.3.2.2-2. Due to the dramatic differences in lithology across the reef complex, separate stratigraphic nomenclatures for basin facies and shelf facies have evolved to represent and discuss these rocks.

Permian Rocks

The basin facieses of the Permian section is divided into four series: Wolfcampian, Leonardian, Guadalupian, and Ochoan.

Wolfcampian Series. The Wolfcamp varies in lithology, grading from primarily limestone that thins or is absent along the crest of the Central Basin Platform to dark shale and sandstone in the Delaware Basin (Nicholson and Clebsch, 1961). Both the clastic and limestone facies of the Wolfcamp have been recognized as oil and gas exploratory targets (Powers et al., 1978).

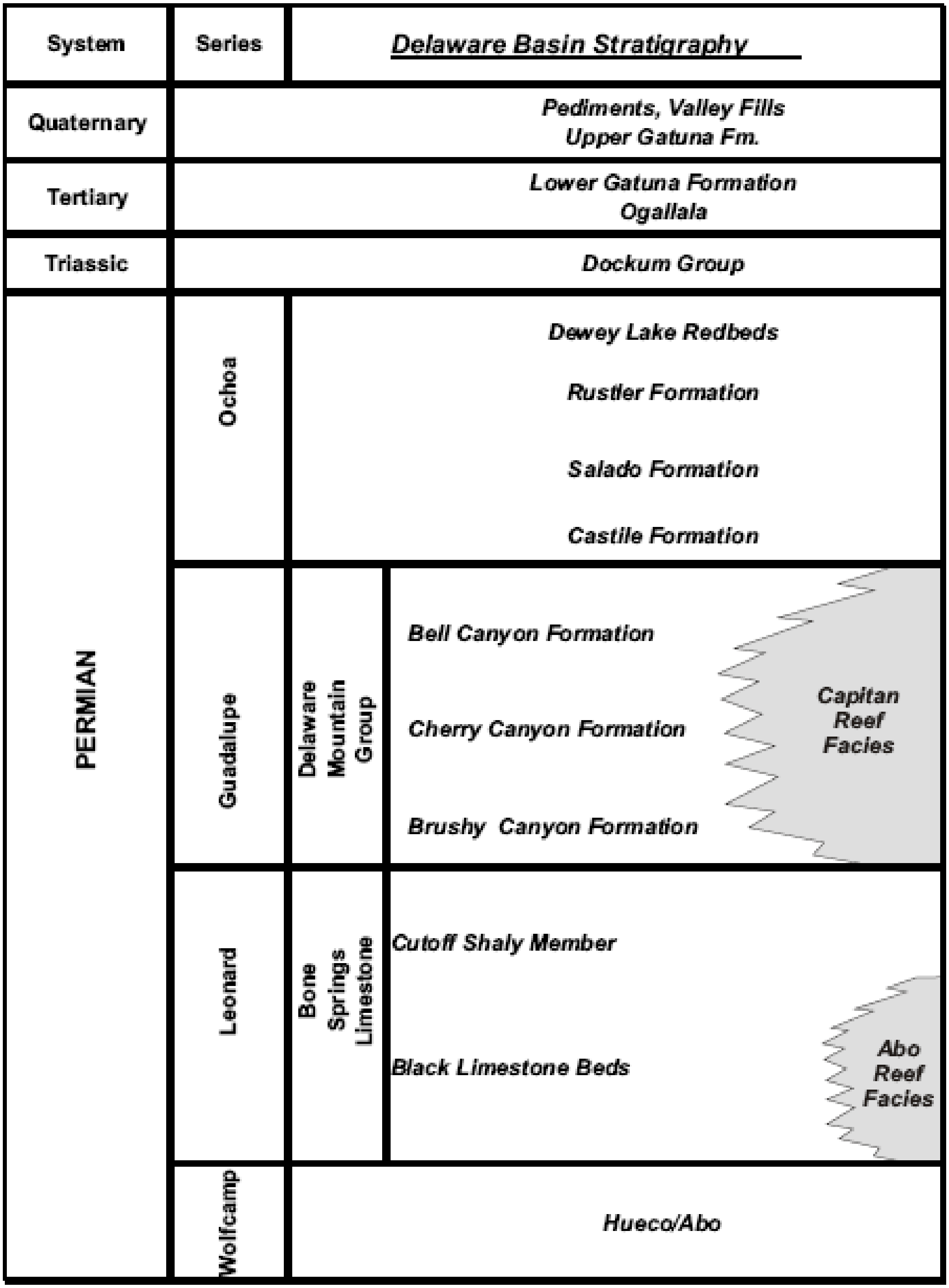


Figure 2.3.2.2-1 Post-Pennsylvanian Stratigraphy of the Delaware Basin (from Hendrickson and Jones, 1952 and Hawley et al., 1993)

Leonardian Series. The Leonardian consists mostly of the Bone Springs limestone, which is dark gray thinly-bedded argillaceous limestone containing thin beds of fine sandstone and interbedded black calcareous cherty shale sequence that is as great as 3,000 feet in thickness. A major reef development (the Abo reef) is present in Bone Springs limestone lateral equivalent (Figure 2.3.2.2-2). The Abo reef comprises one of the most prolific oil and gas producing provinces in southeastern New Mexico.

Guadalupian Series. The Guadalupian series consists mostly of sandstones and shales in the basin facies and limestones in the shelf facies. The basin facies are known as the Delaware Mountain Group, consisting of light gray, very fine grained sandstone and siltstones separated by grey shales or limestones, dolomites, or evaporites (Powers et al., 1978). The Delaware Mountain Group contains important oil and gas exploratory targets in the Delaware Basin (Ventrees, et al., 1959). The Group is divided into three formations from oldest to youngest; the Brushy Canyon, the Cherry Canyon and the Bell Canyon Formations. Each of these sandstone units is up to 1,000 feet thick.

The lateral equivalent to the Delaware Mountain Group is the Capitan limestone and the Goat Seep dolomite, which are the loci of major reef developments. The Capitan Reef is depicted in the tectonic and structure map in Figure 2.3.2.2-3, as well as the cross section in Figure 2.3.2.2-2. The Goat Seep dolomite consists of massive reef and fore-reef talus facies (Hayes, 1964) and thick-bedded light gray fine crystalline and locally porous dolomite. The Capitan limestone is a light-colored, fossiliferous, locally vuggy limestone and breccia (Hayes, 1964). The Capitan limestone forms an arc around the west, north, and east margins of the Delaware Basin. The Capitan limestone comprises a significant fresh water aquifer where it is thinly buried on the west margin of the basin and receives recharge on its outcrop in the Guadalupe Mountains. The Capitan Aquifer contributes significant recharge to the Pecos River. Utilization of water from this unit for municipal, industrial, and extractive industry has been the subject of detailed analyses for potential impacts to in-stream flow in the Pecos River (Hiss, 1978).

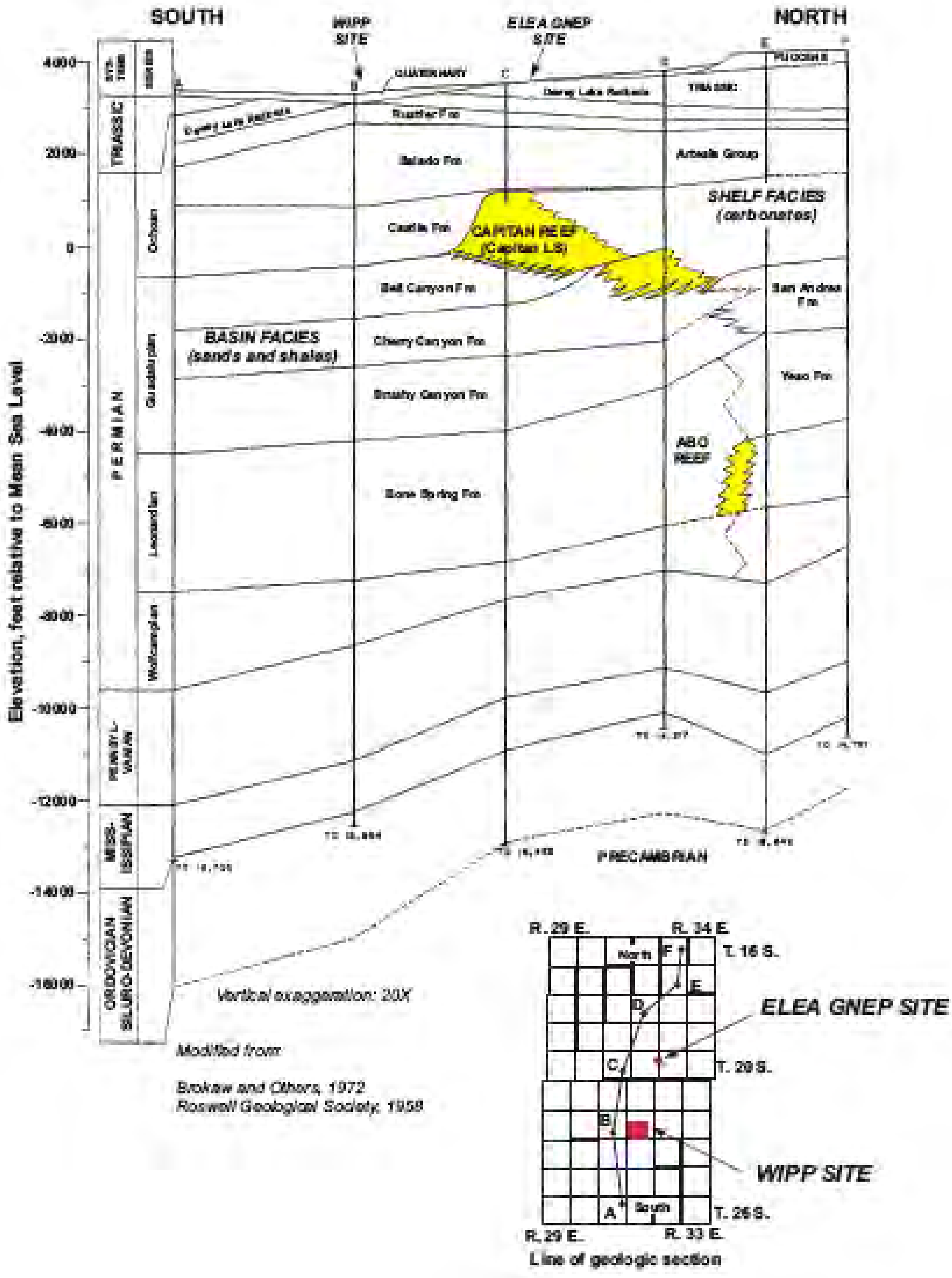


Figure 2.3.2.2-2 Geologic Cross Section Through the Capitan Reef Area, Eddy and Lea Counties, NM

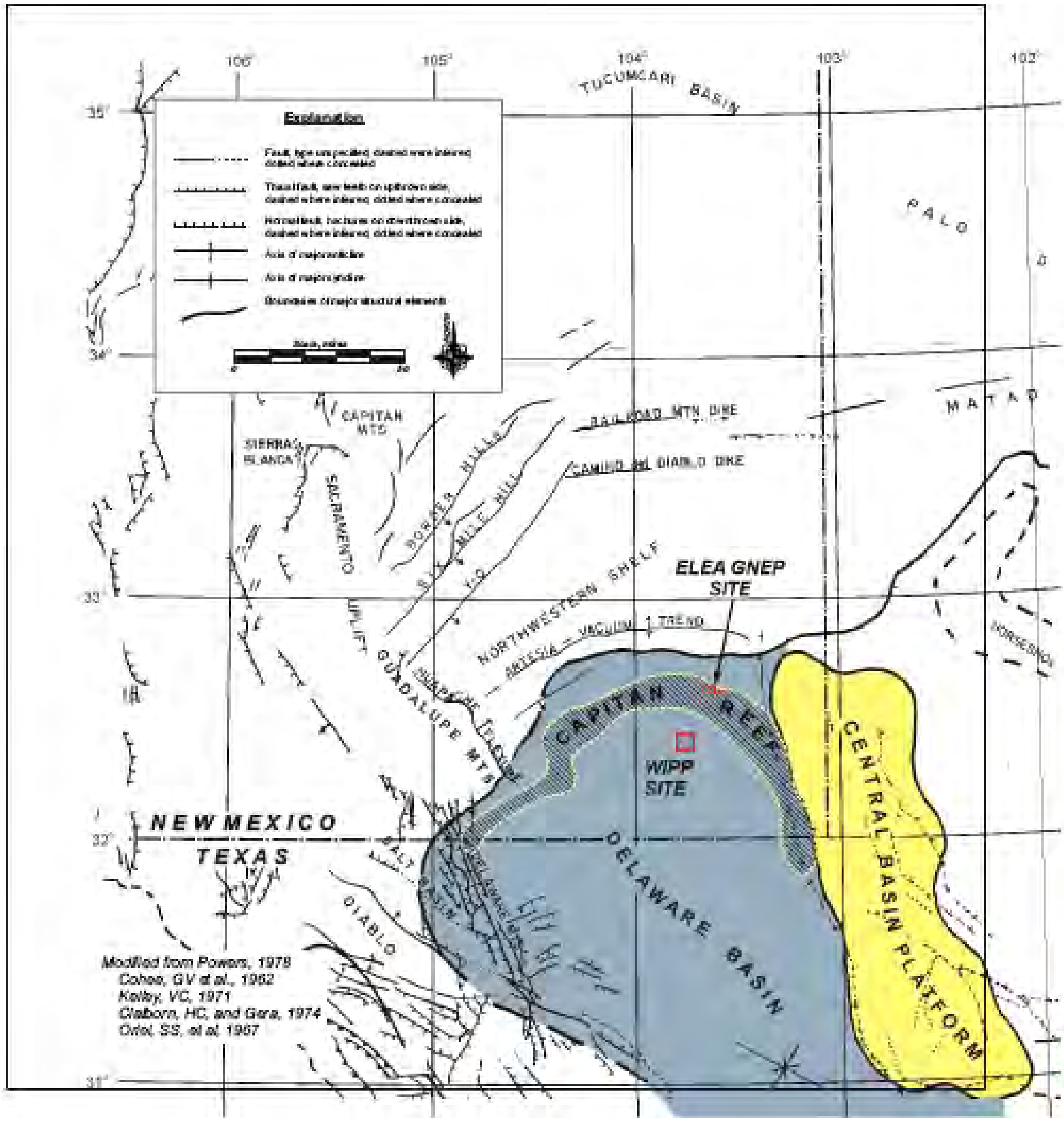


Figure 2.3.2.2-3 Major Regional Geological Structures near the Site (Powers et al., 1978)

Ochoan Series. The Ochoan series is composed primarily of evaporite deposits that formed during regressive events of shallow sea waters (Nicholson and Clebsch, 1961). The lowermost unit is the Castile Formation, consisting principally of anhydrite, gypsum, and small amounts of halite, dolomite and sandstone. The Castile Formation ranges in thickness from as much as 2,000 feet in the basin to being absent outside the reef boundary (Powers et al., 1978).

The lower middle portion of the Ochoan Series is the Salado Formation, which consists primarily of halite and anhydrite with lesser amounts of red mudstones and sandstones. The Salado Formation also contains significant accumulations of valuable potash mineral ore (Vine, 1963). Potash ore zones have been named and identified through approximately the upper half of the upper Salado Formation, but major production has historically been from about the middle third of the formation. The Salado Formation is laterally extensive, and is continuous from the basin area and well beyond the shelf area, thinning gently northward and eastward (Powers et al., 1978).

The upper middle portion of the Ochoan Series is the Rustler Formation. In the vicinity of the Site, the lower portion of the Rustler Formation consists of over 100 feet of siltstone and very fine grained sandstone, interbedded with gypsum and anhydrite. Above the mudstone at the top of the Los Medaños Member is the Culebra Dolomite, a 30-foot thick section of microcrystalline dolomite that is characterized by spherical vugs. Overlying the Culebra, the Tamarisk member consists of 115 feet of massive anhydrite and gypsum. Over the Tamarisk member, the Magenta member consists of 20 feet of thin, wavy, lenticular laminae of dolomite and gypsum. The uppermost portion of the Rustler Formation is the Forty-Niner member, which consists of 65 feet of anhydrite (Powers et al., 1978).

Overlying the Rustler Formation is the Dewey Lake Redbeds, 600 feet of red shale and siltstone. This unit is laterally extensive and was deposited in the shallow water remaining in the Delaware Basin before final sea regression (Mercer and Orr, 1977). Five hundred feet of Dewey Lake Redbeds have been identified in oil well logs in the immediate vicinity of the Site. Surficial geology in the vicinity of the Site is depicted in the geologic map in Figure 2.3.2.2-4. The Dewey Lake Redbeds outcrop in an exposure belt south of Highway 62/180 seven miles southwest of the Site.

Triassic Rocks

Due to lack of deposition or erosion, or both, no rocks from the early portion of the Triassic period are present in the vicinity of the Site. Upper Triassic rocks rest unconformably on late Permian aged Dewey Lake Redbeds in the area. The upper Triassic section consists of up to 1,500 feet of reddish brown shales, siltstones, and fine grained sandstones known as the Dockum Group (Brokaw, et al., 1972). The Dockum Group has been divided into the Santa Rosa Sandstone and the overlying Chinle Formation; however, these two units have not been differentiated in the vicinity of the Eddy and Lea County line.

The Dockum Group outcrops in several areas in the vicinity of the Site. Dockum Group redbeds have been observed in exposures around the flanks of Laguna Gatuna, Laguna Plata, and along an outcrop belt (See local surface geology, Figure 2.3.2.2-4). The Dockum Group is thinly buried by alluvial pediment deposits in the vicinity of the Site. Available unpublished oil well and water well logs and file data of the OCD and the New Mexico State Engineer Office (OSE), as well as published resources were reviewed to evaluate the subsurface stratigraphy in the vicinity of the Site. Summaries of oil well and water well records are included with this report in Table 2.3.2.2-1 and Table 2.3.2.2-2.

The hydrogeologic cross section in Figure 2.3.2.2-5 depicts the distribution of surface alluvium and underlying Dockum Group redbeds in the vicinity of the Site.

Tertiary-Quatemary Rocks

Jurassic rocks are not known to have been deposited in southeastern New Mexico. Cretaceous rocks were deposited in the area, but have been almost entirely removed by erosion (Powers et al., 1978). Following the Cretaceous deposition, regional uplift exposed most of southeastern New Mexico and the Ogallala Formation, consisting of up to 400 feet of fluvial sand, gravel, silt, and clay, were deposited over irregular terrain (Bachman, 1976). The Ogallala is capped by a very dense layer of pisolitic caliche that ranges in thickness from a few feet to as much as 60 feet. Following Pliocene time, the Ogallala was removed in much of southwestern Lea County and eastern Eddy County. The Ogallala remains on the High Plains in northeastern Lea County. The caliche is resistant to erosion and forms a prominent ledge along Mescalero Ridge and the western margin of the High Plains province (see physiographic map, Figure 2.8.1-1).

During Pleistocene and Holocene time, the Ogallala and underlying units continued to erode and well-developed drainage systems developed in the area. Local deposits of mixtures of Ogallala and older units formed in low-lying areas, forming the Gatuna Formation. The Gatuna Formation is likely of early to middle Pleistocene age and is up to several hundred feet thick. Depending upon the location and nearby sediment source rocks, the Gatuna Formation consists of reddish brown friable sandstone, siltstone, siliceous conglomerate, and locally; gypsum and claystone (Powers et al., 1978).

Above the Gatuna Formation and on other pediment alluvial materials, laterally extensive caliche deposits called the Mescalero are present across much of southeastern New Mexico. The Mescalero is described as a sandy light gray to white lower nodular and upper laminar caliche zone that ranges in thickness from

3 to 10 feet. Bachman (1973) characterized this unit as a remnant of an extensive soil profile. The Mescalero is present across the Site and is exposed in an arc along the north and west margins of Laguna Gatuna. The unit is 10 feet thick at the Site (See Figure 2.8.1.1-8).

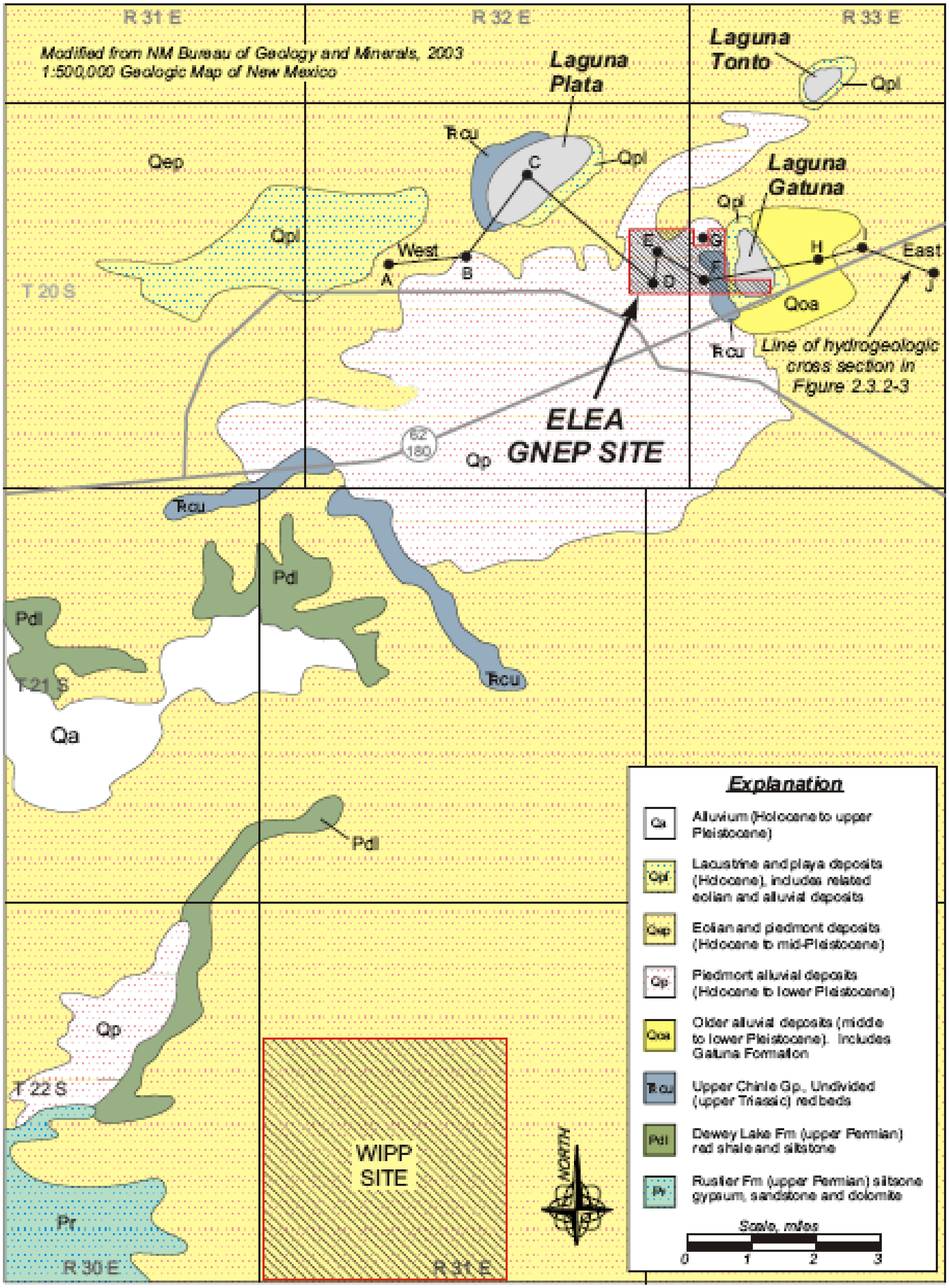


Figure 2.3.2.2-4 Surficial Geology in the Vicinity of the Site

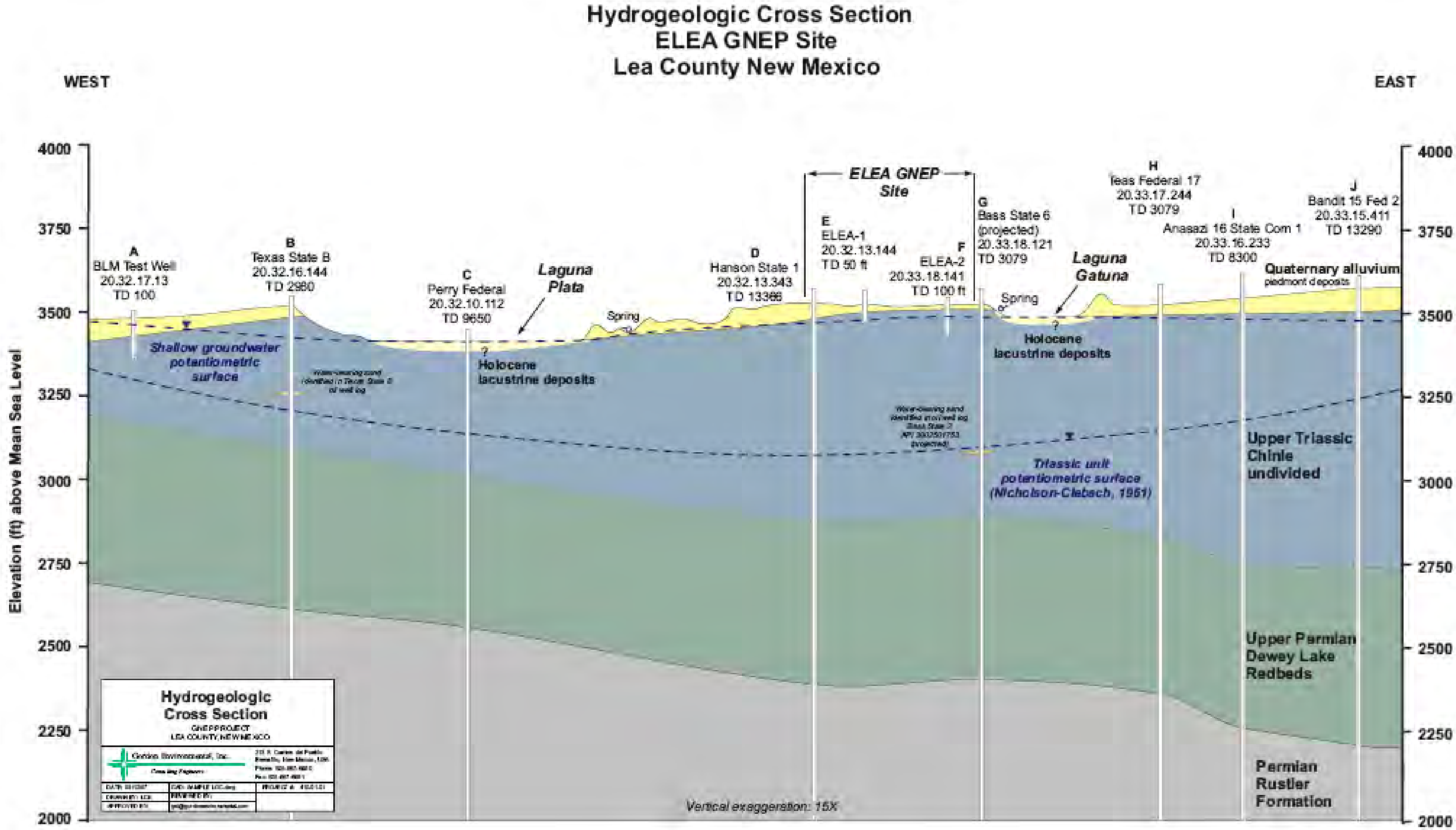


Figure 2.3.2.2-5 Hydrogeologic Cross Section

Playas and shallow lakes are present in several low-lying areas in western Lea County and eastern Eddy County. Several of these low-lying areas contain ephemoral lakes, including Laguna Grande, Laguna Plata, Laguna Gatuna, and Laguna Tonto. Lacustrine deposits including clay, silt, sand, gypsum, carbonate, and halite, as well as associated eolian sands are present in the playas; these units were deposited in Late Pleistocene and Holocene time (Hendrickson and Jones, 1952). Visual inspection of shallow stratigraphy at Laguna Gatuna indicates that a grayish-white lacustrine clay exceeding 10 feet in thickness is present. At least three subsequent periods of sand dune development related to the playa were also noted. A white sandy eolian unit up to 5 feet thick rests on the lacustrine clay. A dark reddish brown silty vertically-jointed eolian unit which is as much as 15 feet thick rests on the lacustrine eolian unit. A more recent deposit of light brown very friable eolian sand forms an arc-shaped ridge along the east margin of Laguna Gatuna. This unit reaches a maximum thickness of 45 feet immediately east of the playa.

Table 2.3.2.2-1 Information from Water Wells in the Vicinity of the Site

Location: Location of wells New Mexico Prime Meridian land location system

USGS 2007 Numbe Well control number in United States Geological Survey database

Well Elevation: Elevation of land surface or wellhead (if indicated) at well in feet above MSL

Use: Type of water use

Well Depth: Total depth of well, in feet below land surface

Geologic Unit: Geologic unit well produces from; Rslr, Rustler Fm.; Tr, Triassic rocks; To, Ogallala Fm; Qal, Quaternary alluvium

Water Level: Depth, feet to water below land surface, or other, as indicated

Source of Data: Nicholson and Clebsch, 1961, New Mexico Bureau of Mines Ground-Water Report 3

Hendrickson and Jones, 1952, New Mexico Bureau of Mines Ground-Water Report 6

Kelly, 1984: Geohydrology Associates Inc., Report to Pollution Control, Inc.

USGS, 2007: Unitedd States Geological Survey Database, 2007

Gordon, 2007: Gordon Environmental site assessment March 2007

WGI, 2007: Washington Group field data, March 2007

Location	Latitude	Longitude	USGS 2007 Number	Well Elevation	Use	Well Depth (ft)	Geologic Unit	Water Level (ft)	Elev Water Table (ft)	Depth to Triassic Shale (ft)	Elev. Top Triassic Shale (ft)	Date of Measurement	Remarks	Source of Data
19.31.28.330				3480	Domestic		Tr	180.00	3300.00			11/29/1948	Windmill	Hendrickson & Jones, 1952
19.31.33.110				3450	Not used	160	Tr	100.70	3349.30			11/29/1948	Abandoned	Hendrickson & Jones, 1952
19.31.33.110a				3450	Stock		Tr	103.00	3347.00			11/29/1948	Gas pump	Hendrickson & Jones, 1952
19.31.33.110b				3450	Stock		Tr					11/29/1948	Windmill	Hendrickson & Jones, 1952
19.32.8.200				3650	Stock		Tr	365.30	3284.70			12/9/1958		Nicholson & Clebsch 1961
19.32.36.100				3565	Dom Stock	485	Tr							Nicholson & Clebsch 1961
19.33.5.213				3710	Stock		Tr	>299				12/9/1958	Pumping WL	Nicholson & Clebsch 1961
19.33.26.244				3600	Dom Stock	101	Qal	92.90	3507.10			7/1/1954		Nicholson & Clebsch 1961
19.34.9.114				3790	Stock	33	Tr?	28.60				6/3/1954		Nicholson & Clebsch 1961
20.31.13.440				3450	Stock		Tr (?)	45.00	3405.00			12/22/1948	Windmill	Hendrickson & Jones, 1952
20.31.15.130				3450	Stock	70	Tr (?)	63.10	3386.90			12/22/1948	Windmill	Hendrickson & Jones, 1952
20.31.16.240				3460	Stock	110+	Tr (?)	61.20	3398.80			12/22/1948	Windmill	Hendrickson & Jones, 1952
20.32.1.322				3510	Stock	30	Qal	21.80	3488.20			1/25/1984	Nonpotable	Nicholson & Clebsch 1961
20.32.13.1441	32.34.429	103.43.215		3526.54	ELEA-1	50	Tr	47.90		26	3500.54	3/9/2007	24 hr after compl	Gordon 2007
								47.94				3/10/2007		Gordon 2007
				*MP = LS + 2.71 ft				48.17				3/20/2007		WGI 2007
								48.72				3/22/2007	after bail test 3-21	WGI-2007
								49.10				3/26/2007		WGI-2007
				DRY (saturation from hyhdrating bentonite seal)				51.65				4/6/2007		WGI-2007
20.32.17.13				3475	BLM Test	100	Qtal	9.00	3466.00	20	3455.00	2/28/1979	Very Salty	Kelly 1984
20.32.18.233				3450	Industrial	400	Tr	89.20	3360.80			3/24/1954	Water zone 215-243	Nicholson & Clebsch 1961
20.32.22.33				3525	BLM Test	170	Tr/qal	30.00	3495.00	40	3485.00	2/28/1979	Fresh	Kelly 1984

Table 2.3.2.2-1 Information from Water Wells in the Vicinity of the Site (continued)

Location	Latitude	Longitude	USGS 2007 Number	Well Elevation	Use	Well Depth (ft)	Geologic Unit	Water Level (ft)	Elev Water Table (ft)	Depth to Triassic Shale (ft)	Elev. Top Triassic Shale (ft)	Date of Measurement	Remarks	Source of Data
20.32.23.43312	32.54957	103.735495	2933039	3551	Commercial	78	Tr	39.40	3511.60			5/29/1968		USGS 2007
								37.46				2/2/1971		USGS 2007
								36.78				2/19/1981		USGS 2007
							Tr	38.03				1/25/1984	Abandoned	Kelly 1984
								38.42				4/7/1986		USGS 2007
								39.37				5/23/1991		USGS 2007
								39.83	3511.17			1/30/1996		USGS 2007
20.32.24.144				3545	Not used	25	Qal	12.30	3532.70			6/11/1954		Nicholson & Clebsch 1961
20.32.24.33333	32.54818	103.727439	2933038	3555	Windmill	65	Qal	38.55	3516.45			5/29/1968		USGS 2007
								37.59				2/2/1971		USGS 2007
								35.33				2/24/1976		USGS 2007
							Ogll	38.72				1/25/1984		Kelly 1984
								40.22	3514.78			1/30/1996		USGS 2007
20.32.25.111				3555	Windmill	67.5	--	35.07	3519.93			12/16/1977		Kelly 1984
20.32.27.144				3545	Not used	25	Qal	12.30	3532.70			6/11/1954		Nicholson & Clebsch 1961
20.32.27.32322				3530	Stock	--	Qal	15.30	3514.70			3/29/1965		Kelly 1984
20.32.27.32411				3530	Stock	75	Qal	16.55	3513.45			2/2/1971	Unused	Kelly 1984
20.32.30.142				3500	None	--	Qal	9.90	3490.10			6/11/1954	Located in sink	Nicholson & Clebsch 1961
20.32.31.13				3549.95	BLM Test	250	Tr	135.12	3414.83	23	3526.95	3/15/1979		Kelly 1984
20.32.33.214				3518	Domestic	60	Qal	46.60	3471.40			6/6/1955	Abandoned	Kelly 1984
20.32.36.21424				3586	Windmill	65	Qal	48.46	3537.54			1/25/1984		Kelly 1984
20.32.36.214				3588	Stock	60	Qal	46.60	3541.40			6/6/1955	West well of 3	Nicholson & Clebsch 1961
20.32.36.221				3588	Stock	53.7	Qal	45.31	3542.69			12/16/1977	Abd SC 2000	Kelly 1984
20.33.4.43211				3556	Used Windmill	58	Qal	33.19	3522.81			3/19/1968	Plugged 1/25/84	Kelly 1984
20.33.5.34321				3550	Oil Test	680	Tr	325.00	3225.00			2/17/1966		SEO
20.33.5.34321				3550	Oil Test	680	Tr	278.57	3271.43			2/2/1971		Kelly 1984
20.33.15.221				3570	Not used		Tr	336.10	3233.90			4/20/1955		Nicholson & Clebsch 1961
20.33.18.3134	32.34.193	103.42.557		3534.54	ELEA-2	100	Tr	47.51	3487.03	25	3509.54	3/10/2007		Gordon 2007
								37.38	3497.16			3/20/2007		WGI 2007
				*MP = LS + 2.40 ft				37.16	3497.38			3/26/2007		WGI 2007
20.33.18.12322				3520	Open hole	--	Tr	249.88	3270.12			3/19/1968	Abandoned	Kelly 1984
20.33.21.111				3536	Windmill	47.5	Tr	35.42	3500.58			1/25/1984	Inoperative	Kelly 1984
20.33.24.122				3630	Stock	700+	Tr	300+				--		Nicholson & Clebsch 1961
20.33.24.124113				3633	Stock	676	Tr	413.55	3219.45			2/3/1971	Used	Kelly 1984

Table 2.3.2.2-1 Information from Water Wells in the Vicinity of the Site (continued)

Location	Latitude	Longitude	USGS 2007 Number	Well Elevation	Use	Well Depth (ft)	Geologic Unit	Water Level (ft)	Elev Water Table (ft)	Depth to Triassic Shale (ft)	Elev. Top Triassic Shale (ft)	Date of Measurement	Remarks	Source of Data
20.34.4.44434				3635	Stock	200+	Tr	172.19	3462.81			2/3/1971		
20.34.17.334				3635	Stock	200	Tr	140.00	3495.00			7/1/1954	Pumping WL	Nicholson & Clebsch 1961
20.34.22.223				3655	Stock	235	Tr							Nicholson & Clebsch 1961
20.34.22.222333				3656	Stock	250	Tr	214.98	3441.02			2/3/1971		Kelly 1984
20.35.1.221				3655	Observation	35	Qal	24.50	3630.50			11/16/1953	Dug well	Nicholson & Clebsch 1961
20.35.31.113				3740	Stock	85	To	68.40	3671.60			6/25/1954	Recently pumped	Nicholson & Clebsch 1961
20.35.33.433				3700	Stock	135	To	94.10	3605.90			6/25/1954	Pumping WL	Nicholson & Clebsch 1961
20.35.35.333				3690	Dom Stock	105	To	88.90	3601.10			4/15/1954	Pumping WL	Nicholson & Clebsch 1961
21.31.2.221				3569	Abandoned	31.87		30.15	3538.85			10/19/1977		Kelly 1984
21.31.3.22				3519.59	BLM Test	200	Tr	142.00	3377.59	30	3489.59	2/28/1979		Kelly 1984
21.31.7.331				3350		367	Rslr	192.10	3157.90			9/14/1972	Conductance 3500	Kelly 1984
21.31.18.411				3310	Stock		Rslr	158+				3/17/1976	Conductance 3200	Kelly 1984
21.32.6.11131				3597	Stock	55	To	44.04	3552.96			2/3/1971	Used windmill	Kelly 1984
21.33.2.231				3810	Domestic	1150	Tr		3810.00					Nicholson & Clebsch 1961
21.33.2.24141				3792	Domestic	120	Tr	104.54	3687.46			11/16/1965	Abandoned	Kelly 1984
21.33.2.24233				3791	Not used	120	Tr	104.01	3686.99			11/16/1965	Open Hole Abd	Kelly 1984
21.33.2.42214				3785	Not used	150	Tr	85.13	3699.87			2/4/1971	Open cased hole	Kelly 1984
21.33.2.422				3805	Domestic	120	To	107.20	3697.80			6/28/1954		Nicholson & Clebsch 1961
21.33.2.42233				3768	Dom Stock	102	Tr	83.20	3684.80			2/4/1971		Kelly 1984
21.33.2.422334				3768	Stock	100	Tr	79.13	3688.87			11/16/1965	Use windmill	Kelly 1984
21.33.2.442				3800	Stock		To	72.90	3727.10			6/28/1954	West side of sink	Nicholson & Clebsch 1961
21.33.2.442a					Dom Stock		To						East sid of sink	Nicholson & Clebsch 1961
21.33.11.11144				3820	Stock	195	To	144.52	3675.48			2/4/1971		Kelly 1984
21.33.18.112				3900	Stock		To	143.00	3757.00			6/21/1954		Nicholson & Clebsch 1961
21.33.18.11410				3892	Stock	160	To	148.13	3743.87			11/16/1965	Used windmill	Kelly 1984
21.33.18.12314				3855	Stock	123	To	117.50	3737.50			2/4/1971	Used windmill	Kelly 1984
21.33.25.42322				3666	Stock			58.95	3607.05			2/4/1971	Used windmill	Kelly 1984
21.33.28.124				3690	Not used	224	Tr	179.50	3510.50			6/30/1954	"standard' well	Nicholson & Clebsch 1961
21.33.28.12443				3688	Stock	224	Tr	178.62	3509.38			2/4/1971	"standard' well	Kelly 1984
21.34.1.24122				3662	Stock		Tr	68.92	3593.08			2/10/1971	Used windmill	Kelly 1984
21.34.8.422				3705	Stock	120	To	105.80	3599.20			3/30/1954		Nicholson & Clebsch 1961
21.34.8.422				3706	Stock		To	105.64	3600.36			2/10/1971	Used windmill	Nicholson & Clebsch 1961
21.34.13.324				3655	Domestic	335	Tr	200.00	3455.00			1943		Nicholson & Clebsch 1961
21.34.21.13141				3677	Not used	196	Tr	99.61	3577.39			2/10/1971		Kelly 1984
21.34.23.223				3660	Ind. Domestic	220	To	150.00	3510.00			1954		Nicholson & Clebsch 1961
21.34.24.222				3655	Domestic	125	Tr(?)							Nicholson & Clebsch 1961
21.34.33.233				3665	Not used	80	To	67.00	3598.00			6/6/1955	"christman" well	Nicholson & Clebsch 1961
21.34.33.233441				3641	Stock	92	To	64.45	3576.55			2/4/1971	Used windmill	Kelly 1984

Table 2.3.2.2-1 Information from Water Wells in the Vicinity of the Site (continued)

Location	Latitude	Longitude	USGS 2007 Number	Well Elevation	Use	Well Depth (ft)	Geologic Unit	Water Level (ft)	Elev Water Table (ft)	Depth to Triassic Shale (ft)	Elev. Top Triassic Shale (ft)	Date of Measurement	Remarks	Source of Data
22.33.13.200				3510	Stock	508	Tr						Water zone 420-470	Nicholson & Clebsch 1961
22.34.12.111				3530	Dom Stock	62	Qal	48.00	3482.00			1951		Nicholson & Clebsch 1961
22.34.12.114				3515	Stock	16	Qal	12.60	3502.40			3/17/1954	Infiltration tunnel	Nicholson & Clebsch 1961

Table 2.3.2.2-2 Information from Oil/Gas Wells in the Vicinity of the Site

Location: Location of wells in New Mexico Prime Meridian land location system
Location within Section: Location of wells in feet relative to north, south, east or west section boundaries
API Number: American Petroleum Institute database well control number
Name: Leasee name, state or federal lease, and sequential well number in lease
Field: New Mexico Oil Conservation Division well field and producing zone name

Source of Data: New Mexico Oil Conservation Division database, 2007

Location	Location within Section	Latitude	Longitude	API Number	Name	Field	Drill Date	Land Surface Elevation (ft) Above MSL	Well Depth (ft)	Shallow Water Zones Depths (ft)	Depth to Top of Triassic Shale (ft)	Depth to Top of Dewey Lake Redbeds (ft)	Depth to top of Rustler (ft)	Depth to Top of Salt	Depth to Bottom of Last Salt (ft)	Depth to top Yates (ft)	Depth to Top of Reef (ft)	Depth to Top of Delaware (ft)	Depth to Top of Cherry Canyon (ft)	Depth to Top of Bone Spring (ft)
20.32.1	2310 FSL 990 FWL			3002531584	Snyder AKY No. 1	E. Lusk Delaware	1994	3485	7930				1105			3197	3630	4602	4852	7863
20.32.10	330 FNL 990 FWL			3002500935	Perry Fed 1		1957	3430	14367				840							
20.32.12	660 FSL 660 FEL			3002500937	Monroe 1	Halfway	1943	3527	3126	515-535	25		1045		2610					
20.32.13	660 FSL 1980 FWL	32.567	103.72122	3002524997	Hanson State	S. Lk Bone Spr	1976	3534	13366			635	1120			3256		5245		7866
20.32.13	660 FSL 1980 FWL	32.567	103.72122	3002524997	Hanson State	S. Lk Atoka gas		3534												
20.32.13	660 FSL 1980 FWL	32.567	103.72122	3002524997	Hanson State	Wildcat Atoka gas		3534												
20.32.14	1980 FSL 1980 FEL			3002526826	Belko Fed 1	Undes. Deleware	1992		13250					1500	2910	3110	3610	4750		7730
20.32.16	2310 FNL 1980 FWL			3002500939	Texas State B		1940	3511	2627	250	15	400	875	1020	2300					
20.32.23	1980 FSL 1980 FWL			3002526414	Baetz 23 No. 1	Salt Lake Bone Sp	1979	3546	13460				1065		2910		3544	5122		7833
20.32.24	660 FNL 660 FWL			3002526416	Boyd A No. 1	Wildcat	1980	3537.4												
20.33.7	660 FSL 660 FWL	32.5815	103.70849	3052505403	Brooks Federal 1	Salt Lake Yates	1941	3530	3110				1104	1276	2620					
20.33.7	660 FSL 1980 FWL	32.58152	103.70421	3002501710	Brooks Federal 7	Salt Lake Yates		3535	3075				1110	1275	2619					
20.33.7	660 FSL 1980 FEL			3002501711	Brooks Federal 3	Salt Lake Yates	1963?	3503					1120	1280	2620					
20.33.7	1980 FSL 2000 FWL			3002501712	Brooks Federal 4	Salt Lake Yates	1962	3540	3064				1132		2620					
20.33.7	660 FSL 1926 FWL	32.58152	103.70438	3002501713	Brooks Federal 6	Salt Lake Yates	1957	3550	15560				1110	1250	2600					
20.33.7	660 FSL 1980 FWL	32.58152	103.70421	3052505404	Brooks	Salt Lake Yates														
20.33.7	660 FSL 660 FWL	32.5815	103.70849	3002501708	Brooks	Salt Lake Yates			3123											
20.33.15	1980 FSL 1980 FEL			3002537231	Bandit 15 Federal 2	Teas Penn Gas	2006	3580	13290			810	1354			3267	3600			
20.33.15	1980 FNL 1980 FWL			3002520459	Tenneco Federal 1	Wildcat	1964	3532						1370	2902	3084				
20.33.16	1730 FNL 1980 FEL			3002531586	Anasazi 16 State1	Teas	1995	3558	8300			770	1280							
20.33.16	990 FNL 990 FWL			3002533697	Conoco State 2	West Teas	1998						1200		2830	2975				
20.33.16	1980 FNL 660 FEL			3002530543	Snyder State 1	West Teas (dry)	1989	3550	3429				1200		2910	3014				
20.33.16	330 FNL 330 FEL			2002533144	State BF-4 (WT 641)	West Teas	1995	3552	3470							3160				
20.33.16	1980 FNL 1980 FEL			3002501740	State BF-1	West Teas	1960	3536	3278		41		1257		2805					
20.33.17	1980 FNL 330 FEL		0	3002501747	No. 1 Federal 17	West Teas	1962	3546	3286			670	1145		2850	2910				
20.33.18	330 FNL 2310 FWL	32.5788	103.70309	3002527903	Bass State 5	Salt Lake Yates	1982	3523.6	3056				1110		2640	2796				
20.33.18	330 FNL 1650 FWL	32.57879	103.70524	3002528128	Bass State 6	Salt Lake Yates	1983	3524	3079			610	1104		2653	2806				
20.33.18	330 FNL 990 FWL	32.57878	103.70738	3002521293	Bass State 3	Salt Lake Yates	1965	3533	3120				1108	1180	2590					
20.33.18	660 FNL 1980 FEL	32.57791	103.70003	3052505422	Smith	Salt Lake Yates														
20.33.18	660 FNL 1980 FEL	32.57791	103.70003	3002501749	Smith Federal 18	Salt Lake Yates	1942	3500	3034				1094	1250	2595					
20.33.18	660 FNL 2010 FEL	32.57791	103.70013	3002525172	Smith 18 Fed 2	Salt Lake Yates	1975	3511.4	3120					1260	2613	2793				
20.33.18	660 FNL 2080 FWL	32.57789	103.70383	3002520328	Bass State 1	Salt Lake Yates	1963	3522	3100				1102	1200	2630	2788				
20.33.18	660 FNL 1980 FWL	32.57789	103.70415	3052505426	Welch State	Salt Lake Yates														
20.33.18	660 FNL 1980 FWL	32.57789	103.70415	3052505425	Welch State	Salt Lake Yates														
20.33.18	660 FNL 1980 FWL	32.57789	103.70415	3052505424	Bass State	Salt Lake Yates														

Table 2.3.2.2-2 Information from Oil/Gas Wells in the Vicinity of the Site (continued)

Location	Location within Section	Latitude	Longitude	API Number	Name	Field	Drill Date	Land Surface Elevation (ft) Above MSL	Well Depth (ft)	Shallow Water Zones Depths (ft)	Depth to Top of Triassic Shale (ft)	Depth to Top of Dewey Lake Redbeds (ft)	Depth to top of Rustler (ft)	Depth to Top of Salt	Depth to Bottom of Last Salt (ft)	Depth to top Yates (ft)	Depth to Top of Reef (ft)	Depth to Top of Delaware (ft)	Depth to Top of Cherry Canyon (ft)	Depth to Top of Bone Spring (ft)
20.33.18	660 FNL 1980 FWL	32.57789	103.70415	3052505423	Bass State	Salt Lake Yates														
20.33.18	660 FNL 1980 FWL	32.57789	103.70415	3002501753	Leonard Welch St 3	Salt Lake Yates	1941	3521	3099	415-425	25		1104	1245	2600					
20.33.18	660 FNL 660 FWL	32.57787	103.70644	3052505427	Welch State	Salt Lake Yates														
20.33.18	660 FNL 660 FWL	32.57787	103.70644	3052505428	Welch State	Salt Lake Yates														
20.33.18	660 FNL 660 FWL	32.57787	103.70644	3002501751	Leonard Welch St 1	Salt Lake Yates	1941	3521	3102	415-460	12		1088	1135	2600					
20.33.18	1700 FNL 1650 FWL	32.57503	103.70518	3002520337	Bass State 2	Salt Lake Yates	1963	3499	3100				1076	1278	2635					
20.33.18	1980 FNL 1980 FWL	32.57426	103.70409	3002512787	Welch State 4	Salt Lake Yates	1941		3079											
20.33.18	1980 FNL 1980 FEL	32.57428	103.69999	3002501750	Smith	Dry and Abd			3074											
20.33.18	1980 FNL 660 FWL	32.57424	103.70638	3002501752	Welch State 2	Salt Lake Yates	1942		3104											
20.33.18	1980 FNL 660 FWL	32.57424	103.70638	3052505430	State	Salt Lake Yates			3104											
20.33.18	1980 FNL 660 FWL	32.57424	103.70638	3052505429	State	Salt Lake Yates														
20.33.18	2310 FSL 1980 FWL	32.57149	103.70406	3002521294	Bass State	Salt Lake Yates	1965	3526	3144				1109	1312	2665					
20.33.18	1980 FSL 1980 FWL	32.57058	103.70404	3052505432	Welch State	Salt Lake Yates														
20.33.18	1980 FSL 1980 FWL	32.57058	103.70404	3002501748	Welch State 1	Salt Lake Yates	1945		3117		20		1110	1266	2625					
20.33.19	990 FNL 1650 FWL	32.56242	103.70502	3002523816	Bass A Federal	Dry Abandoned	1971	3556	100											
20.33.19	1750 FSL 1650 FEL			3002522832	Bass Federal 1	Wildcat P/A	1968						1140		2705	2896	3228			
20.33.19	660 FSI 1980 FWL			3002525021	Bass Federal 3	S. Salt Lake	1975	3567	13600											
20.33.19	2205 FNL 1880 FWL			3002523806	Bass Federal 1	Wildcat	1971		3158				1130		2662	2860				

2.3.2.3 Structure

The Site is situated on the northern margin of a relatively deep sedimentary basin feature known as the Delaware Basin. During most of the Permian period, the Delaware Basin was the site of a deep marine canyon that extended across southeastern New Mexico and west Texas. Major structural elements of the Delaware Basin area are shown in Figure 2.3.2.2-3 (Powers et al., 1978). The major structures of the basin include the Guadalupe Mountains on the west side, the Central Basin Platform on the east side, and the Capitan Reef Complex on the west and north sides of the basin. The reef created steep slopes toward the basin and the thickness of sediments grows precipitously toward the center of the basin from the margin of the reef. The Central Basin Platform forms an abrupt eastern terminus to the Delaware Basin; it is a steeply fault-bound uplift of basement rocks that grew through the early and middle Paleozoic period such that most of the pre-Permian sedimentary section is missing from its apex.

Great thickness of organic-rich marine deposits in the basin and the presence of abrupt structures in the Capitan Reef Complex and Central Basin Platform combined to produce a prolific oil and gas province. These areas have been the focus of intense petroleum exploration and development activities since approximately 1920.

Surficial geology and subsurface structure across the Delaware Basin are depicted in the map and cross section in Figure 2.3.2.3-1. Thickness of sediments in the basin exceeds 20,000 feet, and Permian strata alone account for more than 13,000 feet of sedimentary materials (Oriel, et al., 1967). The Delaware Basin began tectonic development by the late Pennsylvanian period and major basin subsidence took place during the late Pennsylvanian period and early Permian period. Basin development ended in the late Permian period (Brokaw, et al., 1972). During the Triassic period, the area was uplifted, resulting in deposition of clastic continental shales (redbeds). Continuing uplift resulted in erosion and/or non-deposition until the middle to late Cenozoic period, when regional eastward tilting completed structural development of the basin as it exists today (Stipp, 1954). Shallow subsurface structure at the Site consists of gently east sloping beds of Triassic age redbeds, dipping two degrees to the east (Kelly, 1984).

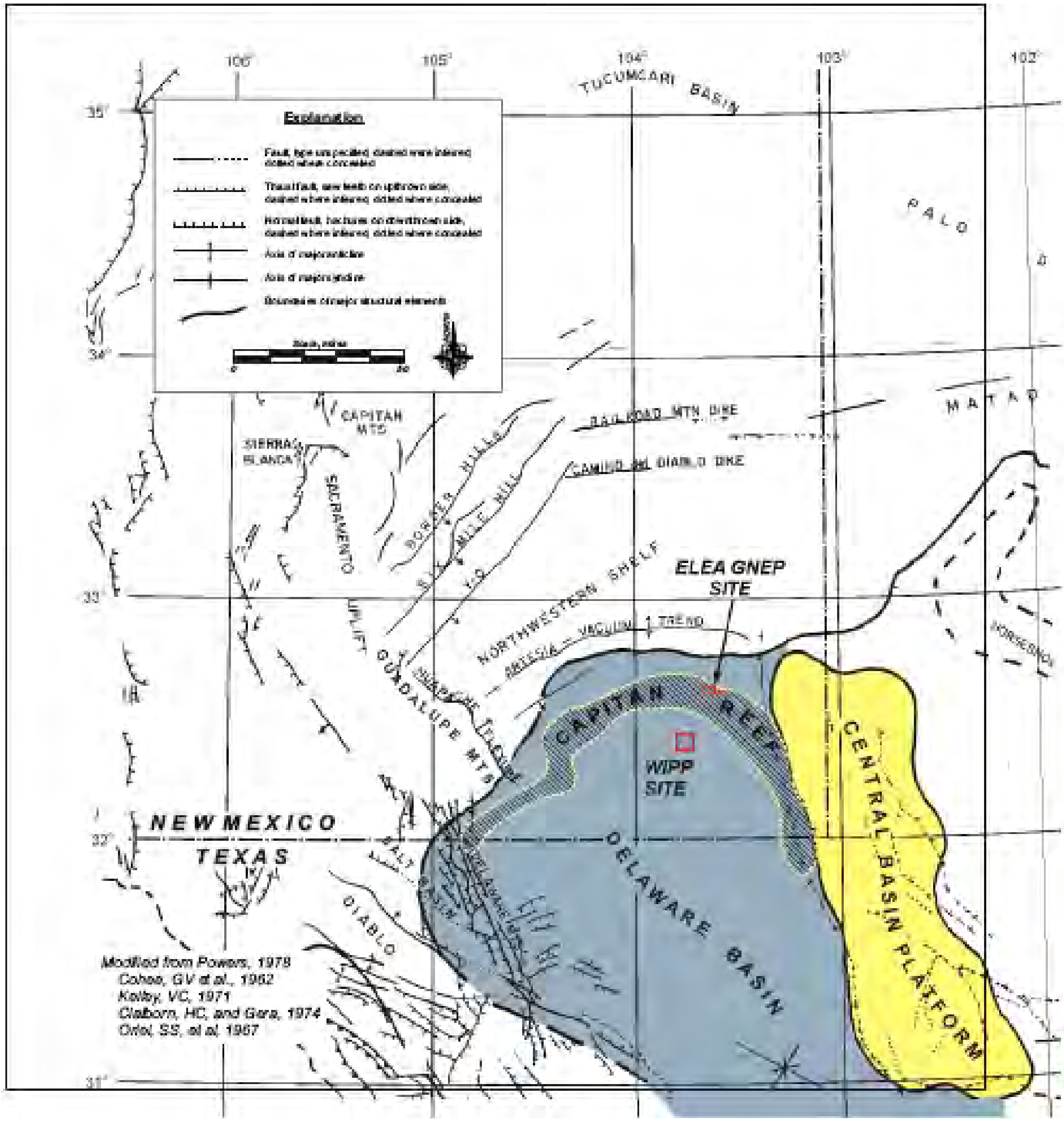


Figure 2.3.2.2-3 Major Regional Geological Structures near the Site (Powers et al., 1978)

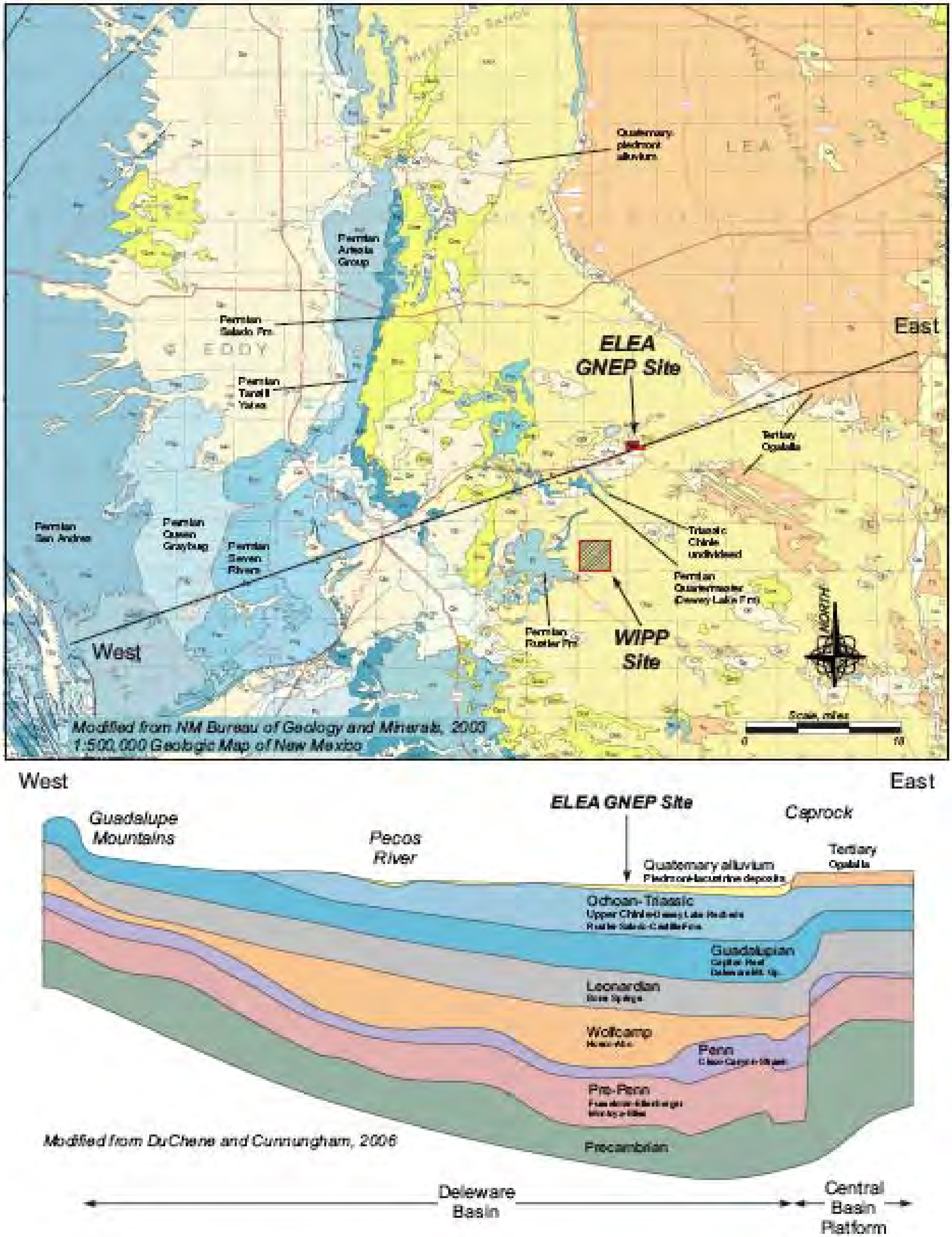


Figure 2.3.2.3-1 Regional Surficial Geology and Generalized Geologic Cross Section Through the Site

2.3.3 Soils

USDA Natural Resources Conservation Service Soil Survey Maps of Lea County, NM (1974; http://soildatamart.nrcs.usda.gov/) were reviewed in order to identify the soil units present at the Site. A Soil Survey Map is provided as Figure 2.3.3-1. The majority of onsite soils (60 percent) consist of Simona fine sandy loam (SE) and Simona-Upton association (SR). Simona soils are calcareous eolian deposits derived from sedimentary rock and consist of fine sandy loam underlain by gravelly fine sandy loam and cemented material, and gravelly fine sandy loam underlain by fine sandy loam and cemented material. Map unit descriptions corresponding to those soils described on Figure 2.3.3-1 are provided in Table 1, Appendix 2H.

As shown on Figure 2.3.2.1-1, the construction zones for the Site largely include the SR and SE soils, as well as: Midessa and Wink fine sandy loams (MN), Mixed alluvial land (MU), Mobeetie-Potter association (MW), and Kimbrough gravelly loam (KO). Descriptions of these soils are provided in Table 1, Appendix 2H. MN soils are calcareous alluvium and/or calcareous eolian deposits derived from sedimentary rock and consist of fine sandy loam underlain by clay loam. MU soils are mixed alluvium derived from sedimentary rock; they consist of stratified sand to loamy fine sand to loam to sandy clay loam to clay loam to clay. MW soils are calcareous sandy alluvium derived from sedimentary rock and consist of fine sandy loam. KO soils are calcareous alluvium and/or calcareous eolian deposits derived from sedimentary rock and consist of gravelly loam underlain by cemented material. Exclusion areas (Figure 2.3.2.1-1) additionally include Badland (BD), Jal association (JA), Largo-Pajarito complex (LP), Playas (Pb), and Stony rolling land (SY) soils (refer to Table 1, Appendix 2H for map unit descriptions).

Soil features for each of the map units at the Site are described in Table 2, Appendix 2H. Soil feature data include the restrictive layer, subsidence, potential for frost action, and risk of corrosion. Physical soil properties are provided in Table 3, Appendix 2H. Physical properties data include depth, sand/silt/clay content (as percentage by weight), moist bulk density, saturated hydraulic conductivity, available water capacity, linear extensibility, organic matter, erosion factors, and wind erodibility. Chemical soil properties are provided in Table 4, Appendix 2H. These data include depth, cation-exchange capacity, effective cation-exchange capacity, soil reaction, calcium carbonate, gypsum, salinity, and sodium adsorption ratio. Engineering properties for the Site soils are provided in Table 5, Appendix 2H. Engineering properties include depth, USDA texture, classification, fragments, percent passing (sieve nos. 4, 10, 40, 200), liquid limit, and plasticity index (Atterberg limits).

A review of the available soil data, including engineering properties of the Site soils indicates favorable conditions for foundations, utilities, surface pavement, and other improvements.

2.3.4 Geologic Hazards

2.3.4.1 Seismology

This section addresses seismology of the Site and region, including structure and tectonics, quaternary faulting, seismicity, earthquake potential, and the design earthquake. Regional and site stability related to dissolution of evaporite stratigraphy, and other geomorphic stability, are addressed in Section 2.3.2.

This assessment has been based upon existing information from public-domain databases and previous nearby seismology studies. The following section briefly describes the investigations and data referenced for this effort, and their primary contributions to the seismology assessment for the Site.

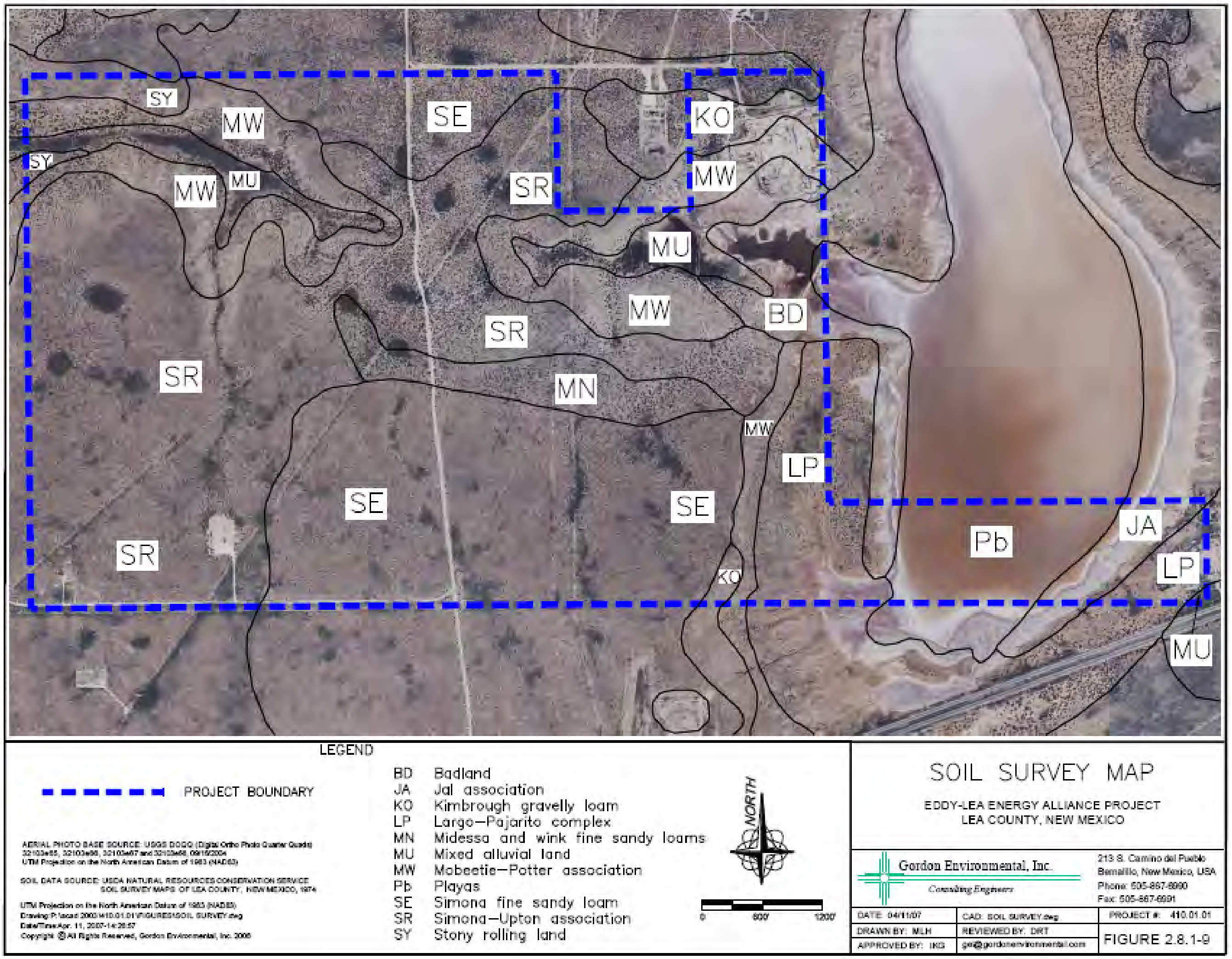


Figure 2.3.3-1 Soil Survey Map

2.3.4.1.1 Previous Investigations and Available Data

The WIPP is located 14 miles southwest of the Site. In 1978, the Geological Characterization Report (GCR) for the WIPP Site in Southeastern New Mexico (Powers et al., 1978) was produced. Referenced within the GCR is Circular 143 of the New Mexico Bureau of Geology and Mineral Resources (NMBGMR) in Socorro, New Mexico, *Seismicity of Proposed Radioactive Waste Disposal Site in Southeastern New Mexico* (Sanford and Toppozada, 1974). Because of the proximity of the Site to the WIPP, the Regional and Site Structure and Tectonics, and the Seismology portions of the GCR are directly relevant. For the seismic risk analysis, authors of the GCR made it clear that the broad characterization of the WIPP site region's seismicity was developed in a way useful for making earthquake design decisions.

The recently licensed NEF uranium enrichment facility located in Lea County, New Mexico submitted the Integrated Safety Analysis (ISA) Summary portion of an application for license to NRC in December 2003 (LES, 2003). The NEF facility location is 20 miles south of Hobbs and 0.5 miles west of the state border with Texas. The Site is located 34 miles west-northwest of the NEF facility location. While the NEF site is located 34 miles east of the Site, and in a different structural basin, the seismology portion of the NEF ISA Summary is useful in updating earthquake information presented in the GCR. Additional information is also provided for Quaternary faulting.

The earthquake data presented in the GCR were only as recent as 1978 because of the date of the study. To address more recent earthquakes and related data, the following reports and data were reviewed:

- Geophysics Open File Report 68 (Sanford et al., 1993), A Review of the Seismicity and Seismic Risk at the WIPP Site, is an update of seismic risk evaluation from earlier work (since 1972) by New Mexico Tech (Sanford and Toppozada, 1974; Sanford et al., 1980). Open File Report 68 used continuing instrument recordings of earthquakes in the area to provide the seismic risk update. Currently, seismicity within 200 miles of the WIPP site is being monitored by the New Mexico Institute of Mining and Technology (NMIMT) in Socorro, New Mexico, using data from a nine-station network centered on the WIPP site. The seismicity data from this network is summarized in Annual Site Environmental Reports by DOE (DOE/WIPP-99-2225 through DOE/WIPP-06-2225). These data have been used to update the frequency and magnitude of earthquakes in the vicinity of the Site.
- NMIMT published Circular 210, *Earthquake Catalogs for New Mexico and Bordering Areas: 1869 – 1998* (Sanford et al, 2002) that consolidates and presents 40 years of seismological research at NMIMT and elsewhere in New Mexico and west Texas. Circular 210 was useful in the overall number and distribution of earthquakes for New Mexico and within the region of the Site. Supporting information was also presented in Circular 210 for the relationship of earthquake activity and tectonic features in New Mexico. Related reports that discuss probabilistic seismic hazard in New Mexico include (but are not necessarily limited to): *Probabilistic Seismic Hazard Estimates for New Mexico Using Instrumental Data from 1962 through 1995* (Lin et al., 1997); and *Some Characteristics of a Probabilistic Seismic Hazard Map for New Mexico* (Lin and Sanford, 2000).
- Wong et al., 2004 presents comprehensive information on earthquake scenario and probabilistic ground-shaking hazard maps for the Albuquerque – Belen – Santa Fe corridor in central New Mexico. While this paper specifically addresses the seismicity of central New Mexico, a tectonically active area in comparison to the region of the Site, important inferences are made about the areas outside the central New Mexico corridor that are applicable to the Site's seismology.
- The United States Geological Survey (USGS) has an extensive database of earthquakes, Quaternary faults, and seismic hazard maps. The basic URL to begin a search for earthquake-related information is http://earthquake.usgs.gov/index.php. From the home page, custom searches can be made for earthquake-related information. This on-line service was used for this

effort to identify Quaternary faults near the Site; historical earthquakes within 200 miles of the Site; and probabilistic ground motion values for the Site.

- The NEF ISA Summary provides information on the seismic history of the region, correlations of seismicity with tectonic features, earthquake recurrence models, earthquake listings, quaternary faultsm, and probabilistic seismic hazard results. Given the close proximity of the NEF site to the Site, this information is generally applicable for this study.

2.3.4.1.2 Structure and Tectonics

The Site is located in the northern portion of the Delaware Basin, a northerly-trending, southward plunging asymmetrical trough with structural relief of greater than 20,000 feet on top of the Precambrian (Powers et al., 1978). The Basin was formed by early Pennsylvanian time, followed by major structural adjustment from Late Pennsylvanian to Early Permian time. Regional eastward tilting of the Basin occurred much later in the Cenozoic era.

Tectonic activity in the Basin is characterized by slow uplift relative to surrounding areas which has resulted in erosion and dissolution of rocks in the Basin. Faulting has not occurred in the northern Delaware Basin in the area of the Site. The regional geology suggests that there have been no recent, dramatic changes in geologic processes and rates in the vicinity of the Site.

2.3.4.1.3 Quaternary Faulting

Quaternary-age faulting is not present in the vicinity of the Site Powers et al. (1978) report that the nearest Quaternary-age fault is located 70 miles southwest of the WIPP site. NEF (NRC, 2005) indicates that the nearest Quaternary-age fault is located more than 100 miles west of the NEF site.

These reports are consistent with information contained in the USGS database for Quaternary faults. The USGS (http://earthquakes.usgs.gov/regional/qfualts) shows that the Guadalupe fault is located 80 miles west of the Site (USGS, 2007a). Little is known about this fault except that it is a normal fault, 3.6 miles in length, and has a slip rate of less than 0.01 in/yr. The Guadalupe fault forms a scarp on unconsolidated Quaternary deposits at the western base of the Guadalupe Mountains in the Basin and Range physiographic province. The same USGS database shows numerous other Quaternary-age faults within a 200-mile radius of the Site, located to the west and southwest, most of which are at the distal end of the radius and are near the Rio Grand Rift of central New Mexico.

Figure 2.3.4.1.3-1 is a map of New Mexico and West Texas showing Quaternary-age faulting as cataloged by the USGS, and as down-loaded from the database referenced above. The database contains locations and information on faults and associated folds that have been active during the Quaternary (the past 1.6 million years).

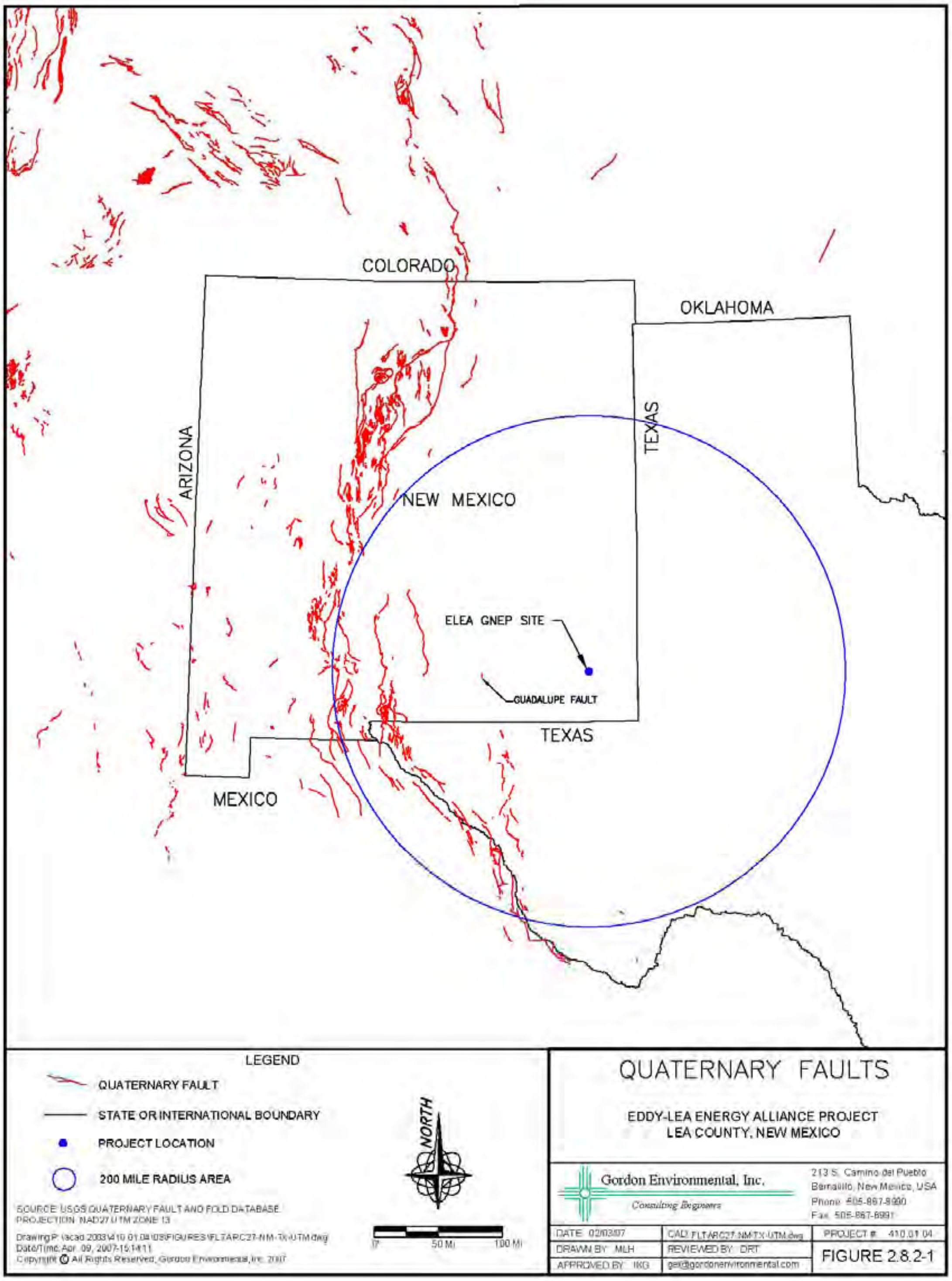


Figure 2.3.4.1.3-1 Quaternary Faults

Table 2.3.4.1.3- 1 summarizes all of the faults and folds within a 200-mile radius of the Site as illustrated on Figure 2.3.4.1.3-1. In all, there are a total of 27 Quaternary faults or fault zones within a 200-mile radius of the Site. A total of four “capable” faults were identified, including the Guadalupe fault.

Table 2.3.4.1.3-1 Summary of Quaternary Faults within 200 Mile (322 km) Radius of GNEP Site

Number	Name	County(s)	Province	Class[1]	Capable[2]	Length (km)[3]	Strike[4]	Movement[5]	Dip[6]	Most Recent Deformation	Slip Rate (mm/yr)[7]
Carlsbad 1 x 2 AMS Sheet											
2054b	Alamogordo Fault, Sacramento Mountains Section	Otero, NM	Basin and Range	A	Y	62	N13 W (section) N9 W (whole fault)	Normal	W	Latest Quaternary (<15,000 ya)	<0.2
2054c	Alamogordo Fault, McGregor Section	Otero, NM	Basin and Range	A	N	15	N21 E (section) N9 W (whole fault)	Normal	W	Late Quaternary (<130,000 ya)	<0.2
2058	Guadalupe Fault	Chaves, Otero, NM	Basin and Range	A	Y	6	N6 W	Normal	W	Latest Quaternary (<15,000 ya)	<0.2
Las Cruces 1 x 2 AMS Sheet											
900	East Franklin Mountains Fault	Dona Ana, NM El Paso, TX	Basin and Range	A	Y	45	N2 E	Normal	E	Latest Quaternary (<15,000 ya)	0.2 to 1.0
901	Hueco Fault Zone	Dona Ana, Otero, NM El Paso, TX	Basin and Range	A	N	116	N7 W	Normal	E, W	Middle and Late Quaternary (<750,000 ya)	<0.2
902	Campo Grande Fault	El Paso, Hudspeth, TX	Basin and Range	A	N	45	N51 W	Normal	SW	Late Quaternary (<130,000 ya)	<0.2
Van Horn 1 x 2 AMS Sheet											
903	Acala Fault	Hudspeth, TX	Basin and Range	A	N	8	N47 W	Normal	SW	Middle and Late Quaternary (<750,000 ya)	<0.2
904	Arroyo Diablo Fault	Hudspeth, TX	Basin and Range	A	N	14	N47 W	Normal	SW	Middle and Late Quaternary (<750,000 ya)	<0.2

Table 2.3.4.1.3-1 Summary of Quaternary Faults within 200 Mile (322 km) Radius of GNEP Site (continued)

Number	Name	County(s)	Province	Class[1]	Capable[2]	Length (km)[3]	Strike[4]	Movement[5]	Dip[6]	Most Recent Deformation	Slip Rate (mm/yr)[7]
905	Amargosa Fault	NA (Mexico)	NA	A	Y	68	N43 E	Normal	NE	Latest Quaternary (<15,000 ya)	<0.2
907	Unnamed Fault (Base of Guadalupe Mtns)	Culberson, TX	Basin and Range	A	N	10	N30 W	Normal	SW	Quaternary (<1.6 Ma)	<0.2
908	East Flat Top Mountain Fault	Hudspeth, TX	Basin and Range	A	N	21	N8 W	Normal	E	Late Quaternary (<130,000 ya)	<0.2
909	North Sierra Diablo Fault	Culberson, Hudspeth, TX	Basin and Range	A	N	4	N83 W	Normal	N	Quaternary (<1.6 Ma)	<0.2
910	East Sierra Diablo Fault	Culberson, TX	Basin and Range	A	N	33	N1 W	Normal	E	Late Quaternary (<130,000 ya)	<0.2
911	West Delaware Mountains Fault Zone	Culberson, TX	Basin and Range	A	N	24	N30 W	Normal	SW	Late Quaternary (<130,000 ya)	<0.2
912	East Baylor Mountain – Carrizo Mountain Fault	Culberson, TX	Basin and Range	A	N	41	N24 E	Normal	SE	Middle and Late Quaternary (<750,000 ya)	<0.2
913	West Eagle Mountains – Red Hills Fault	Hudspeth, TX	Basin and Range	A	N	24	N44 W	Normal	SW	Middle and Late Quaternary (<750,000 ya)	<0.2
919	West Wylie Mountains Fault	Culberson, TX	Basin and Range	A	N	19	N26 W	Normal	SW; W	Quaternary (<1.6 Ma)	<0.2

Table 2.3.4.1.3-1 Summary of Quaternary Faults within 200 Mile (322 km) Radius of GNEP Site (continued)

Number	Name	County(s)	Province	Class[1]	Capable[2]	Length (km)[3]	Strike[4]	Movement[5]	Dip[6]	Most Recent Deformation	Slip Rate (mm/yr)[7]
Marfa 1 x 2 AMS Sheet											
906a	Caballo Fault (northern)	Hudspeth, TX	Basin and Range	A	N	17 (section) 21.1 (total)	N38 W (section) N33 W (total)	Normal	SW	Middle and Late Quaternary (<750,000 ya)	<0.2
906b	Caballo Fault (southern)	Hudspeth, TX	Basin and Range	A	N	25 (section) 21.1 (total)	N30 W (section) N33 W (total)	Normal	SW	Quaternary (<1.6 Ma)	<0.2
914	Ice Cream Cone Fault	Hudspeth, TX	Basin and Range	A	N	10	N55 W	Normal	SW	Middle and Late Quaternary (<750,000 ya)	<0.2
915	West Indio Mountains Fault	Hudspeth, TX	Basin and Range	A	N	56	N24 W	Normal	SW	Late Quaternary (<130,000 ya)	<0.2
916	East Eagle Mountains Fault	Hudspeth, TX	Basin and Range	A	N	1	N10 W (	Normal	E	Quaternary (<1.6 Ma)	<0.2
918a	West Lobo Valley Fault Zone Fay Section	Culberson, TX	Basin and Range	A	N	4 (section) 59.4 (total)	N28 W (section) N19 W (total)	Normal	E	Middle and Late Quaternary (<750,000 ya)	<0.2
918b	West Lobo Valley Fault Zone Neal Section	Culberson, TX	Basin and Range	A	N	18 (section) 59.4 (total)	N11 E (section) N19 W (total)	Normal	E; SE	Late Quaternary (<130,000 ya)	<0.2
918c	West Lobo Valley Fault Zone Mayfield Section	Culberson, Jeff Davis, TX	Basin and Range	A	N	20 (section) 59.4 (total)	N46 W (section) N19 W (total)	Normal	NE	Late Quaternary (<130,000 ya)	<0.2

Table 2.3.4.1.3-1 Summary of Quaternary Faults within 200 Mile (322 km) Radius of GNEP Site (continued)

Number	Name	County(s)	Province	Class[1]	Capable[2]	Length (km)[3]	Strike[4]	Movement[5]	Dip[6]	Most Recent Deformation	Slip Rate (mm/yr)[7]
918d	West Lobo Valley Fault Zone Sierra Vieja Section	Jeff Davis, Presidio, TX	Basin and Range	A	N	22 (section) 59.4 (total)	N12 E (section) N19 W (total)	Normal	E	Late Quaternary (<130,000 ya)	<0.2
920	Unnamed Fault (Southeast of Candelaria)	Presidio, TX	Basin and Range	A	N	3	N9 W	Normal	W	Quaternary (<1.6 Ma)	<0.2

Notes
Fault information from USGS website (http://earthquakes.usgs.gov/regional/qfualts)
Figure 1-1 shows faults within 200 mile (322 km) radius of GNEP site
[1]Class based upon demonstrable evidence of tectonic movement during the Quaternary (known or presumed to be associated with large-magnitude earthquakes);
Class A = Geologic evidence demonstrates the existence of a Quaternary fault of tectonic origin, whether the fault is exposed by mapping or inferred from liquefaction or other deformational features
[2]Capable fault is defined as one that has exhibited one or more of the following characteristics (10 CFR 100 Appendix A.III (Definitions)):

- (1) Movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years;
- (2) Macro-seismicity instrumentally determined with records of sufficient precision to demonstrate a direct relationship with the fault;
- (3) A structural relationship to a capable fault according to characteristics (1) or (2) of this paragraph such that movement on one could be reasonably expected to be accompanied by movement on the other.

[3]Length of fault or fault segment
[4]Average fault strike
[5]Sense of fault movement
[6]Fault dip direction
[7]Fault slip rate category

A "capable" fault is one that has exhibited one or more of the following characteristics (10 CFR 100 Appendix A.III (Definitions)):

- Movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years.
- Macro-seismicity instrumentally determined with records of sufficient precision to demonstrate a direct relationship with the fault.
- A structural relationship to a capable fault according to the previous two characteristics such that movement on one could be reasonably expected to be accompanied by movement on the other.

For the purposes of this assessment, capable faults were identified based solely upon the first characteristic above.

2.3.4.1.4 Seismicity

This section addresses earthquake activity in the region of the Site, and the relationship of earthquake activity to regional tectonics.

Earthquake Activity

Earthquakes of low to moderate magnitude have been documented within a 200 mile radius of the Site. Figure 2.3.4.1.4-1 is a seismicity map of New Mexico and bordering areas as presented in Sanford et al. (2002) showing the locations of earthquakes during the period 1962 to 1995 with moment magnitudes of 1.3 or greater. Figure 2.3.4.1.4-2 is a similar map for earthquakes during the time period 1962 to 1998 with moment magnitudes of 3.0 or greater. Figures 2.3.4.1.4-1 and 2.3.4.1.4-2 are presented to illustrate the quantity and distribution of relatively low-magnitude earthquakes within the vicinity of the Site. The vast majority of the earthquake activity is located southeast of the Site in west Texas, and west/northwest of Site in central New Mexico.

Figure 2.8.2-4 shows the epicenters of all instrumentally-located earthquakes with magnitude 2.5 or greater for the period 1962 through 1992 (Sanford et al., 1993) within a 186 miles of WIPP. While the data for Figures 2.3.4.1.4-and 2.3.4.1.4-2 are more recent (though 1995 and 1998, respectively), Figure 2.3.4.1.4-3 is more specific to the area around WIPP and the Site. As such, it incorporates more of the region to the south and east of the Site.

The U.S. Geological Survey (USGS) earthquake database was used to query historical earthquakes within a 200 mile radius of the Site (USGS, 2007b). According to information provided by the USGS on their website, the USGS earthquake database was assembled over a period of decades, and it consists of numerous constituent catalogs including published papers and computer tapes of records. The database can be accessed online using the URL http://earthquake.usgs.gov/eqcenter then specifying an earthquake search for the radius of a specified location (latitude 32.583 degrees N and longitude 103.708 degrees W were input for the Site). Results of the search of the 200 mile radius yielded a total of 106 historical earthquakes between 1974 and the most recent update of the database in 2006. Appendix 2E is a printout of the search results. The results indicate the closest earthquake to the Site was 24 miles southwest with a magnitude of 2.9 that occurred on December 4, 1984. The highest magnitude earthquake in the database within a 200 mile radius is 5.7 on April 14, 1995 located 159 miles south of the Site.

Seismic information for the region prior to 1962 was derived from chronicles of the effects of earthquakes on people, structures, and surface features using the Modified Mercalli Scale of intensity. Prior to 1962, earthquake activity reported in New Mexico was mostly limited to the Rio Grande Rift region of central New Mexico. Since 1962, the majority of earthquake information has been recorded at numerous seismograph stations throughout the state and surrounding regions.

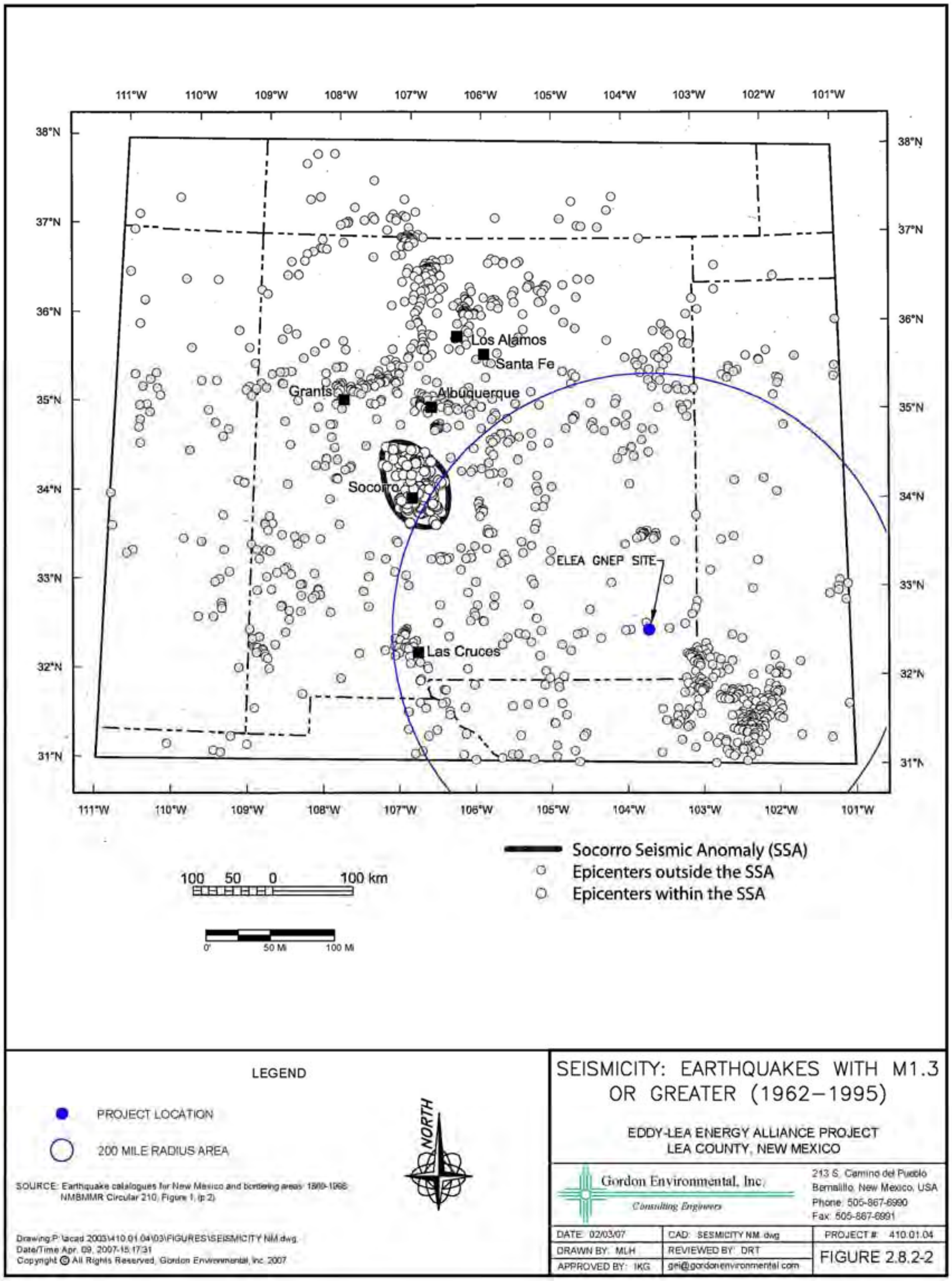


Figure 2.3.4.1.4-1 Seismicity: Earthquakes with M1.3 or Greater (1962 – 1995)

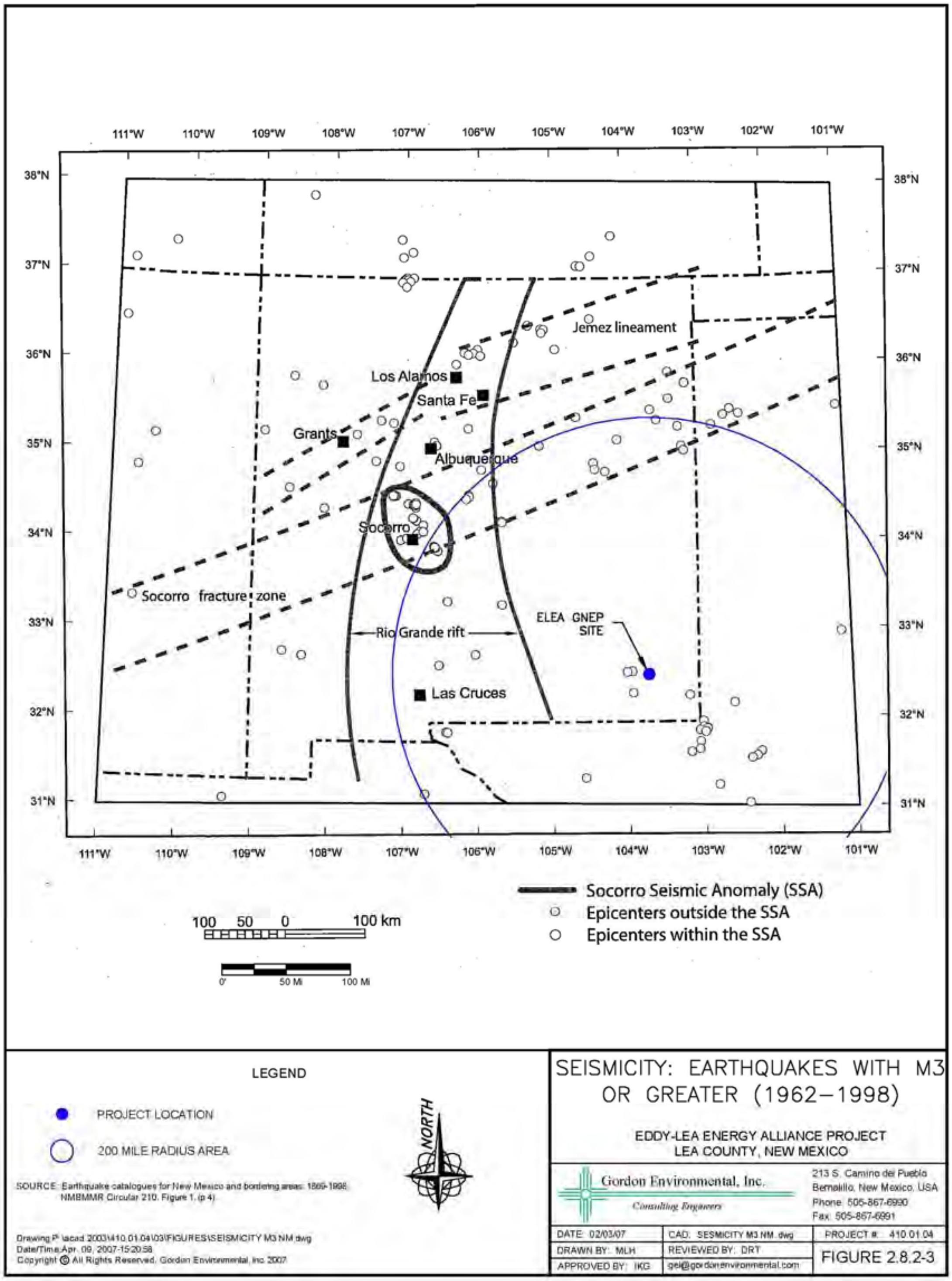


Figure 2.3.4.1.4-2 Seismicity: Earthquakes with M3 or Greater (1962 – 1998)

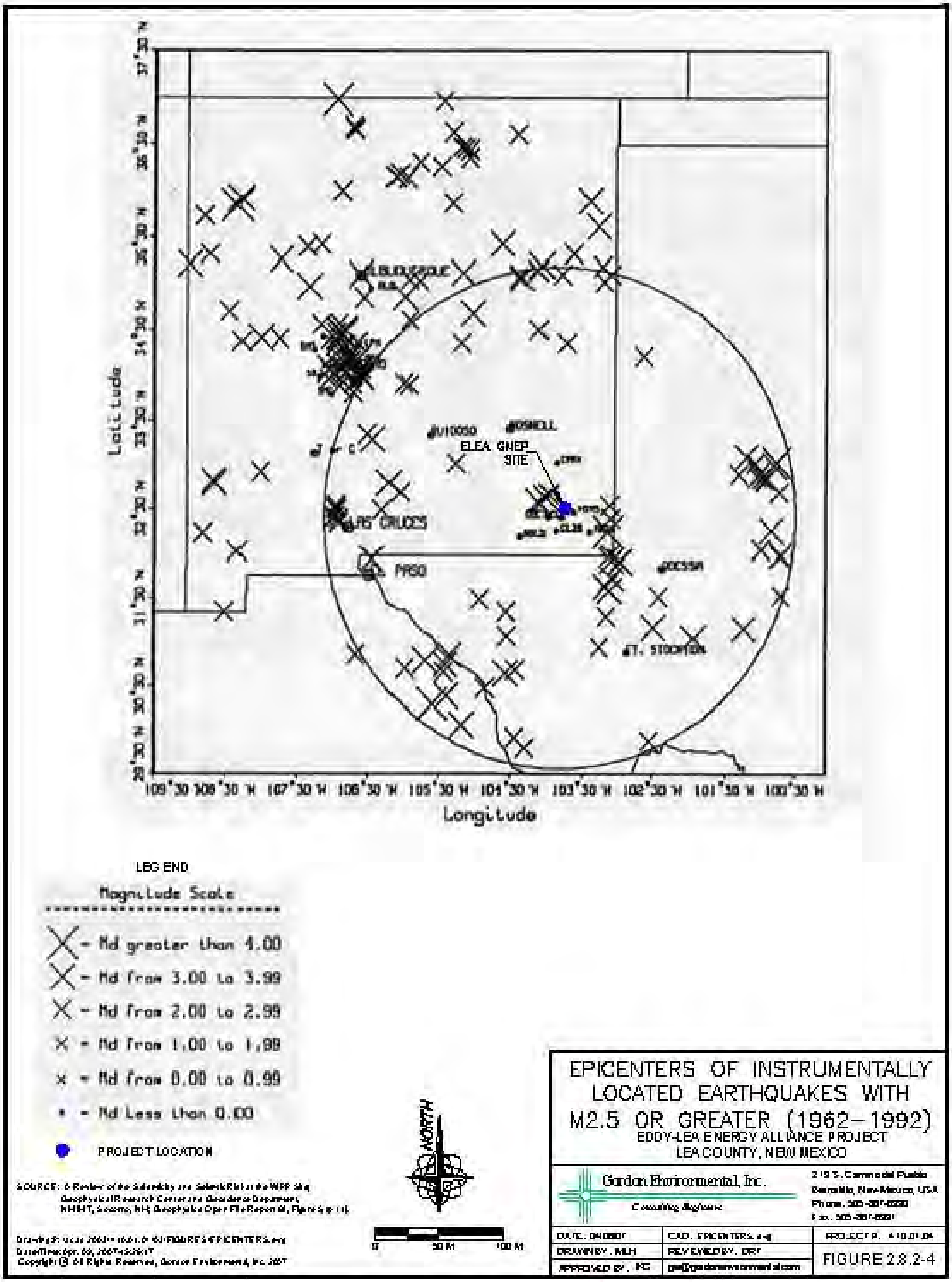


Figure 2.4.4.1.4-3 Epicenters of Instrumentally Located Earthquakes with M2.5 or Greater (1962 – 1992)

The most recent seismic data for the region comes from a network of seismograph stations for the WIPP site located only 14 miles southwest of the Site (Figure 2.3.4.1.4-4). The stations are monitored by New Mexico Institute of Mining and Technology (NMIMT). When appropriate, readings from the network are combined with readings from an additional NMIMT network in the central Rio Grande Rift. Occasionally, data are also exchanged with the University of Texas at El Paso and Texas Tech University in Lubbock, both of which operate stations in West Texas. In 1998 there were a total of seven WIPP stations, and currently there are nine (see Figure 2.3.4.1.4-4). Table 2.3.4.1.4-1 summarizes the seismic data for the stations from 1998 through 2005 for the WIPP network as reported in WIPP Annual Site Environmental Reports for 1998 through 2005, respectively (DOE/WIPP-99-2225 through DOE/ WIPP-06-2225).

Three earthquakes with magnitudes above 5.0 have occurred within 150 miles of the Site. The Valentine, Texas earthquake of August 16, 1931 had an estimated magnitude of 6.4 based upon an original intensity rating of VIII on the Modified Mercalli Scale (Powers et al., 1978). The earthquake was located a distance of 130 miles south of the WIPP site (a similar distance from the Site). An earthquake of magnitude 5.0 was recorded near Eunice, New Mexico, on January 2, 1992. The Eunice earthquake is included in the USGS database (Appendix 2E) and is shown to be a distance of 39 miles east of the Site. On April 14, 1995, a 5.3 magnitude earthquake was recorded 144 miles southwest of the WIPP site (158 miles southwest of the Site) near Alpine Texas (DOE/WIPP 99-2225). Figure 2.3.4.1.4-5 shows earthquakes with magnitudes 4.5 or greater in New Mexico during the period 1869 to 1998. Table 2.3.4.1.4-2 is a summary of those earthquakes. Earthquake No. 30 listed in Table 2.3.4.1.4-2 is the Eunice earthquake of 1992. Both Figure 2.3.4.1.4-5 and Table 2.3.4.1.4-2 are from Sanford et al. (2002).

Earthquake Distribution and Relationship to Tectonics

Sanford et al. (2002) provide the most recent and comprehensive assessment of the geographic distribution of earthquakes and their relationship to tectonism for the Site region of New Mexico and West Texas:

- Figure 2.8.2-3 illustrates that there is a tight cluster of earthquake activity in the Rio Grande valley near Socorro. Referred to as the Socorro Seismic Anomaly (SSA), the SSA occupies only 0.7 percent of the total area shown in the figure, but accounts for 23 percent of the earthquakes 2.0 magnitude or greater.
- Outside the SSA, the pattern of seismicity is diffuse and occurs in all physiographic provinces including the relatively tectonically stable Colorado Plateau and Great Plains provinces.
- While the vast majority of Quaternary faults in New Mexico are within the boundaries of the Rio Grande Rift, earthquake activity between 1962 and 1998 fails to define this major continental rift extending from north of Taos to south of Las Cruces; earthquakes are relatively absent, particularly between just south of Socorro to just north of Las Cruces. (Figures 2.3.4.1.4-1 and Figure 2.3.4.1.4-2).
- There is a relatively small cluster of earthquake activity in the far southeast corner of New Mexico and west Texas in the Great Plains, located 31 to 62 miles southeast of the Site. The distribution appears to correlate with locations of oil and gas fields; the seismic activity in this region is likely induced by production, secondary recovery, or waste injection within this petroleum and natural gas province.

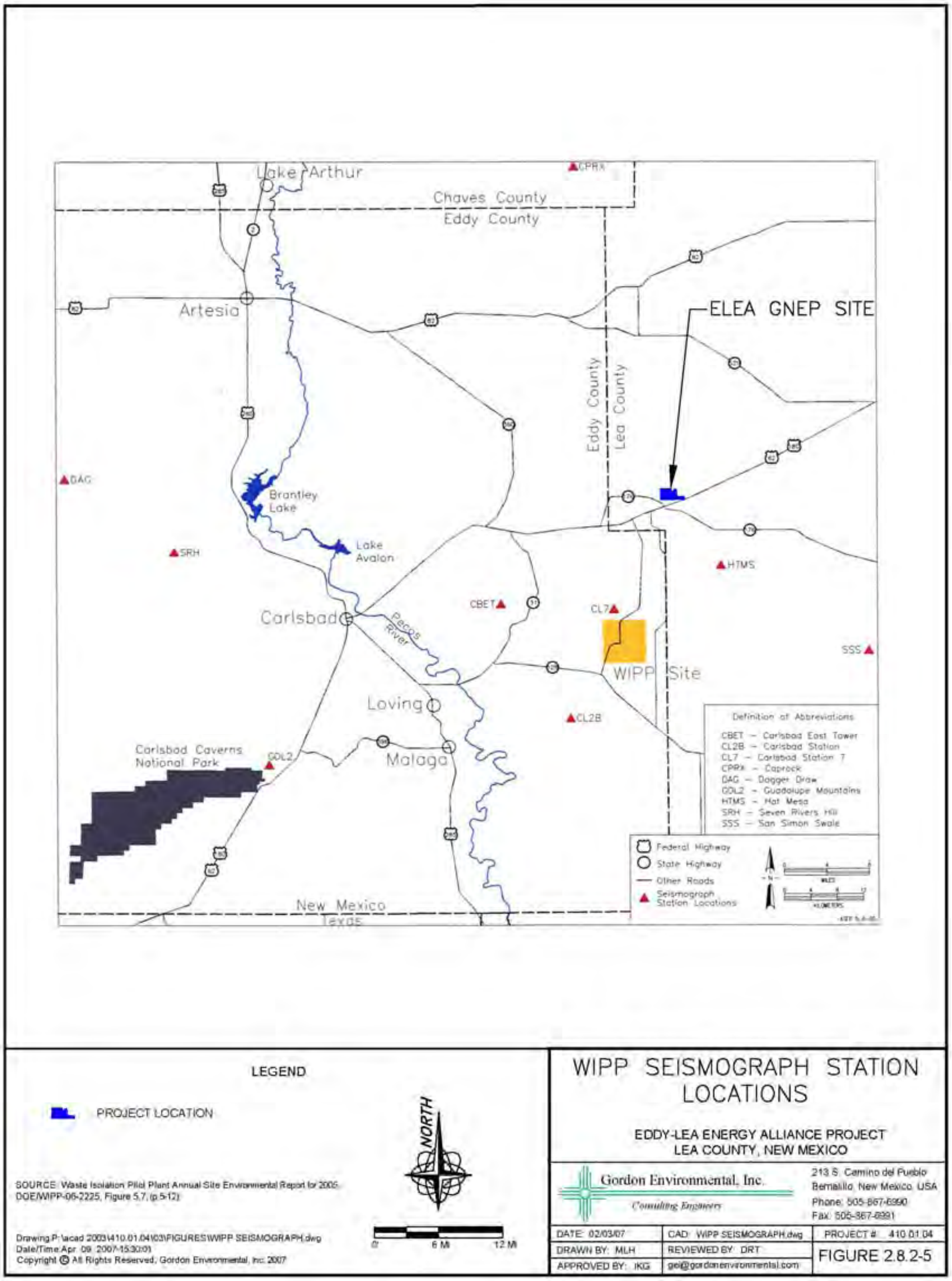


Figure 2.3.4.1.4-4 WIPP Seismograph Station Locations

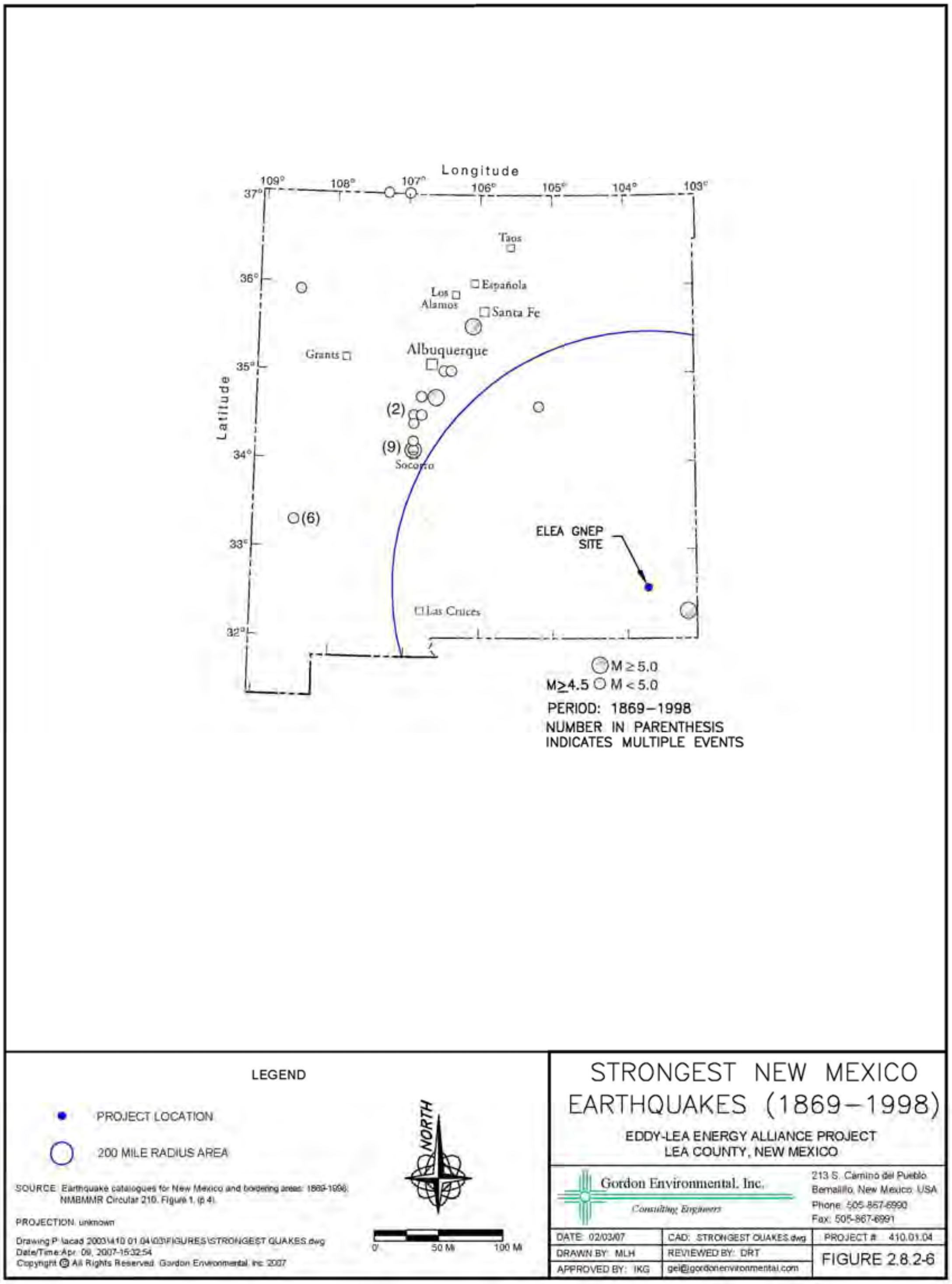


Figure 2.3.4.1.4-5 Strongest New Mexico Earthquakes (1869 – 1998)

Table 2.3.4.1.4-2 Strongest Earthquakes in New Mexico, 1869 - 1998

No.	Date	Origin time hr	min	secs	Approximate location lat (°N)	long (°W)	Maximum intensity (modified Mercalli)	Estimated M	Nearby city
1.	1869				34.1	106.9	VII	5.2	Socorro
2.	Sep. 7, 1893				34.7	106.6	VII	5.2	Belen
3.	Oct. 31, 1895	12			34.1	106.9	VI	4.5	Socorro
4.	1897				34.1	106.9	VI	4.5	Socorro
5.	Sep 10, 1904				34.1	106.9	VI	4.5	Socorro
6.	Jul. 2, 1906	10	15		34.1	106.9	VI	4.5	Socorro
7.	Jul. 12, 1906	12	15		34.1	106.9	VII to VIII	5.5	Socorro
8.	Jul. 16, 1906	19			34.1	106.9	VIII	5.8	Socorro
9.	Nov. 15, 1906	12	15		34.1	106.9	VIII	5.8	Socorro
10.	Dec. 19, 1906	12			34.1	106.9	VI	4.5	Socorro
11.	May 28, 1918	11	30		35.5	106.1	VII to VIII	5.5	Cerrillos
12.	Feb. 5, 1931	4	48		35.0	106.5	VI	4.5	Albuquerque
13.	Feb. 21, 1935	1	25		34.5	106.8	VI	4.5	Bernardo
14.	Dec. 22, 1935	1	56		34.7	106.8	VI	4.5	Belen
15.	Sep. 17, 1938	17	20		33.3	108.5	VI	4.5	Glenwood
16.	Sep. 20, 1938	5	39		33.3	108.5	VI	4.5	Glenwood
17.	Sep. 29, 1938	23	35		33.3	108.5	VI	4.5	Glenwood
18.	Nov. 2, 1938	16	0		33.3	108.5	VI	4.5	Glenwood
19.	Jan. 20, 1939	12	17		33.3	108.5	VI	4.5	Glenwood
20.	Jun. 4, 1939	1	19		33.3	108.5	VI	4.5	Glenwood
21.	Nov. 6, 1947	16	50		35.0	106.4	VI	4.5	Albuquerque
22.	May 23, 1949	7	22		34.6	105.2	VI	4.5	Vaughn
23.	Aug. 3, 1955	6	39	42	37.0	107.3	VI	4.5	Dulce
24.	Jul. 23, 1960	14	16		34.4	106.9	VI	4.5	Bernardo
25.	Jul. 3, 1961	7	6		34.2	106.9	VI	4.5	Socorro
26.	Jan. 23, 1966	1	56	39	37.0	107.0		4.8	Dulce
27.	Jan. 5, 1976	6	23	29	35.9	108.5		4.7	Gallup
28.	Nov. 29, 1989	6	54	39	34.5	106.9		4.7	Bernardo
29.	Jan. 29, 1990	13	16	11	34.5	106.9		4.6	Bernardo
30.	Jan. 2, 1992	11	45	35	32.3	103.2		5.0	Eunice

Source: Sanford, Allan R., Lin, Kuo-wan, Tsai, I-ching, and Jaksha, Lawrence H., 2002, Earthquake catalogues for New Mexico and bordering areas: 1869-1998; NMBMMR Circular 210, Table 2 (p. 5).

The GCR (Powers et al., 1978) concluded that there are three seismic source zones within a 186 mile radius of the WIPP site: the northern and southern regions of the Southern Basin and Range – Rio Grande rift zone located west and southwest of the sites - and the Central Basin Platform zone located southeast of the sites. The GCR (Powers et al., 1978) also concluded that the most active seismic area within 186 miles of the WIPP site (and thus the Site) is the Central Basin Platform southeast of the Site. This is consistent with the more recent seismic data presented in Figures 2.3.4.1.4-1 and 2.3.4.1.4-2. The GCR further concludes that large magnitude earthquakes are not occurring or have not occurred within the recent geologic past in that area due to the absence of Quaternary faults. This is also consistent with the distribution of Quaternary faults within 200 miles of the Site presented in Figure 2.3.4.1.4-1. The GCR suggests that the induced seismicity in the Central Basin Platform southeast of the Site is a result of reduced fluid pressure build-up from fluid injection, and consequential reduction in effective stress across pre-existing fractures and associated decrease in frictional resistance to sliding. The maximum magnitude earthquakes listed in Table 2.3.4.1.4-2 occurring 50 to 53 miles west/northwest of the WIPP Site are referenced in a brief paragraph by Allan Sanford on the New Mexico Tech website http://www.ees.nmt.edu/Geop/recentquakes.html as follows:

> *Continuing Seismicity in Southeastern New Mexico, September 20, 2002*
>
> *On September 17, 2002, earthquakes of magnitude 3.4 and 3.2 occurred at 9:45 AM (MDT) and 5:34 PM (MDT) at an isolated location 27 miles northwest of Carlsbad, New Mexico. The epicenters of these two quakes, 32.58 degrees North latitude and 104.63 degrees West longitude, fall within a small region that has been producing quakes since January of 1997. To date 30 earthquakes of magnitude 2.0 or greater have occurred within this 6 square mile area located*

16 miles south of the village of Hope. The strongest earthquake of this sequence had a magnitude of 4.0 on March 14, 1999. At this time it is believed that these earthquakes may be induced by injection of waste water from natural gas production into a deep well or wells.

Earthquake Potential

An earthquake probability map (EPM) was generated for the region from data input to the interactive USGS website http://earthquake.usgs.gov/research/hazmaps/productsdata/48States/index.php).

The EPM shows the Site (triangle) and an epicenter (circle) associated with the Eunice earthquake location of January 2, 1992 (estimated moment magnitude of 5.0 – see Table 2.3.4.1.4-2). The probability of an earthquake greater than or equal to 5.0 (body-wave magnitude; corresponds to moment magnitude of 4.5 to 4.8) within 50 years and 31 miles source distance is 5 percent. The USGS uses the Poisson probability model for probabilistic seismic hazard assessment (PSHA). Other details and assumptions of PSHAs used to produce EPMs are discussed on the USGS website within the appropriate readme files.

Probabilistic Ground Motion

Probabilistic ground motion for the Site was determined using information from the USGS website http://earthquake.ugs.gov/regional (2002 data) then identifying an area for a map view, or specifying coordinates for a specific location (USGS, 2007c). Figure 2.3.4.1.4-6 is a probabilistic ground motion map of the Site, illustrating peak horizontal acceleration (percent g) with a 2 percent probability of exceedence in 50 years (2,500 year return interval).

The Peak Horizontal Ground Acceleration (PGA) value of 0.12g estimated by the regional USGS algorithm is greater than values suggested in the site-specific work by Powers et al., (1978) of ≤0.06g for a return interval of 1,000 years, and ≤0.1g for a return interval of 10,000 years. Sanford et al. (1993) estimated a maximum expected acceleration of 0.1g for the WIPP. This value assumes a magnitude 6.0 earthquake is possible along the Central Basin Platform, and a magnitude 7.8 earthquake is possible west of the western margin of the Sacramento, Guadalupe, and Delaware Mountain uplifts west of the Site.

The NEF seismic hazard analysis predicts 0.05g for a return interval of 1,000 years and 0.15g for a return interval of 10,000 years. Both the WIPP and NEF results are based on site-specific studies and may provide more reliable results than the USGS methodology which is applied to a large region of the United States.

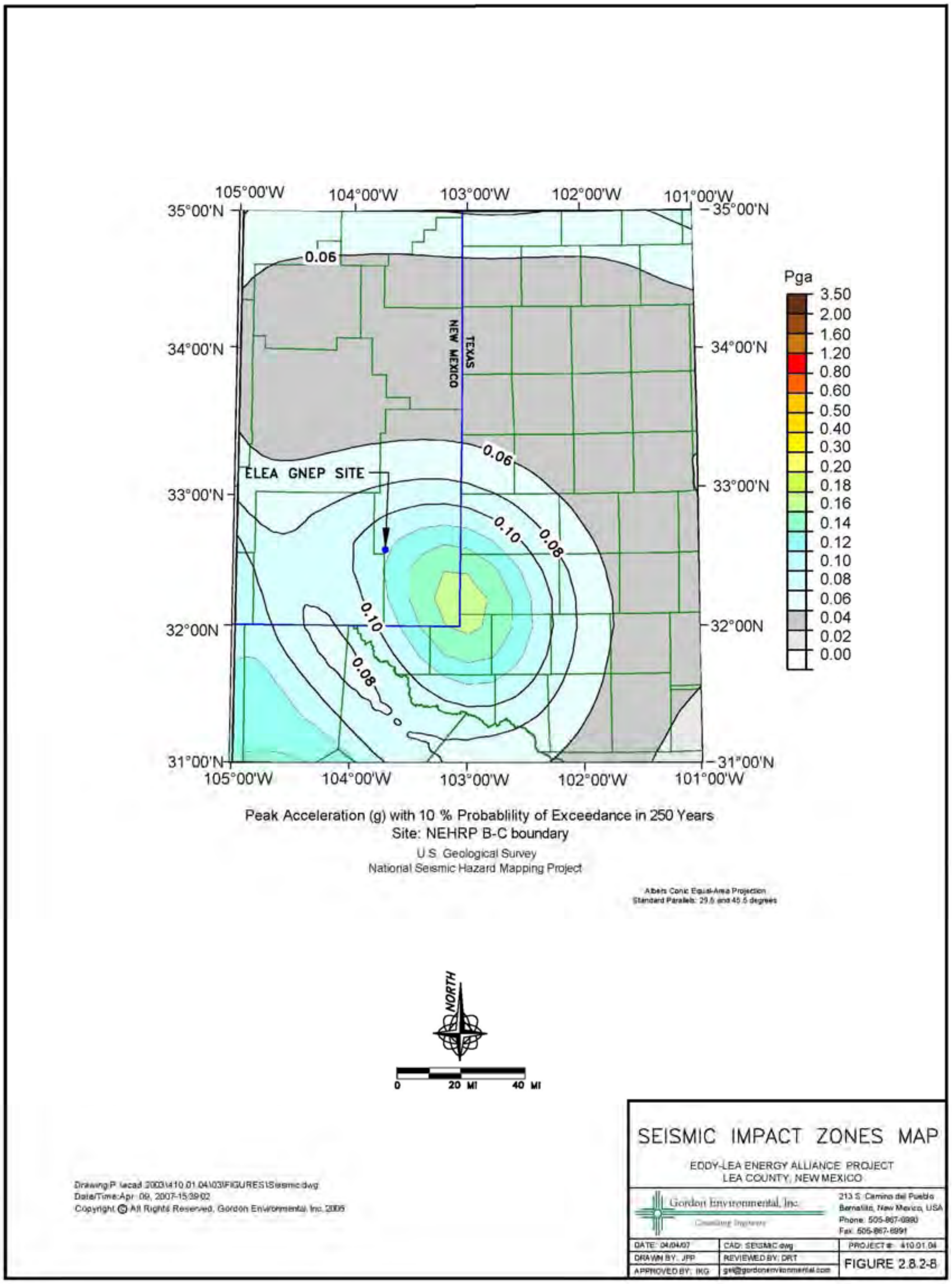


Figure 2.3.4.1.4-6 Seismic Impact Zones Map

Summary

Earthquake activity in southeastern New Mexico and West Texas, inclusive of the Site, has been characterized by events of low to moderate magnitude. Records of recent seismic activity have been recorded with seismograph instrumentation, while information prior to 1962 was derived from chronicles of the effects of earthquakes on people, structures, and surface features ("felt" earthquakes). The strongest earthquake of record within a 200-mile radius of the Site occurred near Valentine, Texas on August 16, 1931, located 130 miles south of the Site near the Texas-Mexico border. The Valentine, Texas earthquake was prior to instrumentation (it was a "felt" earthquake), so its estimated magnitude of 6.4 was determined, in part, from its intensity rating of VIII on the Modified Mercalli Scale. Two other earthquakes of more recent times, with measured magnitudes greater than or equal to 5.0, were recorded within a 200 miles radius of the Site. The Eunice earthquake of January 2, 1992, located 39 miles east of the Site, had a magnitude of 5.0. The Alpine, Texas earthquake of April 14, 1995, located 158 miles southwest of the Site, had a magnitude of 5.3 (5.7 according to the USGS database). The USGS earthquake database reports the earthquake closest to the Site of magnitude 2.5 or greater to be one of magnitude 2.9 located 24 miles southwest of the Site.

The Site is within the Delaware Structural Basin. The Delaware Basin has not experienced significant tectonic activity for the past 200 million years. This is consistent with the lack of recent (Quaternary) faults within a distance of 80 miles of the Site. The vast majority of Quaternary faults within the Site region are within the boundaries of the Rio Grande Rift of central New Mexico.

Historical seismic activity within 200 miles of the Site is related to both tectonism associated with the Rio Grande Rift of central New Mexico, and activity induced by production, secondary recovery, or waste injection associated with oil and gas fields. The induced seismic activity occurs predominantly southeast of the Site within the Central Basin Platform. Recent records (1998 through 2005) from the WIPP seismic monitoring network indicate that the strongest events recorded annually in 1999, 2000, and 2002 through 2005 have been located 50 to 57 miles west to northwest of the WIPP. This activity, typically of 2.5 to 4.0 magnitude during this time period, is located a similar distance from the Site. The recent activity located west to northwest of the WIPP is suspected to be induced by injection of waste water from natural gas production into deep well or wells.

Earthquake probability and probabilistic ground motion are dominated by seismic activity within the Central Basin Platform south and east of the Site. The USGS has calculated an approximate probability of 5 percent of an earthquake with magnitude greater than or equal to 5.0 within 50 years and a distance of 31 miles.

2.3.4.2 Karst Potential

The Carlsbad region is noted for caves and extensive karst terrains, warranting a thorough evaluation of the Site for potential for karst activity. The potential for karst development at the Site was initially evaluated with a review of published and unpublished information on the area. A detailed site reconnaissance was also performed in order to identify any evidence of karst features in the area.

Karst Environments and Features. Thornbury (1969) identified a number of geologic and hydrologic conditions favorable to the development of karst terrain as follows:

- Presence of soluble rock such as limestone, gypsum, dolomite, or halite at or near land surface
- Dense, highly jointed, and/or thinly bedded soluble rock units
- Stream valleys deeply incised into soluble rock
- Moderate to high rainfall rates

Thornbury also identified a number of characteristic karst geomorphic landforms as follows:

- Sinkholes and associated forms, including solution sinks with broad shallow sinkhole ponds and collapse sinks, with steep rocky margins
- Karst plain, as a broad flat area with no laterally extensive drainages
- Sinking creeks, or creeks that end abruptly, typically in sinkholes
- Blind valleys or ephemeral washes that end abruptly
- Rise and resurgence of streams
- Artesian springs

- Haystack hills or hums
- Caverns
- Voids and lost drilling circulation
- Tension cracks

Site File and Literature Review. No references were found on karst in the immediate vicinity of the Site during the file and literature search. Comparison of conditions at the Site with those conditions favorable to karst development identified by Thornbury (1969) indicates that conditions at the Site are not conducive to karst development. No thick sections of soluble rock are present at or near land surface; the shallowest soluble bedrock materials are gypsum and halite beds in the Rustler Formation, which is located at least 1,100 feet below land surface at the Site. Additionally, rainfall rates in the area are not moderate to high (See Section 2.2). The Mescalero caliche is soluble and situated at or near land surface; however this unit is no more than 10 feet in thickness. Local dissolution of this unit may have resulted in the development of a number of small shallow depressions in the area; however this is not regarded as an active or significant karst process at the Site.

Referring to Figure 2.3.2.2-1, Nash Draw and Clayton Basin, located six miles southwest and 12 miles west of the Site, respectively are the result of dissolution of shallow and exposed gypsum and halite beds in the Rustler Formation. Another collapse feature known as San Simon Sink is located 25 miles southeast of the Site; the origin of this feature is less well understood; Nicholson and Clebsch (1963) concluded that San Simon Sink likely resulted from a combination of deep-seated collapse and wind deflation.

Site Reconnaissance. One of the most common indicators of active karst and collapse is the presence of tension cracks in surface soil and rock on margins of actively subsiding areas. Other indicators of active karst processes may be tilting, offset, and/or displacement of older cultural features.

Nicholson and Clebsch (1963) identified an array of large annular cracks in soils arrayed around San Simon Sink, which are clearly visible in the aerial photograph shown in Figure 2.3.4.2-1.

Tension cracks are visible on the margins of many sinks and escarpments of the region where karst processes are active. Land and Love (2000) identified karst-related tension cracks in gypsum beds of the Seven Rivers Formation in the area of McMillan Escarpment on the east flank of the Pecos River near former Lake McMillan (Figure 2.3.4.2-2).

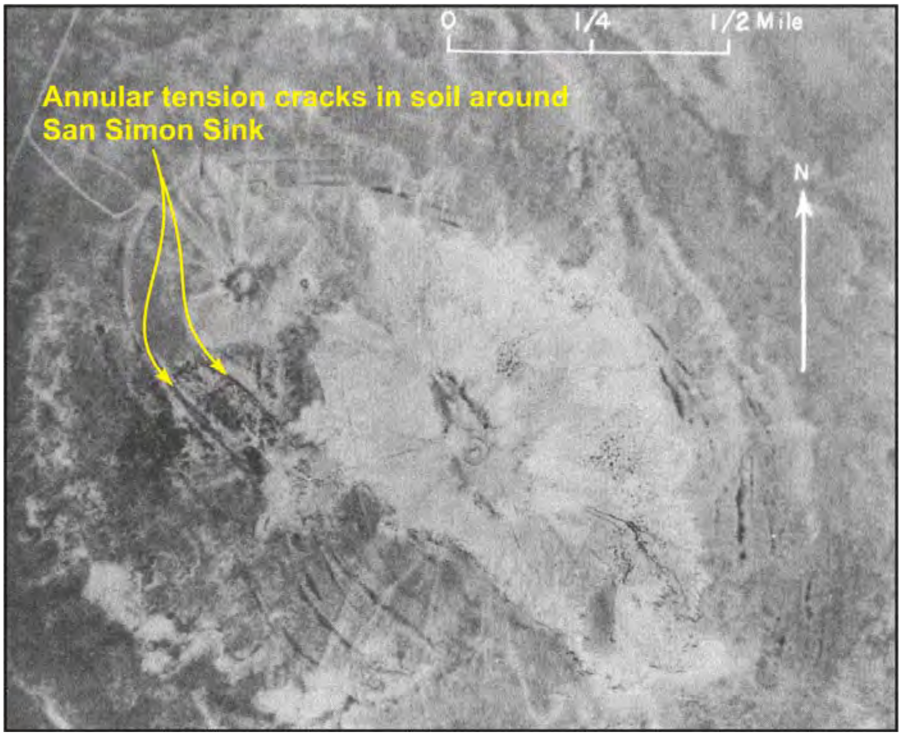


Figure 2.3.4.2-1 Tension cracks in soils around San Simon Sink (from Nicholson and Clebsch, 1963)

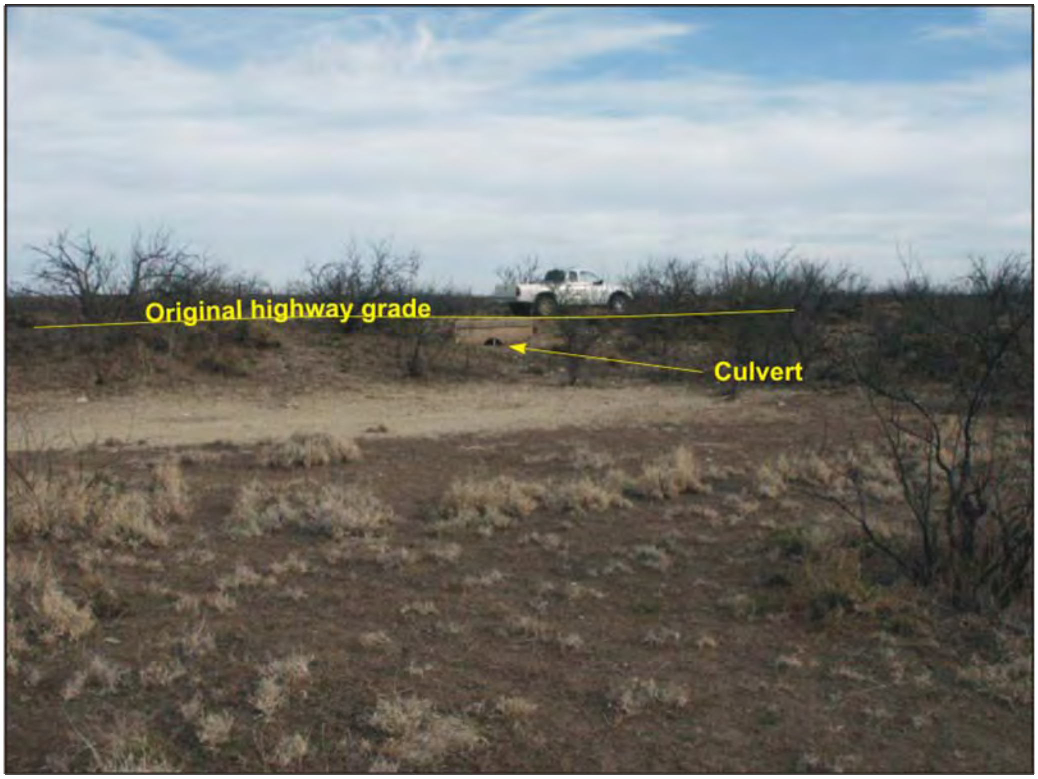
Figure 2.3.4.2-2 Tension cracks in Seven Rivers Formation, McMillan Escarpment Area (from Land and Love, 2000)

During site reconnaissance, detailed inspection of the areas around the margins of Laguna Gatuna and tributary drainages was performed to identify any tension cracks, disrupted soils, tilting, or other evidence of rapid earth displacement. No tension cracks or other evidence of displacement was observed. Additionally, older cultural features in the area were inspected to identify evidence of tilting, offset, or displacement that could indicate recent land movement. A number of oil wells were drilled along the west flank of Laguna Gatuna beginning in the early 1940's. Most of the wells were abandoned by 1975 and well monuments were installed; several of the well monuments were identified during site reconnaissance. None of the monuments displayed evidence of tilting that might be associated with local earth movements. A photograph of a well monument located on the north flank of the west tributary to Laguna Gatuna is shown in Figure 2.3.4.2-3.

Another older cultural feature on the Site is the grade of the old Carlsbad-Hobbs highway that runs from southwest to northeast across the Site. This feature is identified on the historical aerial photos presented in the ESA (Appendix 2G) and predates the earliest photo, flown in 1947. The road grade is roughly level and elevated throughout much of its length across the Site, and it crosses a broad low drainage that runs from south to north a few hundred feet east of piezometer ELEA-1. A culvert is still in place in this drainage, as shown in the photo in Figure 2.3.4.2-4. Viewing the road grade lengthwise along its crest affords an opportunity to identify any locations where subsidence has occurred. This inspection indicated that no significant displacement has occurred along the road grade since its abandonment. The culvert still conveys stormwater through the road grade and does not appear to have subsided relative to the grade and adjacent terrain.

The above referenced literature review and site reconnaissance, leads to the conclusion that no evidence of active karst or land subsidence was discovered during these investigations.

Figure 2.3.4.2-3 Well monument near Laguna Gatuna showing no signs of tilting or displacement



2.3.4.2-4 Onsite Drainage Culvert

2.3.4.3 Site Stability

A halite preservation and stability assessment was performed for the Site by Dennis W. Powers and the *Report on Evaporite Stability in the Vicinity of the Proposed GNEP Site, Lea County, NM* is provided as Appendix 2F. This study was conducted in order assess existing data on the continuity and stability of evaporites under the Site, with special attention to data within, or adjacent to the boundaries of nearby lakes or playas. The main data sources for the project area include potash exploration drillholes and oil and gas drillholes.

Lithologic logs from potash exploration and geophysical logs from oil and gas exploration around the Site in southwestern Lea County, New Mexico, provide evidence of the extent and stability of evaporites and their possible relationship to the formation of playas in the vicinity.

An elevation map on the uppermost evaporite-bearing bed (top of Permian Rustler Formation) shows continuity across the area. General northeast slopes are revealed, with some flattened slopes associated with Laguna Plata. There are no indications of lowering of the surface by dissolution; the top of Rustler under most of Laguna Plata is actually elevated above the general trend. The surface varies locally due to variable reporting for potash drillholes of the first encounter with the uppermost sulfate bed of the Rustler. Marker bed (MB) 103, in the upper Salado Formation, was reported in more detail and shows no effects of dissolution from under the evaporite section or from above.

There are no surface, drillhole, or mining indications that subsidence and collapse chimneys occur at the Site or surrounding area. These features are associated with the front of the Capitan reef, which is south of the Site, and with a hydraulic environment that is not known to exist at the Site.

Geophysical logs indicate that halite in the Rustler persists across the Site area. Dissolution from above to create lows on the uppermost Rustler is not a practical process. Dissolution of the extent inferred at Laguna Plata by Reeves and Temple (1986) would have removed most of the halite down to the depth of

MB103, and there is no indication of such removal. There is neither subsurface drillhole data nor surface features indicating a dissolution front in the vicinity of the Site.

There is no evidence for either past or continuing natural processes that would cause Site instability due to halite dissolution in the near future.

2.4 Water Resources

2.4 Water Resources

Water resources are of interest from two major aspects:

- Surface water availability, quality, and vulnerability
- Groundwater availability, quality, and vulnerability

Information about the Site indicates that there is no surface water in the vicinity that is potable. Therefore, the construction and operation of the proposed facilities are expected to have no adverse impacts. Likewise, the geo-hydrological and climate factors lead to the conclusion that groundwater is not likely to be impacted by the construction, operation or decommissioning of the proposed facilities.

2.4.1 Surface Water Resources

This section provides information needed to evaluate the potential for the proposed facilities to impact surface water resources. Surface waters are of interest with regard to availability and quality.

Surface drainage at the Site is contained within two local playa lakes that have no external drainage. Runoff does not drain to one of state's major rivers. Surface water is lost through evaporation, resulting in high salinity conditions and the waters in soils associated with the playas. These conditions are not favorable for the development of viable aquatic or riparian habitats. Other than the playas, the nearest surface water is the Pecos River which is west of the Site. At its nearest approach, the distance from the Site to the Pecos River is 26 miles. Like most rivers in New Mexico, the Pecos River is described as "extremely variable from year-to-year" (OSE, 2004) due to its dependence on runoff. The principle use of Pecos River water is for agriculture.

Because there are no sensitive or unique aquatic or riparian habitats or wetlands at the Site, nor is there surface water in the vicinity that is potable, the construction and operation of the proposed facilities are expected to have no adverse impacts.

The Site lies within the Pecos River Basin as depicted in Figure 2.4.1-1, which has a maximum basin width of 130 mi, and a drainage area of 44,535 square miles. The Pecos River generally flows year-round. The main stem of the Pecos River and its major tributaries have low flows, and the tributary streams are frequently dry. Seventy-five percent of the total annual precipitation and 60 percent of the annual flow result from intense local thunderstorms between April and September.

Figure 2.4.1-1 Pecos River Basin Drainage Area

The Pecos River originates in the mountains of northeast New Mexico. The northern most major reservoir is Santa Rosa Lake located on the Pecos River, 225 miles north of Carlsbad. The flow in the Pecos River below Fort Sumner is regulated by storage in Sumner Lake, Brantley Reservoir, Lake Avalon, and several other smaller dams, such as Tansill and Lower Tansill Dams in the City of Carlsbad.

At its nearest point, the Pecos River is 26 miles southwest of the Site. The vast majority of tributaries to the river flowing westward are unnamed arroyos. An exception is Pierce Canyon south of Malaga Bend that provides drainage into the Pecos River. Nash Draw, the largest surface drainage feature east of the Pecos River in the region, is a closed depression and does not provide surface flow into the Pecos.

The only major natural lakes or ponds within six miles of the Site include Laguna Gatuna, Laguna Tonto, Laguna Plata, and Laguna Toston which are ephemeral playas. Surface runoff from the Site flows into Laguna Gatuna to the east and Laguna Plata to the northwest (DOE, 2004a).

Water quality in the Pecos River basin is affected by mineral dissolution from natural sources and from irrigation return flows. At Santa Rosa, New Mexico, the average suspended-sediment discharge of the river is 1,650 tons/day. Large amounts of chlorides from Salt Creek and Bitter Creek enter the river near Roswell. River inflow in the Hagerman area contributes increased amounts of calcium, magnesium, and sulfate; and waters entering the river near Lake Arthur are also high in chloride.

Below Brantley Reservoir, springs that were sampled had total dissolved solid concentrations of 3,350 to 4,000 mg/l. Brine is generated and enters the Pecos River at Malaga Bend as the river contacts the Salado Formation adding an estimated 370 tons/day of chloride to the Pecos River (Powers et al., 1978).

2.4.2 Groundwater Resources

The purpose of this section is also to provide information needed to evaluate impacts to groundwater resources as the result of the construction, operation and decommissioning of the proposed facilities. Groundwater is significant if it can become contaminated or otherwise impacted for normal operations of the facilities. Evapo-transpiration at the Site is five times the precipitation rate, indicating that there is little infiltration of precipitation into the subsurface. Furthermore, the near surface water table appears to be 35 feet deep, where present and is likely controlled by the water level in the playa lakes. Groundwater encountered on the east side of the Site is brackish, exceeding 10,000 parts per million in total dissolved solids which is the New Mexico regulatory threshold (NM Water Quality Control Commission Regulations, 20.6.2.3101A) for protected water. No groundwater was encountered in the test boring on the west side of the Site. Regional data indicates that groundwater is on the order of 300 to 400 feet deep. There are numerous low permeability layers between the surface and the expected groundwater level. Therefore, the geo-hydrological and climate factors lead to the conclusion that groundwater is not likely to be impacted by the construction, operation, or decommissioning of the proposed facilities.

2.4.2.1 Site and Regional Hydrogeology

Potable groundwater is available from three geologic units in southern Lea County; the Triassic Dockum shale, the Tertiary Ogallala, and Quaternary alluvium (Nicholson and Clebsch, 1961). No potable groundwater is known to exist in the immediate vicinity of the Site. Shallow groundwater is present in a number of locations in the area, but water quality and quantity are marginal at best and most, if not all, shallow wells that have been drilled in the area are either abandoned or not currently in use. Potable water for the area is generally obtained from potash company pipelines that convey water to area potash refineries from Ogallala High Plains aquifer on the caprock area of eastern Lea County. At present, water is generally obtained from these pipelines for other area users.

Much of the shallow groundwater near the Site has been directly or indirectly influenced by brine discharges from potash refining or oil and gas production. Potash mines have discharged thousands of acre-feet of near-saturated refinery process brine to Laguna Plata and to Laguna Toston for many years. But discharges ceased in Laguna Plata in the mid-1980s and in Laguna Toston by 2001. Laguna Gatuna was the site of multiple facilities for collection and discharge of brines that were co-produced from oil and gas wells in the entire area; facility permits authorized discharge of almost one million barrels of oilfield brine per month between 1969 and 1992. As a result, saturations of shallow groundwater brine have been created in a number of areas associated with the playa lakes. (More detail is provided in Section 2.11).

2.4.2.2 Groundwater at the Site

Several sources of data were used to develop information on the occurrence and quality of groundwater in the area of the Site. Nicholson and Clebsch (1961) described groundwater conditions and sources in southern Lea County. Hendrickson and Jones (1952) published records of groundwater wells and descriptions of water-bearing rocks in eastern Eddy County. Unpublished electronic records of wells in the United States Geological Survey (USGS, 2007) and New Mexico Office of the State Engineer (OSE, 2007) files were consulted to provide information on water wells in the area. Kelly (1978a, 1979, 1982, and 1984) performed a series of investigations of shallow groundwater in the vicinity of Nash Draw, Clayton Basin and the Salt Lakes. Kelly's work included compiling, field checking data, and testing existing wells in the area, as well as installing and testing an array of shallow groundwater monitor wells in the potash district. Four of these wells are located within five miles of the Site. Information from these sources was used to compile the well records in Table 2.3.2.2-1 (water well records). Pursuant to this submittal, shallow drilling and monitor well completion were performed at the Site to provide site specific information on shallow groundwater conditions.

Shallow Drilling Investigation

Well drilling and completion were performed at the Site during the week of March 9, 2007. Two wells, ELEA-1 (CP-961) and ELEA-2 (CP-960) were drilled on the Site to identify the depth and character of water-bearing rocks. Locations of these wells and other wells in the vicinity are shown on the well location map in Figure 2.4.2.2-1. Wells were drilled with direct air-rotary techniques; holes were completed with 2-inch Schedule 40 PVC casing and with gravel packs and annular seals. Since drilling, wells have been monitored for water levels and water samples have been collected and analyzed. Logs of the wells are included in Figure 2.3.2.1-2.

The goals of the drilling investigation were to identify the potential for thin groundwater saturation in lower alluvium perched on the Triassic shale, or deeper groundwater saturation in the Triassic shale. Therefore each well was advanced through the alluvium and into the underlying Triassic shale. During drilling, dry air was used to circulate drill cuttings to the surface; cuttings were examined to identify evidence of water saturation.

Piezometer ELEA-1*:* During drilling ELEA-1, caliche-capped Quaternary sands were drilled to a depth of 26 feet, where the Triassic shale was penetrated. Drill cuttings were moist, but not saturated in the lower portion of the alluvium and the upper few feet of Triassic shale. Cuttings were dry from a few feet below the top of the shale to the total depth of 80 feet. The well was plugged back to 50 feet using hydrated granular bentonite and completed with a gravel pack and well screen from 20 feet to 50 feet to promote communication with any saturation present at the alluvium-shale interface. A small amount of water was initially detected in the well; however the water has steadily declined to within a few inches of the bottom of the well and is attributed to the small amount of bentonite hydration water that was placed in the well to seal the upper annulus during completion. Based on the data obtained from ELEA-1, no shallow groundwater saturation is present at the top of the Triassic shale at the location.

Piezometer ELEA-2: ELEA-2 penetrated caliche-capped Quaternary sands to a depth of 26 feet, where Triassic shale was struck. Drill cuttings were slightly moist in the upper 25 feet of the Triassic shale, then dry-appearing to the total depth of 100 feet. During recovery of the drill tools, mud was noted on the drill bit. The well was cased with a screen interval from 58 feet to 98 feet and equipped with a gravel pack and annular seal. Water level in this well rose slowly over several days to a static depth of 34 feet below land surface (3,497 ft above mean sea level [amsl]). The water-bearing zone in this well consists of either fractures or tight sandy zones between the depths of 85 and 100 feet; water in this zone is under artesian head of 50 feet. Laboratory analyses of water samples from the well indicate that the water is highly mineralized brine.

Based upon information obtained from the onsite drilling, shallow alluvium is likely non water-bearing at the Site. Groundwater saturation in the Triassic shale appears to be limited to small amounts of highly mineralized water likely associated with the brine in Laguna Gatuna, where the brine is 3,500 ft amsl.

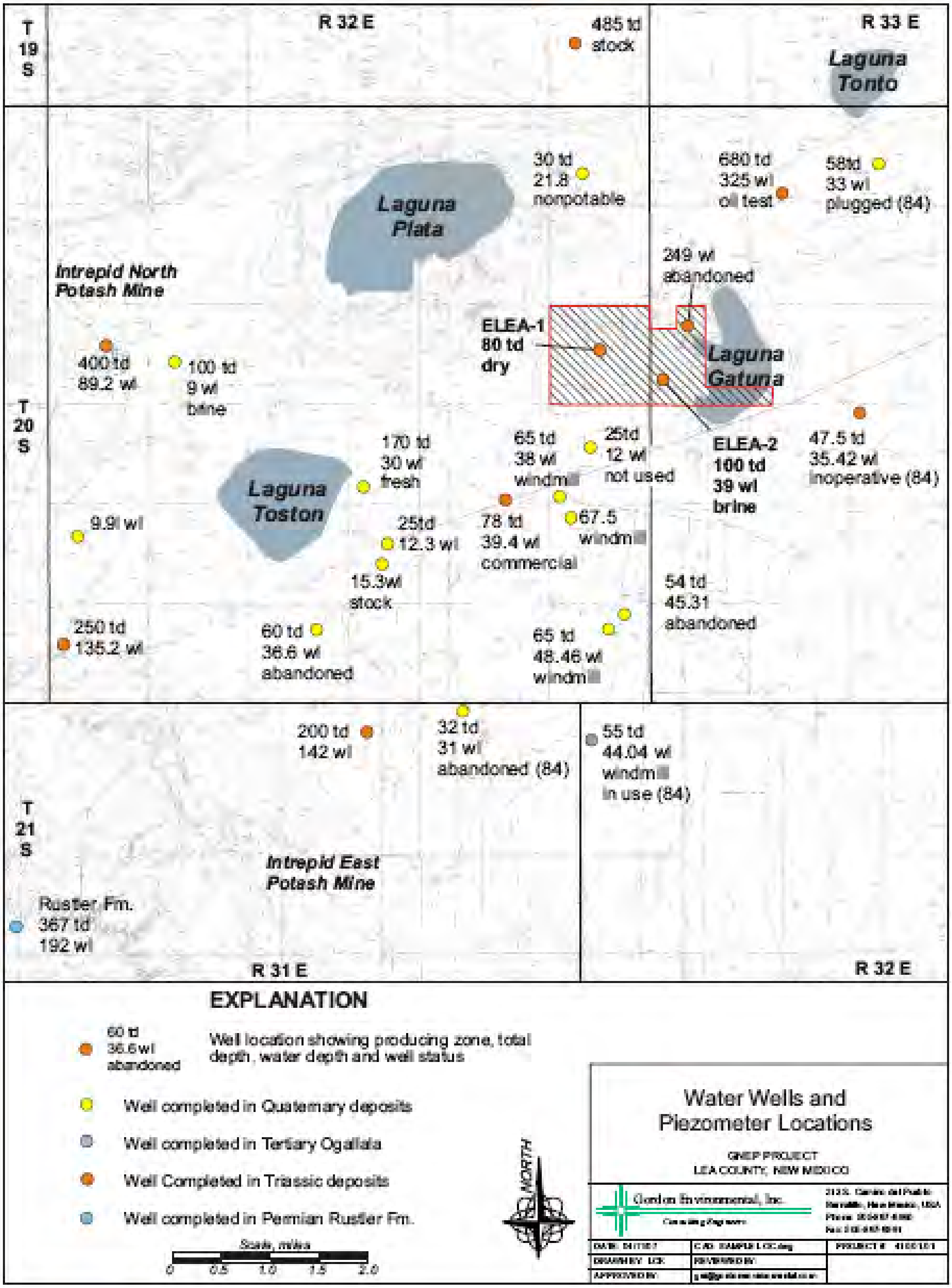


Figure 2.4.2.2-1 Water Wells and Piezometer Locations

Groundwater in the Permian Rustler Formation

In the vicinity of the Site, the Los Mendaños member of the Rustler Formation consists of 100 feet of siltstone and very fine grained sandstone, interbedded with gypsum and anhydrite. Above the mudstone at the top of the Los Mendaños Member is the Culebra Dolomite, a 30-foot thick section of microcrystalline dolomite that is characterized by spherical vugs. Overlying the Culebra, the Tamarisk member consists of 115 feet of massive anhydrite and gypsum. Over the Tamarisk member, the Magenta member consists of 20 feet of thin, wavy, lenticular laminae of dolomite and gypsum. The uppermost portion of the Rustler Formation is the Forty-Niner member, which consists of 65 feet of anhydrite (Powers, et al., 1978). See additional detail in Appendix 2F.

The Rustler Formation is the oldest unit that is known to produce water to a well in the vicinity of the Site. Kelly (1978b) identified a stock well in Section 18, Township 21 South, Range 31 East, 6 miles southwest of the Site that is reported to be completed in the Rustler Formation at a depth of 367 feet. The well was in use at the time of Kelly's reconnaissance and produced water having an electrical conductance of 3,500 micromhos per centimeter, indicating total dissolved solids of 1,250 milligrams per liter. No other wells producing from the Rustler Formation are known to exist in the vicinity of the Site.

Groundwater in the Permian Dewey Lake Redbeds

The Dewey Lake Redbeds overlie the Rustler Formation and consist of red shale and siltstone. Five-hundred (500) feet of Dewey Lake Redbeds have been identified in oil well logs in the immediate vicinity of the Site (OCD, 2007). The Dewey Lake Redbeds outcrop in an exposure belt south of Highway 62/180, seven miles southwest of the Site. The Dewey Lake Redbeds occasionally yield small quantities of moderately mineralized water to stock wells; however no wells in the vicinity of the Site are known to produce water from the Dewey Lake Redbeds.

Groundwater in the Upper Triassic Chinle

Seven hundred feet of upper Triassic shale overlies the Dewey Lake Redbeds in the area of the Site (see hydrogeologic cross section, Figure 2.3.2.2-5). Triassic shales have been identified in exposures around the flanks of Laguna Gatuna, Laguna Plata and along an outcrop belt five miles west of the Site and south of Highway 62/180 (see local surface geology, Figure 2.3.2.2-4). The Triassic shale is thinly buried by alluvial pediment deposits in the vicinity of the Site. Several wells are completed in Triassic shale in the vicinity. Local shallow saturation in the Triassic shale has been found in a few wells; however a deeper potentiometric surface for water in the Triassic section was identified by Nicholson and Clebsch (1961), who produced the potentiometric surface map shown in Figure 2.4.2.2-2. The Nicholson and Clebsch map indicate a groundwater flow direction to the southwest near the Site. This potentiometric surface is plotted on the hydrogeologic cross section (Figure 2.3.2.2-5).

Unpublished oil well logs and file data of the OCD (OCD 2007) indicate that deeper water-bearing sands in the Triassic section were penetrated by several wells in the area of Site. The Texas State B and Bass State 6 oil wells (shown on the hydrogeologic cross section in Figure 2.3.2.2-5) struck water-bearing sands in the Triassic shale at depths of 250 feet and 415 feet, respectively. These sands are plotted on the hydrogeologic cross section in Figure 2.3.2.2-5.

Nicholson and Clebsch (1961) data indicate that quality of water from wells completed in Triassic aquifers ranges from 675 milligrams per liter (mg/l) total dissolved solids (TDS) to 2000 mg/l and average 1000 mg/l. Two wells in the area are known to have produced from this zone; a well at the Intrepid North Potash mine, and a domestic/stock well located three miles north of the Site in Section 36, Township 19 South, Range 32 East.

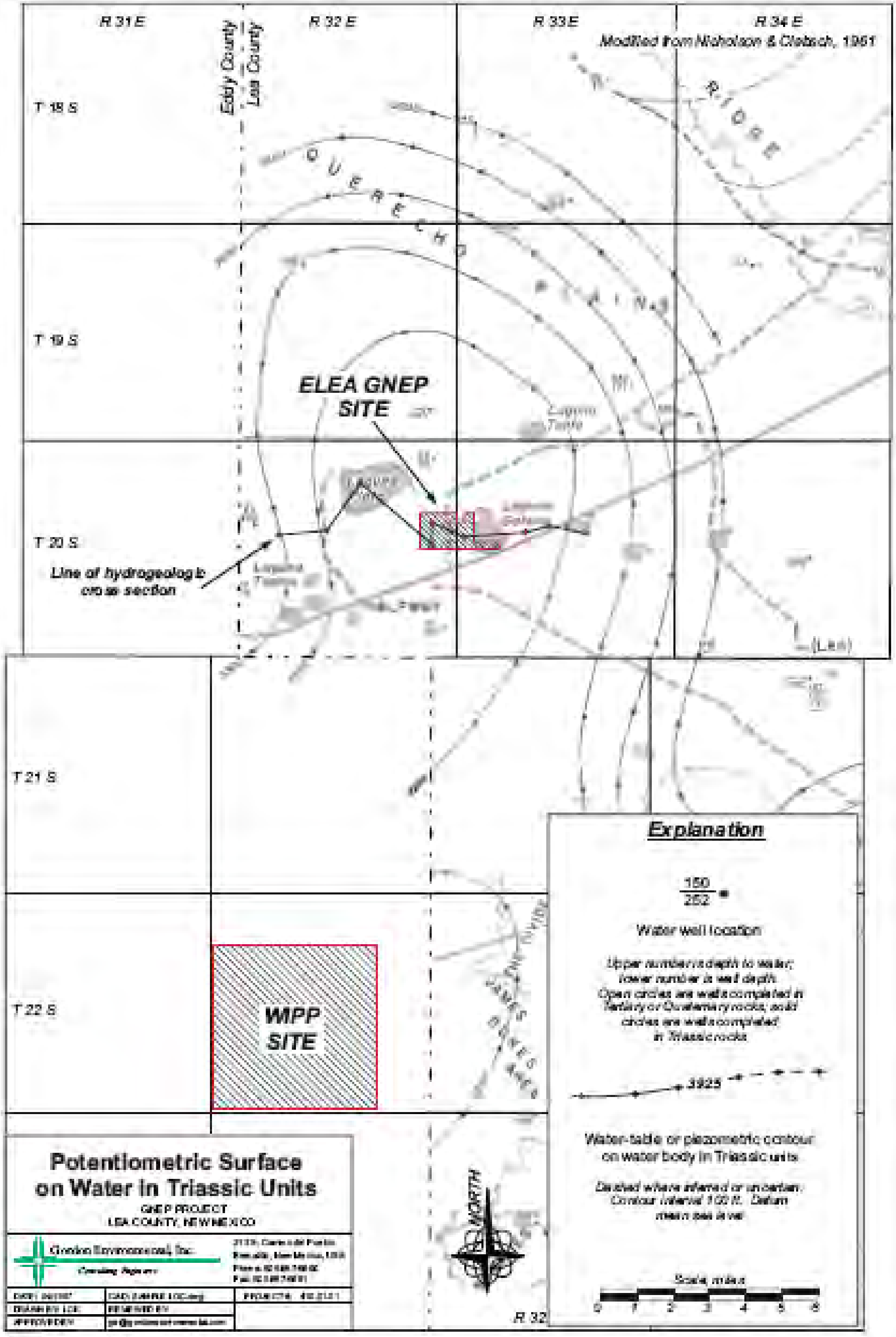


Figure 2.4.2.2-2 Piezometric Surface of Water in Triassic Units in the Area of the Site

Groundwater in the Quaternary Deposits

Quaternary age deposits in the area of the Site consist of pediment alluvium, eolian sands, and lacustrine lake deposits. The pediment deposits form a gently west-sloping surface that is interrupted by drainages, the playa basins and eolian erosion/deposition. Powers, et al., (1978) characterized Laguna Plata, Laguna Gatuna and other depressions in the area as “blowouts” formed by wind erosion. Bachman (1974) and Nicholson and Clebsch (1961) identified large accumulations of sand on prevailing downwind sides (east) of the playas. Nicholson and Clebsch (1961) noted that Laguna Toston appeared to be filled with sediments and stabilized with vegetation such that wind erosion and deposition had halted.

Groundwater occurs in Quaternary alluvium where stream beds or playa blowouts have incised into the Triassic shales and the resulting low has been subsequently filled with eolian sand or pediment materials. Recharge occurs on the flanks of the playas and over buried stream channels and flows toward the playas, or down paleochannels. Distribution and elevation of groundwater in Quaternary deposits based on available water well data are shown on the map in Figure 2.4.2.2-3. This map indicates that groundwater in Quaternary deposits is laterally discontinuous and is in thin saturations that rarely exceed 20 feet. Groundwater appears to be limited to the immediate areas of Laguna Toston, Laguna Plata and an apparent buried stream channel flowing from the area of the southeast corner of Township 20 South, Range 32 East toward Laguna Plata. Laguna Toston is a major input point for potash refinery brine and water appears to drain radially away from this location. Laguna Plata is the topographically lowest point in the area and alluvial groundwater appears to flow toward this site. Available water quality data suggests that the quality of alluvial groundwater ranges from slightly brackish to near-saturated brine in potash refinery discharge areas.

2.4.2.3 Groundwater Quality Summary

Available general groundwater quality data is summarized in the groundwater quality map in Figure 2.4.2.3-1. This map shows available laboratory measurements of TDS of groundwater samples from the area, including three BLM test wells sampled by Kelly (1979) and water samples collected from Laguna Gatuna (surface water) and piezometer ELEA-2 as part of the March 2007 site investigations. Water TDS ranged from 424 mg/l in a sample collected from a BLM test well tapping Triassic shale five miles southwest of the Site to 300,000 mg/l in a water sample collected from Laguna Gatuna. Two BLM test wells near Laguna Toston and the Intrepid North Potash Mine contained 3,100 mg/l and 173,000 mg/l TDS, respectively. The sample from piezometer ELEA-2 contained 83,000 mg/l TDS. Based on this data, most shallow alluvial groundwater in the vicinity of the Site has been impacted by brine disposals, or originated from brine disposal.

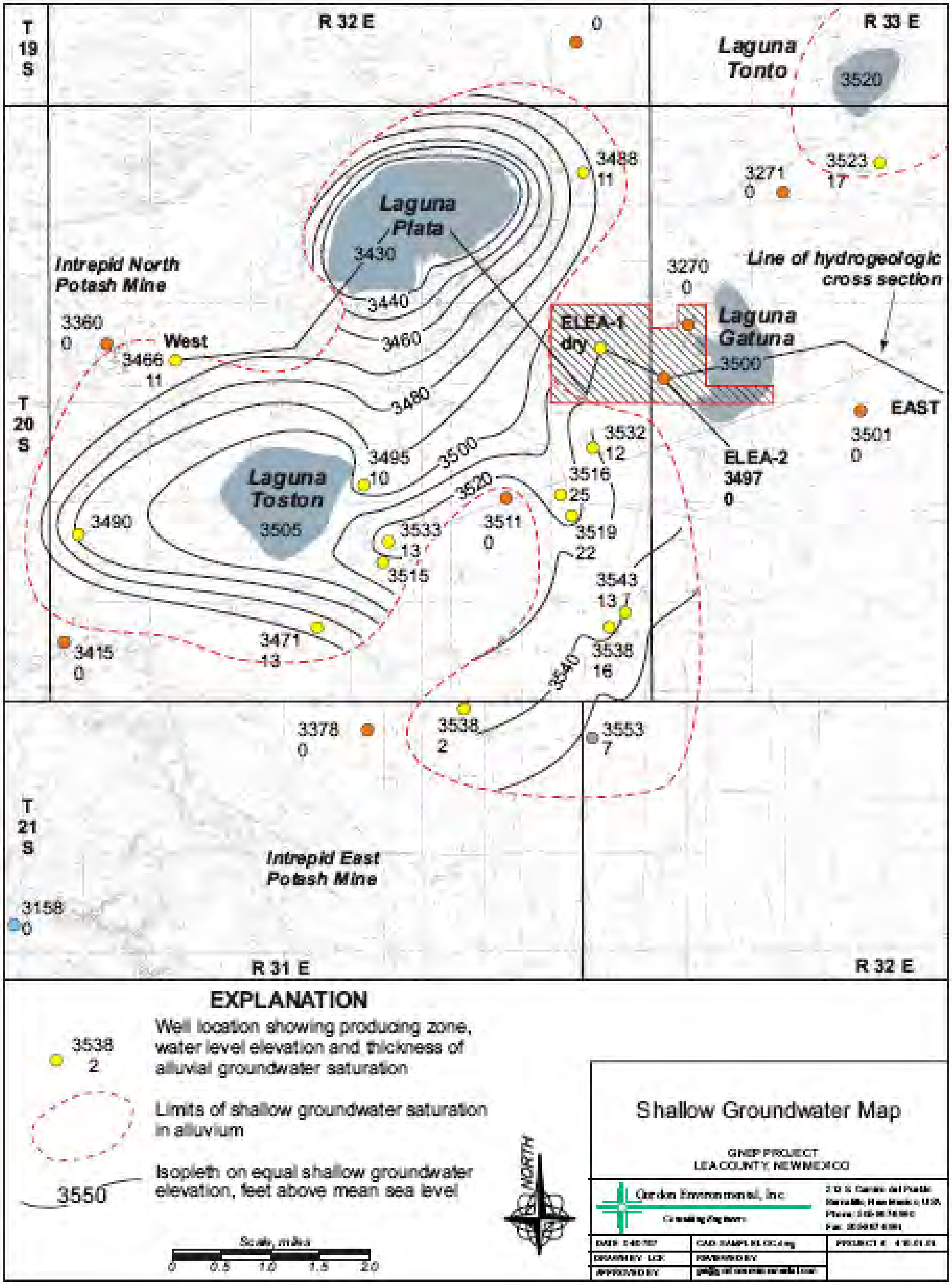


Figure 2.4.2.2-3 Shallow Groundwater Map

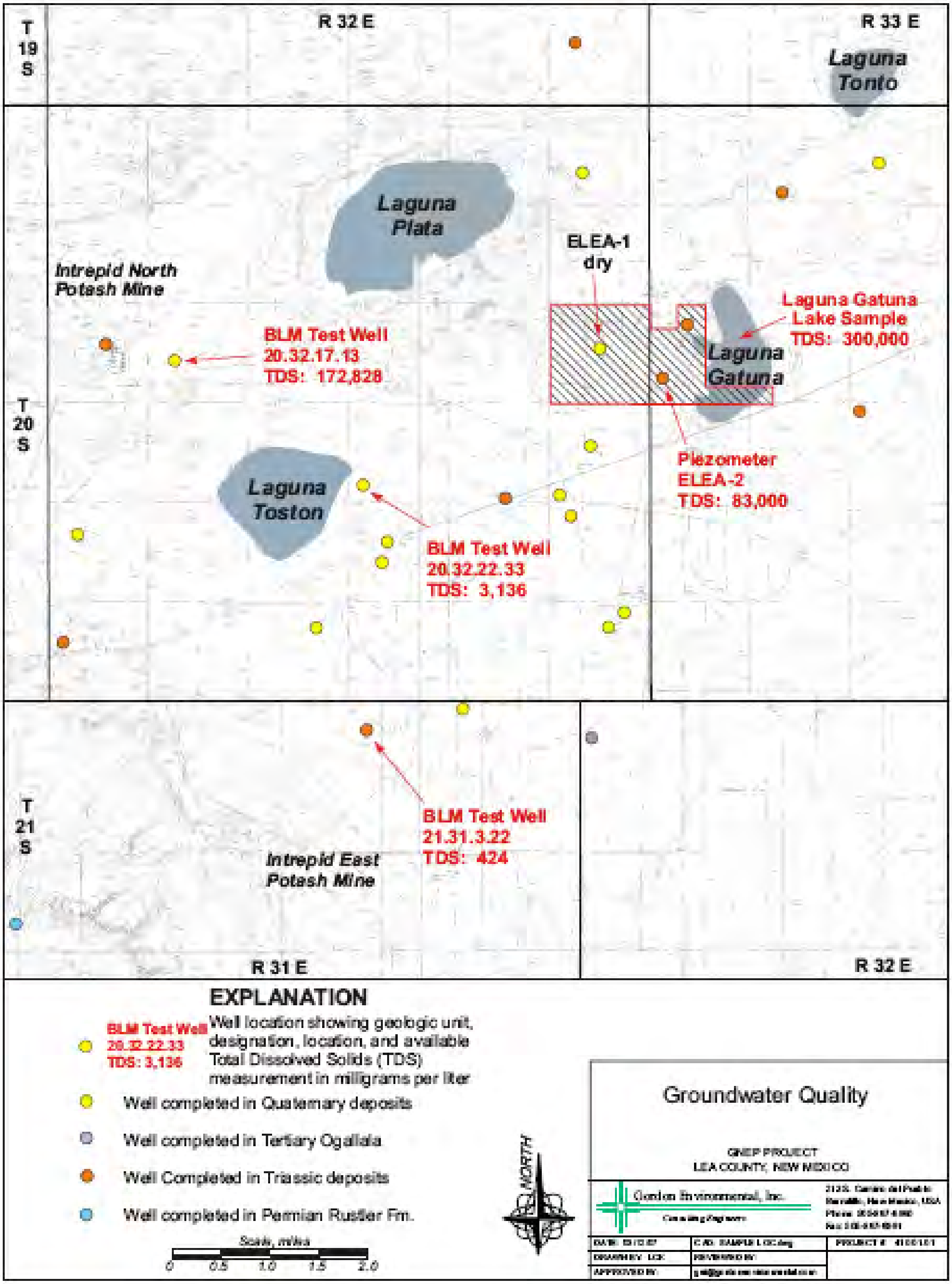


Figure 2.4.2.3-1 Groundwater Quality

2.4.3 Water Supply

The High Plains Aquifer in the Ogallala Formation contains 3.270 billion acre-feet of water and underlies 174,050 square miles in parts of eight states, Figure 2.4.3-1 (HPWD, 2007). In eastern New Mexico the aquifer underlies 9,450 mi^2 or 8 percent of the state. The volume of recoverable water in the New Mexico portion of the aquifer is on the order of 50 million acre feet. (USGS, 2007d).

The City of Carlsbad owns and operates Double Eagle Water System, located near Maljamar in northwestern Lea County (City of Carlsbad, 2005). The Double Eagle Water System is supplied by groundwater pumped from 11 wells completed in the Ogallala Formation. The first 16-mile segment of the pipeline carrying water from these wells to the WIPP facility has a 24-inch diameter and runs to Highway 62/180.

The ELEA GNEP facilities will be able to tap into the Double Eagle Water Resorece System that is 3 miles west of the Site. This source of water is adequate to supply the water needs of analogous operating facilities. The City of Carlsbad has indicated that the Double Eagle water line near the Site is capable of delivering 6,000 gallons per minute. This equates to over 8,000,000 gallons of water per day. The City of Carlsbad is in the process of modeling the Double Eagle system to determine what upgrades are needed for future users. The water superintendent offered to include the GNEP facilities in the modeling if water requirements are known. (Abell, 2007).

It is estimated that the Lea County portion of the High Plains Aquifer contains 14,000,000 acre feet of recoverable water (OSE, 2000).

Figure 2.4.3-1 High Plains Aquifer (used with permission from HPWD)

2.5 Floodplains and Wetlands

2.5 Floodplains and Wetlands

This section contains information regarding floodplains and wetlands. This information is needed for evaluating impacts related to severe storm events and to assess the need for permits and mitigative measures to avoid impacts to protected wetlands areas. A Flood Hazard Boundary Map produced by the Federal Emergency Management Agency for the Pecos River Floodway does not include the Site. Therefore, there are no 100-year floodplains within the Site. Both of these drainages are able to accept a one-day severe storm total within a 5 and 7.5 inch range with excess free board space. Therefore the risk of adverse impacts due to floods is small.

No Corps of Engineers jurisdictional wetlands were identified anywhere on the Site. Therefore the risk of impacts to wetlands is nonexistent.

2.5.1 Floodplains

The Site is located in western Lea County, north of Highway 62/180 with Eddy County in close proximity to the west. Lea County is divided in half by a prominent topographic feature known as Mescalero Ridge. The Mescalero Ridge traverses the western and central portions of Lea County and is a nearly perpendicular cliff that indicates the southern limits of the High Plains in New Mexico. The High Plains are capped by a thick layer of caliche, locally known as Caprock, which extends throughout northern Lea County. In the east-central part of Lea County, the Mescalero Ridge becomes more subdued and is no longer considered a ridge (OSE, 2007). Figure 2.5.1-1illustrates the major topographic areas in the region of the Site.

The Site is not located in any 100 year or 500 year flood plain, as shown in Figure 2.5.1-2.

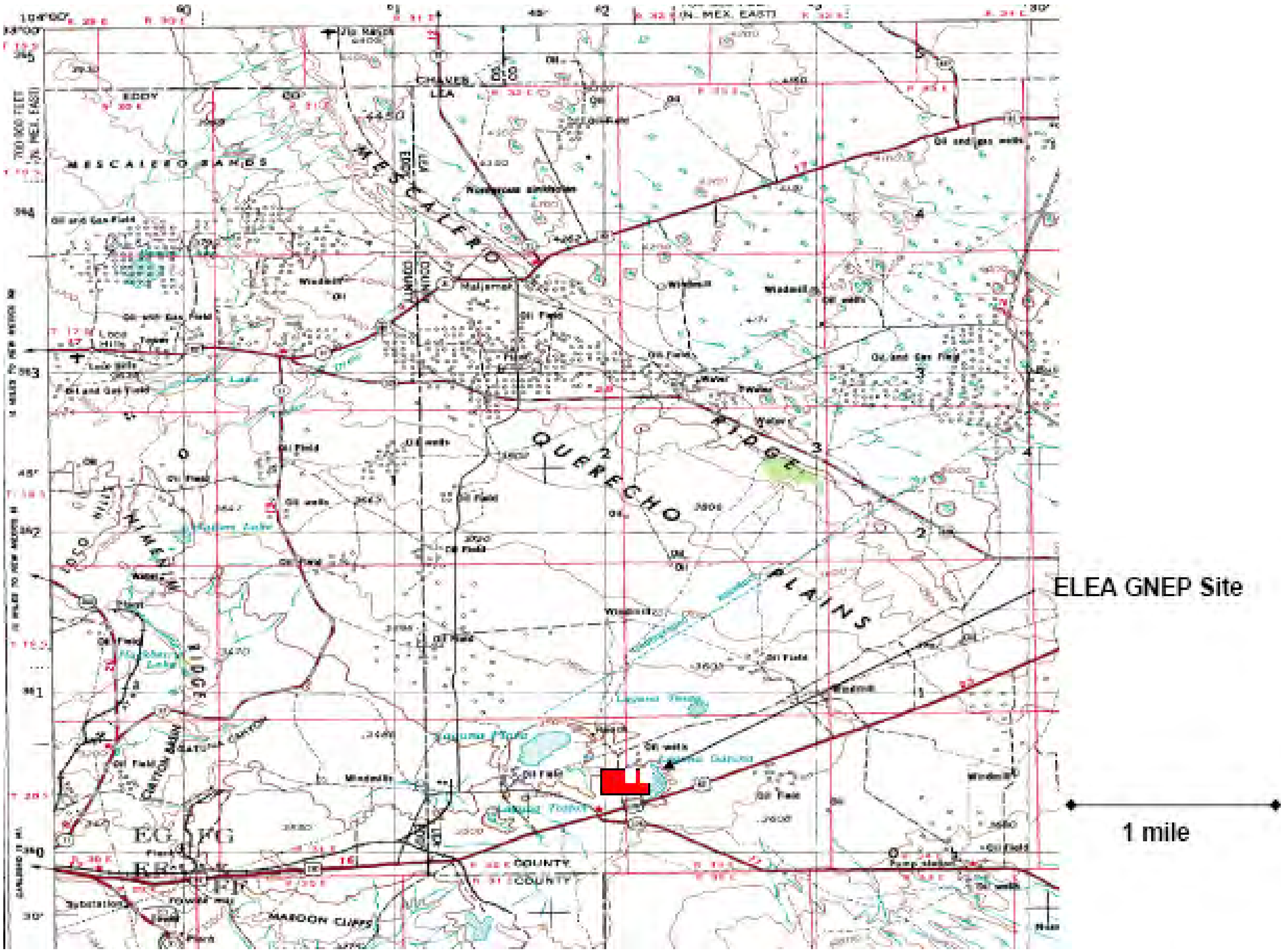


Figure 2.5.1-1 Topographical Map of Northwest Lea County Showing Mescalero Ridge which is the Topographic Divide between the Texas Gulf Basin and the Pecos River Basin

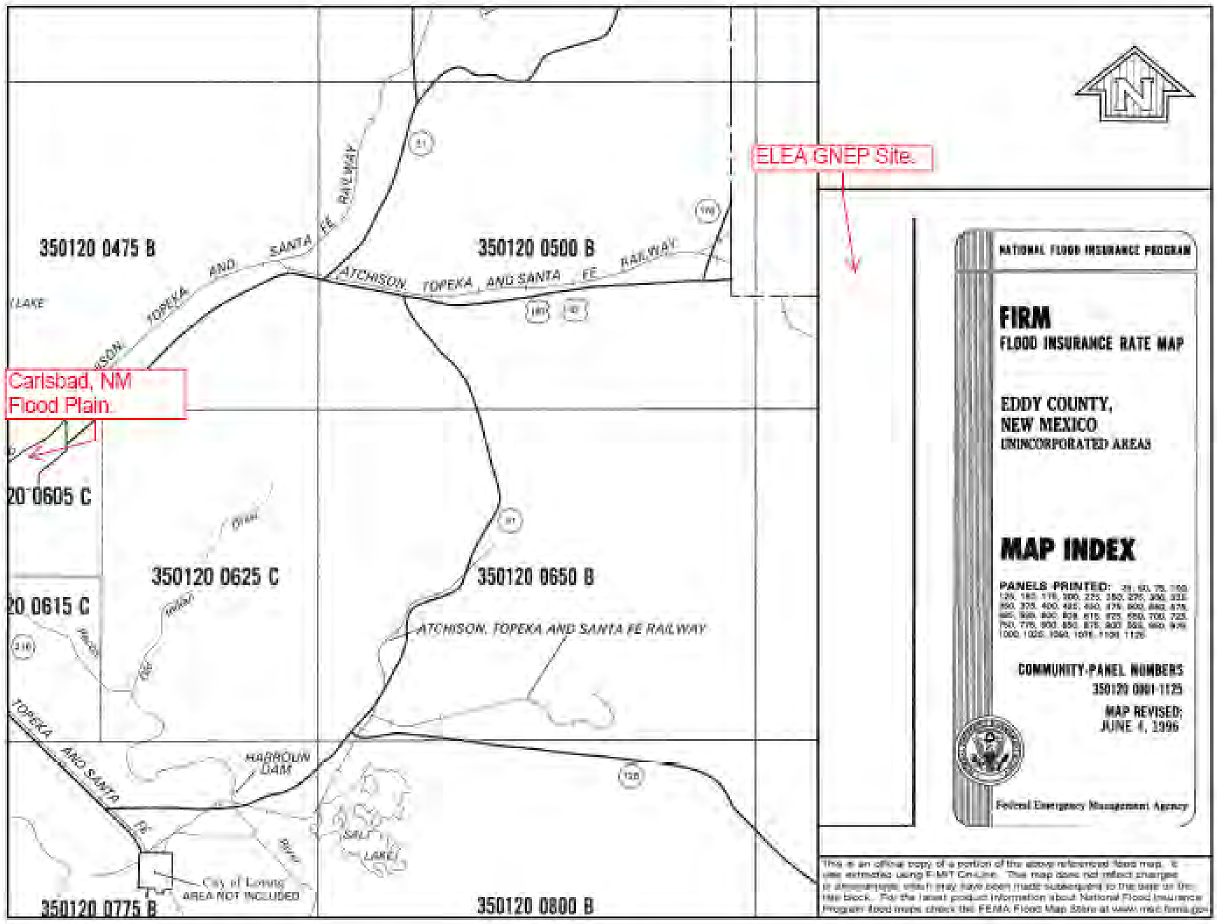


Figure 2.5.1-2 Federal Emergency Management Agency (FEMA) Floodplain Map for Eastern Eddy County

The FEMA has no flood plain neither identified nor mapped for Lea County, New Mexico (FEMA, 2007).

Elevations in Lea County vary from 2,900 feet in the southeast to 4,400 feet in the northwest. This relief provides two surface water drainage basins in the county. The Texas Gulf Basin, located in the northern portion of Lea County, and the Pecos River Basin, located in the southern portion of the county, is separated by the Mescalero Ridge and its extended escarpment (OSE, 2007).

In Lea County neither of the two major drainage basins, the Texas Gulf Basin in the north and east and the Pecos River Basin in the south and west, contain large-scale surface-water bodies or through-flowing drainage systems. The surface water supplies that exist are transitory and limited to quantities of runoff impounded in short drainage ways, shallow lakes, and small depressions, including various playas and lagunas. The Texas Gulf Basin contains a lake, the Llano Estacado, and the Simona Valley. The Pecos River Basin contains the Querecho Plains, the Eunice Plains, and the Antelope Ridge.

A cluster of four saline playas are located in the Querecho Plain area of the west-central part of the county. These playas, which retain runoff temporarily, are referred to locally as lagunas. Laguna Plata covers the largest area, about 2 square miles. Laguna Toston, the smallest of the four with a surface area of one-quarter square mile, is completely filled with sediments; the other three all contain accumulations of clastic sediments and salts (halite, gypsum).

As presented in Section 2.2, the average rainfall in Hobbs, New Mexico was 18.15 inches per year based on 1971-2000 meteorological data. However, the largest recorded rainfall in a 24 hour period recorded in Hobbs totaled 7.5 inches (WUSRCC, 2000).

The topography of the Site shows a high point located on the southern border of the Site and gentle slopes leading to the two drainages (Laguna Plata and Laguna Gatuna). Both of these drainages would be able to accept a one day severe storm total within the 7.5 inch range with excess free board space. The natural drainage of the Site is useful by providing a natural area for impoundment of excess runoff during severe storms.

2.5.2 Wetlands

No Corps of Engineers jurisdictional wetlands were identified anywhere on the Site. To be classified as a Corps of Engineers jurisdictional wetland, a site must simultaneously exhibit three types of physical evidence; it must possess wetland hydrology, contain hydric soils, and support a sufficient number and density of hydrophytic plants (Environmental Laboratory, 1987). Although temporarily saturated soils exist at the edges and/or bottom of Laguna Gatuna when runoff water is present and wetland hydrology is evident, no hydrophytic plants were observed in the survey area. The lack of hydrophytic plants may be due to prolonged dry periods (dessication of the playa), excessive salt buildup in the soil and water, and/or other factors. Because all three of the Corps of Engineers characteristics are not met, the Site is not classified as a wetland.

2.6 Ecological Resources

2.6 Ecological Resources

The purpose of this section is to provide information that will allow an evaluation of the impacts the construction, operation, and decommissioning of the proposed facilities will have on ecological resources. This section describes the terrestrial communities of the Site and their associated plant and animal species.

A significant body of literature exists that is related to habitat, flora, and fauna in the region. This section is based upon a review of the available literature and consultation with wildlife biologists with expertise in regional habitat. An emphasis was placed on determining the habitats of potential species that could occur at the Site. Data identified in the ecological field surveys of the Site that were conducted in March 2007 and summarized in Appendix 2B augment the literature and consultation data.

Vegetation and habitats within the Site and immediately surrounding area are common within the region. The Site does not support any vegetation of significance. Significance is defined in this document as any plant, animal, or habitat that 1) has high public interest or economic value or both or; 2) may be critical to the structure and function of the ecosystem or provide a broader ecological perspective of the region.

This section of DSR summarizes the terrestrial habitat at the Site while the more detailed report on terrestrial habitats is included as Appendix 2B. Based on the lack of significant species and habitats, including habitats for threatened or endangered species, the proposed facilities are expected to have small impacts on the ecological resources. Clearing 600 acres of land to construct the facilities will remove habitat that is currently used principally for grazing livestock. This will displace resident populations of rabbits and coyotes and other small mammals. However, the area does not provide a unique habitat for these animals. Construction and operation of the facilities will likely remove some of the traditional stressors such as grazing and oil and gas production that have affected habitat in the past. Portions of the Site may be available for habitat improvement.

2.6.1 Terrestrial Habitats

Characteristics that collectively create site habitat are the interactions of climate with elevation, soils, and physical setting. These factors have combined to support certain vegetation and provide food and cover for wildlife.

The Site is located primarily (roughly 98 percent) in an environment of Simona-Tonuca soils and includes varying combinations of sand, fine sands, loam, and gravel (Turner et. al., 1974). An indurated layer of caliche underlies soils in the area. This layer is named Mescalero Caliche at the Site and consists of pedogenic calcrete denoting soil formed as naturally cemented calcium carbonate (Powers, 2007). It is significant in that it affects the depth to which roots can grow and thus, the vegetative species in the area. The caliche can be found as outcrops at the surface in some areas and from 10 to 12 inches beneath the surface in the remainder of the Site.

The regional climate is semiarid-continental with generally warm temperatures. Average annual rainfall at the Site will be similar to that reported by the WIPP which is in the range of 13.5 inches per year. This represents precipitation data collected at the WIPP site from 1990 through 2006, coupled with the 1970 through 1989 temperature data collected at the Carlsbad Regional Airport by the DOT Federal Aviation Administration. The Site’s pattern of evaporation is similar to that at Brantley and Avalon reservoirs just north of Carlsbad where evaporation far exceeds average precipitation. Service winds are primarily southeasterly; however, strong westerly Spring winds are frequent.

These conditions generally favor plants that can efficiently absorb, store, and utilize water from the soil. The vegetation community for the Site is Desert Grassland which contains both prairie grasses and shrubs and provides food and cover for specific types of wildlife. Figure 2.6.1-1 provides views of the common fauna and flora at the Site.

Honey Mesquite *(Prosopis glandulosa)*

Black-tailed jackrabbit (*Lepus californicus)*

Figure 2.6.1-1 Common Flora and Fauna Habitat at Site

2.6.1.1 Fauna in the Vicinity of the Site

The Site is contained within the BLM Roswell Resource Management planning area. For the planning area, the BLM's Roswell Field Office Database (BLM 2004) indicates a potential for 43 species of mammals, 31 species of reptiles, and 60 species of birds. Reptiles are also identified from "Amphibians & Reptiles of New Mexico". Research and ecological field surveys conducted in preparation of the EIS for the NEF in Lea County, New Mexico (NRC, 2005) and results of the ecological field surveys conducted at the Site in March 2007 refine the list to those species whose preferred habitat aligns with the habitat characteristics associated with the Site.

The composition of wildlife species at the Site is reflective of the type, quality, and quantity of habitat present. Wildlife species likely to be present at the Site and vicinity are those that occur in prairie grasses and semi-desert shrubs and are listed in Table 2.6.1.1-1.

During the field surveys, 16 bird species and 4 mammal species were recorded and these are noted in Table 2.6.1.1-1. No reptiles were observed due to the season. Most bird species observed were typical year round residents or wintering species for Desert Grasslands in southern New Mexico. All birds observed, with the exception of the Eurasian Collared Dove, are protected by the Migratory Bird Treaty Act (Appendix 2B).

Table 2.6.1.1-1 Mammals, and Amphibians/Reptiles Potentially Inhabiting the Site and Vicinity, Noting Their Habitat and Bird (BLM 2004, NRC 2005, BISON-M, Appendix 2B)

Mammals		
Common Name	***Scientific Name***	***Preferred Habitat***
Badger	*Taxidea taxus*	Prairies, near rodents and lizards
Black-tailed jackrabbit [1]	*Lepus californicus*	Grasslands and open areas.
Black-tailed prairie dog	*Cynomys ludovivianus*	Short Grass Prairie
Bobcat	*Lynx rufus*	Rocky, brushy hillsides
Cactus mouse	*Peromyscus eremicus*	Grasslands, prairies and mixed vegetation
Coyote[1]	*Canis letrans*	Open space, grasslands, and brush country
Deer mouse	*Peromyscus maniculatus*	Grasslands, prairies, and mixed vegetation
Desert cottontail [1]	*Sylvilagus audubonii*	Arid lowlands, brushy cover, and valleys
Desert pocket mouse	*Perognathus penicillatus*	Grasslands
Gray shrew	*Notiosorex crawfordi*	Any
Hispid pocket mouse	*Chaetodipus hispidus*	Scattered stands of grasses

Hognose skunk	*Conepatus mesoleucus*	Brushy foothills
House mouse	*Mus musculus*	Near buildings and humans
Javelina	*Dicotyles tajacu*	Mesquite with abundant prickly pear
Merriams kangaroo rat	*Dipodomys merriami*	Sagebrush, shad scale, creosote bush, many soil types
Mexican ground squirrel	*Spermphilus mecicanus*	Grassy, bushy areas, mesquite
Mountain lion	*Felis concolor*	Multiple habitats, stays near dear and adequate cover
Mule deer	*Odocoileus hemionus*	Desert Shrubs, chaparral, and rocky uplands
Nelsons pocket mouse	*Perognathus nelsoni*	Grasslands
Northern grasshopper mouse	*Onychomys leucogaster*	Grasslands
Ords kangaroo rat	*Dipodomys ordii*	Hard desert soils
Plains harvest mouse	*Reithrodontomys montanus*	Well drained grasslands, bluestem grass
Plains pocket gopher	*Geomys bursarius aernarius*	Deep soils of the plains
Plains pocket mouse	*Perognathus flavescens*	Grasslands
Porcupine	*Erethizon dorsatum*	Dry, scrubby areas
Pronghorn antelope	*Antilocapra americana*	Sagebrush flats, plains, and deserts
Raccoon	*Procyon lotor*	Brushy, semi-desert, chaparral, and mesquite
Rock squirrel	*Spermphilus variegates*	Rocky areas, near canyon walls
Silky pocket mouse	*Perognathus flavus*	Prairies, sandy, gravely areas
Southern plains woodrat [1]	*Neotomamicropus*	Grasslands, prairies and mixed vegetation
Spotted ground squirrel	*Spermphilus spilosoma*	Brushy, semi-desert, chaparral, mesquite, and oaks
Striped skunk	*Mephitis mephitis*	All land habitats
Swift fox	*Vlupes velox*	Rangeland with short grasses and low shrub density
Thirteen-lined ground squirrel	*Spermphilus tridecemlineatus*	Short grass prairie
Western harvest mouse	*Reithrodontomys megalotis*	Dry, weedy or grassy areas
White-throated woodrat	*Neotoma albigula*	Grasslands, prairies and mixed vegetation
Reptiles		
Common Name	***Scientific Name***	***Preferred Habitat***
Round-tail horned lizard	*Phrynosoma modestum*	Arid or semiarid, desert plains, scrubby vegetation and sandy or gravelly soils
Bull snake (gopher)	*Pituophis melanoleucus*	Mesquite bosque and creosote bush
Checkered garter snake	*Thamnophis marciauns*	Grama-tabosa grass in Chihuahuan Desert
Checkered whiptail	*Cnemidophorus grahamii*	Grama-tabosa grass in Chihuahuan Desert
Chihuahuan spotted whiptail	*Cnemidophorus exsangus*	Grama-Tobosa grass in Chihuahuan Desert
Coachwhip	*Masticophis flagellum*	Mixed grass prairie and desert grasslands
Collared lizard	*Crytaphytus collaris*	Desert grasslands
Common king snake	*Lampropeltis getula*	Grassland and mesquite dominated flats
Glossy snake	*Arizona elegans*	Grama-buffalo grasses
Great plains skink	*Eumeces obsoletus*	Grama-Tobosa grasses
Greater earless lizard	*Cophosaurus texanus scitulus*	Rocky dry streambeds, broken rock around limestone cliffs
Ground snake	*Sonora semiannulata*	Grama-buffalo and Grama-Tobosa grasses
Lesser earless lizard	*Holbrookia maculate*	Mixed grass prairie and desert grasslands

Longnose snake	*Rhinocheilus lecontei*	Desert grasslands
Many lined skink	*Eumeces multivirgatus*	Rocky areas
Massasauga rattlesnake	*Sistrurus catenatus*	Dry shortgrass plains
Milk snake	*Lampropeltis triangulum*	Grama-Buffalo grasses
Night snake	*Hypsiglena torquata*	Grama-Tobosa grasses
Ornate box turtle	*Terrapene ornate*	Desert grasslands and short grass prairie
Plains black-headed snake	*Tantilla nigriceps*	Short grass prairie and desert grasslands
Plains Striped Whiptail	*Aspidoscelis inornatus lianuras*	Desert and plains grasslands
Prairie lizard	*Sceloporus undulates*	Prairies, grasslands
Sand-dune lizard	*Sceloporus arenicolus*	Open sand, takes refuge in shinnery oak.
Side-blotched lizard	*Uta stansburana*	Flat desert areas with scattered rocks or low vegetation and convenient mammal burrows for protection
Six-lined racerunner	*Cnemidophorus sexlineatus*	Mixed grass prairie and desert grasslands
Texas Spotted Whiptail	*Aspidoscelis qularis gularis*	Varies from arid canyon bottoms and washes to semiarid prairies
Texas Horned Lizard	*Phrynosoma cornutum*	Desert Grasslands
Trans-Pecos Striped Whiptail	*Aspidoscelis inornatus heptagrammus*	Rocky slopes or flatlands with scattered vegetation. Sandy silt deposited by periodic flooding.
Western diamondback rattlesnake	*Crotalus atrox*	Mesquite-grasslands
Western hognose snake	*Heterodon nasicus*	Grassland flats
Western rattlesnake (prairie)	*Crotalus viridis*	Mesquite-grasslands
Western whiptail lizard	*Cnemidophorus tigris*	Mixed grass prairie and desert grasslands
Yellow mud turtle	*Kinosternon flavescens*	Permanent bodies of water with muddy bottoms such as lakes, ponds, cattle tanks

Birds

Common Name	***Scientific Name***	***Common Name***	***Scientific Name***
American kestrel	*Falco sparverius*	Lark sparrow	*Chondestes grammacus*
Ash-throated flycatcher	*Myiarchus cinerascens*	Lesser nighthawk	*Chordeiles acutipennis*
Bairds sparrow	*Ammodramus bairdii*	Lesser prairie chicken	*Tympanuchus pallidicintus*
Barn swallow	*Hirundo rustica*	Loggerhead shrike[1]	*Lanius ludovicianus*
Bewicks wren	*Thryomanes bewickii*	Mourning dove	*Zenaida macroura*
Black-throated sparrow	*Amphispiza bilineata*	Nighthawk	*Chordeiles minor*
Brewers sparrow	*Spizella breweri*	Northern bobwhite	*Colinus virginianus*
Brown thrasher	*Toxostoma rufum*	Northern flicker	*Colaptes auratus*
Brown-headed cowbird	*Molothrus ater*	Northern harrier[1]	*Circus cyaneus*
Burrowing owl	*Athene cinicularia*	Northern mockingbird	*Mimus polyglottus*
Cactus wren[1]	*Camppylorhynchus brunneicapillus*	Pyrrhuloxia	*Cardinalis sinuatus*
Cassins sparrow[1]	*Aimophila cassinii*	Red-Tailed hawk	*Buteo jamaicensis*
Cedar waxwing	*Bombycilla cedrorum*	Rough-Legged hawk	*Buteo lagopus*
Chihuahuan raven	*Corvus cryptoleucus*	Sage sparrow	*Amphispiza belli*
Common barn owl	*Tyto alba*	Sage thrasher	*Oreoscoptes montanus*
Coopers hawk	*Accipter striatus*	Savannah sparrow	*Passerculus sandwichensis*
Crissal thrasher[1]	*Toxostoma crissale*	Says phoebe	*Sayornis saya*
Curve-billed thrasher	*Toxostoma curvirostre*	Scaled quail	*Callipepla squamata*
Eastern meadowlark	*Sturnella magna*	Scissor-tailed flycatcher	*Tyrannus forficatus*
Eurasian collared dove[1,2]	*Streptopelia decaocto*	Snowy Plover[1]	*Charadrius alexandrinus*
Ferruginous hawk[1]	*Buteo regalis*	Spotted towhee	*Pipilo maculatus*

Golden eagle	*Aquila chrysaetos*		Swainsons hawk	*Buteo swainsoni*
Grasshopper sparrow	*Ammodramus savannarum*		Turkey vulture	*Cathartes aura*
Great horned owl	*Bubo virginianus*		Verdin	*Auriparus flaviceps*
Greater roadrunner	*Geococcyx californianus*		Vesper sparrow	*Pooecetes gramineus*
Greater yellowlegs[1]	*Tringa melanoleuca*		Western bluebird	*Sialia mexicana*
Harris hawk	*Parabuteo unicinctus*		Western kingbird	*Tyrannus vertucalis*
Horned lark[1]	*Eremophila alpestris*		Western meadowlark[1]	*Sturnella neglecta*
House finch	*Carpodacus mexicanus*		Western screech owl	*Otus kennicotti*
Killdeer[1]	*Chardrius vociferus*		White-crowned sparrow[1]	*Zonotrichia leucphrys*
Ladder-backed woodpecker[1]	*Picoides scalaris*		White-throated sparrow	*Zonotrichia albicollis*
Lark bunting[1]	*Calamospiza melanocorys*		White-winged dove	*Zenaida asiatica*

[1] Species observed during the Site ecological surveys [2] Not Protected by the Migratory Bird Treaty Act

2.6.1.2 Flora in the Vicinity of the Site

The portion of the Site with the primary vegetation community of Desert Grasslands is widespread at lower elevations in southern and western New Mexico. As is observed elsewhere in the state, Desert Grassland often contains a substantial shrub component, in this case honey mesquite (*Prosopis glandulosa*). Desert Grasslands begin at the western edge of the Laguna Gatuna shoreline zone and extend throughout the Site to its western border. The portion of the Site with this general habitat is shown in Figure 2.6.1.2-1 and is all of the area within the Site boundary with the exception of those areas circled and marked as Badlands and Playas (Turner et al., 1974).

Desert Grasslands can include black grama, blue grama, bluestem, buffalo grass, western wheatgrass, galletas, tobosa, alkali sacaton, three-awn, mesquite, serviceberry, skunkbush sumac, sand sagebrush, Apache plume, creosotebush, and cliffrose. With appropriate moisture (generally more than is typically experienced) sunflower, croton, and pigweed may grow in disturbed or ponded depressions. A list of the plants observed at the Site is included in Table 2.6.1.2-1.

Table 2.6.1.2-1 Flora Observed at the Site (Appendix 2B)

Species Name		Family Name	
Common	**Scientific**	**Common**	**Scientific**
Alkali Sacaton	*Sporobolus airoides*	Grass	*Poaceae*
Black Grama	*Bouteloua eriopoda*	Grass	*Poaceae*
Bladderpod	*Lesquerella sp.*	Mustard	*Brassicaceae Mustard*
Blue Grama	*Bouteloua gracilis*	Grass	*Poaceae*
Bristlegrass	*Setaria leucopila*	Grass	*Poaceae*
Broom Snakeweed	*Gutierrezia sarothrae*	Sunflower	*Asteraceae*
Buffalobur	*Solanum rostratum*	Potato	*Solanaceae*
Burrograss	*Scelropogon brevifolius*	Grass	*Poaceae*
Cowpen Daisy	*Verbesina encelioides*	Sunflower	*Asteraceae*
Dwarf Desert Holly	*Acourtia nana*	Sunflower	*Asteraceae*
Fourwing Saltbush	*Atriplex canascens*	Goosefoot	*Chenopodiaceae*
Glovemallow	*Sphaeralcea sp.*	Mallow	*Malvaceae*
Honey Mesquite	*Prosopis glandulosa*	Pea	*Fabaceae*
James' Nailwort	*Paronychia jamesii*	Pink	*Caryophyllaceae*
Joint Fir	*Epedra sp.*	Joint Fir	*Ephedraceae*
Lotebush	*Condalia [Microrhamnus]*	Buckthorn	*Rhamnaceae*
Milkvetch	*Astragalue sp.*	Pea	*Fabaceae*
Mock Vervain	*Glandularia sp.*	Vervain	*Vervenaceae*
Muhly	*Muhlenbergia sp.*	Grass	*Poaceae*
Panicgrass	*Panicum sp.*	Grass	*Poaceae*
Pott's Leatherweed	*Croton pottsii*	Spurge	*Euphorbiaceae*
Ragweed	*Ambrosia*	Sunflower	*Asteraceae*
Small Soapweed	*Yucca glauca*	Agave	*Agavaceae*
Spiny Dogweed	*Thymophylla acerosa*	Sunflower	*Asteraceae*
Threeawn	*Aristida sp.*	Grass	*Poaceae*
Tobosa	*Pleuraphis [Hilaria] mutica*	Grass	*Poaceae*
Vine Mesquite	*Panicum obtusum*	Grass	*Poaceae*

The ecological survey results noted that:

- Relatively few species were observed as the Site survey could not be conducted during the growing season
- The most common and conspicuous plant at the Site is honey mesquite
- Grasses are not abundant in density or diversity; blue grama (*Bouteloua gracilis*) is the species most frequently encountered
- No riparian habitat exists in or near the Site (Appendix 2B)

Laguna Gatuna (Playa soil mapping unit) and the contingent near-shore zone (Badlands mapping unit) occupy 9 percent of the overall land mass (86 acres) on the eastern edge of the Site. This area supports virtually no plant life and provides almost no habitat for wildlife because of the dearth of food and high salinity of the soils and water. These areas are noted in Figure 2.6.1.2-1.

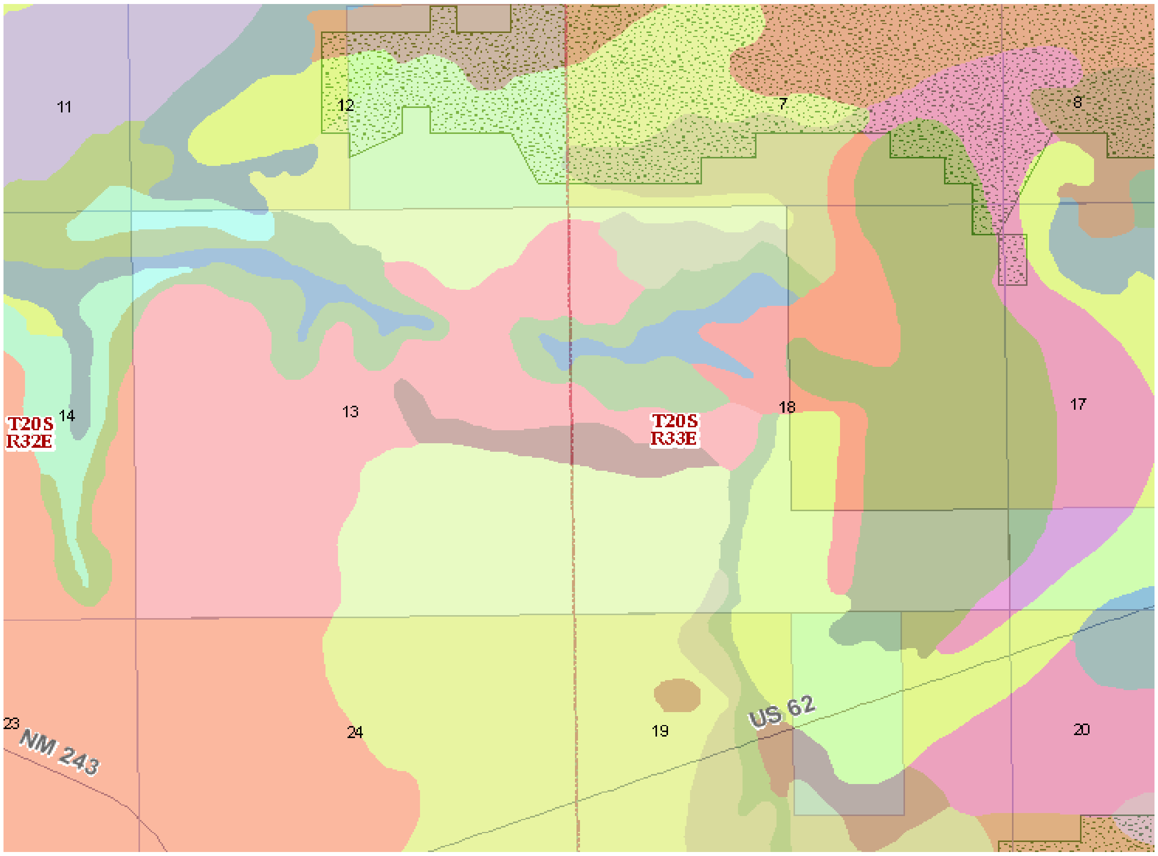


Figure 2.6.1.2-1 United States Department of Agriculture Soils Map (Turner et. al. 1974)
See Appendix 2B for Explanation

2.6.2 Aquatic Ecology

This section describes the potential for aquatic/riparian habitats within the Site and the resulting conclusion regarding their presence. The section is based on review of data from available literature and consultation with regional wildlife biologists; confirmed by the ecological survey conducted on the Site on March 16 - 18, 2007. As a result of this work, it is confirmed that there is no aquatic/riparian habitat in the Site (see Appendix 2B). This conclusion is based on the following:

- Absence of permanent surface waters throughout the Site
- High saline content of the Laguna Gatuna soils and soil sediments in the shoreline zone
- High salinity of the playa water when present
- Absence of micro invertebrates in the Laguna (Lang and Rogers, 2002)
- Confirmation that there are no halophytic (plants thriving in saline soils) or riparian vegetation in the Site

The BLM Resource Management database (BLM, 2004) and the recent Environmental Impact Statement prepared for the NEF (NRC, 2005) identified eight amphibian species that could potentially be present in the area. These are listed in Table 2.6.2-1 along with their preferred habitat (BISON-M). However, the factors bulleted above also result in the absence of amphibian species. This was confirmed to the extent possible for the season in which the survey was conducted. No amphibian species were observed during the survey (See Appendix 2B).

Table 2.6.2-1 Amphibians Potentially Present at the Site and Vicinity and Their Habitat (BLM 2004, NRC 2005, BISON-M)

Amphibians		
Common Name	**Scientific Name**	**Preferred Habitat**
Barking frog	*Hylactophryne augusti*	Damp areas in limestone caves, crevices, and ledges. Rarely seen in open
Couch's Spadefoot	*Scaphiopus couchii*	Shallow to standing pools of water
Great plains toad	*Bufo cognatus*	Desert Grassland, creosote bush, grassland flats, mesquite dominated flats
Green toad	*Bufo debilis*	Desert Grassland, semi-arid plains, valleys, foothills
New Mexico spadefoot	*Spea multiplicata*	Shallow to standing pools of water
Plains leopard frog	*Rana blairi*	Variety of aquatic habitat types, with terrestrial habitat surrounding areas usually grassland, sandhills, and cottonwood-willow
Plains spadefoot toad	*Spea bombifrons*	Shallow to standing pools of water
Tiger Salamander	*Ambystoma tigrinum*	Tall grass prairie and desert grasslands

Surveys for macro invertebrates in Laguna Gatuna, as well as other playas in the vicinity of the survey area performed in 2000-2002 found no macro invertebrates (Lang and Rogers, 2002). The March survey confirmed there to be no evidence of fish or shellfish in the Laguna Gatuna.

2.6.3 Threatened and Endangered Species Survey

Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.) was enacted to prevent the further decline of endangered and threatened species and restores those species and their critical habitats.

There are three species considered "Species of Concern" within the habitat near the Site. These include the Lesser Prairie Chicken (*Tympanuchus pallidicinctus*), the Sand Dune Lizard (*Sceloporus aerinicolus*), and Gypsum wild-buckwheat (*Eriogonum gypsophilum*). These species have not been located within the Site and regulatory reviews and field inspections do not support the belief that they are present within the Site.

The U.S. Fish and Wildlife Service (USFWS) office has provided a list of threatened and endangered species in southeast New Mexico which are illustrated in Table 2.6.3-1. The USFWS defines Threatened and Endangered Species in five (5) categories as follows:

- Endangered: Any species which is in danger of extinction throughout all or a significant portion of its range
- Threatened: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
- Candidate Species: Taxa for which the USFWS has sufficient information to propose that they be added to the list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities
- Proposed: Any species of fish, wildlife, or plant that is proposed in the Federal Register to be listed under Section 4 of the Act. This could be either proposed for endangered or threatened status

- Species of Concern: Taxa for which further biological research and field study are needed to resolve their conservation status OR are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies

The State of New Mexico, NMSA Title 19, Natural Resources and Wildlife, Chapter 33, Endangered and Threatened Species Statute 19.33.6.8 establishes the state list of threatened and endangered wildlife species as shown in Table 2.6.3-2.

There are no wetlands or unique habitats for threatened or endangered plant or animal species on the Site. Currently the land is used for grazing and oil and gas production.

*Table 2.6.3-1 Eddy and Lea County Threatened and Endangered Species. (All species are listed for Eddy County. Species with * are also listed for Lea County.)*

Common Name	**Scientific Name**	**Species Group**	**Listing Status**
Bald Eagle*	*Haliaeetus leucocephalus*	Birds	Threatened
Black-Footed Ferret*	*Mustela nigripes*	Mammals	Endangered
Gypsum Wild-Buckwheat	*Eriogonum gypsophilum*	Flowering Plants	Threatened
Kuenzler Hedgehog Cactus	*Echinocereus fendleri var. kuenzleri Escobaria (Coryphantha)*	Flowering Plants	Endangered
Least Tern	*Sterna antillarum*	Birds	Endangered
Lee Pincushion Cactus	*Coryphantha sneedii var. leei*	Flowering Plants	Threatened
Lesser Prairie-Chicken*	*Tympanuchus pallidicinctus*	Birds	Candidate
Mexican Spotted Owl	*Strix occidentalis lucida*	Birds	Threatened
Texas Hornshell (mussell)	*Popenaias popeii*	Clams	Candidate
Northern Aplomado Falcon*	*Falco femoralis septentrionalis*	Birds	Endangered
Pecos Bluntnose Shiner	*Notropis simus pecosensis*	Fishes	Threatened
Pecos Gambusia	*Gambusia nobilis*	Fishes	Endangered
Sand Dune Lizard*	*Sceloporus arenicolus*	Reptiles	Candidate
Sneed Pincushion cactus	*Coryphantha sneedii var. sneedii*	Flowering Plants	Endangered

Table 2.6.3-2 State of New Mexico Listed and Sensitive Species. (All species are listed for Eddy County except for Bell's vireo which is listed for Lea County only. Species with are listed for Lea County.)*

Common Name	Scientific Name	Species Group	Listing Status
Lesser prairie-chicken*	*Tympanuchus pallidicinctus*	Bird	Candidate
Texas hornshell (mussel)	*Popenaias popeii*	Mollusk - Invertebrate	Candidate
Sand dune lizard*	*Sceloporus arenicolus*	Reptile	Candidate
Least Tern (Interior Population)	*Sterna antillarum*	Bird	Endangered
Northern aplomado falcon*	*Falco femoralis septentrionalis*	Bird	Endangered
Pecos gambusia	*Gambusia nobilis*	Fish	Endangered
Black-footed ferret*	*Mustela nigripes*	Mammal	Endangered
Kuenzler's hedgehog cactus	*Echinocereus fendleri var. kuenzleri Escobaria (=Coryphantha)*	Plant	Endangered
Sneed pincushion cactus	*Coryphantha sneedii var. sneedii*	Plant	Endangered
Bald eagle*	*Haliaeetus leucocephalus*	Bird	Threatened
Mexican spotted owl Designated Critical Habitat	*Strix occidentalis lucida*	Bird	Threatened
Pecos bluntnose shiner Designated Critical Habitat	*Notropis simus pecosensis*	Fish	Threatened
Gypsum wild-buckwheat Designated Critical Habitat	*Eriogonum gypsophilum*	Plant	Threatened
Lee pincushion cactus	*Coryphantha sneedii var. leei*	Plant	Threatened
Limestone tiger beetle	*Cicindela politula petrophila*	Arthropod - Invertebrate	Species of Concern
American peregrine falcon*	*Falco peregrinus anatum*	Bird	Species of Concern
Arctic peregrine falcon*	*Falco peregrinus tundrius*	Bird	Species of Concern
Baird's sparrow*	*Ammodramus bairdii*	Bird	Species of Concern
Bell's vireo*	*Vireo bellii*	Bird	Species of Concern
Black tern	*Chlidonias niger*	Bird	Species of Concern
Northern goshawk	*Accipiter gentilis*	Bird	Species of Concern
Western burrowing owl*	*Athene cunicularia hypugaea*	Bird	Species of Concern

Common Name	Scientific Name	Species Group	Listing Status
Yellow-billed cuckoo*	*Coccyzus americanus*	Bird	Species of Concern
Blue sucker	*Cycleptus elongatus*	Fish	Species of Concern
Gray Redhorse	*Scartomyzon congestum*	Fish	Species of Concern
Greenthroat darter	*Etheostoma lepidum*	Fish	Species of Concern
Headwater catfish	*Ictalurus lupus*	Fish	Species of Concern
Pecos pupfish	*Cyprinodon pecosensis*	Fish	Species of Concern
Rio Grande shiner	*Notropis jemezanus*	Fish	Species of Concern
Black-tailed prairie dog*	*Cynomys ludovicianus*	Mammal	Species of Concern
Guadalupe southern pocket gopher	*Thomomys umbrinus guadalupensis*	Mammal	Species of Concern
Pecos River muskrat	*Ondatra zibethicus ripensis*	Mammal	Species of Concern
Swift fox*	*Vulpes velox*	Mammal	Species of Concern
Townsend’s big-eared bat	*Corynorhinus townsendii*	Mammal	Species of Concern
Western red bat	*Lasiurus blossevillii*	Mammal	Species of Concern
Ovate vertigo (snail)	*Vertigo ovata*	Mollusk - Invertebrate	Species of Concern
Pecos Springsnail	*Pyrgulopsis pecosensis*	Mollusk - Invertebrate	Species of Concern
Few-flowered Jewelflower	*Streptanthus sparsiflorus*	Plant	Species of Concern
Glass Mountain coral-root	*Hexalectris nitida*	Plant	Species of Concern
Guadalupe Rabbitbrush	*Chrysothamnus nauseosus var. texensis*	Plant	Species of Concern
Mat Leastdaisy	*Chaetopappa hersheyi*	Plant	Species of Concern
Tharp’s blue-star	*Amsonia tharpii*	Plant	Species of Concern
Wright’s water-willow	*Justicia wrightii*	Plant	Species of Concern

2.6.3.1 Lesser Prairie Chicken

The Lesser Prairie Chicken is an upland, grassland-nesting bird present in regions of New Mexico. Once present in large numbers, the Lesser Prairie Chicken population and its original distribution have declined significantly. In the twentieth century, human influences such as the conversion of native rangelands to cropland, decline in habitat quality due to herbicide use, petroleum and mineral extraction activities, and excessive grazing of rangelands by livestock have contributed to this decline. Severe drought has also significantly impacted Lesser Prairie Chicken populations. Due to these factors, the Lesser Prairie Chicken is now being considered by the USFWS as a species in need of protection through the ESA.

As a year-round resident, the breeding, summer, and winter ranges of the Lesser Prairie Chicken are identical. The Lesser Prairie Chicken is present in Eddy and Lea counties.

The Lesser Prairie Chicken's habitat includes native rangeland in different stages of plant succession consisting of a diversity of native, short- to mid-height grasses and forbs interspersed with low-growing shrubby cover. Optimum Lesser Prairie Chicken habitat in New Mexico includes shinnery oak/bluestem habitat dominated by sand bluestem (*Andropogon hallii*), little bluestem (*Andropogon scoparium*), Indiangrass, switchgrass, buffalo grass, sand dropseed (*Sporobolus cryptandrus*), and sand sagebrush (*Artemisia filifolia*). These habitat types provide protective cover for nesting and brood-rearing activities, as well as food. Sand plum (*Prunus angustifolia*) and skunkbush sumac (*Rhus aromatica*) are valuable shrubs for providing shade and brood-rearing cover as well. Display grounds, or leks, are established in open areas of low-growing vegetation and generally are located within or close to grassland nesting cover. Adequate cover is among the greatest factors affecting Lesser Prairie Chicken populations, and the continued loss of shrub/grassland habitat remains the greatest threat to the Lesser Prairie Chicken. Figure 2.6.3.1-1 is a side-by-side view of favorable Lesser Prairie Chicken habitat (left photo) and the typical habitat provided at the Site (right photo). Note the absence of shinnery oak and favorable tall grasses at the Site. Figure 2.6.3.1-2 depicts the Lesser Prairie Chicken range within the BLM Roswell Planning Area.

Figure 2.6.3.1-1 Side-by-Side Comparison of Favorable Lesser Prairie Chicken Habitat (left) and Typical Habitat Found on the Site (Right)

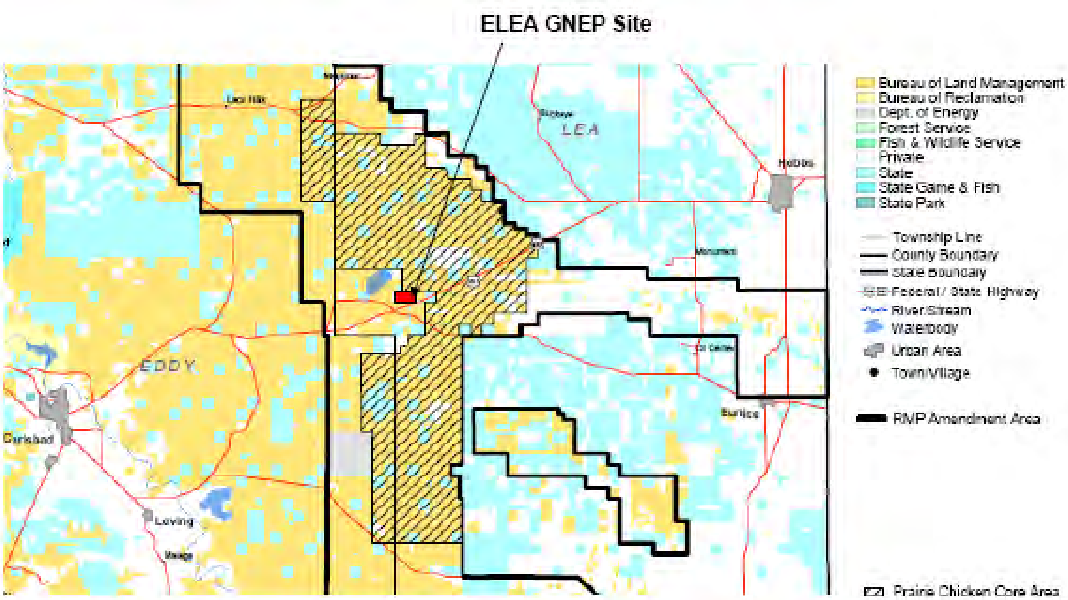


Figure 2.6.3.1-2 Bureau of Land Management Map depicting Lesser Prairie Chicken and Sand Dune Lizard Habitat Area in Eddy and Lea Counties

2.6.3.2 Sand Dune Lizard

The Sand Dune Lizard (formerly known as the Dunes Sagebrush Lizard) is a small reptile, from nose to tail about as long as a human hand. This blunt-nosed lizard has a rounded head, bright yellow eyes, and a faint yellow under-lip beneath its wide mouth. In coloration, it is well camouflaged with small scales of pale gray and tan. Along its back, faint brownish speckles extend in parallel lines from the ear openings to the base of the tail. While its front feet are small, its back feet are large and well suited for running and digging in sand. It has long, splayed, claw-tipped toes - the fourth digit being the longest. Distribution of the Sand Dune Lizard is restricted to sand dune habitat in Lea, Eddy, and south Chaves counties in south eastern New Mexico (see Appendix 2A, Map 12). The Sand Dune Lizard occurs only in large and deep sand dune "blowouts" (open, low-lying areas between active dunes) in areas dominated by shinnery oak (see Appendix 2A, Map 13). Sand Dune Lizard populations may be threatened by activities that remove shinnery oak, or otherwise alter the configuration of shrub and grass cover and blowout patches in dune areas. The two main threats faced by the Sand Dune Lizard are the removal of shinnery oak by herbicide application or grazing and disturbance of dune areas by roads and infrastructure from activities such as oil and gas development (NP LPC/SDL Working Group 2005). Both of these activities have occurred at the Site.

2.6.3.3 Gypsum Wild-Buckwheat

The Gypsum Wild-Buckwheat is a tufted, herbaceous, perennial, growing from a woody base; leaves basal, dark green, thick, glabrous above and sparsely hairy beneath; blade ovate to reniform, 1.0-2.0 cm long, 1.5-2.5 cm wide, petiole often longer than the blade; inflorescence an open leafless cyme, 12-20 cm tall; involucres in clusters at the ends of inflorescence branches, campanulate, 4 or 5-toothed, each with 6 flowers; and flowers yellow with 6 tepals, 2 mm long. The plant flowers May through June (Hitchcock, 1971).

The habitat of the Gypsum Wild-Buckwheat is restricted to almost pure gypsum that is sparsely vegetated with other gypsophilous plants such as Hairy crinklemat (*Coldenia hispidissiam)*, Guadalupe stickleaf (*Mentzelia humilis*), and Pecos gyp ringstem (*Anulocaulis leiosolenus*) at 3,280 to 3,600 feet elevations. Locations where these conditions are known to exist include Eddy County, New Mexico; north of Carlsbad at Seven River Hills; south of Black River Village; and in the drainages of Ben Slaughter Draw and Hay Hollow.

Oil and gas development is occurring throughout the range of this species. The gypsum deposits on which this plant occurs could be mined. Off-road vehicles were damaging the habitat at Seven River Hills in the past, but the area was closed and the old damage is healing. No habitat suitable for the Gypsum Wild-Buckwheat occurs on or within 6 miles of the Site.

2.7 Social and Economic Resources

2.7 Social and Economic Resources

This section summarizes the demographic and socio-economic characteristics in the area of the Site. A more complete discussion is presented in Appendix 2J. This section presents the information to evaluate the potential socioeconomic and cultural impacts from the construction and operation of the proposed facilities on employment and economic activity, population and housing, and public services and finances within the 50-mile and, in some cases, broader region of influence. During construction, the employment impacts would be largest. Demographic information indicates that a significant number of new construction jobs would represent a significant portion of the construction labor force in the region of interest. Therefore, the economic impacts are expected to be moderate. More discussion follows and can be found in Appendix 2J.

Demographic and socio-economic data were primarily extracted from the 1990 and 2000 Decennial Census data (USCB, 2007 a, b, c). School enrollment figures were downloaded from the websites of the National Center for Education Statistics and the New Mexico Public Education Department. Vital statistics numbers were processed from records provided by the New Mexico Department of Health Vital Statistics Records. The New Mexico Construction and Industries Division (CID) was the source of new residential construction data for most of the areas covered in the study area. Data for the City of Hobbs are from Hobbs.

2.7.1 Population

The study area covers a 50-mile radius from the Site, designated by a red dot in Figure 2.7.1-1. Socio-economic characteristics and some housing data are tabulated at the Census Tract level. The Census Tract boundaries (in blue outline) are shown in Figure 2.7.1-1 and the numbers on the map designate the Census Tracts in each county. Some Texas counties are also in the circle but the population centers are well outside the defined 50-mile radius. Consequently, for the most part, no information is presented for these places.

2.7.1.1 Population Characteristics

Table 2.7.1-1 shows the population of the urban areas by proximity to the Site. Figures 2.7.1-2 and 2.7.1-3 illustrate the relative location of these areas to the Site. Close to the Site are the cities of Carlsbad in Eddy County and Hobbs in Lea County. Carlsbad is 32 miles southwest while Hobbs is 34 miles northeast of the Site.

Figure 2.7.1-3 aggregates the number of people that are covered within the 50 mile radius and indicates that approximately 20,000 people reside within 30 miles of the Site. Extending the radius another three miles captures an additional 30,000 people. Figure 2.7.1-3 further shows that more than 100,000 people reside just over 40 miles from the Site. The areas within the 30-mile radius of the project are sparsely populated. The cities and urban areas in the study area are more than 30 miles away. Altogether, approximately 115,000 people reside in the study area.

Table 2.7.1-2 presents the Census 2000 population counts of the study area and detailed by Census Tract, indicates where and how the approximately 114,000 people are distributed throughout the study area. Hobbs and Carlsbad comprise over 60 percent of the study area population. The smallest urban area was Loving with a population of just over 2,000 people; Eunice had a population just below 2,900 people; and Tatum had close to 4,000 people.

From 1990 to 2000, the study area population increased by almost four percent or approximately 4,200 people. Table 2.7.1-2 specifies the Census Tracts that gained population as well as those that suffered a loss during the 1990s. As shown in Table 2.7.1-3, the compound annual average growth rate over the five-year period, from July 1, 2001 to July 1, 2005, was about four-tenths of one percent (two thousand people). Table 2.7.1-4 indicates that population growth in the study area was primarily from natural increase (the difference between births and deaths) versus migration. The population growth is consistent with residential construction trends reported for the period.

Table 2.7.1-1 Cities of Varying Population Sizes and Their Distance to Study Site
(Source: USCB, 2007a)

Population	State	County	Place	Distance from the Center (miles) of Study Area	Population	Housing Units
At least 20,000 people	NM	Eddy	Carlsbad	33.2	25,625	11,421
	NM	Lea	Hobbs	37.8	28,657	11,968
	TX	Howard	Big Spring	136.4	25,233	8,155
	TX	El Paso	Socorro	193.6	27,152	6,756
At least 30,000 people nearest	TX	Ector	Odessa	109.1	90,943	37,966
	NM	Chaves	Roswell	109.4	45,293	19,327
	TX	Midland	Midland	117.2	94,996	39,855
	NM	Otero	Alamogorda	179.4	35,582	13,704
	NM	Dona Ana	Las Cruces	241.5	74,267	29,184
At least 100,000 people	TX	Lubbock	Lubbock	147	199,564	84,066
	TX	El Paso	El Paso	197.2	563,662	182,063

2.7.1.2 Future Population Size

Table 2.7.1-5 presents a set of projections by Census Tract and County from July 1, 2010 to July 1, 2030. The projected population numbers were derived by a mathematical extrapolation method using the following formula:

Pt+n = Pt e(rn), where

Pt+n = Population at time + n or later year

Pt = Population at time t or an earlier year

e = is a constant equal to the value 2.7182818

r = compound annual average growth rate

n = number of years for which population is calculated

The assumption is that the compound annual average growth rate experienced during the period July 1, 2001 to July 1, 2005 continues into the future. For the very near future the population numbers should useful. However, projections need to be updated every 3 to 5 years, especially for places like southeastern New Mexico that are undergoing rapid economic and demographic change. See Appendix 2J for explanation of projections and limitations in their use.

2.7.1.3 Race and Ethnic Composition of the Study Area Population

Figures 2.7.1-4 and 2.7.1-5 show the ethnic population distribution by Census Tract. Table 2.7.1-2 suggests that the race and ethnic composition of this region is changing. From 1990 to 2000, the Hispanic population in the study area increased by 26 percent. In comparison, the overall study area population increased by only four percent. See Appendix 2J for further information on the distribution of these minority populations which are primarily in or near urban areas.

Figure 2.7.1-6 reflects the demographic trend in the study area population. The younger age groups are represented by minority and Hispanic individuals while the older age groups are primarily Anglos or White Not Hispanic. The minority population comprised approximately 60 percent of the population who were younger than 10 years old and greater than 50 percent among the 10-19 years old.

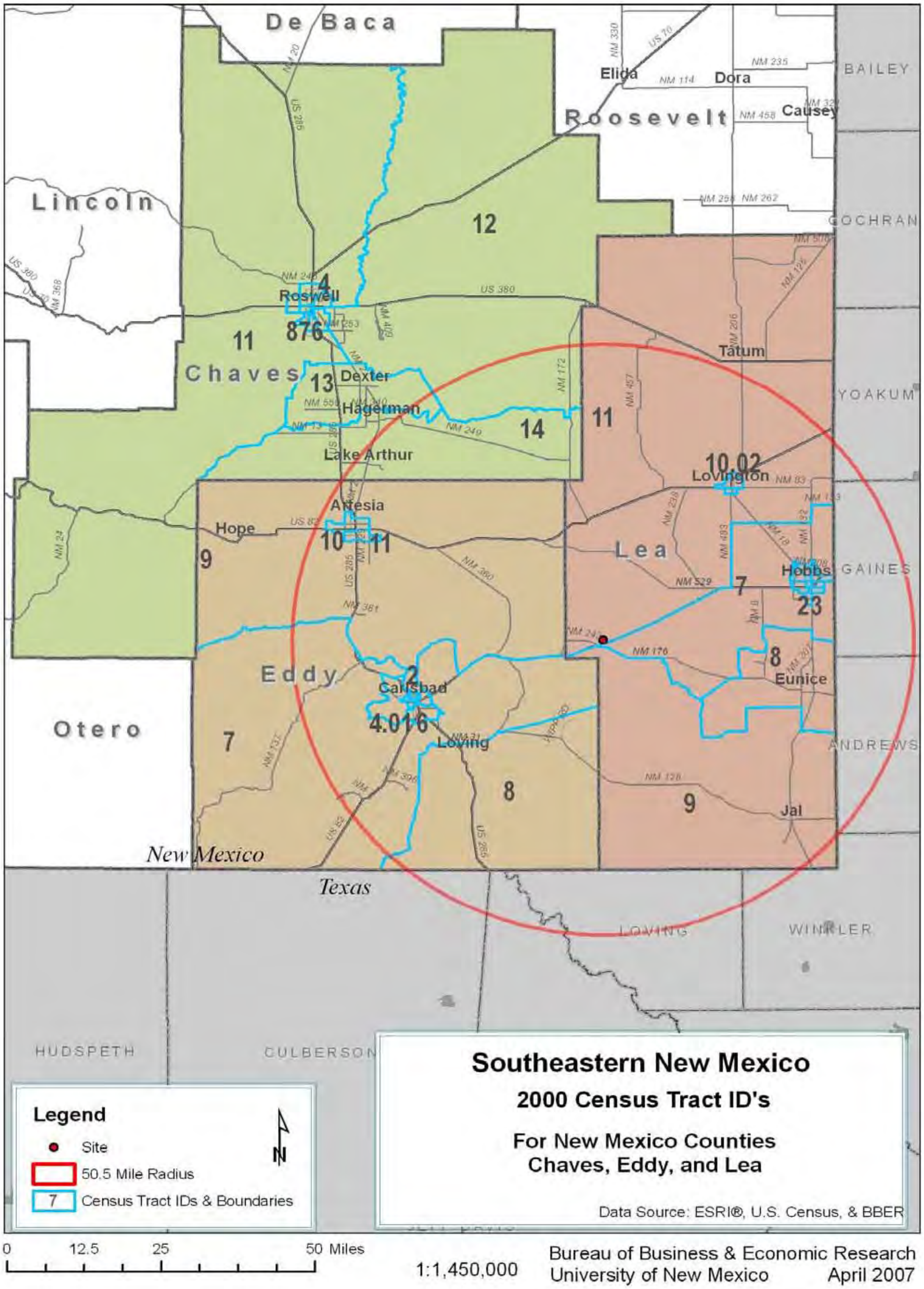


Figure 2.7.1-1 Study Area Definition

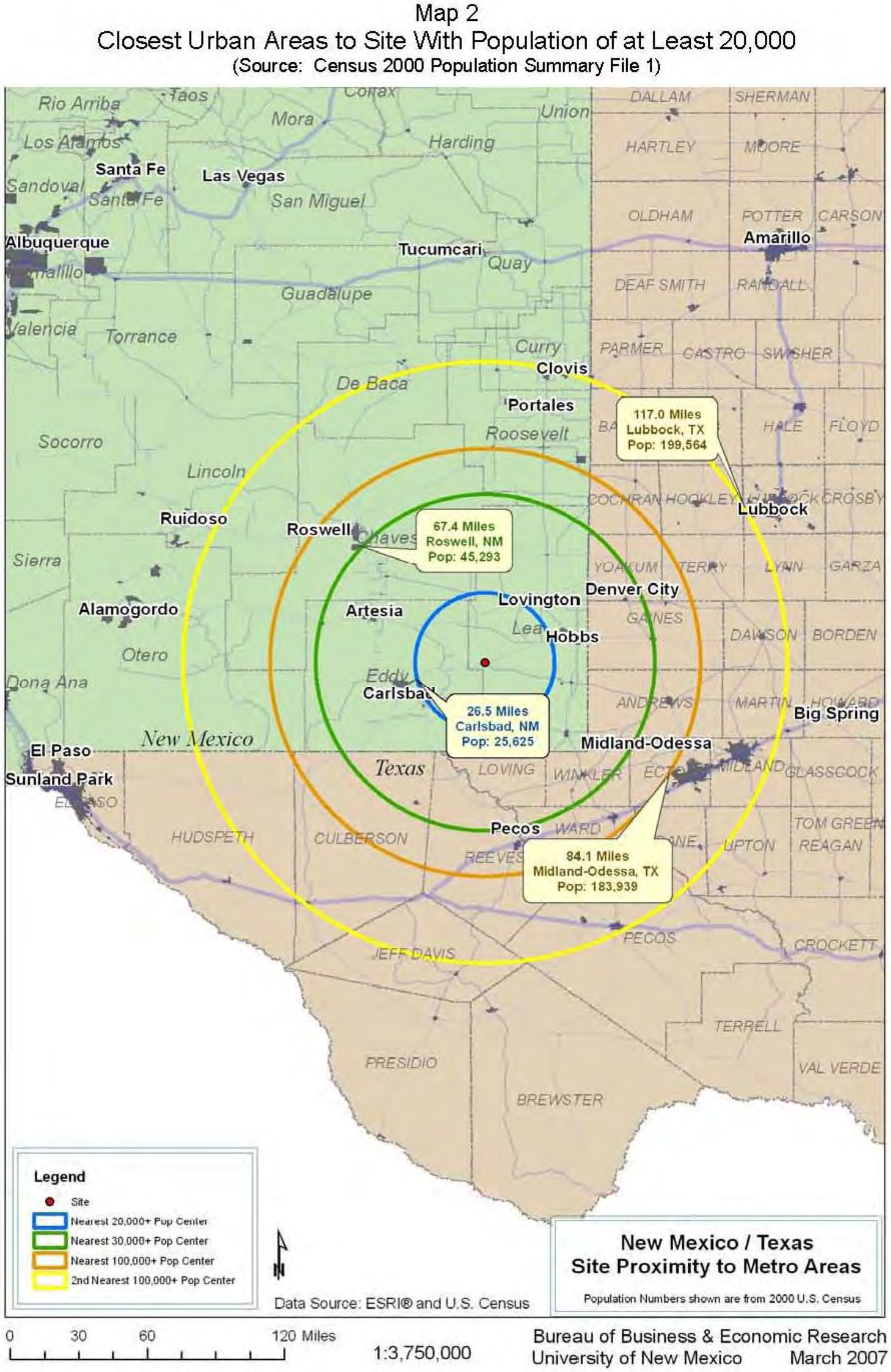


Figure 2.7.1-2 Closest Urban Areas to Site with Population of at Least 20,000

Map 3
Total Population Within the 50.5 Mile Radius
(Source: Census 2000 Summary File 1)

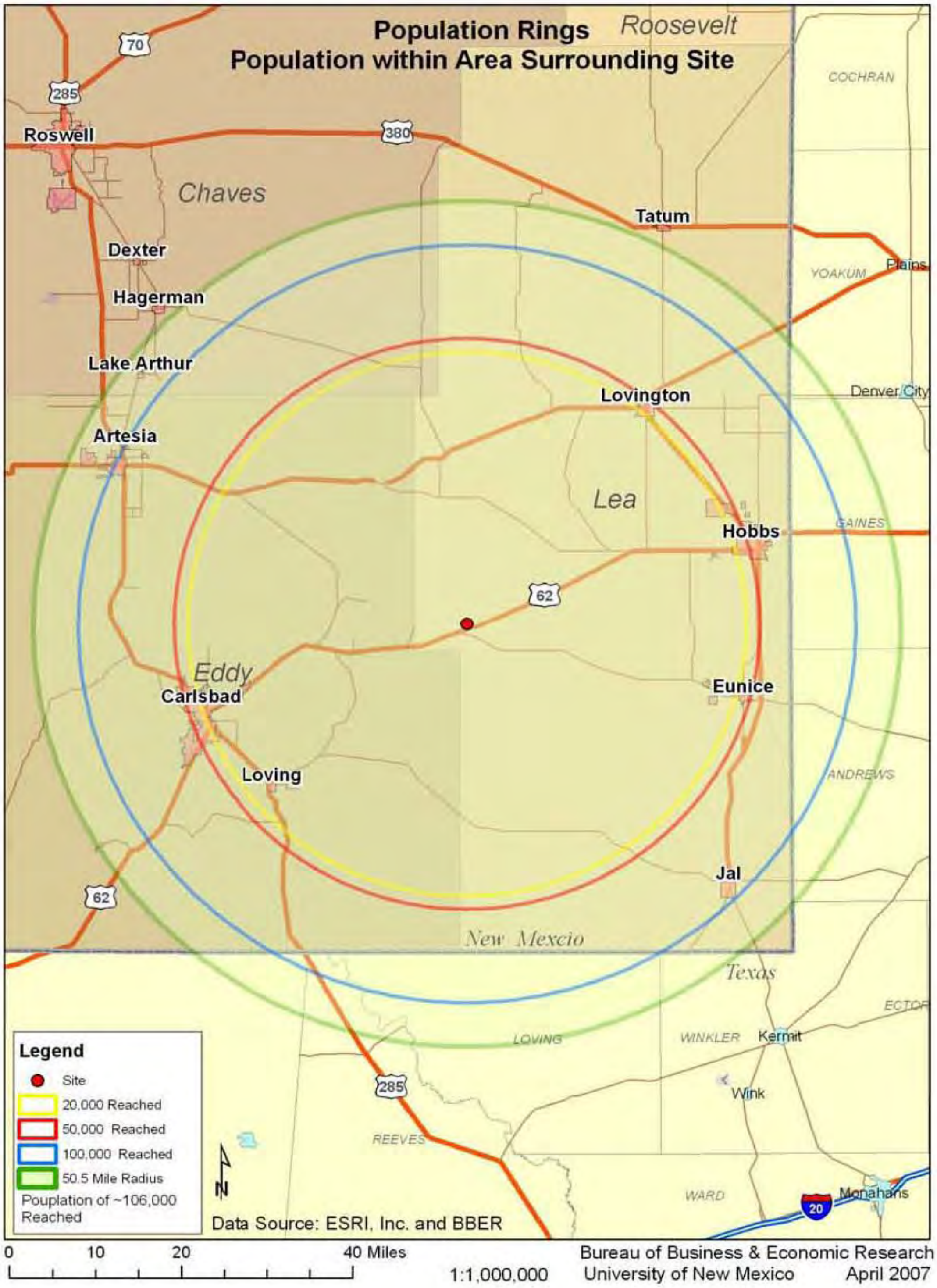


Figure 2.7.1-3 Total Population within the 50.5 Mile Radius

Table 2.7.1-2 Population Counts, Annual Average Growth Rate, Percent Change from 1990 to 2000, by Census Tract
(Source: USCB, 2007a, b, c, d)

County/Census Tract	Total Population		Growth Rate		Hispanic		Growth Rate	
	Census 1990	Census 2000	Average Annual Growth Rate	Percent Change From 1990 to 2000	Census 1990	Census 2000	Average Annual Growth Rate	Percent Change From 1990 to 2000
Chaves County	**57,849**	**61,382**	**0.59**	**6.11**	**21,271**	**26,904**	**2.35**	**26.48**
Census Tract 12	1,533	1,808	1.65	17.94	507	658	2.61	29.78
Census Tract 13	2,064	2,850	3.23	38.08	1,090	1,664	4.23	52.66
Ceensus Tract 14	2,147	2,539	1.68	18.26	1,170	1,527	2.66	30.51
Chaves in Study Area	**5,744**	**7,197**	**2.26**	**25.30**	**2,767**	**3,849**	**3.30**	**39.10**
Eddy County								
Census Tract 1	1,553	1,544	-0.06	-0.58	430	499	1.49	16.05
Census Tract 2	4,179	4,416	0.55	5.67	353	528	4.03	49.58
Census Tract 3	5,552	5,375	-0.32	-3.19	1,147	1,373	1.80	19.70
Census Tract 4.01	3,611	3,591	-0.06	-0.55	930	967	0.39	3.98
Census Tract 4.02	4,696	4,345	-0.78	-7.47	1,839	1,715	-0.70	-6.74
Census Tract 5	3,502	3,323	-0.52	-5.11	2,032	2,050	0.09	0.89
Census Tract 6	4,978	5,506	1.01	10.61	2,354	2,752	1.56	16.91
Census Tract 7	3,810	5,015	2.75	31.63	1,117	1,818	4.87	62.76
Census Tract 8	1,851	2,078	1.16	12.26	1,273	1,388	0.86	9.03
Census Tract 9	3,310	4,415	2.88	33.38	1,127	1,526	3.03	35.40
Census Tract 10	5,646	5,974	0.56	5.81	3,165	3,513	1.04	11.00
Census Tract 1	5,917	6,076	0.27	2.69	1,377	1,894	3.19	37.55
Total	**48,605**	**51,658**	**0.61**	**6.28**	**17,144**	**20,023**	**1.55**	**16.79**
Lea County								
Census Tract 1	2,723	2,446	-1.07	-10.17	1,485	1,546	0.40	4.11
Census Tract 2	3,459	2,982	-1.48	-13.79	1,629	1,760	0.77	8.04
Census Tract 3	3,654	3,301	-1.02	-9.66	1,886	2,121	1.17	12.46
Census Tract 4	2,532	2,489	-0.17	-1.70	1,162	1,514	2.65	30.29
Census Tract 5.01	6,685	6,099	-0.92	-8.77	808	1,027	2.40	27.10
Census Tract 5.02	5,522	5,538	0.03	0.29	715	1,671	8.49	133.71
Census Tract 6	5,968	5,870	-0.17	-1.64	1,436	2,197	4.25	52.99
Census Tract 7	6,337	7,906	2.21	24.76	762	1,972	9.51	158.79
Census Tract 8	3,014	2,896	-0.40	-3.92	772	1,072	3.28	38.86
Census Tract 9	2,335	2,118	-0.98	-9.29	812	857	0.54	5.54
Census Tract 10.02	6,053	6,254	0.33	3.32	2,767	3,352	1.92	21.14
Census Tract 10.03	3,676	3,636	-0.11	-1.09	1,432	1,685	1.63	17.67
Census Tract 11	3,807	3,976	0.43	4.44	932	1,236	2.82	32.62
Total	**55,765**	**55,511**	**-0.05**	**-0.46**	**16,598**	**22,010**	**2.82**	**32.61**
Study Area	**110,114**	**114,366**	**0.38**	**3.86**	**36,509**	**45,882**	**2.29**	**25.67**

Note: The Chaves County totals are presented in the table but only figures from Census Tracts 12 to 14 are included in the study area.

Table 2.7.1-3 Study Area Population Estimates and Growth: July 1, 2000 to July 1, 2005
(Source: BBER, 2007)

Census Tract	Population Estimates as of July 1…					Population Growth	
	2001	2002	2003	2004	2005	Compound Annual Average Growth Rate	Percent Change from 2001 to 2005
Chaves County	*61,660*	*61,480*	*61,410*	*61,890*	*62,282*	0.20	1.01
Census Tract 12	1,786	1,784	1,791	1,811	1,824	0.42	2.11
Census Tract 13	2,920	2,934	2,950	2,995	3,042	0.82	4.16
Census Tract 14	2,489	2,477	2,469	2,481	2,491	0.02	0.10
Total	**7,195**	**7,195**	**7,210**	**7,287**	**7,356**	**0.45**	**2.25**
Eddy County							
Census Tract 1	1,671	1,677	1,684	1,690	1,705	0.41	2.05
Census Tract 2	4,568	4,563	4,559	4,554	4,573	0.02	0.12
Census Tract 3	5,482	5,486	5,487	5,489	5,517	0.13	0.63
Census Tract 4.01	3,711	3,710	3,709	3,708	3,725	0.07	0.37
Census Tract 4.02	4,293	4,288	4,283	4,278	4,293	0.00	0.00
Census Tract 5	3,285	3,285	3,285	3,285	3,300	0.09	0.46
Census Tract 6	5,428	5,411	5,394	5,378	5,390	-0.14	-0.70
Census Tract 7	4,947	4,940	4,928	4,914	4,927	-0.08	-0.41
Census Tract 8	2,057	2,056	2,058	2,062	2,074	0.17	0.86
Census Tract 9	4,378	4,386	4,404	4,425	4,452	0.33	1.67
Census Tract 10	5,998	6,013	6,035	6,048	6,090	0.30	1.53
Census Tract 11	6,024	6,039	6,053	6,078	6,121	0.32	1.62
Total	**51,842**	**51,853**	**51,878**	**51,909**	**52,167**	**0.13**	**0.63**
Lea County							
Census Tract 1	2,405	2,456	2,443	2,478	2,494	0.73	3.72
Census Tract 2	2,899	2,990	2,899	2,914	2,913	0.09	0.47
Census Tract 3	3,204	3,304	3,224	3,255	3,263	0.36	1.84
Census Tract 4	2,406	2,498	2,415	2,431	2,433	0.22	1.12
Census Tract 5.01	5,878	6,118	5,880	5,918	5,950	0.24	1.23
Census Tract 5.02	5,364	5,553	5,397	5,444	5,459	0.35	1.77
Census Tract 6	5,805	5,875	5,878	5,948	5,983	0.60	3.07
Census Tract 7	9,140	7,941	9,401	9,755	9,972	1.74	9.10
Census Tract 8	2,800	2,896	2,815	2,835	2,840	0.28	1.41
Census Tract 9	2,049	2,123	2,052	2,067	2,068	0.19	0.95
Census Tract 10.02	6,281	6,259	6,303	6,348	6,359	0.25	1.25
Census Tract 10.03	3,516	3,642	3,526	3,553	3,561	0.26	1.29
Census Tract 11	3,843	3,991	3,850	3,877	3,875	0.17	0.83
Total	**55,590**	**55,645**	**56,084**	**56,823**	**57,170**	**0.56**	**2.84**
Study Area	**114,626**	**114,693**	**115,172**	**116,019**	**116,694**	**0.36**	**1.80**

Table 2.7.1-4 Component of Population Change, by Census Tract from 2000 to 2005
(Source: NM DOH, 2007)

Study Area	Number of ...			Total Population Change	Residual
	Births	Deaths	Natural Increase		
Chaves County	**4,727**	**3,022**	**1,705**	**622**	**-1,083**
Census Tract 12	113	44	70	38	-32
Census Tract 13	284	49	235	122	-113
Census Tract 14	256	60	195	3	-193
Total	**653**	**153**	**500**	**162**	**-338**
Eddy County					
Census Tract 1	122	113	8	34	26
Census Tract	183	255	-72	6	78
Census Tract 3	447	729	-282	34	316
Census Tract 4.01	272	180	92	14	-79
Census Tract 4.02	478	196	282	0	-282
Census Tract 5	374	206	168	15	-153
Census Tract 6	502	484	18	-38	-56
Census Tract 7	381	174	207	-20	-227
Census Tract 8	204	44	160	18	-142
Census Tract 9	237	154	84	73	-10
Census Tract 10	596	345	251	92	-159
Census Tract 11	563	332	231	98	-133
Total	**4,358**	**3,211**	**1,147**	**325**	**-822**
Lea County					
Census Tract 1	357	162	196	89	-106
Census Tract 2	445	147	298	14	-285
Census Tract 3	478	171	308	59	-249
Census Tract 4	430	111	319	27	-292
Census Tract 5.01	612	293	319	72	-247
Census Tract 5.02	674	272	402	95	-307
Census Tract 6	659	513	146	178	32
Census Tract 7	416	367	49	832	783
Census Tract 8	135	116	19	39	20
Census Tract 9	78	63	14	19	5
Census Tract 10.02	723	244	480	79	-401
Census Tract 10.03	439	228	211	45	-166
Census Tract 11	163	72	91	32	-59
Total	**5,610**	**2,759**	**2,851**	**1,580**	**-1,271**
Study Area Total	**10,621**	**6,123**	**4,498**	**2,067**	**-2,431**

Appendix 2J provides further information regarding the corresponding decline in the minority share among the population older than 45 years old and the age differentials between Anglos and minority populations in the study area. At a glance, the population pyramids in this Appendix show that the minority population will continue to increase in the region of interest.

2.7.1.4 Migration Status of Residents and Workers

This section examines the migration status of both residents and workers. The data for the migration status of residents were based on the response to the Census 2000 question on place of residence five years prior to April 1, 2000, the cut-off date for Census 2000. The data for migration of workers (age 16 or older) were based on the response to the inquiry regarding their place of work.

Table 2.7.1-5 Population Projections, by Census Tract: July 1, 2010 to July 1, 2030
(BBER, 2007)

Census Tract	Population Projection As of July 1É				
	2010	2015	2020	2025	2030
Chaves County	**62,910**	**63,545**	**64,186**	**64,834**	**65,488**
Census Tract 12	1,862	1,901	1,941	1,982	2,024
Census Tract 13	3,168	3,300	3,438	3,581	3,730
Census Tract 14	2,494	2,496	2,499	2,502	2,504
Total	***7,522***	***7,691***	***7,864***	***8,041***	***8,222***
Eddy County					
Census Tract 1	1,740	1,776	1,812	1,850	1,887
Census Tract 2	4,579	4,585	4,591	4,596	4,602
Census Tract 3	5,551	5,586	5,621	5,657	5,692
Census Tract 4.01	3,738	3,752	3,766	3,779	3,793
Census Tract 4.02	4,293	4,293	4,293	4,293	4,293
Census Tract 5	3,316	3,331	3,346	3,361	3,376
Census Tract 6	5,352	5,315	5,278	5,241	5,204
Census Tract 7	4,906	4,886	4,866	4,845	4,825
Census Tract 8	2,092	2,110	2,128	2,146	2,165
Census Tract 9	4,526	4,602	4,679	4,757	4,837
Census Tract 10	6,183	6,277	6,373	6,471	6,569
Census Tract 11	6,221	6,322	6,425	6,529	6,635
Total	**52,498**	**52,835**	**53,177**	**53,526**	**53,881**
Lea County					
Census Tract 1	2,587	2,683	2,783	2,886	2,994
Census Tract 2	2,927	2,940	2,954	2,968	2,982
Census Tract 3	3,324	3,385	3,447	3,510	3,575
Census Tract 4	2,460	2,487	2,515	2,543	2,572
Census Tract 5.01	6,023	6,097	6,172	6,248	6,324
Census Tract 5.02	5,555	5,653	5,753	5,855	5,958
Census Tract 6	6,166	6,355	6,550	6,751	6,958
Census Tract 7	10,879	11,869	12,949	14,128	15,413
Census Tract 8	2,880	2,921	2,962	3,003	3,046
Census Tract 9	2,088	2,108	2,127	2,148	2,168
Census Tract 10.02	6,439	6,520	6,602	6,685	6,768
Census Tract 10.03	3,607	3,653	3,700	3,748	3,796
Census Tract 11	3,907	3,940	3,973	4,006	4,039
Total	**58,842**	**60,611**	**62,487**	**64,478**	**66,593**
Study Area	**118,862**	**121,137**	**123,529**	**126,045**	**128,696**

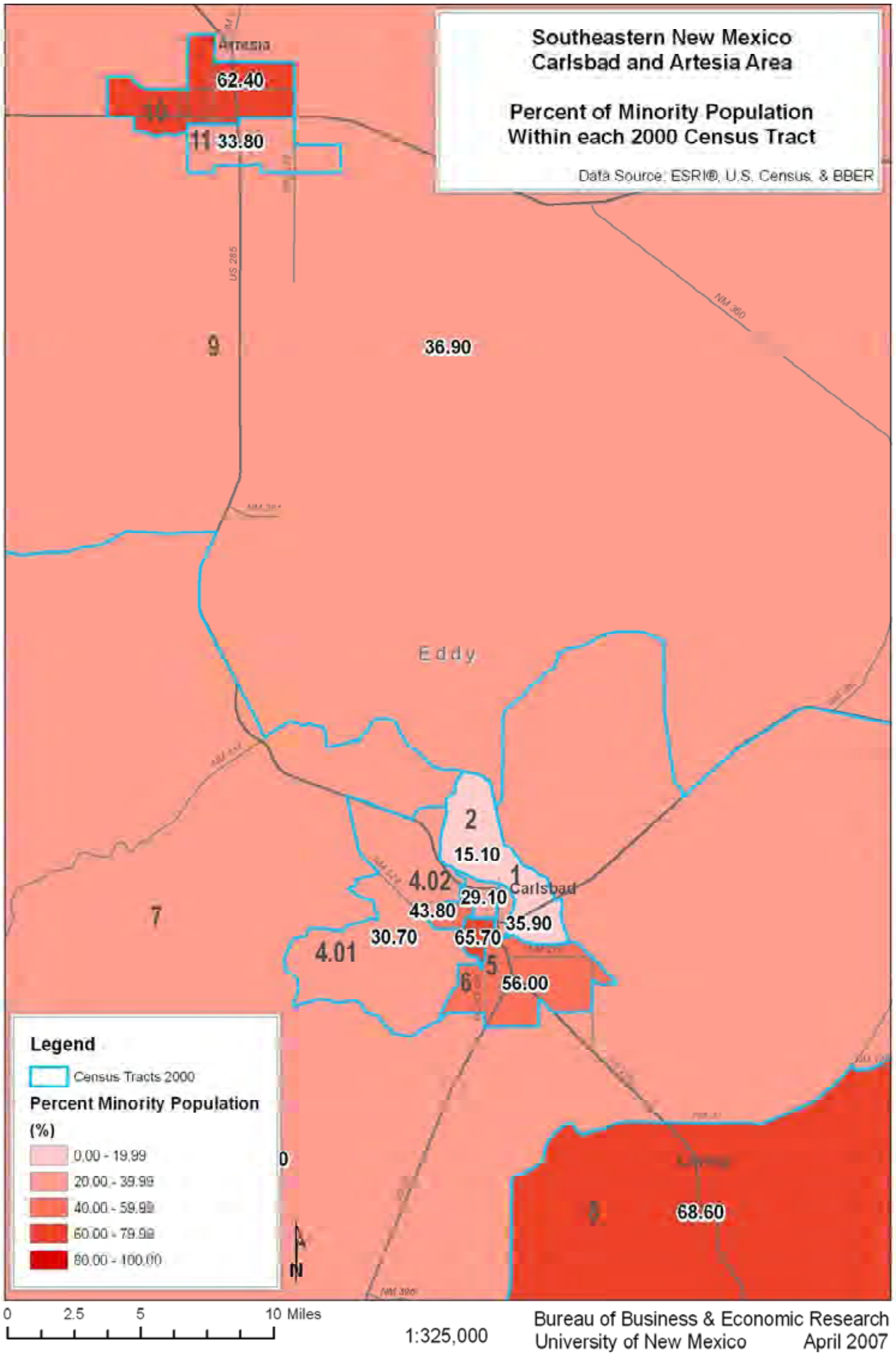


Figure 2.7.1-4 Minority Population in Eddy County Urban Areas: Census 2000

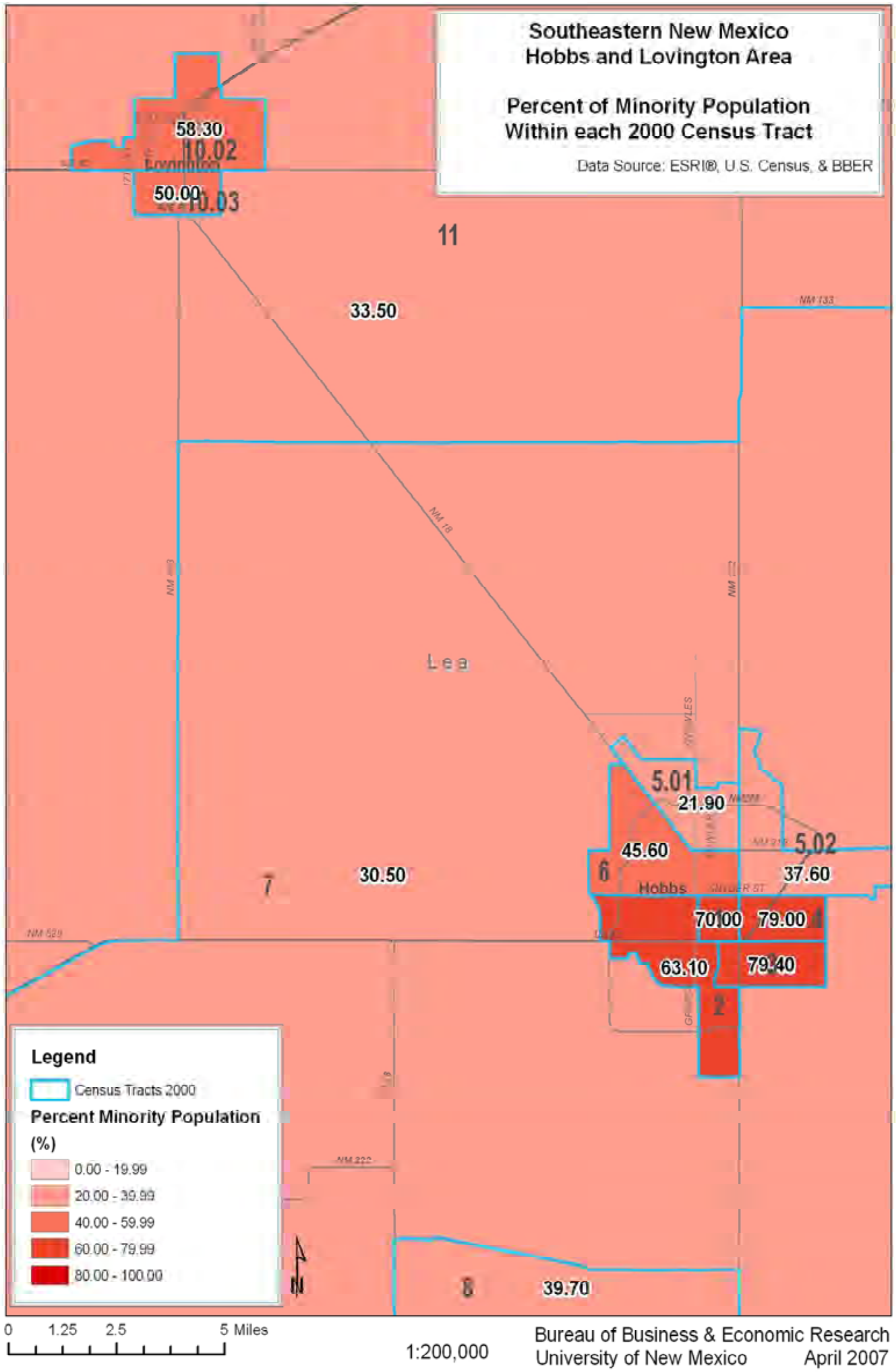


Figure 2.7.1-5 Minority Population in Lea County Urban Areas: Census 2000

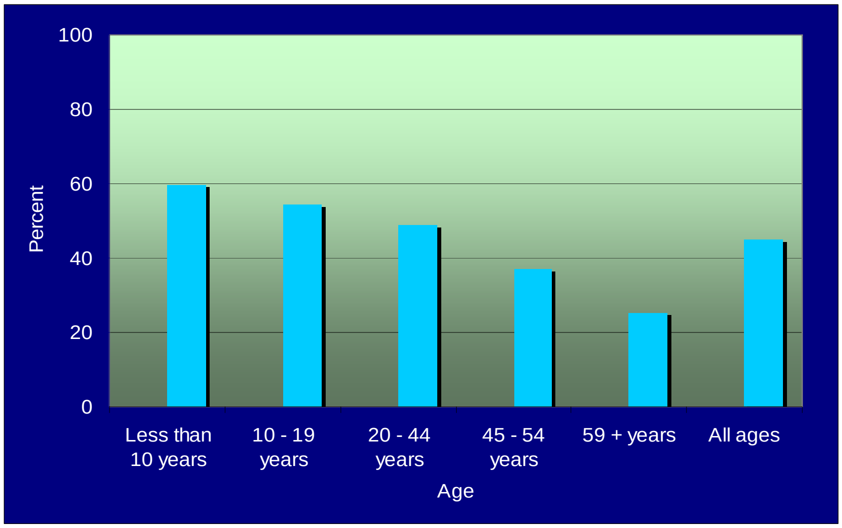


Figure 2.7.1-6 Study Area Population by Age (in Percent): Census 2000

Appendix 2J summarizes the migration status of the study area population aged five years and older in 2000 and shows the distribution of the region's population according to their place of residence five years prior to the Census. Lea County had the highest proportion migrants from outside New Mexico. Eleven percent of Lea County residents in 2000 came from outside the state. Chaves County (10.5 percent) and Eddy County (9.6 percent) had about equal proportions of migrants from outside the state. Census Tracts outside the boundaries of the city appeared to be the major destination of these out-of-state migrants. The only apparent exception to this pattern is in the Lake Arthur area (Census Tract 14).

This section also examines the commuting behavior of workers in the region. Table 2.7.1-6 shows that approximately 43,000 study area residents reported that they were working for pay in 2000. Virtually all workers (97.3 percent) aged 16 years and older in the study area had a job within the state of New Mexico. Only a small fraction (2.7 percent) commuted to another state. Table 2.7.1-6 further indicates that among those who worked in state, 97 percent worked in their own county of residence.

2.7.1.5 Socio-Economic Characteristics

This section investigates the socio-economic characteristics of the study area residents. Included in the analyses are educational attainment, school enrollment, and poverty status of the resident population. Educational attainment as used in the Census 2000 refers to the highest level of schooling that was completed by an individual. The data for educational attainment presented below are for individuals 18 years and older. School enrollment data cover the school population by grade from School Year (SY) 1986 to SY2005. Data on the minority student population by grade from SY1989 to SY2004 are also presented in this segment of the report. The data on school enrollment were downloaded from the National Center for Education Statistics website. The poverty status of the resident population was extracted from the Census 2000. The poverty rate varies by household income and number of people in the household and this was estimated for the household population. The poverty rate was not calculated for group quarters population or those who were in nursing homes, prisons, dormitories, etc.

2.7.1.6 School Enrollment Levels and Trends

Data on school enrollment in the counties within the study area is included here as an indicator of population statistics. Data from the National Center for Education Statistics (NCES, 2007) were downloaded for each school district and aggregated to the county level. For the Lake Arthur area, only the statistics for the Lake Arthur Municipal School District is included in this report. College enrollment statistics were taken from, and are limited to only two school years (SY2002 and SY2003). A detailed discussion of Schools and Education and related trends is in Section 2.7.4.5.

Table 2.7.1-6 Place of Work of Study Area Residents Aged 16 Years and Older: Census 2000
(Source USCB, 2007c)

Study Area	In State of Residence			Outside State of Residence	Total
	In County of Residence	In State Outside of County of Residence	Total In State		
Frequency Distribution					
Lake Arthur Area	2,330	336	***2,666***	27	2,693
Eddy County	19,236	637	***19,873***	312	20,185
Lea County	18,566	435	***19,001***	827	19,828
Study Area	**40,132**	**1,408**	***41,540***	**1,166**	**42,706**
Percent Distribution					
Lake Arthur Area	87.4	12.6	***99.0***	1.0	100.0
Eddy County	96.8	3.2	***98.5***	1.5	100.0
Lea County	97.7	2.3	***95.8***	4.2	100.0
Study Area	**96.6**	**3.4**	***97.3***	**2.7**	**100.0**

Public School Enrollment

Table 2.7.1-7 summarizes public school enrollment from SY1986 to SY2005. Figure 2.7.1-7 graphs the trend over a 20-year period. It appears that public school enrollment peaked in the SY1995 when enrollment was at 25,191 students. The public school enrollment stayed above 25,000 for the next two school years. Since SY1998 the enrollment figures have trended downwards, reaching their lowest point in SY2004, when enrollment was at 22,300 students. In 10 years, from SY1995 to SY2005, the study area lost a total of 2,600 students. A slight improvement in the total enrollment figures was noted in SY2005. This upward change appears to be mostly the result of improvements in the Grades 1 to 6 enrollment.

Prior to SY 2000, the enrollment decline was primarily the result of decreases in elementary and middle school enrollments. After SY2000, high school enrollment started to drop. The downturn in the school enrollment, especially in the elementary and middle school levels, that started in the late 1990s is likely to be correlated with the migration of families with young children from the region.

It appears that the out-migration of families with children is beginning to impact the high school enrollment. Starting in SY1999, high school enrollments in the three counties have been declining. Between SY1995 and SY2000, the study area had a gain of about 100 high school students. But between SY2000 and SY2005, high school enrollment in the area decreased by as many as 580 students.

Minority Student Enrollment

Table 2.7.1-8 and Figure 2.7.1-8 show the levels and trends of minority student enrollment in the study area. School enrollment statistics for minority students were not disaggregated by grade level thus all students including kindergarten and special education students were included in the total enrollment for the denominator. Overall, the proportion of minority students in the study area has been steadily increasing. In 16 years, the minority student share in the total enrollment grew from 50 percent to 61 percent.

Table 2.7.1-7 Public School Enrollment by Grade and County: School Year 1986 to 2005
(Source: NCES, 2007)

School Year	Grade 1 - 6	Grade 7- 9	Grade 10-12	All Grades	Grade 1 - 6	Grade 7- 9	Grade 10-12	All Grades
	Lake Arthur				Eddy County			
1986	70	39	31	140	4,491	1,992	1,962	8,445
1987	81	39	34	154	4,464	1,980	1,982	8,426
1988	90	44	40	174	4,476	1,977	1,991	8,444
1989	90	40	46	176	4,586	2,055	1,959	8,600
1990	98	35	37	170	4,636	2,192	1,989	8,817
1991	93	39	40	172	4,727	2,253	2,106	9,086
1992	118	40	30	188	4,805	2,445	2,310	9,560
1993	103	49	45	197	4,786	2,554	2,351	9,691
1994	99	70	44	213	4,653	2,577	2,392	9,622
1995	90	77	59	226	5,082	2,992	2,388	10,462
1996	98	68	61	227	5,038	2,923	2,437	10,398
1997	99	68	62	229	5,211	2,783	2,539	10,533
1998	106	63	56	225	5,086	2,672	2,648	10,406
1999	96	62	51	209	4,914	2,545	2,585	10,044
2000	98	53	50	201	4,778	2,583	2,399	9,760
2001	91	46	47	184	4,782	2,457	2,283	9,522
2002	93	43	38	174	4,733	2,462	2,248	9,443
2003	74	50	36	160	4,664	2,512	2,231	9,407
2004	72	27	31	130	4,562	1,588	2,115	8,265
2005	68	46	29	143	4,670	2,446	2,092	9,208
	Lea County				**Study Area**			
1986	6,842	3,064	2,471	12,377	11,403	5,095	4,464	20,962
1987	6,735	2,906	2,432	12,073	11,280	4,925	4,448	20,653
1988	6,816	2,876	2,397	12,089	11,382	4,897	4,428	20,707
1989	6,731	2,888	2,362	11,981	11,407	4,983	4,367	20,757
1990	6,599	2,942	2,334	11,875	11,333	5,169	4,360	20,862
1991	6,710	3,008	2,354	12,072	11,530	5,300	4,500	21,330
1992	6,662	3,166	2,586	12,414	11,585	5,651	4,926	22,162
1993	6,441	3,325	2,634	12,400	11,330	5,928	5,030	22,288
1994	6,232	3,262	2,574	12,068	10,984	5,909	5,010	21,903
1995	6,066	3,319	2,593	11,978	11,238	6,388	5,040	22,666
1996	5,975	3,301	2,703	11,979	11,111	6,292	5,201	22,604
1997	6,068	3,274	2,747	12,089	11,378	6,125	5,348	22,851
1998	5,892	3,079	2,828	11,799	11,084	5,814	5,532	22,430
1999	5,570	2,959	2,775	11,304	10,580	5,566	5,411	21,557
2000	5,436	2,831	2,693	10,960	10,312	5,467	5,142	20,921
2001	5,412	2,780	2,643	10,835	10,285	5,283	4,973	20,541
2002	5,316	2,730	2,630	10,676	10,142	5,235	4,916	20,293
2003	5,286	2,762	2,570	10,618	10,024	5,324	4,837	20,185
2004	5,246	2,876	2,505	10,627	9,880	4,491	4,651	19,022
2005	5,434	2,802	2,443	10,679	10,172	5,294	4,564	20,030

Minority enrollment in Eddy County has been on a downward trajectory since SY1995, when their numbers topped 5,900 students giving them a 52 percent share in the total student population. In SY2004, Eddy County registered over 4,600 minority students, which is about half their total student enrollment for this school year. This rise in the minority student enrollment is consistent with the strong population growth of the Hispanic population in the region (see Table 2.7.1-2).

College Enrollment

Six post-secondary educational institutions were identified in the region. Five are state institutions. One, the College of the Southwest, which is in the city of Hobbs, is privately owned. Eastern New Mexico University (ENMU) has two campuses that are within driving distance from the study area. The main campus is located in Portales and a branch campus is in Roswell. The New Mexico Military Institute (NMMI) and the New Mexico Junior College are two-year institutions. New Mexico State University (NMSU) whose main campus is in Las Cruces has a branch in Carlsbad.

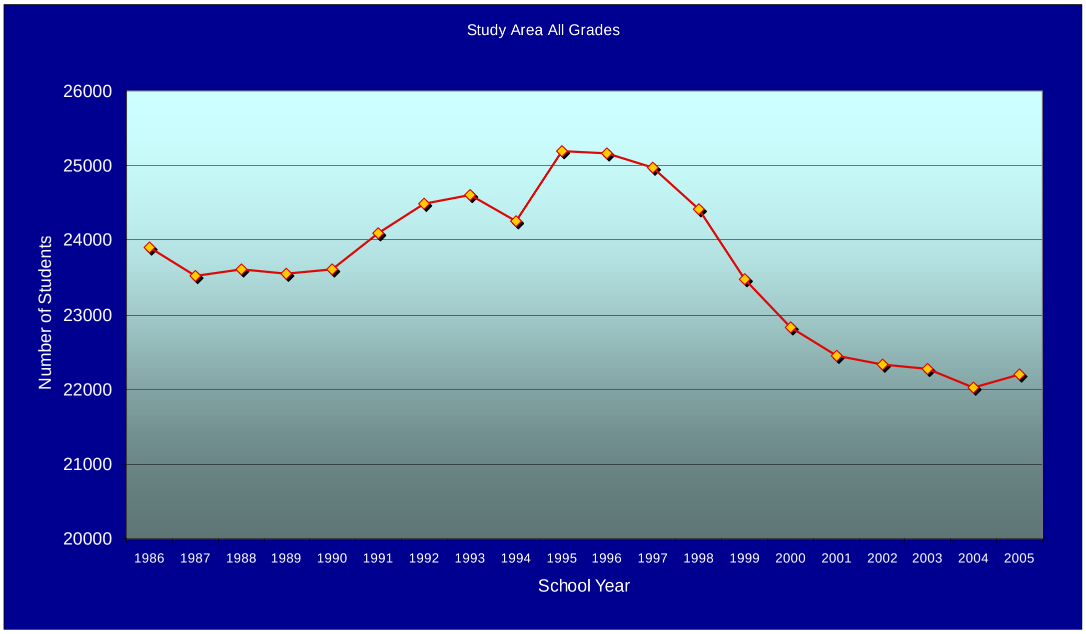


Figure 2.7.1-7 Study Area Public School Enrollment: SY1986 to SY2005, All Grades
(Source: NCES, 2007)

Table 2.7.1-9 shows that, in general, college enrollment in the region has increased between 2003 and 2004. The exception to this pattern is the College of the Southwest where enrollment has declined.

2.7.1.7 Poverty Status of Study Area Residents

Poverty status is a relative measure of economic well-being that is determined on the basis of family income and the number of people in that family. The Census Bureau calculates income cutoffs that serve as guidelines to determine the poverty status of families and unrelated individuals. "The total income of each family or unrelated individual was tested against the appropriate poverty threshold. If the total income was less than the corresponding cutoff, the family or unrelated individual was classified as 'below the poverty level.' The number of persons below the poverty level was the sum of the number of persons in families with incomes below the poverty level and the number of unrelated individuals with incomes below the poverty level." (USCB, 1993) The poverty thresholds are revised yearly to compensate for changes in the cost of living as reflected in the Consumer Price Index.

Tables 2.7.1-10 and 2.7.1-11 contain the poverty statistics for the study area population. Although statistics are presented separately for Hispanic and minorities, these categories are overlapping. Most the minorities are also Hispanics. These categories were combined because of the small numbers of non-Hispanic non-White races. The poverty rate in the study area is slightly higher than for the state as a whole. New Mexico's poverty rate in 2000 was calculated at 18 percent compared to 25 percent for the study area. Tables 2.7.1-10 and 2.7.1-11 indicate that there is great variability in poverty status across geography and among different categories of people. Table 2.7.1-11 shows that in the year 2000, Eddy County had the lowest proportion of poor people.

Table 2.7.1-8 Minority School Enrollment by County: School Year 1989 to 2004
(Source: NSEC, 2007)

School Year	Lake Arthur			Eddy County		
	Total	Minority	% Minority	Total	Minority	% Minority
1989	200	117	58.5	9,439	5,082	53.8
1990	191	127	66.5	9,626	5,218	54.2
1991	195	118	60.5	9,901	5,307	53.6
1992	206	147	71.4	10,390	5,401	52.0
1993	215	133	61.9	10,519	5,378	51.1
1994	235	150	63.8	10,403	5,301	51.0
1995	240	147	61.3	11,326	5,917	52.2
1996	255	145	56.9	11,201	5,851	52.2
1997	249	160	64.3	11,342	5,745	50.7
1998	238	171	71.8	11,191	5,586	49.9
1999	224	158	70.5	10,807	5,347	49.5
2000	221	155	70.1	10,500	5,139	48.9
2001	206	156	75.7	10,188	5,004	49.1
2002	194	139	71.6	10,230	4,904	47.9
2003	179	135	75.4	10,188	4,832	47.4
2004	168	128	76.2	9,058	4,615	50.9
School Year	**Lea County**			**Study Area**		
	Total	Minority	% Minority	Total	Minority	% Minority
1989	13,510	6,177	45.7	23,149	11,376	49.1
1990	13,335	6,244	46.8	23,152	11,589	50.1
1991	13,545	6,449	47.6	23,641	11,874	50.2
1992	13,643	6,667	48.9	24,239	12,215	50.4
1993	13,557	6,816	50.3	24,291	12,327	50.7
1994	13,237	6,839	51.7	23,875	12,290	51.5
1995	13,216	6,880	52.1	24,782	12,944	52.2
1996	13,265	6,988	52.7	24,721	12,984	52.5
1997	13,079	7,031	53.8	24,670	12,936	52.4
1998	12,725	6,951	54.6	24,154	12,708	52.6
1999	12,167	6,743	55.4	23,198	12,248	52.8
2000	11,765	6,777	57.6	22,486	12,071	53.7
2001	11,660	6,921	59.4	22,054	12,081	54.8
2002	11,546	7,006	60.7	21,970	12,049	54.8
2003	11,509	7,169	62.3	21,876	12,136	55.5
2004	10,563	7,247	68.6	19,789	11,990	60.6

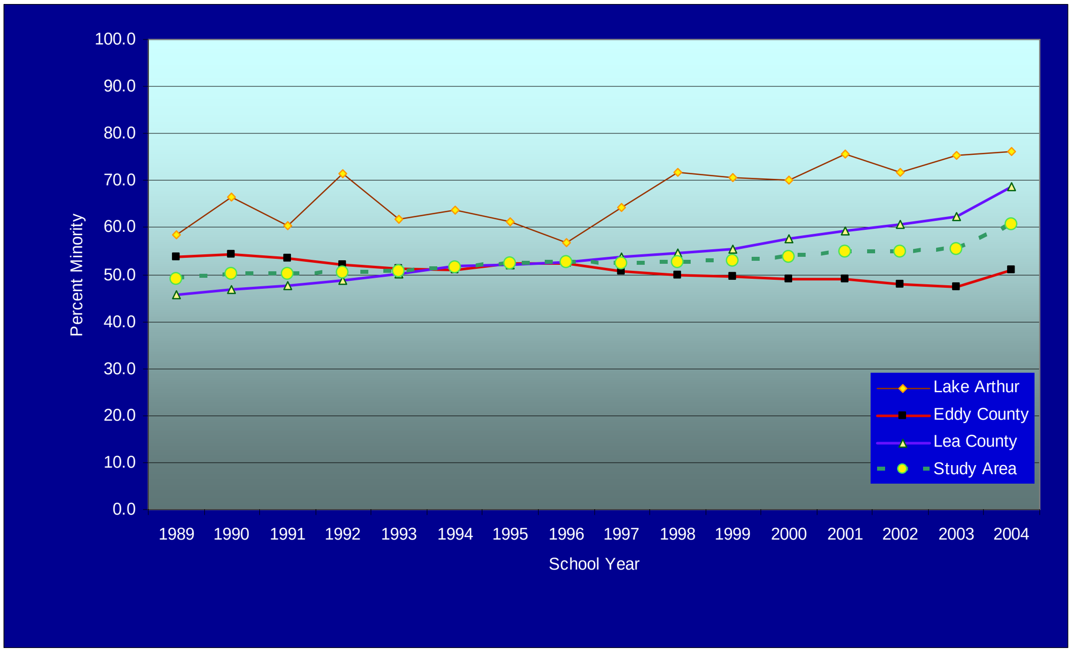


Figure 2.7.1-8 Percent of Minority Students in Public Schools: School Year 1989 to 2004
(Source: NCES, 2007)

Table 2.7.1-9 College Enrollment: Fall 2003-2004

County	City	Institute Name	Full-time equivalent enrollment Fall 2003	Full-time equivalent enrollment Fall 2004	12-month unduplicated headcount 2002-03	12-month unduplicated headcount 2003-04
Chaves	Roswell	Eastern New Mexico University-Roswell Campus	2,394	2,491	4,448	4,569
Chaves	Roswell	New Mexico Military Institute	408	430	2,291	4,391
Eddy	Carlsbad	New Mexico State University-Carlsbad	799	828	2,552	2,620
Lea	Hobbs	New Mexico Junior College	1,517	2,021	8,740	9,747
Lea	Hobbs	College of the Southwest	667	583	2,630	2,582
Roosevelt	Portales	Eastern New Mexico University-Main Campus	3,048	3,190 *	*	

*Enrollment figures were not included here because they were inconsistent with other enrollment statistics.

Regardless of place of residence, Hispanics and minorities had a higher poverty rate than Anglos. Table 2.7.1-11 details the poverty rate across Census Tracts. Slightly over 21,000 people in the study area were determined to have fallen below the poverty threshold in the year 2000. Table 2.7.1-11 shows that 10 Census Tracts had poverty rates higher than the study area as a whole. Only Eddy County Census Tract 2 had the lowest poverty rate; seven percent of this Census Tract's population was below the poverty threshold in 2000. The Census Tract with the second lowest poverty rate is Census Tract 12 in the Lake Arthur area with 11 percent poverty rate.

2.7.2 Employment and Income

The economic region surrounding the Site includes all those counties that lie within a 50 mile radius of the Site as discussed in Section 2.7.1. The areas surrounding Carlsbad, Artesia, Hobbs, and Roswell are each classified as Micropolitan Areas. The Bureau of Economic Analysis (BEA) publishes data for

Table 2.7.1-10 Poverty Rate of City Residents, by Race and Ethnicity: Census 2000
(Source: USCB, 2007d)

Study Area	Population under poverty	Poverty Rate %	Hispanic* Poverty Population	Hispanic* Poverty Rate %	Anglo** Poverty population	Anglo** poverty Rate %	Minority** Poverty Population	Minority** Poverty Rate %
Chaves County	**12,778**	**21.27**	**8,550**	**32.26**	**3,539**	**11.34**	**9,239**	**32.00**
Lake Arthur	98	24.56	78	29.89	20	14.49	78	29.89
Eddy County	**9,425**	**18.51**	**5,754**	**28.89**	**3,295**	**11.31**	**6,130**	**28.17**
Artesia	2,177	20.15	1,521	29.94	547	10.09	1,630	30.27
Carlsbad	4,175	16.47	2,051	22.11	1,883	12.72	2,292	21.73
Loving	317	23.98	266	24.84	47	19.50	270	24.98
Lea County	**11,317**	**21.08**	**7,019**	**33.06**	**3,311**	**11.34**	**8,006**	**32.71**
Eunice	402	15.65	238	23.36	149	9.92	253	23.71
Hobbs	6,670	24.21	4,104	35.52	1,722	12.53	4,948	35.84
Jal	361	17.91	224	26.99	131	11.46	230	26.35
Lovington	2,051	22.15	1,504	30.97	481	11.95	1,570	29.99
Tatum	134	18.69	66	18.44	53	15.73	81	21.32

Note: Poverty Rate is the ratio of population who are below 100% of poverty as defined by the Census Bureau.
* Hispanic is of all races.
** Anglo refers to those who identified themselves as White Only Race and Non-Hispanic.
***Minority refers to those who identified themselves as White Hispanic and all Non-White races.

micropolitan areas, but in the three cases, the boundaries, and hence the data, are identical with the respective county in which the communities are located. While the three New Mexico counties are thus considered to be micropolitan areas, seven Texas counties in the area are all rural counties, with low population density and, with the exception of Gaines and Andrews counties, have limited economic activity.

2.7.2.1 Historical Trends

Table 2.7.2-1 presents historical data by decade on total employment for Eddy, Lea and Chavez Counties and for each of the seven Texas counties and offers a comparison with New Mexico and the U.S. The figures on total employment include full- and part-time wage and salary workers and those who are self-employed as farm and non-farm proprietors. The figures on employment growth are the calculated compound annual rates of growth over the decade. More recent data on wage and salary employment by industry sector are presented in Appendix 2J.

2.7.2.2 Recent Economic Performance

Employment and Earnings

Table 2.7.2-2 below provides data from 2001 to 2005 on the performance of wages and salaries by employment sector in the three New Mexico counties in the ELEA region. The compound annual rate of private sector employment growth from 2001 to 2005 was a robust 3 percent in Lea County, but much more modest in Chaves and Eddy counties. Much of the growth is related to oil and gas, but there have been a number of positive developments in other sectors. Certain sectors, particularly the mining and farm sectors, are important to total county compensation. The mining activity is predominately oil and gas, although other mining activities take on importance in some counties (e.g., potash in Eddy County). Transportation is another sector that accounts for a disproportionately large share of total income in some of the ELEA counties. Much of this is truck transportation and may be linked to oil and gas activity. Rail accounts for 3 percent of total compensation in Culberson; pipelines for 8 percent in Winkler and 1 percent respectively for Eddy and Lea counties. The government sector has a very large presence in some of the counties, most notably Culberson and Reeves where it is at or near 50 percent, but accounts for only 14 percent of total compensation in Lea County.

Table 2.7.1-11 Study Area Poverty Rate, by Census Tract: Census 2000
(Source: USCB, 2007c)

Study Area	Total Population for whom poverty status is determined	Number of Poor People	Poverty Rate
Chaves County	***60,087***	***12,778***	***21.3***
Census Tract 12	1,766	196	11.1
Census Tract 13	2,767	482	17.4
Census Tract 14	2,532	656	25.9
Total	**7,065**	**1,334**	**18.9**
Eddy County			
Census Tract 1	1,350	269	25.0
Census Tract 2	4,307	276	7.0
Census Tract 3	5,258	810	20.3
Census Tract 4.01	3,411	466	15.3
Census Tract 4.02	4,336	738	22.3
Census Tract 5	3,319	870	40.7
Census Tract 6	5,506	865	16.0
Census Tract 7	5,015	857	22.4
Census Tract 8	2,073	425	24.5
Census Tract 9	4,409	758	21.2
Census Tract 10	5,859	1,561	30.6
Census Tract 11	6,065	874	19.8
Total	**50,908**	**8,769**	**22.0**
Lea County			
Census Tract 1	2,470	824	45.4
Census Tract 2	2,979	1,027	44.7
Census Tract 3	3,290	1,481	53.1
Census Tract 4	2,441	975	49.4
Census Tract 5.01	6,089	699	14.2
Census Tract 5.02	5,538	1,105	28.4
Census Tract 6	5,730	721	17.7
Census Tract 7	6,556	814	17.7
Census Tract 8	2,891	465	20.9
Census Tract 9	2,114	379	28.6
Census Tract 10.02	5,990	1,449	32.7
Census Tract 10.03	3,623	659	22.4
Census Tract 11	3,971	719	22.2
Total	**53,682**	**11,317**	**28.5**
Study Area	111,655	21,420	**25.4**

Table 2.7.2-1 Historical Employment for Counties within 50 Miles of the Site
(Source: BEA, 2007)

	Total Employment				Annual % Growth by Decade		
	1970	1980	1990	2000	1970-80	1980-90	1990-00
New Mexico Counties							
Lea County Employment	21,061	29,765	27,419	28,469	3.5%	-0.8%	0.4%
Eddy County Employment	16,188	21,689	22,143	25,530	3.0%	0.2%	1.4%
Chaves County Employment	17,142	23,088	27,098	28,017	3.0%	1.6%	0.3%
Texas Counties							
Andrews County Employment	4,737	6,596	7,080	6,017	3.4%	0.7%	-1.6%
Culberson County Employment	1,871	1,884	1,744	1,391	0.1%	-0.8%	-2.2%
Gaines County Employment	5,151	6,465	6,092	7,321	2.3%	-0.6%	1.9%
Loving County Employment	102	132	95	98	2.6%	-3.2%	0.3%
Reeves County Employment	6,087	5,970	5,888	6,469	-0.2%	-0.1%	0.9%
Winkler County Employment	3,938	3,818	3,428	3,048	-0.3%	-1.1%	-1.2%
Yoakum County Employment	3,751	4,218	4,963	4,190	1.2%	1.6%	-1.7%
New Mexico Employment	398,899	598,199	767,139	972,954	4.1%	2.5%	2.4%
United State Employment (000s)	91,282	114,231	139,381	166,759	2.3%	2.0%	1.8%

Source: US Bureau of Economic Analysis

Table 2.7.2-2 Recent Wage and Salary Employment by Sector in Chaves, Eddy and Lea Counties (4 Q Figures through 2006 Q3)
(Source: NMDOL, 2007)

	CHAVES COUNTY				EDDY COUNTY				LEA COUNTY			
	Ave Emp	% of	Annual Growth		Ave Emp	% of	Annual Growth		Ave Emp	% of	Annual Growth	
Industry	2005	Total	2001-05	4 Q's	2005	Total	2001-05	4 Q's	2005	Total	2001-05	4 Q's
Agric, forest, fishing & hunting	1,508	7%	-2%	2%	361	2%	-1%	-7%	417	2%	2%	-2%
Mining	524	2%	0%	7%	2,820	14%	2%	9%	5,387	21%	3%	18%
Utilities	58	0%	-12%	22%	122	1%	-2%	1%	242	1%	0%	-1%
Construction	979	5%	3%	17%	1,058	5%	-1%	8%	1,687	7%	0%	5%
Manufacturing	1,136	5%	-14%	11%	783	4%	-1%	-9%	339	1%	-2%	99%
Wholesale trade	728	3%	-1%	-9%	471	2%	1%	0%	930	4%	-3%	15%
Retail trade	2,725	13%	4%	2%	2,117	10%	-2%	6%	2,719	11%	0%	-1%
Transportation & warehousing	811	4%	10%		787	4%	1% *		915	4%	3%	20%
Information	244	1%	-1%	3%	242	1%	-6%	2%	246	1%	2%	6%
Finance & insurance	586	3%	5%	4%	587	3%	4%	5%	644	3%	5%	1%
Real estate & rental & leasing	205	1%	1%	11%	406	2%	5%	2%	406	2%	9%	-3%
Professional & tech'l services	511	2%	-1%	37%	515	3%	10%	-11%	373	1%	8%	7%
Mgt companies & enterprises	43	0%	-4%	18%	178	1%	48% *		*		*	
Admin & waste services	251	1%	-3%	18%	1,395	7%	2%	23%	1,457	6%	8%	-7%
Educational services	15	0%	4%	78%	41	0%	7%	5%	*		*	
Health care & social assist	3,148	15%	6%	9%	2,251	11%	3%	-1%	2,826	11%	3%	2%
Arts, entertain & recreation	165	1%	-3%	0%	81	0%	1%	-28%	*		*	
Accom & food services	2,505	12%	-1%	1%	1,746	9%	0%	3%	1,833	7%	6%	4%
Other services	568	3%	0%	9%	833	4%	1%	-1%	871	3%	7% *	
Non-classifiable	*				*				21	0%	*	
Total private sector	16,715	79%	0%	5%	16,802	83%	1%	4%	21,935	87%	3%	6%
Public administration	4,403	21%	0%	1%	3,436	17%	1%	1%	3,384	13%	-1%	-1%
Federal	329	2%	-3%	0%	596	3%	4%	8%	114	0%	-2%	-3%
State	1,544	7%	1%	3%	605	3%	2%	0%	285	1%	1%	0%
Local	2,531	12%	0%	0%	2,234	11%	0%	0%	2,985	12%	-1%	-1%
Grand total	21,118	100%	0%	4%	20,238	100%	1%	4%	25,319	100%	2%	5%

Note: 4 quarter growth is for the latest 4 quarters available, those ending with the third quarter of 2006 over the same quarters a year earlier.

Source: NM Dept of Labor, Quarterly Census of Employment

Taxable Gross Receipts

Tables 2.7.2-3 and 2.7.2-4 provide detailed data by NAICS 3-digit industries on the taxable gross receipts reported for respectively Eddy and Lea counties and for the major municipality(ies) within each county.[1] Table 2.7.2-3 presents the data for Eddy County, Carlsbad and Artesia. Table 2.7.2-4 presents the data for Lea County and Hobbs.

2.7.2.3 Labor Force

Table 2.7.2-5 presents the data on the labor force status of the population age 16 and over in each of the ELEA counties in 2000. For comparative purposes, the data are also presented on New Mexico and the U.S.; of interest are the labor force participation rates.[2]

The economy of the region has changed dramatically since 2000. Table 2.7.2-6 presents annual averages on the civilian labor force, employment, unemployment, and the unemployment rate for each of the counties included in the economic analysis from 2000 to 2006. The final column calculates the changes in each of the variables since 2000. Over this period with three exceptions, both the labor force and employment in each of the counties have increased. The exceptions are Reeves, Loving, and Gaines, where the declines have been relatively small. In some cases, like Lea County, the increases have been considerable. Aside from three exceptions mentioned, the gains in employment are greater than those in the labor force. Both the number and the percent of those counted as unemployed have fallen. In some counties, notably Lea, Eddy, Andrews, and Culberson, the employment rate in 2006 averaged well below 4 percent, a result generally said to be indicative of a tight labor market. Table 2.7.2-7 presents Census 2000 data on the top 20 occupations in Eddy and Lea counties. Even in 2000 and before the energy boom a number of the top occupations were in the construction, extraction and maintenance occupations and the production, transportation, and material moving occupations.

2.7.2.4 Economic Outlook for the Region

With its historical dependence on natural resources and mining, the economic region surrounding the Site has experienced periodic boom and bust but little in the way of sustained economic development. Energy markets have once again created a flurry of activity in the oil fields, just as the region is set to embark on a new energy future.

Lea County employment growth is expected to exceed recent experience and to be in the 5-10 percent range in both 2007 and 2008, slowing dramatically, perhaps even turning negative in 2009 when current projects discussed below will have been completed. The Lea County economy is expected to experience moderate employment growth thereafter. Oil and gas activity may continue to have employment gains if energy prices remain high or exceed current levels, but the growth in employment is expected to moderate over time.

Like Lea County, Eddy County's future will be shaped in part by what happens to oil and gas and, to a lesser extent, to potash. However, the WIPP site and those various entities which have grown up around WIPP or which are in Carlsbad in support of the WIPP operation will play a major role in the economy. Carlsbad Caverns and other outdoor recreational opportunities will continue to draw tourists into the area.

Chaves County has considerably less mining activity but has, nonetheless felt the effects of the energy boom. The county has a diversified economy, which has recently benefited from the expansion of the

[1] The figures in the table for 2005 and 2006 have been adjusted to add back in the amounts of the deductions for food sold in stores and for medical services that went into effect on January 1, 2005. The annual figures are based on activity months, not distribution months, so Christmas sales, which primarily affect December activity, will be reflected in the calendar year in which those sales were made, i.e., 2005, if in sales were made in December 2005.
[2] To be counted in the civilian labor force one must either be working or actively seeking work. The unemployment rate thus only includes those who have not, for one reason or another, given up looking for work.

Table 2.7.2-3 Taxable Gross Receipts, Calendar 2002-06, Eddy County and Cities

	Thousands of Dollars					% Annual Growth	
Calendar Years	**2002**	**2003**	**2004**	**2005**	**2006**	**2002-06**	**2005-06**
EDDY COUNTY							
Agriculture, Forestry, Fishing & Hunting	*	2,820	3,611	5,409	5,896	*	9.0%
Mining & Oil and Gas Extraction	105,998	141,687	165,010	247,914	416,371	40.8%	67.9%
Utilities	110,270	#VALUE!	101,924	115,640	124,942	3.2%	8.0%
Construction	110,270	135,434	113,838	161,141	217,961	18.6%	35.3%
Manufacturing	30,954	34,796	31,684	37,177	46,554	10.7%	25.2%
Wholesale Trade	79,997	90,496	84,999	135,874	144,499	15.9%	6.3%
Retail Trade	278,789	318,416	408,178	433,813	513,701	16.5%	18.4%
Transportation and Warehousing	-	27,052	29,799	46,698	56,367	*	20.7%
Information and Cultural Industries	-	21,770	23,245	23,421	23,600	*	0.8%
Finance and Insurance	5,692	4,791	5,859	5,993	5,989	1.3%	-0.1%
Real Estate and Rental and Leasing	18,671	5,411	5,778	7,078	11,357	-11.7%	60.4%
Professional, Scientific & Technical Services	*	52,087	58,621	84,427	85,163	*	0.9%
Management of Companies and Enterprises	113	*	90	*	*	*	*
Admin and Support, Waste Mgt	*	*	517	1,369	3,129	*	128.6%
Educational Services	*	*	34	*	338	*	*
Health Care and Social Assistance	*	44,711	64,837	53,741	54,957	*	2.3%
Arts, Entertainment and Recreation	*	473	593	527	423	*	-19.8%
Accommodation and Food Services	*	48,210	54,502	62,108	63,444	*	2.2%
Total of above five categories, 2002	81,035					10.8%	
Other Services (except Public Admin)	286,183	274,606	241,588	298,502	384,540	7.7%	28.8%
Unclassified Establishments	*	3,137	399	677	1,947	*	187.5%
Totals	1,189,132	1,301,296	1,395,109	1,717,906	2,161,508	16.1%	25.8%
CARLSBAD							
Agriculture, Forestry, Fishing & Hunting	*	*	*	295	*	*	*
Mining & Oil and Gas Extraction	9,847	8,105	14,270	18,928	25,112	26.4%	32.7%
Utilities	*	*	19,206	21,895	22,746	*	3.9%
Construction	29,550	31,966	30,218	34,563	45,305	11.3%	31.1%
Manufacturing	10,327	10,993	12,071	13,971	19,103	16.6%	36.7%
Wholesale Trade	21,847	18,434	19,740	25,403	22,787	1.1%	-10.3%
Retail Trade	185,218	178,433	200,104	214,350	222,426	4.7%	3.8%
Transportation and Warehousing	*	8,662	6,865	16,577	18,072	0.0%	9.0%
Information and Cultural Industries	*	9,177	10,181	10,267	10,427	0.0%	1.6%
Finance and Insurance	*	2,946	3,777	3,680	3,546	0.0%	-3.6%
Real Estate and Rental and Leasing	2,481	2,938	3,255	4,212	6,073	25.1%	44.2%
Professional, Scientific & Technical Services	*	31,124	29,112	33,897	42,011	*	23.9%
Management of Companies and Enterprises	*	*	*	*	*	*	*
Admin and Support, Waste Mgt	*	*	216	686	1,531	*	123.3%
Educational Services	*	84	136	30	*	*	0.0%
Health Care and Social Assistance	*	38,223	58,942	49,805	50,132	*	0.7%
Arts, Entertainment and Recreation	*	*	217	191	129	*	-32.8%
Accommodation and Food Services	*	32,924	38,453	40,168	44,657	*	11.2%
Total of above five categories, 2002	61,404					12.0%	
Other Services (except Public Admin)	-	81,831	88,087	84,558	86,016	*	1.7%
Unclassified Establishments	*	896	272	211	1,603	*	661.0%
Totals	475,699	474,878	535,246	573,824	621,994	6.9%	8.4%
ARTESIA							
Agriculture, Forestry, Fishing and Hunting	*	*	2,780	2,572	1,622	*	-36.9%
Mining and Oil and Gas Extraction	11,433	16,486	22,354	24,297	47,481	42.8%	95.4%
Utilities	*	14,390	18,642	21,593	24,698	*	14.4%
Construction	38,002	54,505	29,809	55,247	75,855	18.9%	37.3%
Manufacturing	8,385	7,514	4,968	7,275	12,818	11.2%	76.2%
Wholesale Trade	34,413	41,149	26,408	59,479	65,957	17.7%	10.9%
Retail Trade	*	75,564	86,138	109,458	129,746	*	18.5%
Transportation and Warehousing	*	2,528	3,993	5,039	5,450	*	8.2%
Information and Cultural Industries	*	7,117	8,589	8,015	8,303	*	3.6%
Finance and Insurance	*	1,589	2,023	2,198	2,307	*	5.0%
Real Estate and Rental and Leasing	15,973	1,963	1,805	1,967	2,382	-37.9%	21.1%
Professional, Scientific and Technical Services	*	13,323	14,095	28,837	26,034	*	-9.7%
Management of Companies and Enterprises	*	*	*	*	*	*	*
Admin and Support, Waste Mgt	*	*	146	686	1,364	*	99.0%
Educational Services	*	*	*	41	*	*	*
Health Care and Social Assistance	*	4,396	5,888	3,912	4,807	*	22.9%
Arts, Entertainment and Recreation	*	*	*	66	*	*	*
Accommodation and Food Services	*	11,764	15,102	16,845	16,930	*	0.5%
Other Services (except Public Admin)	33,233	22,882	34,356	40,399	45,238	8.0%	12.0%
Unclassified Establishments	*	*	*	*	*	*	*
Totals	278,324	283,387	277,315	388,461	471,950	14.1%	21.5%

Source of data: New Mexico Taxation and Revenue Department, Report 80, Quarterly and Revised Quarterly from Monthly Reports

Table 2.7.2-4 Taxable Gross Receipts, Calendar 2002-06, Lea County and Hobbs

	Thousands of Dollars					% Annual Growth	
Calendar Years	**2002**	**2003**	**2004**	**2005**	**2006**	**2002-06**	**2005-06**
LEA COUNTY							
Agriculture, Forestry, Fishing & Hunting	1,407	1,637	1,186	1,926	2,069	10.1%	7.4%
Mining & Oil and Gas Extraction	200,003	249,591	290,898	405,812	564,188	29.6%	39.0%
Utilities	93,555	128,136	119,802	148,182	157,833	14.0%	6.5%
Construction	110,342	141,407	189,027	243,426	287,725	27.1%	18.2%
Manufacturing	29,719	48,635	68,611	77,655	106,535	37.6%	37.2%
Wholesale Trade	78,960	110,259	86,723	147,407	162,452	19.8%	10.2%
Retail Trade	318,644	338,544	385,782	455,406	514,914	12.7%	13.1%
Transportation and Warehousing	15,085	13,690	24,929	29,358	45,921	32.1%	56.4%
Information and Cultural Industries	*	22,696	24,782	26,354	25,931	*	-1.6%
Finance and Insurance	5,150	4,460	5,140	4,837	5,685	2.5%	17.5%
Real Estate and Rental and Leasing	4,218	7,327	13,959	20,013	25,696	57.1%	28.4%
Professional, Scientific & Technical Services	*	20,322	33,896	53,371	50,707	*	-5.0%
Management of Companies and Enterprises	*	*	*	*	*	*	
Admin and Support, Waste Mgt	*	*	2,134	5,013	17,944	*	258.0%
Educational Services	*	321	1,417	763	799	*	4.8%
Health Care and Social Assistance	*	63,927	61,843	76,504	78,004	*	2.0%
Arts, Entertainment and Recreation	*	659	899	625	554	*	-11.2%
Accommodation and Food Services	*	47,958	55,483	66,221	74,700	*	12.8%
Total of above five categories, 2002	97,805	-	-	-	-	12.0%	
Other Services (except Public Admin)	74,606	283,983	322,865	418,043	503,439	61.2%	20.4%
Unclassified Establishments	*	1,837	451	107	727	*	579.3%
Totals	1,250,258	1,489,771	1,690,387	2,182,241	2,627,764	20.4%	20.4%
HOBBS							
Agriculture, Forestry, Fishing & Hunting	*	*	736	843	*	*	*
Mining & Oil and Gas Extraction	100,316	116,099	126,532	180,936	248,347	25.4%	37.3%
Utilities	*	*	28,239	39,500	42,405	*	7.4%
Construction	46,936	53,549	54,394	91,227	98,912	20.5%	8.4%
Manufacturing	13,254	21,658	34,868	45,204	65,028	48.8%	43.9%
Wholesale Trade	34,500	42,038	43,685	75,361	90,384	27.2%	19.9%
Retail Trade	250,827	263,434	297,515	357,200	391,756	11.8%	9.7%
Transportation and Warehousing	*	7,613	8,056	11,172	16,508	*	47.8%
Information and Cultural Industries	*	11,522	13,202	13,862	14,541	*	4.9%
Finance and Insurance	3,626	3,199	3,699	3,412	3,631	0.0%	6.4%
Real Estate and Rental and Leasing	3,434	5,773	11,679	17,202	23,255	61.3%	35.2%
Professional, Scientific & Technical Services	*	10,887	15,101	17,781	23,328	*	31.2%
Management of Companies and Enterprises	*	*	*	*	*	*	*
Admin and Support, Waste Mgt	*	*	1,415	2,151	4,421	*	105.6%
Educational Services	*	218	279	349	477	*	36.6%
Health Care and Social Assistance	*	52,785	55,907	70,478	71,309	*	1.2%
Arts, Entertainment and Recreation	*	497	834	595	449	*	-24.5%
Accommodation and Food Services	*	34,285	43,696	53,274	61,160	*	14.8%
Other Services (except Public Admin)	*	158,200	187,268	224,880	280,112	*	24.6%
Unclassified Establishments	*	1,276	*	*	*	*	*
Totals	747,428	812,189	927,390	1,205,528	1,437,810	17.8%	19.3%

Source of data: New Mexico Taxation and Revenue Department, Report 80, Quarterly and Revised Quarterly from Monthly Reports

Table 2.7.2-5 Labor Force Status of Population 16 and Over, ELEA Counties, New Mexico, U.S., 2000

Employment Status	**Lea**	**Eddy**	**Chaves**	**Andrews**	**Culberson**	**Gaines**	**Loving**	**Reeves**	**Winkler**	**Yoakum**	**New Mexico**	**US**
Population 16 years and over	**40,893**	**38,653**	**45,882**	**9,503**	**2,183**	**10,062**	**56**	**9,675**	**5,338**	**5,320**	**1,369,176**	**217,168,077**
Males	**20,223**	**18,542**	**21,960**	**4,545**	**1,082**	**4,876**	**25**	**5,149**	**2,577**	**2,564**	**663,095**	**104,982,282**
In labor force	**12,854**	**12,402**	**14,107**	**3,143**	**758**	**3,545**	**22**	**2,764**	**1,555**	**1,822**	**448,543**	**74,273,203**
labor force participation rate	**63.6%**	**66.9%**	**64.2%**	**69.2%**	**70.1%**	**72.7%**	**88.0%**	**53.7%**	**60.3%**	**71.1%**	**67.6%**	**70.7%**
Civilian labor force	**12,838**	**12,383**	**14,067**	**3,143**	**758**	**3,545**	**22**	**2,764**	**1,555**	**1,822**	**439,250**	**73,285,305**
Employed	**11,857**	**11,487**	**12,935**	**2,905**	**702**	**3,357**	**22**	**2,381**	**1,405**	**1,708**	**406,760**	**69,091,443**
Unemployed	**981**	**896**	**1,132**	**238**	**56**	**188**	**-**	**383**	**150**	**114**	**32,490**	**4,193,862**
Unemployment Rate	**7.6%**	**7.2%**	**8.0%**	**7.6%**	**7.4%**	**5.3%**	**0.0%**	**13.9%**	**9.6%**	**6.3%**	**7.4%**	**5.7%**
Armed Forces	**40**	**19**	**40**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**9,293**	**987,898**
Not in labor force	**7,369**	**6,140**	**7,853**	**1,402**	**324**	**1,331**	**3**	**2,385**	**1,022**	**742**	**214,552**	**30,709,079**
	-											
Females	**20,670**	**20,111**	**23,922**	**4,958**	**1,101**	**5,186**	**31**	**4,526**	**2,761**	**2,756**	**706,081**	**112,185,795**
In labor force	**9,448**	**9,702**	**11,254**	**2,368**	**619**	**2,231**	**20**	**2,066**	**1,235**	**1,330**	**386,089**	**64,547,732**
labor force participation rate	**45.7%**	**48.2%**	**47.0%**	**47.8%**	**56.2%**	**43.0%**	**64.5%**	**45.6%**	**44.7%**	**48.3%**	**54.7%**	**57.5%**
Civilian labor force	**9,448**	**9,702**	**11,246**	**2,368**	**619**	**2,231**	**20**	**2,066**	**1,235**	**1,330**	**384,190**	**64,383,493**
Employed	**8,397**	**9,104**	**10,093**	**2,159**	**591**	**2,103**	**20**	**1,850**	**1,156**	**1,153**	**356,356**	**60,630,069**
Unemployed	**1,051**	**598**	**1,153**	**209**	**28**	**128**	**-**	**216**	**79**	**177**	**27,834**	**3,753,424**
Unemployment Rate	**11.1%**	**6.2%**	**10.3%**	**8.8%**	**4.5%**	**5.7%**	**0.0%**	**10.5%**	**6.4%**	**13.3%**	**7.2%**	**5.8%**
Armed Forces	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,899**	**164,239**
Not in labor force	**11,222**	**10,409**	**12,668**	**2,590**	**482**	**2,955**	**11**	**2,460**	**1,526**	**1,426**	**319,992**	**47,638,063**

Source: US Census Bureau, Fact Sheets, 2000 Census

Table 2.7.2-6 Civilian Labor Force, Employment and Unemployment, 2000-2006

	2000	2001	2002	2003	2004	2005	2006	Change 2000-06
NEW MEXICO COUNTIES								
Chaves County								
Civilian Labor Force	25,826	25,853	25,805	25,946	26,176	26,630	26,982	1,156
Employment	24,378	24,399	24,132	24,031	24,376	25,034	25,711	1,333
Unemployment	1,448	1,454	1,673	1,915	1,800	1,596	1,272	-176
Rate	5.60%	5.60%	6.50%	7.40%	6.90%	6.00%	4.70%	-0.9%
Eddy County								
Civilian Labor Force	23,273	23,497	23,949	24,237	24,524	25,057	25,433	2,160
Employment	21,951	22,323	22,542	22,772	23,114	23,841	24,452	2,501
Unemployment	1,322	1,174	1,407	1,465	1,410	1,216	981	-341
Rate	5.70%	5.00%	5.90%	6.00%	5.70%	4.90%	3.90%	-1.8%
Lea County								
Civilian Labor Force	22,646	23,702	23,365	24,040	24,899	26,315	27,406	4,760
Employment	21,455	22,684	22,093	22,745	23,643	25,161	26,480	5,025
Unemployment	1,191	1,018	1,272	1,295	1,256	1,154	926	-265
Rate	5.30%	4.30%	5.40%	5.40%	5.00%	4.40%	3.40%	-1.9%
NEW MEXICO								
Civilian Labor Force	852,293	863,682	875,631	893,118	914,538	935,888	952,933	100,640
Employment	810,024	821,003	827,303	840,422	862,422	886,724	912,126	102,102
Unemployment	42,269	42,679	48,328	52,696	52,116	49,164	40,807	-1,462
Rate	5.00%	4.90%	5.50%	5.90%	5.70%	5.30%	4.30%	-0.7%
TEXAS COUNTIES								
Andrews County								
Civilian Labor Force	5,612	5,673	5,874	6,273	6,256	6,422	7,022	1,410
Employment	5,336	5,425	5,542	5,911	5,942	6,145	6,777	1,441
Unemployment	276	248	332	362	314	277	245	-31
Rate	4.92%	4.37%	5.65%	5.77%	5.02%	4.31%	3.49%	-1.4%
Culberson County								
Civilian Labor Force	1,489	1,547	1,610	1,609	1,561	1,660	1,683	194
Employment	1,404	1,471	1,510	1,514	1,471	1,586	1,629	225
Unemployment	85	76	100	95	90	74	54	-31
Rate	5.71%	4.91%	6.21%	5.90%	5.77%	4.46%	3.21%	-2.5%
Gaines County								
Civilian Labor Force	6,231	6,312	6,443	6,872	6,682	6,601	6,135	-96
Employment	5,961	6,016	6,113	6,513	6,322	6,279	5,848	-113
Unemployment	270	296	330	359	360	322	287	17
Rate	4.33%	4.69%	5.12%	5.22%	5.39%	4.88%	4.68%	0.3%
Loving County								
Civilian Labor Force	49	48	47	50	58	36	37	-12
Employment	45	45	44	45	54	32	33	-12
Unemployment	4	3	3	5	4	4	4	0
Rate	8.16%	6.25%	6.38%	10.00%	6.90%	11.11%	10.81%	2.6%
Reeves County								
Civilian Labor Force	5,033	4,989	5,063	4,787	4,442	4,329	4,149	-884
Employment	4,589	4,616	4,340	4,224	4,034	3,982	3,882	-707
Unemployment	444	373	723	563	408	347	267	-177
Rate	8.82%	7.48%	14.28%	11.76%	9.19%	8.02%	6.44%	-2.4%
Winkler County								
Civilian Labor Force	2,926	2,941	3,001	3,083	3,105	3,052	3,221	295
Employment	2,759	2,774	2,734	2,844	2,902	2,893	3,089	330
Unemployment	167	167	267	239	203	159	132	-35
Rate	5.71%	5.68%	8.90%	7.75%	6.54%	5.21%	4.10%	-1.6%
Yoakum County								
Civilian Labor Force	3,309	3,501	3,296	3,416	3,338	3,309	3,462	153
Employment	3,133	3,347	3,111	3,222	3,160	3,147	3,314	181
Unemployment	176	154	185	194	178	162	148	-28
Rate	5.32%	4.40%	5.61%	5.68%	5.33%	4.90%	4.27%	-1.0%
UNITED STATES								
Civilian Labor Force (000s) :	142,583	143,734	144,863	146,510	147,401	149,320	151,428	8,845
Employment	136,891	136,933	136,485	137,736	139,252	141,730	144,427	7,536
Unemployment	5,692	6,801	8,378	8,774	8,149	7,591	7,001	1,309
Rate	4.00%	4.70%	5.80%	6.00%	5.50%	5.10%	4.60%	0.6%

Estimates are not seasonally adjusted. Estimates are subject to revision.

Sources: New Mexico Department of Labor, Table A: Civilian Labor Force, Employment, Unemployment and Unemployment Rate, 1996-2007, pulled 3-9-07. Texas Workforce Commission, Texas Labor Market Information (http://www.tracer2.com/?PAGEID=142, as pulled 3-9-07)

Table 2.7.2-7 Top 20 Male and Female Occupations, Lea and Eddy Counties, 2000

	LEA COUNTY	Employed Males		EDDY COUNTY	Employed Males	
	TOP 20 MALE OCCUPATIONS	Number	Percent	TOP 20 MALE OCCUPATIONS	Number	Percent
1	Installation	1,344	11.3%	Construction trades workers	1,182	10.3%
2	Sales and related	1,085	9.2%	Installation	1,155	10.1%
3	Extraction workers	1,072	9.0%	Sales & related	1,039	9.0%
4	Production occupations	1,061	8.9%	Management except farm & farm managers	871	7.6%
5	Management except farm & farm managers	858	7.2%	Production occupations	865	7.5%
6	Material moving workers	844	7.1%	Material moving workers	768	6.7%
7	Motor vehicle operators	812	6.8%	Motor vehicle operators	700	6.1%
8	Construction trades workers	780	6.6%	Extraction workers	615	5.4%
9	Office & administrative support	528	4.5%	Office and administrative support	544	4.7%
10	Supervisors, construction & extraction	455	3.8%	Building & grounds cleaning/maintenance	509	4.4%
11	Protective service occupations:	388	3.3%	Food preparation & serving related	375	3.3%
12	Building & grounds cleaning/maintenance	318	2.7%	Supervisors, construction & extraction	320	2.8%
13	Farming, fishing and forestry	317	2.7%	Protective service occupations:	311	2.7%
14	Education, training & library	284	2.4%	Education, training & library	296	2.6%
15	Fire fighting, prevention & law enforcement	279	2.4%	Fire fighting, prevention & law enforcement	244	2.1%
16	Farmers and farm managers	231	1.9%	Community & social services	158	1.4%
17	Food preparation & serving related	191	1.6%	Architects, surveyors, cartographers & engineers	155	1.3%
18	Health diagnosing & treating practitioners & technical	188	1.6%	Life, physical & social science	146	1.3%
19	Community & social services	147	1.2%	Farmers and farm managers	141	1.2%
20	Architects, surveyors, cartographers & engineers	129	1.1%	Health diagnosing & treating practitioners & techi	132	1.1%
		11,311	95.4%		10,526	92%
		Employed Females			Employed Females	
	TOP 20 FEMALE OCCUPATIONS	Number	Percent	TOP 20 FEMALE OCCUPATIONS	Number	Percent
1	Office & administrative support	1,997	23.8%	Office & administrative support	2,283	25.1%
2	Sales and related	1,060	12.6%	Sales & related	1,259	13.8%
3	Education, training & library	998	11.9%	Education, training & library	948	10.4%
4	Food preparation & serving related	842	10.0%	Food preparation & serving related	687	7.5%
5	Personal care & service	589	7.0%	Personal care & service	666	7.3%
6	Management except farm & farm managers	482	5.7%	Healthcare support occupations	490	5.4%
7	Health diagnosing & treating practitioners & technical	410	4.9%	Management except farm & farm managers	450	4.9%
8	Healthcare support occupations	349	4.2%	Health diagnosing & treating practitioners & technica	392	4.3%
9	ilding and grounds cleaning and maintenance occupatic	329	3.9%	Building & grounds cleaning/maintenance	283	3.1%
10	Health technologists and technicians	179	2.1%	Production occupations	235	2.6%
11	Community and social services occupations	155	1.8%	Health technologists and technicians	208	2.3%
12	Financial specialists	128	1.5%	Financial specialists	198	2.2%
13	Arts, design, entertainment, sports & media	117	1.4%	Motor vehicle operators	171	1.9%
14	Fire fighting, prevention & law enforcement	106	1.3%	Community & social services	136	1.5%
15	Legal occupations	58	0.7%	Arts, design, entertainment, sports & media	107	1.2%
16	Business operations specialists	49	0.6%	Business operations specialists	106	1.2%
17	Computer and mathematical occupations	44	0.5%	Life, physical & social science	82	0.9%
18	Extraction workers	28	0.3%	Material moving workers	64	0.7%
19	Farmers and farm managers	20	0.2%	Computer and mathematical occupations	53	0.6%
20	Construction trades workers	20	0.2%	Construction trades workers	53	0.6%
		7,960	94.8%		8,871	97.4%

US Census Bureau, 2000 Census, Table P50 With Codes (PDF 8KB)
Detailed Occupation Code List (PDF 42KB)

dairy industry and of processing activities, like cheese-making. The manufacturing base in Roswell was hit hard by the closure of Nova Bus, the current shut-down of the successor plant run by Millennium. Roswell does have a growing industry that uses facilities at the old air base to service/renovate airplanes. Growth is expected to be moderate.

Many of the Texas counties in the economic region are tied into the oil economy and will rise or fall depending upon future energy prices. Gaines County has some interesting economic initiatives, including the builders coop a bio-diesel plant. Andrews is the potential site for two major projects discussed below. Both areas have seen some in-migration by employees from the NEF facility, although, to date, the number is very small. The housing markets in both counties seem to be responding, albeit slowly, to the need for more housing, and the prices quoted for new houses seem to compare favorably with the Hobbs market. This suggests that counties in Texas are likely to experience population increase related to developments in the larger region. The growth of their economies and their population will undoubtedly encourage more retail and commercial development.

There would seem to be a reasonable basis for optimism that the levels of oil and gas activity seen today will be sustained for at least the next few years. Indeed, some major providers of mining support and field services indicated they planned to continue adding to their workforce over the next few years. And Enterprise Project Partners is investing $150 million in a 75 MBPD Hobbs Fractionator that is located between Hobbs and Seminole, Texas. The Hobbs Facility is part of an overall effort to increase capacity to store and transport liquefied natural gas (NGL) within the region. The project should be completed by the end of the second quarter of 2007 (Enterprise Products Partners, L.P., 2006).

Section 2.7.5 provides abundant evidence of the oil and gas windfall to local county governments and to many communities and school districts. Rapid growth poses challenges to local governments. What the energy boom can provide are the financial resources to make strategic investments in infrastructure – in transportation networks, in water and sewer systems, in public schools, in parks and in cultural and recreational facilities.

The economy of the ELEA region seems poised for growth from sources outside of oil and gas. There are several projects that merit discussion. These are listed below and discussed in detail in Appendix 2J.

National Enrichment Facility (NEF), Eunice, New Mexico

The National Enrichment Facility (NEF) will use a gas centrifuge to produce the “low enriched uranium” required by nuclear power plants. (NEF, 2007a).

The NEF estimates construction of the $1.5 billion facility will take seven and a half years, (NEF, 2007b). Annual facility operations will provide close to 300 fulltime and contract jobs who will receive an estimated annual pay of $10 million and an estimated $3.1 million in annual benefits.

550-Megawatt Combined-Cycle Generating Plant, West of Hobbs, New Mexico

Lea Power Partners is developing this project under a contract with Xcel Energy, which will purchase power from the plant for 25 years. (Xcel, 2006). According to Dan Dunlap from Colorado Energy Management, construction on the plant began June 1, 2006, with an expected completion date a year later (Dunlap, 2007). At any time, the project will involve as many as 500-550 construction workers, including both direct hires and contract workers. Operations will employ 30-35 people.

Waste Isolation Pilot Plant (WIPP), Carlsbad, New Mexico

WIPP is administered by the DOE’s Carlsbad Field Office. WIPP is the only geological repository in the US for disposal of defense-related transuranic waste (WGI, 2007b). The managing and operating contractor employs approximately 700 people. Additional personnel are associated with the WIPP from the Department of Energy, two scientific laboratories, and other contractors.

Engineered Products Department (EPD), Carlsbad, New Mexico

The EPD is a division within WGI. According to their website, EPD is a precision metals fabrication and machining facility specializing in high integrity containers for nuclear and hazardous service. Current employment at EPD is 150 employees, including part-time workers. Last year WGI invested $1.5 million into EPD’s state-of-the-art facility and plan to invest another $2.5 million this year.

2.7.2.5 Energy Corridor

Many in the larger region that spans from Midland-Odessa up to Andrews and Gaines Counties north to perhaps as far as Portales and south and west to encompass Lea and Eddy Counties in New Mexico have a vision of this area as the new energy corridor. The vision sees as assets the major facilities already in place or under construction – e.g., WIPP, NEF – and to the infrastructure and organizations that have grown up to support these facilities, e.g., EPD, as already discussed, the Center of Excellence for Hazardous Materials Management (CEHMM), the Carlsbad Environmental Monitoring and Research Center (CEMRC) at NMSU in Carlsbad, and Waste Control Specialists (WCS, 2007).

The vision broadens to encompass the synergies of new facilities which might be located in the area. These are summarized below and discussed in more detail in Appendix 2J.

FutureGen, Odessa, Texas

FutureGen is a public-private partnership to design, build, and operate the world's first coal-fueled, near-zero emissions power plant, at a cost exceeding U.S. $1 billion. (FutureGen, 2007) The FutureGen Alliance, which includes some of the largest producers and users of coal working in collaboration with the DOE, will build the FutureGen plant on a site selected through an open, competitive site-selection process. A Request for Proposals to host the site (Site RFP) was issued in March 2006, and a total of 12 proposals were received. Four sites were selected for further review. One of those sites is Odessa, Texas. If built in Odessa, the project is expected to cost $250 million and to have peak construction employment of 1,300. Once operational, the facility should have a permanent workforce of 150.

High Temperature Teaching and Test Reactor Facility (HT3R), University of Texas – Permian Basin Andrews County

The total cost, including engineering, licensing, and construction of this facility in West Texas, is estimated to be approximately $400 million - to be raised from government, industry, and private sources (Wright, 2007). The facility will be sited in Andrews County.

Deconversion Facility, Andrews County, Texas

Early in 2005, Louisiana Energy Services (LES) and the nuclear energy services company AREVA signed a Memorandum of Understanding that could lead to the construction of a private uranium hexafluoride deconversion plant to support the proposed NEF outside Eunice, New Mexico.

Global Nuclear Energy Partnership, Eddy Lea Energy Alliance, LLC Site between Hobbs and Carlsbad

As part of the Advanced Energy Initiative, the GNEP seeks to develop worldwide cooperation on enabling expanded use of economical, nuclear energy to meet growing electricity demand. GNEP will implement the critical technologies needed to change the way used nuclear fuel is managed – to build recycling technologies that enhance energy security in a safe and environmentally responsible manner.

The ELEA offered a site between Carlsbad and Hobbs for the location of these facilities. Placing the GNEP facilities in the region is expected to create several thousand construction jobs and several hundred operations jobs. The exact size and design of the facilities have not been developed. The local population is generally receptive and enthusiastic regarding the GNEP proposal.

2.7.2.6 Metropolitan Statistical Areas in the Greater Region Surrounding the Site

Figure 2.7.2-1 shows the major metropolitan areas within the larger region of the Site. Going clockwise from upper left, the Metropolitan Statistical Areas (MSA) are Albuquerque, Santa Fe, Amarillo, Lubbock, Odessa, Midland, El Paso, and Las Cruces. The closest metro areas and the ones with which there have been the closest ties for Lea and Eddy Counties are Lubbock, Midland-Odessa, and El Paso.

Table 2.7.2-8 provides a socio-economic profile on the MSA within the larger region. These MSA provide additional labor markets, particularly for craft trades to serve the immediate needs of major project construction in the region.

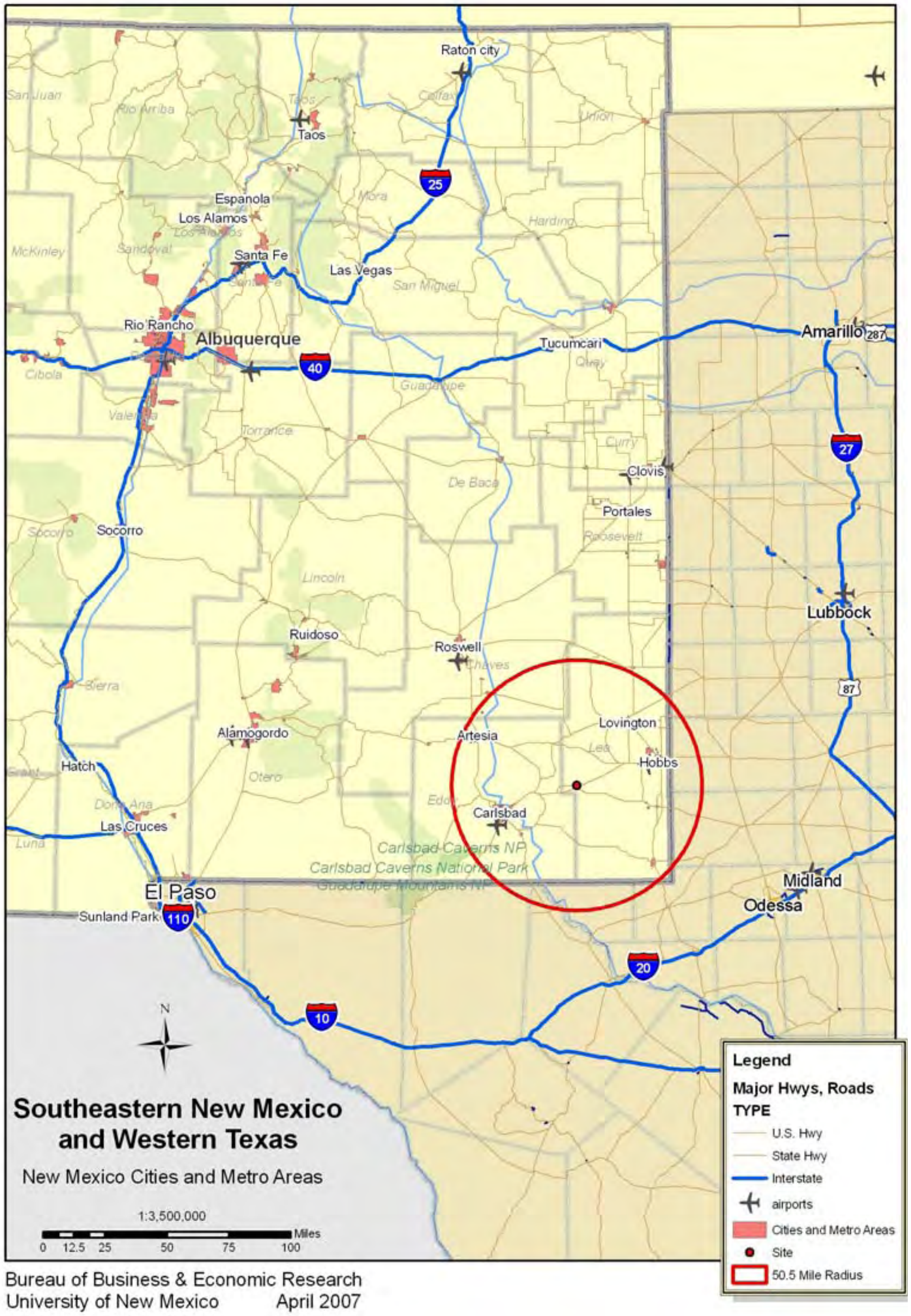


Figure 2.7.2-9 Major Metropolitan Areas within the Region

Table 2.7.2-8 Socio-Economic Profile on the Metropolitan Statistical Areas within the Larger Region

MSA	Census Population Est 2006	Total Non-farm Employment 2006	Personal Income $ millions 2005	Per Capita Income 2005
Albuquerque	816,811	391,700	24,319	30,477
Santa Fe	142,407	62,800	5,066	35,964
Las Cruces	193,888	67,000	4,302	22,706
Amarillo	241,515	110,100	6,712	28,122
El Paso	736,310	264,800	16,434	22,775
Lubbock	261,411	128,400	7,346	28,364
Midland	124,380	63,000	4,847	39,939
Odessa	127,462	57,400	3,234	25,805

Sources: US Census Bureau, NM Department of Labor, Texas Labor Market Information (http://www.tracer2.com/), US Bureau of Economic Analysis (http://www.bea.gov/)

2.7.3 Housing

New construction as reflected in the number of building permits issued by the New Mexico Construction and Industries Division and other permitting places was slow at the beginning of this decade but accelerated in the last three years. Table 2.7.3-1 shows the Building Permits, by Census Tract: January 2000 to December 2005. Detailed information regarding occupancy and vacancy and additional housing statistics can be found in Part 1 of Appendix 2J.

Interviews with developers and county officials indicate that more residential development is planned. Planning documents from Hobbs and Carlsbad also point to policy changes favoring more development. The increase in the number of building permits issued in the last three years, especially in Lea County reflects the changes made in response to heavy pressure on the housing and commercial sectors which are, in turn, responding to significant increases in economic activity in the Permian Basin.

2.7.4 Public Services

2.7.4.1 Power Availability

Numerous electric transmission lines transverse the area to provide service to major cities and industrial facilities, oil wells, compressor stations, and ranches. These are served by two gas-fired electric power plants; XL Energy Cunningham and Maddox Station, to the west of Hobbs, New Mexico and are part of the Southwest Power Pool power grid. Xcel Energy owns and operates the transmission lines through its subsidiary, Southwestern Public Service Company (XCEL Energy, 2007). Nearby power transmission lines are shown on Map 4 (Appendix 2A). Xcel, in their 2006 Annual Report indicate that the Cunningham Station has two gas turbines and two steam generators had 485 megawatts (MW) of “dependable” summer capability and the Maddox station with one gas turbine and one steam generator had 178 MW of dependable summertime capability (Xcel, 2007a). Xcel operates in eight states with a combined capacity of 15,550 MW serving 3.3 million customers (Xcel, 2007b).

Table 2.7.3-1 Building Permits, by Census Tract: January 2000 to December 2005
(Source: CID, 2007, Hobbs, 2007)

Study Area	*Building Permits as of December 31…*						
	2000	2001	2002	2003	2004	2005	Total
Chaves County	**61**	**37**	**50**	**93**	**143**	**98**	**482**
12.00	3	1	3	4	3	2	16
13.00	2	1	1	3	7	4	18
14.00	0	1	2	2	5	3	13
Total	**6**	**4**	**6**	**9**	**14**	**9**	**48**
Eddy County							
1.00	0	0	1	2	2	1	6
2.00	0	1	3	5	6	9	24
3.00	0	2	3	7	7	2	22
4.01	0	1	2	4	4	4	16
4.02	1	1	3	5	6	2	17
5.00	0	1	2	4	4	1	13
6.00	0	1	3	7	8	9	28
7.00	1	4	4	6	7	12	33
8.00	1	0	2	4	3	3	14
9.00	5	4	9	13	7	13	51
10.00	3	2	7	7	7	6	33
11.00	1	2	4	12	8	6	33
Total	12	18	43	77	71	68	289
Lea County							
1.00	0	2	3	3	3	2	14
2.00	0	0	1	4	4	3	12
3.00	1	0	1	5	4	4	15
4.00	0	2	1	3	3	2	12
5.01	1	6	8	15	28	15	74
5.02	0	0	2	6	7	5	20
6.00	0	0	2	6	6	7	21
7.00	5	6	10	20	24	21	87
8.00	0	0	4	3	4	7	19
9.00	1	0	1	4	3	4	13
10.02	2	0	4	8	9	15	37
10.03	0	0	1	5	6	9	22
11.00	2	1	5	8	5	12	32
Total	**12**	**17**	**44**	**90**	**108**	**106**	**377**
Study Area	**30**	**39**	**93**	**176**	**193**	**183**	**714**

2.7.4.2 Analytical Laboratory Services

A vital part of the infrastructure in the vicinity is the availability of independent environmental monitoring facilities and a well-established radiologic baseline. One such facility exists in Carlsbad, NM as part of the New Mexico State University (NMSU). The CEMRC is a division of the College of

Engineering at NMSU, and was established in 1991 with a grant from the DOE. The primary goals of the CEMRC are to:

- Establish a permanent center of excellence to anticipate and respond to emerging health and environmental needs, and
- Develop and implement an independent health and environmental monitoring program in the vicinity of the WIPP, and make the results easily accessible to all interested parties.

The CEMRC technical programmatic areas include:

- Actinide Chemistry
- Environmental Chemistry – Inorganic and volatile organic compounds (VOCs) in the Environment
- Radiochemistry – Measurement of radionuclides in air, soil water and biota
- Field Programs – Aerosol, soil, sediment, water collection, and processing
- Informatics and Modeling
- Internal Dosimetry – in *vivo* and in *vitro* measurements of radiation exposure

The development and implementation of an independent health and environmental monitoring program has been CEMRC's primary activity since establishment.

The internal dosimetry program conducts analyses and consultation for the study and management of internal radiation exposure. The analyses include collection of information on work and residence history, past and current radiation exposure, bioassays to measure the presence of radionuclides within body tissues (*in vivo*) or body fluids and excretions (in vitro), and calculation of dose associated with observed uptakes. Consultation includes interpretation of bioassay results and can extend to collaboration with health care professionals and workplace supervisors.

"Lie Down and Be Counted" Internal Dosimetry Services Project – CEMRC is conducting an *in vivo* radio bioassay research project entitled **"**Lie Down and Be Counted**"** (LDBC) (See Table 2.7.4-1). This project involves citizen research volunteers from southeastern New Mexico and supports education for the public about naturally occurring radioactivity and CEMRC's environmental studies. The objective of the research is to characterize and monitor for internally deposited radionuclides in the general population living around the WIPP site. The data collected prior to the opening of the WIPP facility (March 26, 1999) serve as a baseline for comparisons with periodic follow-up measurements that are slated to continue throughout the operational phase of the WIPP. Participants in the project are monitored every two years. The radiobioassay service is free to the public.

The following table summarizes the number of lung and whole body counts performed at CEMRC since the *in vivo* bioassay facility was commissioned in August 1997. Participating in the LDBC consists of a lung and whole body count every two years.

Table 2.7.4-1 CEMRC "Lie Down and be Counted" Program Totals as of July 21, 2006

Total number of individuals who have participated in the study prior to the first shipment, on March 27, 1999 of radioactive waste to the WIPP site.(baseline cohort)	**367**
Total number of counts of LDBC participants (includes recounts of some individuals)	**1046**
Total number of lung and whole body counts performed at the Center since July 1997	**3167**

2.7.4.3 Police Protection, Fire Protection and Emergency Medical Services

Police protection, fire protection and emergency medical services throughout the study area are summarized in Table 2.7.4-2. Details are found in Appendix 2J.

Table 2.7.4-2 Police and Fire Protection and Emergency Medical Services in the Region

Jurisdiction	Type	Staff Size	Annual Budget $/year	Comments
Eddy County	Police (Sheriff)	56	3,093,000	
Eddy County	Fire	250 volunteers	5,000,000	12 stations
Eddy County	EMS	2 paramedics		
Carlsbad	Police	70	6,000,000	6 vacancies
Carlsbad	Fire	45	4,487,000	2 vacancies
Carlsbad	EMS	45 EMT, 7 also paramedics, half are HAZMAT trained		
Artesia	Police	69	5,200,000	
Artesia	Fire	21	1,500,000	
Artesia	EMS			
Loving	Police	4 FT, 10 Vol	200,000	
Loving	Fire	27 volunteers	46,000	
Loving	EMS	7		
Lea County	Police (Sheriff)	53	7,000,000	
Lea County	Fire	57	106,000	
Lea County	EMS	8		
Hobbs	Police	125	10,000,000	
Hobbs	Fire	67	9,000,000	3 vacancies
Hobbs	EMS	32		
Lovington	Police	28		
Lovington	Fire	25 FT 3 PT	2,000,000	
Lovington	EMS	20		
Eunice	Police	N/A		
Eunice	Fire	N/A		
Eunice	EMS	N/A		
Multi	Ambulance	5FT, 7PT		5 Ambulances
Multi	Air Evacuation	Helicopter in Hobbs Fixed wing airplane in Carlsbad		
Multi	Police	30		NM State Police
Multi				

2.7.4.4 Water and Wastewater

Water and wastewater infrastructure are summarized in Tables 2.7.4-3 and 2.7.4-4. Details can be found in Appendix 2J. The discussion in Section 2.4.3 underscores the availability of water resources in the region to support the proposed facilities.

2.7.4.5 Schools

Table 2.7.4-5 summarizes the public school facilities and demographics for the various districts in the region. Detailed information regarding the status of these school districts can be found in Part 1 of Appendix 2J.

2.7.4.6 Health Care

2.7.4.6.1 Carlsbad

Carlsbad Medical Center

Carlsbad Medical Center (CMC) is a full-service, 127-bed community-oriented hospital providing medical, surgical and restorative patient care for the Eddy County region (CMC, 2007). The Carlsbad Medical Center has one main site and two medical office buildings, the Pecos Valley Medical Complex and the Southwest Medical Complex. Carlsbad Medical Center's sister facility is Lea Regional Medical Center in Hobbs, New Mexico.

2.7.4.6.2 Artesia

Artesia General Hospital

Artesia General Hospital is a 34 bed critical access hospital (AGH, 2007). The Emergency Room is open 24 hours and has six beds. Patients needing more extensive treatment are usually transported to Lubbock, Texas or Albuquerque, New Mexico however this can vary due to the request of the patient and the available transportation company.

2.7.4.6.3 Hobbs

Lea Regional Medical Center

Lea Regional Medical Center (LRMC) is a licensed 250-bed facility offering the following services: Adult Mental Health Program, Cardiac Services, Case Management, Emergency Department, Gastroentology/Endoscopy Department, Inpatient Physical Rehabilitation Unit, Intensive Care Unit, Laboratory, Nursery, Obstetrics/Labor & Delivery, Outpatient Services, Pediatrics, Pharmacy, Rehabilitation Therapies, Respiratory Care Services, Sleep Study Center, Surgical/Orthopedics Unit, and Transitional Care Unit (LRMC, 2007).

Expansion Projects: Lea Regional has committed to an $8 million renovation project starting December 2006. In 2005, Lea Regional was remodeled and expanded with total estimated cost at $11 million. This expansion and renovation included the Outpatient Surgery Area and the Emergency Room. Lea Regional Medical Center also be expanded and moved the Rehabilitation Services Department. There are new renovations taking place in Women's health services unit.

Table 2.7.4-3 Water Services in the Region of the Site

Jurisdiction	Description	Capacity	Future Plans
Hobbs	Hobbs services about 11,500 homes and businesses from 32 wells that pump water from the Ogallala Aquifer (Woomer, 2007). Service in Hobbs extends to the city limits and to some surrounding areas, basically small pockets of land that make up a very small percent of total system service.	The maximum capacity for the city's water system is about 23 mg/d. The average is about 12 mg/d. The summer months will see higher usage, which amounts to about 17 mg/d, or about 75 percent of capacity.	The City of Hobbs is currently in the process of increasing its distribution to new areas of growth. They are also replacing a storage tank with a capacity of 200,000 gallons with one that has a capacity of 600,000, for a net gain of 400,000 gallons. The city spends about $600,000 on maintenance to both the water and sewer systems.
Lovington	Lovington services about 3,700 homes and businesses from 15 well into the Ogallala Aquifer that are located about five miles from the city (Kelly, 2007). Service is mainly within the city limits of Lovington, although there are small pockets of service outside.	The maximum capacity for the city's water system is about 6 mg/d. The average usage is about three mg/d, or about 50 percent of capacity. The summer months will see high usage to about five mg/d.	The City of Lovington is currently in the process of spending $1.5 million to renovate the system (new lines and replacements). They are also going to spend $1.0 million to drill wells into a different area of the aquifer to relieve the current system.
Eunice	Eunice currently services about 1,300 homes and businesses from several wells located about 20 miles from the city (Roxy, 2007). The service is mainly within the city limits. Eunice receives all of its water from the Ogallala Aquifer.	The maximum capacity for the city's water system is about 4.3 mg/d. The average usage is about two mg/d, or less than 50 percent of capacity. Information for summer usage was not available.	The City of Eunice is currently in the process of upgrading the system. They are adding new wells and replacing the main lines in response to the expected growth associate particularly with the National Enrichment Facility. The capital improvements are expected to increase capacity, so that the system can serve between 10,000 and 15,000 people.
Carlsbad	The City of Carlsbad services about 27,000 homes and between 10,000 and 11,000 businesses. There are two water systems. The city water system, which runs throughout the city and into some outlying areas, draws from the Sheep's Draw Aquifer, which is part of the Capitan Reef Aquifer (Abell, 2007).	The City of Carlsbad has abundant water rights, but the city water system has a capacity of about 22 mg/d. During the winter the city uses about four to six mg/d. During the summer months, however, the city comes close to maximum capacity. Currently there is little extra capacity in either system during peak usage.	There is a project to build a five million gallon reservoir in the Double Eagle System. The City of Carlsbad has plans for a hydrological study to better prepare for future expansion. Any expansion would require major changes in the size of the lines needed to service the new developments. This would be an expensive undertaking and would need to be contracted out.
Artesia	The City of Artesia services about 4,800 homes and businesses. Service in Artesia extends to the city limits and some surrounding areas. The city uses seven wells which tap the Ogallala Aquifer for its water needs.	Artesia's water system has about a six mg/d capacity. Average usage is about three mg/d (about 50 percent of capacity), however the system can reach close to capacity during the summer months.	Artesia is planning on increasing its pumping capability by adding two wells. One will be drilled while the other will be purchased. This will not increase the capacity in the system because the city will still need the water rights for any additional water. The city is also planning on adding another reservoir with a presently unknown capacity.

Table 2.7.4-4 Wastewater Services in the Region of the Site

Jurisdiction	Description	Capacity	Future Plans
Hobbs	The City of Hobbs serves about 11,500 homes and businesses with sewer service and wastewater treatment from the City's treatment plant (Woomer, 2007). Solid waste from the plant is sent to the landfill, while the effluent is sent to the agricultural areas and the oil fields. Sewer services are provided to locations within the city limits of Hobbs, with a very small percent outside. In addition, about two percent of the homes in the service area use septic systems.	The maximum capacity for the treatment plant in Hobbs is currently 3.5 mg/d. The system is running close to capacity with current usage. No sewer line information available.	The City of Hobbs is currently in the process of spending $35 million to expand the current treatment facility. This upgrade and new construction, which is expected to be completed by January 2009, will add five mg/d to the existing capacity of 3.5 mg/d, meaning that use will then be at about 41 percent of capacity.
Lovington	The City of Lovington serves about 3,700 homes and businesses (Kelly, 2007). The service is mainly within the city limits of Lovington, although a very small percent of service is outside the city. Currently no one within the city limits uses a septic system. The wastewater is treated exclusively at the city treatment plant. The effluent is reused for irrigation at a city owned farm to grow feed for animals.	The maximum capacity for the treatment plant is currently 1.0 mg/d. The system is averaging about 700,000 g/d (about 70 percent of capacity) with current usage. Pipeline capacity is unknown.	There are no projects planned in the near future.
Eunice	The town of Eunice serves the wastewater needs of about 1,300 homes and businesses (Roxy, 2007). The service is mainly within the city limits of Eunice. A small percentage of residents use septic systems within the service area. Wastewater from Eunice is treated in lagoons where it is allowed to evaporate or be used for irrigation. A new system currently being planned.	The maximum capacity for the city is currently for 5,000 people. The system is actually running for between 3,000 and 3,500 people (about 60 to 70 percent of capacity). The volume in per day usage was unavailable as was information on the pipelines.	The City of Eunice is currently upgrading the main lines. They are also looking at upgrading the entire system, but such an overhaul is probably at least five years into the future. Because the planning for the new system is still in the very early stages, there is no information on possible capacity for the expected system. Any large increases in demand on the system would be very difficult in the short-term.
Carlsbad	The City of Carlsbad services about 27,000 homes and between 10,000 and 11,000 businesses. Sewer service extends to the city limits; however, about three percent of the geographic area within the city limits is currently not covered, and an estimated 10 percent of the homes in Carlsbad use septic systems (Sena, 2007). Wastewater in the sewer system is pumped to the treatment plant located about 3.5 miles East of Carlsbad and about 100 ft from the Pecos River. Most of the wastewater goes into the Pecos River after being treated. The rest (less than one mg/d), which is not potable, goes to the golf course. The solid waste is mixed with wood mulch and other organics to produce a soil enrichment product utilized at City parks and others.	The city treatment plant has the capacity of processing about six mg/d, but is currently running about 2.5 mg/d (or 42 percent of capacity) on average.	The city is currently upgrading three lift stations and adding one more. The expected increase in capacity of the pipes will be between 0.5 and 1.0 mg/d. The treatment facility is also expected to receive an upgrade, but the project is still in the engineering research stage.

Jurisdiction	Description	Capacity	Future Plans
Artesia	The City of Artesia provides sewer services to about 5,000 homes and businesses mainly within the city limits of Artesia (Stroud, 2007). Few residents within the service area currently use a septic system for their wastewater. The wastewater is processed exclusively at the city treatment plant. The effluent is reused for irrigation and pumped to the local fields.	The city treatment plant has a maximum capacity of 1.8 mg/d. The system is running at 1.1 to 1.2 mg/d (about 66 percent of capacity) with current usage.	The City of Artesia is currently in the process of expanding and upgrading the current treatment facility to handle between 2.5 and 3.0 mg/d.

Table 2.7.4-5 School Statistics for the Region Around the Site

School name	Grades	Students	Teachers	Male	Female	Unknown	Native America	Asian	Black	Hispanic	White	Migrant Students
HOBBS, NEW MEXICO												
B.T. WASHINGTON ELEM	KG	181	14.2	97	84	0	0	1	23	120	37	0
BROADMOOR ELEMENTARY	KG-6	303	16.3	151	152	0	0	5	19	159	120	0
COLLEGE LANE ELEM	KG-6	389	22.5	213	176	0	1	2	8	107	271	0
CORONADO ELEMENTARY	KG-6	358	23	184	174	0	0	0	29	164	165	0
EDISON ELEMENTARY	KG-6	284	20.7	141	143	0	1	1	36	216	30	0
HIGHLAND JR HIGH	7-8	653	34.9	345	308	0	1	2	58	322	270	0
HOBBS ALTERNATIVE HI	9-12	89	7.8	48	41	0	0	0	4	63	22	0
HOBBS FRESHMAN SCH	9-9	572	35.8	283	289	0	4	4	32	288	244	0
HOBBS HIGH	10-12	1518	92.4	776	742	0	7	9	98	745	659	0
HOUSTON JR HIGH	7-9	547	34.1	285	262	0	4	2	18	325	198	0
JEFFERSON ELEMENTARY	KG-6	316	20.6	168	148	0	0	2	23	263	28	0
JENKINS-NUNAN CENTER	PK-PK	83	2.1	53	30	0	0	0	4	52	27	0
MILLS ELEMENTARY	KG-6	400	25.2	206	194	0	1	2	19	143	235	0
SANGER ELEMENTARY	KG-6	318	18.5	158	160	0	0	0	21	151	146	0
SOUTHERN HEIGHTS ELE	KG-6	432	30.3	216	216	0	0	0	18	363	51	0
STONE ELEMENTARY	KG-6	409	24.4	205	204	0	0	4	18	111	276	0
TAYLOR ELEMENTARY	KG-6	357	22.3	186	171	0	0	6	34	215	102	0
WILL ROGERS ELEM	KG-6	351	24.9	186	165	0	0	0	15	292	44	0
	TOTAL	7560	470	3901	3659	0	19	40	477	4099	2925	0
EUNICE NEW MEXICO												
CATON MIDDLE	6-8	133	13.2	64	69	0	0	0	3	57	73	0
EUNICE HIGH	9-12	199	15.8	110	89	0	0	0	3	96	100	0
METTIE JORDAN ELEM	PK-5	270	19	139	131	0	3	0	1	136	130	0
	TOTAL	602	48	313	289	0	3	0	7	289	303	0
LOVINGTON, NEW MEXICO												
BEN ALEXANDER ELEM	2-2	210	14.8	101	109	0	1	3	7	144	55	7
JEFFERSON ELEMENTARY	3-3	198	13.4	108	90	0	1	1	9	119	68	10
LEA CY. DETENTION CN	9-11	10	1	9	1	0	0	0	1	8	1	0
LEA ELEMENTARY	1-1	217	15.7	115	102	0	1	1	2	139	74	7

School name	Grades	Students	Teachers	Male	Female	Unknown	Native America	Asian	Black	Hispanic	White	Migrant Students
LLANO ELEMENTARY	PK-KG	386	23.9	214	172	0	1	1	14	264	106	15
LOVINGTON HIGH	10-12	515	31.2	241	274	0	3	3	17	289	203	6
LOVINGTON JR HIGH	8-12	414	24.3	197	217	0	1	0	11	277	125	7
NEW HOPE ALT HIGH	9-12	73	7	40	33	0	0	1	3	53	16	2
TAYLOR MIDDLE	6-7	414	24.6	199	215	0	2	0	11	240	161	8
YARBRO ELEMENTARY	4-5	447	24.9	249	198	0	1	2	18	288	138	11
	TOTAL	2884	180.8	1473	1411	0	11	12	93	1821	947	73
LAKE ARTHUR, NEW MEXICO												
LAKE ARTHUR ELEM	PK-5	80	9.5	48	32	0	0	0	0	61	19	10
LAKE ARTHUR HIGH	9-12	46	8.2	25	21	0	0	0	0	34	12	11
LAKE ARTHUR MIDDLE	6-8	42	4.4	22	20	0	0	0	0	33	9	4
	TOTAL	168	22.1	95	73	0	0	0	0	128	40	25
TATUM, NEW MEXICO												
TATUM ELEMENTARY	PK-6	136	11.5	63	73	0	0	0	1	67	68	0
TATUM HIGH	9-12	91	7.5	50	41	0	0	0	0	44	47	0
TATUM JR HIGH	7-8	54	4.5	30	24	0	0	0	0	25	29	0
	TOTAL	281	23.5	143	138	0	0	0	1	136	144	0
JAL, NEW MEXICO												
JAL ELEMENTARY	PK-6	193	15	90	103	0	0	0	1	115	77	0
JAL HIGH	9-12	158	8.7	75	83	0	0	0	0	91	67	0
JAL JR HIGH	7-8	69	6.2	29	40	0	0	0	0	40	29	0
	TOTAL	420	29.9	194	226	0	0	0	1	246	173	0
CARLSBAD, NEW MEXICO												
ALTA VISTA MIDDLE	6-8	590	39	317	273	0	6	0	17	365	202	0
CARLSBAD HIGH	9-12	1723	93.9	888	835	0	19	14	38	800	852	0
CRAFT ELEMENTARY	1-5	173	13.7	81	92	0	3	0	2	123	45	0
DR. E.M. SMITH ELEM	1-5	108	8.4	63	45	0	0	0	3	67	38	0
ECE CENTER	PK-K	590	36.8	337	253	0	3	1	10	300	276	0
EDDY ELEMENTARY	1-5	200	13.7	100	100	0	0	0	2	121	77	0
GRACE HOUSE PROG RTC	7-12	12	1	12	0	0	3	0	0	5	4	0
HILLCREST ELEMENTARY	1-5	214	15.6	115	99	0	1	0	4	148	61	0
JEFFERSON MONTESSORI	KG-11	111	8	65	46	0	1	2	0	27	81	0

School name	Grades	Students	Teachers	Male	Female	Unknown	Native America	Asian	Black	Hispanic	White	Migrant Students
JOE STANLEY SMITH EL	1-5	250	17.3	125	125	0	2	0	6	153	89	0
MONTERREY ELEMENTARY	1-5	315	21.1	173	142	0	1	3	6	134	171	0
P.R. LEYVA MIDDLE	6-8	777	44.2	380	397	0	5	2	7	277	486	0
PATE ELEMENTARY	3-5	185	13.1	92	93	0	1	1	6	100	77	0
PUCKETT ELEMENTARY	1-5	201	13.7	104	97	0	1	0	5	131	64	0
RIVERSIDE ELEMENTARY	1-5	260	15.5	123	137	0	2	6	1	44	207	0
SUNSET ELEMENTARY	1-5	342	21.1	185	157	0	0	1	1	122	218	0
	TOTAL	6051	376.1	3160	2891	0	48	30	108	2917	2948	0
LOVING, NEW MEXICO												
LOVING ELEMENTARY	PK-5	276	17.7	132	144	0	0	0	4	208	64	12
LOVING HIGH	9-12	166	14.8	94	72	0	0	1	1	140	24	9
LOVING MIDDLE	6-8	148	9.7	70	78	0	0	0	0	116	32	4
	TOTAL	590	42.2	296	294	0	0	1	5	464	120	25
ARTESIA, NEW MEXICO												
ARTESIA HIGH	10-12	736	43.1	362	374	0	3	4	10	350	369	8
ARTESIA PARK JH	8-9	577	30.4	292	285	0	1	0	8	301	267	7
ARTESIA ZIA INTERMED	6-7	532	38.3	282	250	0	1	0	8	304	219	7
CENTRAL ELEMENTARY	1-5	116	12.6	60	56	0	0	0	0	77	39	1
GRAND HTS.EARLY CHD.	PK-KG	307	22.7	161	146	0	0	0	1	164	142	0
HERMOSA ELEMENTARY	1-5	349	24.2	186	163	0	2	0	6	181	160	3
PENASCO ELEMENTARY	KG-8	17	3	11	6	0	0	0	0	6	11	0
ROSELAWN ELEMENTARY	1-5	177	16.5	91	86	0	0	0	0	166	11	12
YESO ELEMENTARY	1-5	374	26.8	185	189	0	0	0	3	140	231	1
YUCCA ELEMENTARY	1-5	283	21.4	131	152	0	2	2	7	172	100	1
	TOTAL	3468	239	1761	1707	0	9	6	43	1861	1549	40

The Lea Regional Emergency Room was recently renovated and expanded. This $5.5 million project added two new entrances, new patient waiting area, vending and triage areas, ten exam rooms, two trauma rooms, and a new nurse's station.

2.7.4.6.4 Lovington

Nor Lea General Hospital

Nor Lea General Hospital is a small 26 bed medical facility located in Lovington, New Mexico. The ER has a basic trauma unit for critical care. Patients needing more extensive treatment can be transported to Lubbock, Texas or Albuquerque, New Mexico. Nor Lea also runs three local clinics that offer basic health services. The clinics are located in Lovington, Jal, and Tatum.

Lovington Good Samaritan Center

The Good Samaritan Center is a 62 bed facility owned and operated by the Evangelical Lutheran Good Samaritan Society, a Christian non-profit organization based in Sioux Falls, S.D (LGSC, 2007). The center provides 24-hour nursing service. Residents are under the care of a physician of their choice.

2.7.4.7 Recreational Facilities

2.7.4.7.1 Major National & State Parks in Southeastern New Mexico

There are abundant outdoor recreational opportunities is close proximity to the Site. Figure 2.7.4-2 displays some of major national and state parks in the immediate vicinity of the Site. Each of these areas is discussed in the text which follows. The information provided consists primarily of excerpts from the websites indicated.

Carlsbad Caverns National Park

Carlsbad Cavern is one of over 300 limestone caves in a fossil reef laid down by an inland sea 250 to 280 million years ago. The park contains 113 of these caves, formed when sulfuric acid dissolved the surrounding limestone, creating some of the largest caves in North America. The park offers a variety of cave tours – from the self-guided areas of the Big Room to crawling through narrow passageways in the Hall of the White Giant or in Spider Cave – as well as opportunities for hiking and backcountry camping. The park has two historic districts on the National Register of Historic Places, the Cavern Historic District and the Rattlesnake Springs Historic District.

The **Carlsbad Wilderness** is the desert backcountry surrounding Carlsbad Caverns National Park, with scattered sotol, agave, and juniper vegetation. (Public Lands, 2007)

Guadalupe Mountains National Park

Located 55 miles southwest of Carlsbad on Highway 62/180, the rock exposures in Guadalupe Mountains National Park are part of one of the finest examples of an ancient fossil reef. It is largely because of the area's geologic importance that it became a National Park in 1972. Rising from the desert, this mountain mass contains portions of the world's most extensive and significant Permian limestone fossil reef, formed about 250 million years ago. Also featured are a tremendous earth fault, lofty peaks, unusual flora and fauna, and a colorful record of the past. Guadalupe Peak, highest point in Texas at 8,749 feet; El Capitan, a massive limestone formation; McKittrick Canyon, with its unique flora and fauna; and the "bowl", located in a high country conifer forest, are significant park features. Activities include backpacking, camping, hiking, photography, star gazing, wildlife watching, ranger-led activities, natural history exhibits, desert wild flowers, and horseback riding (NPS, 2007b).

Figure 2.7.4-2 Major Parks and Recreational Areas in Lea and Eddy Counties
Source: (NPS, 2007a)

Guadalupe Back Country Byway

The Byway is a 30-mile road which begins at U.S. 285, 12 miles north of Carlsbad in the Chihuahuan Desert, and ascends about 3,000 feet into the Guadalupe Mountains. The terrain gets rugged quickly. Large patches of prickly pear and sotol grow out of cream-colored limestone outcrops. The desert landscape, beautiful as it is, conceals beauty and riches perhaps unsuspected by its earliest Paleo-Indian inhabitants 10,000 years ago. From the highest point, the byway continues down N.M. 137 for several more miles, until the road intersects the boundary of the Lincoln National Forest. The road continues through southern New Mexico into Texas. There are 16 miles of hiking trails in the recreational area, varying from 1.5 to 6.6 miles long (NMT, 2007).

Lincoln National Forest

Located in South Central New Mexico, the Lincoln National Forest consists of three ranger districts; Sacramento, Smokey Bear, and Guadalupe. There are three major mountain ranges; Sacramento, Guadalupe, and Capitan that cover 1,103,441 acres in parts of four counties in southeastern New Mexico. Elevations of 4,000 to 11,500 feet pass through five different life zones from Chihuahuan desert to sub-alpine forest. Vegetation ranges from rare cacti in the lower elevations to Engelmann spruce in the higher (USFS, 2007).

Living Desert Zoo & Gardens

Located in Carlsbad, New Mexico and dedicated to the interpretation of the Chihuahuan Desert, Living Desert State Park is an indoor/outdoor living museum displaying more than 40 native animal species and hundreds of succulents from around the world. While on the 1.3 mile self-guided tour, which takes approximately 1.5 hours, visitors will discover sand dunes and mountainous areas, where pinion and juniper trees contrast with the desert floor below. One of the park's main highlights is endangered

Mexican wolves. Living Desert participates in the American Zoo and Aquarium Association's Mexican gray wolf Species Survival Plan Program, exchanging wolves with other zoological facilities to help ensure their survival (EMNRD, 2007a).

Brantley Lake State Park

Brantley Lake State Park is New Mexico's newest state park and includes a 3,000-acre lake on the Pecos River (6,500 acres at flood pool) created by the construction of the Brantley Dam. The project's main purpose was to replace McMillan Dam, which was declared unsafe. Additional benefits include irrigation, flood control, fish and wildlife enhancement, and recreation. The park offers trails, camping, boating, a variety of water sports, and fishing for warm water fish, including largemouth bass, walleye, channel catfish, white bass, bluegill, and crappie (EMNRD, 2007b).

Bottomless Lakes State Park

In 1933 the bottomless lakes area was set aside as New Mexico's first state park. Lea Lake is the deepest at 90 feet and is the only lake where swimming is allowed. During summer, visitors can rent paddleboats for a small fee. Devil's Inkwell is 32 ft. deep and is named for its steep sides and dark water, the result of algae growth. The lake is stocked with rainbow trout in winter. Lazy Lagoon is surrounded by treacherous and odorous mud flats, making in inaccessible for recreation but a great place to view waterfowl that are often present. Recreational opportunities at Bottomless Lakes include camping, picnicking, fishing, boating, sailing, and wildlife viewing. The Park also has a trail system open to hiking and site seeing. The area is also famous for its "Pecos Diamonds", which are actually quartz crystals formed inside the gypsum in the soil. The soft gypsum sometimes crumbles away, exposing the "diamonds" (ENMRD, 2007d).

Avalon Reservoir

The Avalon Reservoir is a very shallow 5-6' deep, 66-acre lake on the Pecos River 3 miles north of Carlsbad, New Mexico. The dam is an earth-fill structure constructed in 1907. Recreation at Avalon Reservoir is managed by the Carlsbad Irrigation District under an agreement with the Bureau of Reclamation. The Avalon Reservoir is stocked by the New Mexico Department of Game and Fish, which also provides law enforcement for all boating activities. Fishing is available year-round, predominantly for white bass, catfish, and bream. Scuba diving for game fish is permitted (ENMRD, 2007c).

The W. S. Huey Waterfowl Area

This area combines the former Artesia Waterfowl Area, 640 acres, and the Karr Farm, 2,240 acres. It was purchased by the U.S. Bureau of Reclamation to mitigate habitat changes caused by the Brantley Dam downstream on the Pecos River. Dedicated September 6, 1986, it was named for the man who was director of the Department of Game and Fish from 1975-78 and secretary of Natural Resources Department from 1978 to 1983. Here, sharp-eyed sandhill cranes, large flocks of snow geese, and other flights of waterfowl stop to rest and feed after a long fall journey from the far north. Primary crops are small grains, alfalfa and clover, and provide feed for snow geese, cranes, ducks, and Canada geese. The area also accommodates nesting geese and ducks. Other species in the area include pheasant, quail, dove, antelope, deer, and fur bearers. Visitors may take a self-guided tour of the area. There are no picnicking or camping facilities at the Site (NMFWD, 2007).

2.7.4.7.2 Other Parks and Recreation Areas

Black River Recreation Area

The 1,200-acre Black River Recreation Area is managed to provide low-impact recreation and environmental education opportunities while maintaining a healthy river system and riparian habitat. This river corridor acts as a transition zone between the limestone foothills of the Guadalupe Escarpment and the southern gypsum soils to the east. Several spring-fed pools within the area comprise the headwaters of the Black River. The area includes a series of deep, elongated pools interconnected by a shallow, narrow stream.

The Black River, an oasis in the Chihuahuan Desert, is home to rare species of plants, fish, and reptiles in and around the river. During migration seasons, the area teems with birds, including waterfowl, shorebirds, and songbirds. Bird populations in this small area fluctuate daily and seasonally. Visitors may observe green-backed herons, orchard orioles, yellow-billed cuckoos, and roadrunners. Lush desert vegetation and clear pools of water provide excellent opportunities for viewing wildlife. The recreation area's most frequently visited site is the Cottonwood Day Use Area, which includes a wildlife viewing platform, picnic tables, and a toilet. The parking area is approximately 500 feet from the water's edge (BLM, 2007b). The Black River Recreation Area is located about 26 miles southwest of Carlsbad, New Mexico.

Hackberry Lake

The Hackberry Lake Off-Highway Vehicle (OHV) area offers over 55,000 acres of rolling stabilized dune lands and cliffs. The area is open for intensive use of motorcycles, sand dune buggies, and other OHVs. Trails within the area take advantage of a variety of soils and topographic features, which include many turns and steep hill climbs. Routes go from shallow rocky, loamy soil on low hills to deep alluvial soils with sandy inclusions. The trails travel across small draws and along the bottom of deep arroyos. The area also includes a sand dune complex. The area is used by the Desert Rough Riders Club for an annual competitive motorcycle event – the Carlsbad 100 Desert Race – which traverses more than 44 miles of public land (DRC, 2007). Hackberry Lake OHV Area is about 20 miles northeast of Carlsbad, New Mexico, and can be accessed at a number of locations.

La Cueva Non-Motorized Trail System

The La Cueva Non-Motorized Trail System covers approximately 2,200 acres and contains more than 15 miles of maintained trails. The non-motorized trails are conveniently located near the city limits of Carlsbad, and are primarily used by mountain bikers, hikers, and equestrians. The trails wind through the rolling limestone foothills of the Guadalupe Mountains and the rugged Chihuahuan Desert environment. A wide variety of cactus and wildlife add to the desert experience. The La Cueva Non-Motorized Trail System is located partially within the city limits of Carlsbad, NM, on its south-west side (BLM, 2007c).

2.7.4.7.3 Carlsbad Parks and Recreational Facilities

City of Carlsbad Parks and Recreation Department

The department maintains approximately 1,204 acres of parks comprising 31 different facilities within the City of Carlsbad and is responsible for maintenance of all playground equipment, fishing piers, and boat docks located within the park areas. In addition to maintaining, lands, buildings and equipment, the Department assists with all special events and recreational activities, including the 16th of September Celebration, Heritage Days, and Art-A-Fair, 4th of July celebration and various sporting and other events (City of Carlsbad, 2007). More detail is available in Appendix 2J on each of the facilities.

Lake Carlsbad Recreation Area

With 125.6 acres, this park winds along the Pecos River from the railroad bridge south to the upper Tansil Dam. This area contains playground equipment, barbecue grills, tables, restrooms, boat docks, swimming area and the Beach Bandshell. The Lake Carlsbad Recreation Area is 125.6 acres located along the Pecos River from the railroad bridge south to the upper Tansil Dam. This area is used for picnics, water sports, playgrounds and fishing and boating. There are many areas for picnics in shaded areas with picnic tables and grills. There is a swim area that is open to the public from Memorial Day weekend through Labor Day weekend.

Pecos River Village Recreation Area

Located on the east side of the Pecos River off of Muscatel Avenue, this recreation area hosts the Pecos River Village Conference Center, Riverwalk Recreation Center, and Playground on the Pecos.

Shooting Range/Action Sports Complex

Consisting of approximately 645 acres, this complex is located approximately 2.5 miles north of Happy Valley on the east side of the truck by-pass leading to the Artesia Highway (U.S. 185). The area provides 4 trap ranges, pistol range, small bore rifle range, large bore rifle range, silhouette rifle range, silhouette pistol range, muzzle loaders range, black powder range, archery range, cross-wind runways for radio controlled model airplanes, a competition go-cart track, restroom facilities, and picnic areas.

Bike/Jogging/Walking Trail

This 6.4 mile, 5-foot wide asphalt recreational trail is for use by bicyclists, joggers, and walkers. It is located along the Carlsbad Irrigation District Canal and runs the entire length of the city. At the user's preference, the trail may be accessed at either point located at the National Parks Highway, San Jose Boulevard, Boyd Drive, Lea Street, Texas Street, Church Street, Pierce Street, and/or Westridge.

Ocotillo Hills Nature Trail Skyline Drive/NMSU-Carlsbad/Heritage Park

The Ocotillo Hills Nature Trail courses along the hillside between Skyline Drive and New Mexico State University-Carlsbad. The trail is 0.9 miles in length and provides a scenic hike that highlights many of the native plants and, at times, the wildlife. A scenic overlook parking area is located at the top of the trail providing a spectacular view of the entire city, particularly at night.

2.7.4.7.4 Hobbs Parks and Recreational Facilities

The sections of the City of Hobbs website relating to recreation and youth services are under construction. The information which follows on Hobbs facilities was compiled from Hobbs, 2007a

State Facilities and Parks

- Lakes near Hobbs, New Mexico: Twin Lakes, Lea County, New Mexico - 5 miles away
- Green Meadow Lake, Lea County, New Mexico (see above) - 12 miles away
- Red Lake, Lea County, New Mexico - 14 miles away
- Dry Lake, Lea County, New Mexico - 23 miles away
- Floyd Lake, Lea County, New Mexico - 25 miles away
- Rainy Lake, Lea County, New Mexico - 25 miles away
- White Lake, Lea County, New Mexico - 23 miles away

Golf Courses near Hobbs, New Mexico:

- Hobbs Country Club, Hobbs, New Mexico - 1 mile away
- Ocotillo Park Golf Course, Hobbs, New Mexico - 14 miles away
- County of Gaines Golf Course, Denver City, Texas - 34 miles away
- Yoakum County Golf Course, Denver City, Texas - 34 miles away
- Gaines County Golf Course, Seminole, Texas - 45 miles away
- Winkler County Golf Course, Kermit, Texas - 60 miles away

Recreational Facilities

The following information is from www.hobbschamber.org. Sport enthusiasts will find that Hobbs features one of the most affordable public golf courses in a 100-mile radius, the Ocotillo Golf Course. The Ocotillo Course also offers one of the best jogging trails in the area. Other amenities to be found in Hobbs include numerous public parks, health clubs, the Zia Softball Complex, baseball fields, swimming pools (including the water park which opened in 2002), shooting range, archery range, bike trails, tennis courts, and a full service country club with pool and golf course. Additionally the Martin Luther King Soccer Complex includes eight soccer fields and a walking trail. For campers Hobbs offers excellent facilities with full RV hook-ups at Harry McAdams Park.

2.7.4.7.5 Lovington Parks and Recreation Facilities

The following information is from Lovington, 2007.

City of Lovington

The City operates and maintains five city parks, one swimming pool, eleven baseball fields, numerous practice fields for little league, and one shooting range.

Lovington Country Club

This small town course on Highway 70 affords an extremely friendly atmosphere. The course has wide, but tree-lined fairways and fast greens. There is a small lake that comes into play on a couple holes. Telephone (505) 396-6619.

2.7.4.8 Social Assistance Programs in Southeastern New Mexico

This section provides an overview programs available in Lea and Eddy counties for the cities of Carlsbad, Artesia, Hobbs, and Lovington.

2.7.4.8.1 Regional Programs

Southeast New Mexico Community Action Corporation

Southeast NM Community Action Corporation (SNMCAC) is a private non-profit organization providing social assistance programs for Eddy, Otero, Chaves, Lea, and Lincoln Counties. This agency develops programs which produce immediate benefits and provide support and assistance for those in the community who are in need of and eligible for services (SNMCAC, 2007). SNMCAC provides a Child & Adult Care Food Program. The primary objective of this program is to improve the health and eating habits of participants enrolled in family day care and adult care homes and centers.

CSBG Rent/Mortgage Payments and Utility Assistance provides funding for past due bills if the applicant meets the income guidelines and provides the required documentation. This program will also provide prescription assistance if the client does not have Medicaid, health insurance, or Worker Compensation.

FEMA Assistance is also offered if the applicant meets the income guidelines and provides the required documentation. Funds must be used to meet emergency food or shelter needs only. SNMCAC has entered into a partnership with Group Work camps that will allow youth and teens to rehabilitate elderly, disabled, and low-income homes. Funding is provided by the State of New Mexico-HSD/Income Support Division.

Head Start

Head Start is a federal program for preschool children from low-income families. Children who attend Head Start participate in a variety of educational activities. They also receive medical and dental care, have healthy meals and snacks, and enjoy playing indoors and outdoors in a safe setting. SNMCAC currently operates Head Start Centers in Eddy and Chaves Counties. Funding is provided by U.S. Department of Health and Human Services. Table 2.7.4-6 provides a report on the number of centers and the number of children in the various Head Start programs.

Home Education Livelihood Program (HELP)

HELP – New Mexico, Inc or HELP-NM was created and incorporated as Home Education Livelihood Program, Inc. in 1965 by the interdenominational New Mexico Council of Churches and its successor, the New Mexico Conference of Churches and Church Women United (HELP, 2007). The organization is committed to full employment, minimal poverty and crime, and family self-sufficiency. HELP-NM wants to see systems and services for children and families that are aligned and integrated, with a capacity to address effectively community problems like teen pregnancy, high school dropout issues, and drug use.

There are two HELP facilities in Southeast New Mexico, one in Carlsbad and one in Hobbs.

United Way

United Way in Carlsbad and Artesia provides funding to organizations based on an application process (United Way, 2007). Criteria include the number of programs these organizations run, initial investment in organization. To be eligible for funding, organizations must be 501.2-c3 non-profit-organizations.

Table 2.7.4-6 Head Start Center and Participation, FY 03-04

Location	Number of Centers	Number of Children
Artesia	1	202
Carlsbad	1	205
Dexter	1	NA
Hagerman	1	NA
Lake Arthur	1	NA
Roswell	3	333
Loving *	1	32

*Loving Municipal schools operates this center for SNMCAC through a Delegate agency.

2.7.4.8.2 Eddy County

The Senior Citizens Program operates within Eddy County. Services provided include: transportation, congregate meals, and home delivered meals. These services are provided with federal and state funding. Local funding is sought to meet program-funding requirements. In addition, donations are encouraged from participants in order to insure services are continued and/or expanded. The program serves persons 60 and over.

2.7.4.8.3 Programs within the City of Carlsbad

The City of Carlsbad Community Development Department is responsible for a variety of grants including legislative and the Small Cities Community Development Block Grant (CDBG) (Beasley, 2007). The City applies annually to the New Mexico Department of Finance and Administration – Local Government Division for funding assistance. Eligible activities for funding assistance are community infrastructure, housing, public service capital outlay, economic development, emergency need, and Colonias.

Senior Programs. The Retired Senior and Volunteer Program (RSVP) assesses community needs and recruits Carlsbad adults 55 years and over to fill these needs, thus providing an outlet for the retired worker to maintain active productive lives through volunteer work.

The North Mesa Senior Recreation Center is located at 1112 N. Mesa in Carlsbad, New Mexico.

The San Jose Senior Center provides meals and services for seniors and offers a variety of activities: information and referrals, assistance with income tax preparation, transportation for shopping and paying bills, activities; arts and crafts, bingo, pool, aerobics, Spanish classes, field trips to educational locations, and blood pressure screenings.

Carlsbad Child Care Services (New Mexico Kids, 2007). New Mexico Kids organization supports networking, information and resource awareness and access, and technical assistance for child care professionals, parents and health educators. Currently, Carlsbad has eighteen facilities served by licensed child care centers and private homes. Child Care services are provided by private and religious organizations and under federally funded programs. Happiness Christian Day Care has met its maximum capacity of 129 for its facilities and there are no current plans for expansion. Saint Edwards Catholic School has a capacity of 150 children but only 40 are currently enrolled. However, there are plans for expansion by adding a toddler program.

2.7.4.8.4 Programs within the City of Artesia

Senior programs. The Artesia Senior Center is the only senior center in Artesia (Artesia News, 2007). The center hosts programs such bingo and educational programs.

Child Care Services. Artesia has seven registered child care centers and homes under www.newmexicokids.org listing (New Mexico Kids, 2007). The Artesia Head Start Center under the NM Community Action Corporation has a total of 210 children enrolled. In particular, Great Expectations Day Care center meets its capacity of 75-80 children and there are no current plans for expansion. Likewise, Lil' Dogs Child Care Center also has 70 children enrolled with no expansion plans.

Mental Health Care (Artesia News, 2007). Artesia Health Resources offers individual and family therapy; parenting education and has a 24-Hour Crisis Line. In addition, Artesia Family Services is a division of Carlsbad Mental Health Association and provides individualized children case-management. The Christian Professional Counseling Services provides individual and family counseling and offers a mix of mental health and substance abuse services (PMS, 2007).

Domestic Violence Services

There are two domestic violence services, the Artesia Domestic Violence Shelter, or Grandma's House, and the Eddy County Family Crisis Center. Both centers are a battered family shelter providing intervention services, counseling, and referral (Artesia News, 2007).

2.7.4.8.5 Programs within the City of Lovington

Senior Services. The Senior Citizen Center provides service to the elderly by helping them to maintain an independent way of life (Lovington, 2007). Services include delivered meals five days. The center works with local doctors and home health care providers to reach the frail and elderly persons. The center provides information and assistance in matters of social security, SSI, food stamps, taxes insurance, legal aid, and other available programs. The center also provides congregate meals three days a week, adult education classes and a variety recreational and entertainment activities.

Childcare Services. Currently, Lovington has five registered child care centers, Little Steps Early Learning Academy, Jackson Avenue Baptist Church, In his Hands Christian Day Care Center, Lovington High School, and Noah's Ark Day Care Center (New Mexico Kids, 2007). Little Steps Early Learning Academy, Jackson Avenue Baptist Church, Noah's Ark Day Care Center meet their maximum capacity of about forty to fifty children per facility. There are no current plans for expansion, with the exception of Jackson Avenue Baptist Church, which plans to add an additional building to hold up to 100 children.

Youth Services. The Lovington Activity Center provides service for all types of functions in a space that now includes a multi-purpose gym facility (Lovington, 2007). The most important function of the center is to encourage active involvement of the youth and help them develop responsibility, self-respect, and leadership.

United Way of Lea County serves both Hobbs and Lovington.

2.7.4.8.6 Programs within the City of Hobbs

Senior Services. The Hobbs Senior Center offers a great variety of programs and services for people 62 years of age and older. The center serves luncheon Monday through Friday and also provides a Meals-On-Wheels program is available for homebound elderly citizens of Hobbs and surrounding Lea County. In addition, the center provides transportation for its members to area senior citizens activities, doctor appointments, and grocery shopping (Hobbs, 2007).

Child Care Centers. Currently, Hobbs is the home to twenty registered child care centers (New Mexico Kids, 2007). Bernice Coffield Early Head Start, Mother Goose Pre-School, The Jungle Book, and Washington Heights Nursery Inc., are the largest facilities, with over 100 children. There are no current plans for expansion for child care centers, with the exception of The Jungle Book, which is adding an additional room to accommodate new child-care programs.

Mental Health Services. The Guidance Center of Lea County provides a mix of mental health and substance abuse services, including outpatient substance abuse treatment (Therapists Unlimited, 2007).

Special programs are offered for adolescents, persons with co-occurring mental and substance abuse disorders, women, DUI/DWI offenders, and criminal justice clients.

Other Social Welfare organizations available in Hobbs but not listed above include the American Red Cross, Faith in Action Incorporated, Family Center-Parent Anonymous, Leaders, Habitat for Humanity, and the Salvation Army.

2.7.5 Local Government Funds and Expenditures

2.7.5.1 New Mexico

Local government authority to tax is limited except for that authority specifically provided by statute. The two major local government revenue sources are the property tax and the gross receipts tax.

Property Taxes

Properties are valued at current and correct, except centrally assessed properties, like utilities. The assessment ratio is 1/3, which means that the net taxable value is one third of the assessed value minus allowable exemptions. The mil rates are the taxes owed per dollar of net taxable value. The maximum operating levy that may be imposed by a county is 11.85 mils, while the maximum for a municipality is 7.65 mils. The state, counties and municipalities and school districts are allowed to go into debt and to sell General Obligation (GO) Bonds, with principal and interest payable from a debt service levy, but only after the specific bond purposes that have been approved by the voters. The State Constitution places strict limits on GO bonding capacity for each type of jurisdiction. (See footnote at the bottom of Figure 2.7.5-1).

Tables 2.7.5-1, 2.7.5-2, and 2.7.5-3 present figures for tax year 2006 on the three New Mexico counties that are within 50 miles of the Site. For each jurisdiction, the table presents figures on residential and non-residential net taxable value as well as on the value of oil and gas production and equipment, using the methodology for each laid out in statute. It then presents the applicable mil levies and a calculation of the "obligations", that is the revenues that would be collected by the jurisdiction in question assuming 100 percent collection on net taxable value. For many Eddy and particularly Lea county jurisdictions, the ad valorem levy on oil and gas production and equipment accounts for a substantial proportion of total obligations.

Table 2.7.5-4 examines the sources of growth in county and municipality property tax revenues within the three ELEA counties between tax year 2002 and tax year 2006. The increase in oil and gas activity over the period made a major contribution to revenue growth in all three counties and in Carlsbad, Hobbs, Eunice, and Jal.

Table 2.7.5-1 Property Taxes Chaves County: Net Taxable Value, Mil Levies, Obligations, Tax Year 2006

	Residential	Non Residential	Oil & Gas	Total
CHAVES COUNTY				
Net Taxable Value (000s)	521,180	671,753	119,707	1,312,640
Mil Rates				1,312,640
Operating	6.989	10.350	10.350	
Debt Service				
Revenues if 100%				
Operating	3,642,526	6,952,648	1,238,965	11,834,139
Debt Service				
DEXTER				
Net Taxable Value ($000s)	4,369	1,691		6,061
Mil Rates				
Operating	1.268	2.225		
Debt Service				
Revenues if 100%				
Operating	5,540	3,763		9,304
Debt Service				
HAGERMAN				
Net Taxable Value ($000s)	2,692	880		3,573
Mil Rates				
Operating	1.849	2.225		
Debt Service				
Revenues if 100%				
Operating	4,978	1,958		6,937
Debt Service				
LAKE ARTRUR				
Net Taxable Value ($000s)	710	401		1,112
Mil Rates				
Operating	2.225	2.225		
Debt Service				
Revenues if 100%				
Operating	1,580	893		2,473
Debt Service				
ROSWELL				
Net Taxable Value ($000s)	282,577	160,184		442,761
Mil Rates				
Operating	7.351	7.650		
Debt Service	0.670	0.670		
Revenues if 100%				
Operating	2,077,226	1,225,405		3,302,631
Debt Service	189,327	107,323		296,650
UNINCORPORATED AREAS				
Net Taxable Value ($000s)	230,830	508,596	119,707	859,131
Dexter School District	9,565	36,573	3,252	49,390
Hagerman School District	3,162	16,073	2,643	21,878
Lake Arthur School District	1,041	10,276	8,990	20,307
Roswell School District	67,225	110,310	104,344	281,879
Outside Districts 14,27/28	1,582	9,428	477	11,487
Outside District 1	26	23		48
CHAVES SWCD				
Net Taxable Value ($000s)	79,951	162,956	-	242,907
Mil Rates	0.854	1.000		
Revenues if 100%	68,278	162,956		231,234

	Residential	Non Residential	Oil & Gas	Total
CHAVES COUNTY SCHOOL DISTRICTS				
DEXTER SCHOOL DISTRICT				
Net Taxable Value ($000s)	13,934	38,265	3,252	55,451
Mil Rates				
Operational	0.226	0.479	0.479	
Debt Service	8.632	8.632	8.632	8.632
Cap Improvement	2.000	2.000	2.000	2.000
School District Ed. Tech. D	1.137	1.137	1.137	1.137
Revenues if 100%				
Operational	3,149	18,329	1,558	23,036
Debt Service	120,277	330,301	28,071	478,649
Cap Improvement	27,868	76,529	6,504	110,901
School District Ed. Tech. D	15,843	43,507	3,697	63,047
HAGERMAN SCHOOL DISTRICT				
Net Taxable Value ($000s)	5,854	16,953	2,643	25,451
Mil Rates				
Operational	0.328	0.5	0.5	
Debt Service	6.536	6.536	6.536	6.536
Cap Improvement	2.000	2.000	2.000	2.000
Revenues if 100%				
Operational	1,920	8,476	1,322	11,718
Debt Service	38,263	110,804	17,277	166,344
Cap Improvement	11,708	33,906	5,287	50,901
LAKE ARTHUR SCHOOL DISTRICT				
Net Taxable Value ($000s)	1,752	10,678	8,990	21,419
Mil Rates				
Operational	0.380	0.500	0.500	
Debt Service	4.615	4.615	4.615	4.615
Cap Improvement	2.000	2.000	2.000	2.000
Revenues if 100%				
Operational	666	5,339	4,495	10,499
Debt Service	8,084	49,277	41,488	98,849
Cap Improvement	3,503	21,355	17,979	42,838
ROSWELL SCHOOL DISTRICT				
Net Taxable Value ($000s)	349,802	270,494	104,344	724,640
Mil Rates				
Operational	0.290	0.500	0.500	
Debt Service	5.098	5.098	5.098	5.098
Cap Improvement	2.000	2.000	2.000	2.000
Revenues if 100%				
Operational	101,443	135,247	52,172	288,862
Debt Service	1,783,292	1,378,977	531,947	3,694,215
Cap Improvement	699,604	540,987	208,688	1,449,280
ENMU ROSWELL				
Net Taxable Value ($000s)	519,572	662,303	119,229	1,301,105
Mil Rates				
Operating	0.941	1.000	1.000	
Debt Service	1.371	1.371	1.371	
Revenues if 100%				
Operating	488,918	662,303	119,229	1,270,450
Debt Service	712,334	908,017	163,463	1,783,814
NM JUNIOR COLLEGE				
Net Taxable Value ($000s)	26	23		48
Mil Rates	4.470	5.000		
Revenues if 100%	114	113	-	228

NM Dept of Finance and Administration, Local Government Division, Certificate of Tax Rates, Tax Year 2006

Table 2.7.5-2 Property Taxes Eddy County: Net Taxable Value, Mil Levies, Obligations, Tax Year 2006

	Residential	Non Residential	Oil & Gas	Total
EDDY COUNTY				
Net Taxable Value (000s)	333,133	565,660	1,677,482	2,576,274
Mil Rates				2,576,274
Operating	6.623	7.500	7.500	
Debt Service				
Revenues if 100%				
Operating	2,206,338	4,242,448	12,581,111	19,029,897
Debt Service				
ARTESIA				
Net Taxable Value ($000s)	67,274	110,870	334	178,478
Mil Rates				
Operating	1.888	2.225	2.225	
Debt Service				
Revenues if 100%				
Operating	127,013	246,686	743	374,443
Debt Service				
CARLSBAD				
Net Taxable Value ($000s)	167,274	93,679	17,053	278,006
Mil Rates				
Operating	6.225	6.225	6.225	6.225
Debt Service				
Revenues if 100%				
Operating	1,041,283	583,152	106,154	1,730,588
Debt Service				
HOPE				
Net Taxable Value ($000s)	320	358		678
Mil Rates				
Operating	5.503	7.650		
Debt Service				
Revenues if 100%				
Operating	1,761	2,742		4,503
Debt Service				
LOVING				
Net Taxable Value ($000s)	3,119	1,374		4,493
Mil Rates				
Operating	1.842	2.059		
Debt Service				
Revenues if 100%				
Operating	5,745	2,829		8,574
Debt Service				
UNINCORPORATED AREAS				
Net Taxable Value ($000s)	95,145	359,378	1,660,095	2,114,618
Carlsbad School District	57,569	219,943	885,165	1,162,677
Hope School District	34,980	124,294	665,066	824,340
Loving School District	2,596	15,142	109,863	127,601
	95,145	359,378	1,660,095	2,114,618
ARTESIA GENERAL HOSPITAL (Artesia and Hope School Districts)				
Mil Rates				
Operating	3.000	3.000	3.000	3.000
Debt Service	2.650	2.650	2.650	2.650
Revenues if 100%				
Operating	307,722	706,567	1,996,199	3,010,489
Debt Service	271,821	624,135	1,763,309	2,659,265

	Residential	Non Residential	Oil & Gas	Total
EDDY COUNTY SCHOOL DISTRICTS				
ARTESIA SCHOOL DISTRICT				
Net Taxable Value ($000s)	67,274	110,870	334	178,478
Mil Rates				
Operational	0.432	0.500	0.500	
Debt Service	0.585	0.585	0.585	0.585
Cap Improvement	2.000	2.000	2.000	2.000
HB 33 School Bldgs	4.415	4.415	4.415	4.415
Revenues if 100%				
Operational	29,062	55,435	167	84,664
Debt Service	39,355	64,859	195	104,410
Cap Improvement	134,548	221,740	668	356,956
HB 33 School Bldgs	297,015	489,491	1,475	787,981
CARLSBAD SCHOOL DISTRICT				
Net Taxable Value ($000s)	224,843	313,622	902,218	1,440,683
Mil Rates				
Operational	0.427	0.500	0.500	
Debt Service	1.309	1.309	1.309	1.309
Cap Improvement	2.000	2.000	2.000	2.000
HB 33 School Bldgs	2.000	2.000	2.000	2.000
Revenues if 100%				
Operational	96,008	156,811	451,109	703,928
Debt Service	294,320	410,531	1,181,004	1,885,855
Cap Improvement	449,687	627,243	1,804,437	2,881,367
HB 33 School Bldgs	449,687	627,243	1,804,437	2,881,367
HOPE SCHOOL DISTRICT				
Net Taxable Value ($000s)	35,300	124,652	665,066	825,018
Mil Rates				
Operational	0.432	0.500	0.500	
Debt Service	0.585	0.585	0.585	0.585
Cap Improvement	2.000	2.000	2.000	2.000
HB 33 School Bldgs	4.415	4.415	4.415	4.415
Revenues if 100%				
Operational	15,250	62,326	332,533	410,109
Debt Service	20,651	72,922	389,063	482,636
Cap Improvement	70,600	249,305	1,330,131	1,650,036
HB 33 School Bldgs	155,850	550,340	2,936,265	3,642,455
LOVING SCHOOL DISTRICT				
Net Taxable Value ($000s)	98,264	360,752	1,660,095	2,119,111
Mil Rates				
Operational	0.432	0.500	0.500	
Debt Service	1.996	1.996	1.996	1.996
Cap Improvement	2.000	2.000	2.000	2.000
School Dist Ed. Tech. Debt	1.087	1.087	1.087	1.087
Revenues if 100%				
Operational	42,450	180,376	830,047	1,052,874
Debt Service	196,136	720,062	3,313,549	4,229,746
Cap Improvement	196,529	721,505	3,320,189	4,238,222
HB 33 School Bldgs	106,813	392,138	1,804,523	2,303,474
NMSU CARLSBAD BRANCH				
Mil Rate	0.903	1.000	1.000	
Revenues if 100%	203,034	313,622	902,218	1,418,874

NM Dept of Finance and Administration, Local Government Division, Certificate of Tax Rates, Tax Year 2006

Table 2.7.5-3 Property Taxes Lea County: Net Taxable Value, Mil Levies, Obligations, Tax Year 2006

	Residential	Non Residential	Oil & Gas	Total
LEA COUNTY				
Net Taxable Value (000s)	261,454	390,641	1,862,717	2,514,811
Mil Rates				
Operating	8.785	10.600	10.600	
Debt Service				
Revenues if 100%				
Operating	2,296,872	4,140,792	19,744,796	26,182,460
Debt Service				
EUNICE				
Net Taxable Value ($000s)	7,710	3,269	11,892	22,871
Mil Rates				
Operating	7.317	7.241	7.650	
Revenues if 100%				
Operating	56,412	23,673	90,978	171,062
HOBBS				
Net Taxable Value ($000s)	141,308	116,517	56,339	314,164
Mil Rates				
Operating	4.996	5.555	5.555	
Revenues if 100%				
Operating	705,974	647,254	312,963	1,666,191
JAL				
Net Taxable Value ($000s)	5,727	2,488	1,091	9,306
Mil Rates				
Operating	7.145	7.650	7.650	
Revenues if 100%				
Operating	40,918	19,035	8,345	68,298
LOVINGTON				-
Net Taxable Value ($000s)	33,270	13,302		46,572
Mil Rates				
Operating	4.974	5.650		
Revenues if 100%				
Operating	165,487	75,154		240,642
TATUM				-
Net Taxable Value ($000s)	2,085	1,084		3,169
Mil Rates				
Operating	3.779	4.225		
Revenues if 100%				
Operating	7,881	4,580		12,460
UNINCORPORATED AREAS				
Net Taxable Value ($000s)	71,354	253,980	1,793,394	2,118,728
Eunice School District	1,513	36,246	551,851	589,611
Hobbs School District	47,859	96,811	437,099	581,768
Jal School District	665	23,431	189,134	213,231
Lovington School District	18,107	70,627	486,749	575,483
Tatum School District	3,210	26,865	128560.95	158,636
NOR-LEA HOSPITAL DISTRICT (Lovington School District, Tatum School District)				
Mil Rates	4.000	4.000	4.000	
Revenues if 100%				
NOR-Lea Hospital Dist.	226,688	447,510	2,461,241	3,135,439
EUNICE HOSPITAL DISTRICT (Eunice only)				
Mil Rates				
Eunice Hospital District	2.000	2.000	2.000	2.000
Eunice Hospital Dist. Debt	0.348	0.348	0.348	0.348
Revenues if 100%				
Eunice Hospital District	18,446	79,031	1,127,488	1,224,965
Eunice Hospital Dist. Debt	3,210	13,751	196,183	213,144
JAL HOSPITAL (Jal School District)				
Mil Rates	2.500	2.500	2.500	
Revenues if 100%				
Jal Hospital	15,981	64,798	475,562	556,341

	Residential	Non Residential	Oil & Gas	Total
LEA COUNTY SCHOOL DISTRICTS				
EUNICE SCHOOL DISTRICT				
Net Taxable Value ($000s)	9,223	39,516	563,744	612,482
Mil Rates				
Operational	0.335	0.500	0.500	
Cap Improvement	2.000	2.000	2.000	2.000
HB 33 School Bldgs	2.000	2.000	2.000	2.000
Revenues if 100%				
Operational	3,090	19,758	281,872	304,719
Cap Improvement	18,446	79,031	1,127,488	1,224,965
HB 33 School Bldgs	18,446	79,031	1,127,488	1,224,965
HOBBS SCHOOL DISTRICT				
Net Taxable Value ($000s)	189,167	213,328	493,438	895,932
Mil Rates				
Operational	0.310	0.500	0.500	
Debt Service	1.725	1.725	1.725	1.725
Cap Improvement	1.965	2.000	2.000	
HB 33 School Bldgs	3.929	4.000	4.000	
Revenues if 100%				
Operational	58,642	106,664	246,719	412,025
Debt Service	326,312	367,991	851,180	1,545,483
Cap Improvement	371,712	426,657	986,875	1,785,244
HB 33 School Bldgs	743,236	853,313	1,973,750	3,570,299
JAL SCHOOL DISTRICT				
Net Taxable Value ($000s)	6,392	25,919	190,225	222,537
Mil Rates				
Operational	0.437	0.500	0.500	
Cap Improvement	2.000	2.000	2.000	2.000
Revenues if 100%				
Operational	2,793	12,960	95,112	110,866
Cap Improvement	12,784	51,839	380,450	445,073
LOVINGTON SCHOOL DISTRICT				
Net Taxable Value ($000s)	51,377	83,929	486,749	622,055
Mil Rates				
Operational	0.301	0.470	0.470	
Debt Service	2.022	2.022	2.022	2.022
Cap Improvement	1.948	1.880	1.880	
HB 33 School Bldgs	2.000	2.000	2.000	2.000
Revenues if 100%				
Operational	15,464	39,446	228,772	283,683
Debt Service	103,884	169,704	984,207	1,257,795
Cap Improvement	100,082	157,786	915,089	1,172,957
HB 33 School Bldgs	102,754	167,857	973,499	1,244,110
TATUM SCHOOL DISTRICT				
Net Taxable Value ($000s)	5,295	27,949	128,561	161,805
Mil Rates				
Operational	0.254	0.498	0.498	
Debt Service	2.626	2.626	2.626	2.626
Cap Improvement	1.736	1.993	1.993	
Revenues if 100%				
Operational	1,345	13,919	64,023	79,287
Debt Service	13,905	73,394	337,601	424,900
Cap Improvement	9,192	55,702	256,222	321,116
NEW MEXICO JUNIOR COLLEGE				
Net Taxable Value ($000s)	261,454	390,641	1,862,717	2,514,811
Mil Rates				
Operating	4.385	5.000	5.000	
Revenues if 100%				
Operating	1,146,475	1,953,204	9,313,583	12,413,262

Source of Data: Local Government Division, Certificate of Tax Rates, Lea County, 2006

Table 2.7.5-4 Growth in Property Taxes Between Tax Year 2002 and Tax Year 2006

	Residential		Compound Annual % Change	Non-Residential		Compound Annual % Change	Oil & Gas		Compound Annual % Change	Total Net Taxable Value		Compound Annual % Change
	2002	2006	02-06	2002	2006	02-06	2002	2006	02-06	2002	2006	02-06
LEA COUNTY												
NTV ($000)	219,482	261,454	4.5%	326,935	390,641	4.6%	1,064,105	1,862,717	15.0%	1,610,523	2,514,811	11.8%
County Rate	6.679	8.785	7.1%	8.600	10.600	5.4%	8.600	10.600	5.4%			
Obligations	1,465,923	2,296,872	11.9%	2,811,639	4,140,792	10.2%	9,151,307	19,744,796	21.2%	13,428,869	26,182,460	18.2%
Eunice												
NTV ($000)	6,853	7,710	3.0%	2,724	3,269	4.7%	5,161	11,892	23.2%	14,739	22,871	11.6%
MuniRate	6.818	7.317	1.8%	7.650	7.241	-1.4%	7.650	7.650	0.0%			
Obligations	46,725	56,412	4.8%	20,840	23,673	3.2%	39,485	90,978	23.2%	107,050	171,062	12.4%
Hobbs												
NTV ($000)	119,784	141,308	4.2%	95,167	116,517	5.2%	20,894	56,339	28.1%	235,846	314,164	7.4%
MuniRate	4.949	4.996	0.2%	4.894	5.555	3.2%	4.894	5.555	3.2%			
Obligations	592,813	705,974	4.5%	465,746	647,254	8.6%	102,257	312,963	32.3%	1,160,817	1,666,191	9.5%
Jal												
NTV ($000)	5,428	5,727	1.3%	2,184	2,488	3.3%	661	1,091	13.3%	8,273	9,306	3.0%
MuniRate	6.585	7.145	2.1%	7.650	7.650	0.0%	7.650	7.650	0.0%			
Obligations	35,742	40,918	3.4%	16,705	19,035	3.3%	5,060	8,345	13.3%	57,508	68,298	4.4%
Lovington												
NTV ($000)	29,083	33,270	3.4%	10,610	13,302	5.8%				39,693	46,572	4.1%
MuniRate	6.679	4.974	-7.1%	8.600	5.650	-10.0%						
Obligations	194,243	165,487	-3.9%	91,248	75,154	-4.7%				285,491	240,642	-4.2%
Tatum												
NTV ($000)	1,889	2,085	2.5%	1,524	1,084	-8.2%				3,414	3,169	-1.8%
MuniRate	3.526	3.779	1.7%	4.203	4.225	0.1%						
Obligations	6,662	7,881	4.3%	6,406	4,580	-8.0%				13,068	12,460	-1.2%
EDDY COUNTY												
NTV ($000)	282,715	333,133	4.2%	409,336	565,660	8.4%	1,045,411	1,677,482	12.5%	1,737,463	2,576,274	10.3%
County Rate	6.285	6.623	1.3%	7.500	7.500	0.0%	7.500	7.500	0.0%			
Obligations	1,776,866	2,206,338	5.6%	3,070,023	4,242,448	8.4%	7,840,585	12,581,111	12.5%	12,687,474	19,029,897	10.7%
Artesia												
NTV ($000)	52,937	67,274	6.2%	55,890	110,870	18.7%	175	334	17.6%	109,001	178,478	13.1%
MuniRate	1.936	1.888	-0.6%	2.225	2.225	0.0%	2.225	2.225	0.0%			
Obligations	102,486	127,013	5.5%	124,355	246,686	18.7%	388	743	17.6%	227,229	374,443	13.3%
Carlsbad												
NTV ($000)	146,687	167,274	3.3%	85,529	93,679	2.3%	3,180	17,053	52.2%	235,396	278,006	4.2%
MuniRate	5.959	6.225	0.011	6.225	6.225	-	6.225	6.225	-			
Obligations	874,107	1,041,283	4.5%	532,415	583,152	2.3%	19,798	106,154	52.2%	1,426,319	1,730,588	5.0%
Hope												
NTV ($000)	349	320	-2.1%	304	358	4.2%				653	678	1.0%
MuniRate	4.036	5.503	8.1%	7.650	7.650	0.0%						
Obligations	1,407	1,761	5.8%	2,327	2,742	4.2%				3,735	4,503	4.8%
Loving												
NTV ($000)	2,881	3,119	2.0%	1,229	1,374	2.8%				4,110	4,493	2.2%
MuniRate	1.576	1.842	4.0%	2.225	2.059	-1.9%						
Obligations	4,541	5,745	6.1%	2,734	2,829	0.9%				7,275	8,574	4.2%
CHAVES COUNTY												
NTV ($000)	316,699	521,180	13.3%	261,669	671,753	26.6%	85,487	1,312,640	98.0%	663,854	1,312,640	18.6%
County Rate	7.338	6.989	-1.2%	10.919	10.350	-1.3%	10.919	10.350	-1.3%			
Obligations	2,323,936	3,642,526	11.9%	2,857,161	6,952,648	24.9%	933,427	11,834,139	88.7%	6,114,525	11,834,139	17.9%
Dexter												
NTV ($000)	3,394	4,369	6.5%	1,331	1,691	6.2%				4,724	6,061	6.4%
MuniRate	1.256	1.268	0.2%	2.225	2.225	0.0%						
Obligations	4,262	5,540	6.8%	2,961	3,763	6.2%				7,223	9,304	6.5%
Hagerman												
NTV ($000)	2,424	2,692	2.7%	713	880	5.4%				3,137	3,573	3.3%
MuniRate	1.741	1.849	1.5%	2.225	2.225	0.0%						
Obligations	4,221	4,978	4.2%	1,586	1,958	5.4%				5,807	6,937	4.5%
Lake Arthur												
NTV ($000)	660	710	1.8%	396	401	0.3%				1,056	1,112	1.3%
MuniRate	2.080	2.225	1.7%	2.225	2.225	0.0%						
Obligations	1,373	1,580	3.6%	882	893	0.3%				2,255	2,473	2.3%
Roswell												
NTV ($000)	245,161	282,577	3.6%	124,408	160,184	6.5%				369,569	442,761	4.6%
MuniRate - Total	9.500	8.021	-4.1%	10.066	8.320	-4.7%						
Operational	7.084	7.351	0.9%	7.650	7.650	0.0%						
Debt Service	2.416	0.670	-27.4%	2.416	0.670	-27.4%						
Obligations	1,736,721	2,077,226	4.6%	951,721	1,225,405	6.5%				2,688,442	3,302,631	5.3%
Debt Service	592,309	189,327	-24.8%	300,570	107,323	-22.7%				892,879	296,650	-24.1%

Source: NM Local Government Division, Property Tax Certificates for Lea, Eddy and Chaves Counties, 2002 and 2006

Gross Receipts Tax

The gross receipts tax is imposed on the seller for the privilege of doing business in New Mexico and is an extremely broad-based tax, according to the New Mexico Taxation and Revenue Department, (NMTRD, 2007). The tax is imposed on the gross receipts of persons who (reproduced from New Mexico Taxation and Revenue Department, Tax Facts, 2006):

1. Sell property in New Mexico. Property includes real property, tangible personal property, including electricity and manufactured homes, and certain intangible property, such as licenses and franchises.

2. Perform services in New Mexico. Service includes construction activities and all construction materials that will become part of the construction project.
3. Lease property employed in New Mexico.
4. Sell research and development services performed outside New Mexico when the product of the service is initially used in New Mexico.

The gross receipts tax is applied to total gross receipts net of certain exemptions and deductions that are spelled out in statute – to taxable gross receipts. Generally, the gross receipts tax rate is the applicable rate at the place of business, although construction activity is taxed at the construction site. The total rate is the sum of the state tax, now five percent, the County tax – and here it makes a difference whether the business is located within or outside an incorporated municipality within the county, and the municipal tax, unless in an unincorporated area.

The gross receipts tax provides over two-thirds of New Mexico municipality general fund revenues and is of growing importance to county governments. Municipalities have the authority to impose up to 1.25 cents in quarter and eighth cent increments for a municipal gross receipts tax, with an additional quarter cent of authority to impose increments of municipal infrastructure tax. They also can impose a one eighth cent environmental gross receipts tax. Some of this authority can be exercised by the governing body but typically is subject to a negative referendum; some may require a positive referendum. Municipalities also all receive a 1.225 percent distribution of state-shared receipts based on state revenues from activity within the municipality. Counties have more limited general authority to impose a county gross receipts tax and they do not receive a state-shared distribution. However, counties have numerous options to impose taxes for other purposes. Some of these taxes, e.g., fire protection, county environmental gross receipts tax, may only be imposed on residents of the unincorporated area. Some, like those for jails, hospitals and other health care facilities reflect County responsibilities and are imposed county-wide.

Table 2.7.5-5 indicates the various local option gross receipts taxes that the counties and municipalities in the vicinity of the Site had in place as of January 1, 2007. The first block of columns reports the municipal taxes; the second, the county taxes; the third block of columns reports the state tax and the total tax rate within the distribution; the final block of columns indicates the total local distribution percentages to counties and municipalities based on these taxes.

Table 2.7.5-6 provides five years of data on gross receipts tax distributions for each of those New Mexico counties and municipalities included in the economic region. The last two columns present calculated growth rates, compound annual growth between 2002 and 2006 and the growth between 2005 and 2006. The revenue growth is affect both by changes in the local option taxes and by changes in the tax base. Figures on the changing tax base by sector for each of the counties and major municipalities can be found in the Section 2.7.2. Recent strong growth in taxable receipts for a number of these jurisdictions is clearly related to rapidly escalating oil and gas activity in the Permian Basin.

Other Revenue Sources

While the property and gross receipts taxes constitute the major revenue sources for the New Mexico counties and municipalities in the region, cities and counties also receive a number of distributions from the state that are important to financing general government activities. While not all inclusive, the amounts of the major distributions to each of these local governments in FY2006 are given in Table 2.7.5-7. Some of these distributions may be used for any lawful purpose.

Table 2.7.5-5 Gross Receipts Tax Rates: Chaves, Eddy and Lea Counties and Incorporated Municipalities

GROSS RECEIPTS TAXES ENACTED, TAXING JURISDICTIONS IN LEA, EDDY & CHAVES COUNTIES, JAN. 1, 2007

	Municipal Gross Receipts	Municipal Infrastruct	Municipal Environ	County Gross Receipts	County Health Care	Local Hospital	Jail	Fire	County Environ	State Gross Receipts	Total Tax Rate	Municipal Local Option a	State Shared Municipal	Total Municipal Distrib	County Local Option b
MAXIMUM AUTHORITY	**1.2500%**	**0.2500%**	**0.0625%**	**0.4375%**	**0.1250%**	**0.5000%**	**0.1250%**	**0.2500%**	**0.1250%**	**5.0000%**		**1.8125%**	**1.2250%**	**3.0375%**	**2.9375%**
CHAVEZ COUNTY															
Unincorporated				0.3750%	0.0625%		0.1250%	0.2500%	0.1250%	5.0000%	5.9375%	0.0000%	0.0000%	0.0000%	0.9375%
Dexter	1.2500%			0.3750%	0.0625%		0.1250%			5.0000%	6.8125%	1.2500%	1.2250%	2.4750%	0.5625%
Hagerman	1.2500%	0.1250%	0.0625%	0.3750%	0.0625%		0.1250%			5.0000%	7.0000%	1.4375%	1.2250%	2.6625%	0.5625%
Lake Arthur	0.7500%			0.3750%	0.0625%		0.1250%			5.0000%	6.3125%	0.7500%	1.2250%	1.9750%	0.5625%
ROSWELL	1.2500%	0.1250%	0.0625%	0.3750%	0.0625%		0.1250%			5.0000%	7.0000%	1.4375%	1.2250%	2.6625%	0.5625%
EDDY COUNTY															
Unincorporated				0.2500%				0.2500%	0.1250%	5.0000%	5.6250%	0.0000%	0.0000%	0.0000%	0.6250%
Artesia	1.2500%	0.2500%	0.0625%	0.2500%						5.0000%	6.8125%	1.5625%	1.2250%	2.7875%	0.2500%
CARLSBAD	1.2500%	0.2500%	0.0625%	0.2500%						5.0000%	6.8125%	1.5625%	1.2250%	2.7875%	0.2500%
Hope	1.2500%			0.2500%						5.0000%	6.5000%	1.2500%	1.2250%	2.4750%	0.2500%
Loving	1.2500%	0.1250%	0.0625%	0.2500%						5.0000%	6.6875%	1.4375%	1.2250%	2.6625%	0.2500%
												0.0000%	1.2250%	1.2250%	0.0000%
LEA COUNTY															
Unincorporated				0.2500%					0.1250%	5.0000%	5.3750%	0.0000%	0.0000%	0.0000%	0.3750%
Eunice	1.2500%	0.1250%	0.0625%	0.2500%						5.0000%	6.6875%	1.4375%	1.2250%	2.6625%	0.2500%
HOBBS	1.2500%	0.1250%	0.0625%	0.2500%						5.0000%	6.6875%	1.4375%	1.2250%	2.6625%	0.2500%
Jal	1.2500%	0.1250%	0.0625%	0.2500%						5.0000%	6.6875%	1.4375%	1.2250%	2.6625%	0.2500%
Lovingom	1.2500%	0.1250%		0.2500%						5.0000%	6.6250%	1.3750%	1.2250%	2.6000%	0.2500%
Indust Park				0.2500%					0.1250%	5.0000%	5.3750%	0.0000%	1.2250%	1.2250%	0.3750%
Tatum	1.2500%	0.1250%	0.0625%	0.2500%						5.0000%	6.6875%	1.4375%	1.2250%	2.6625%	0.2500%
ROOSEVELT COUNTY															
Unincorporated				0.4375%		0.5000%	0.1250%			5.0000%	6.0625%	0.0000%	0.0000%	0.0000%	1.0625%
Causy	0.5000%			0.4375%		0.5000%	0.1250%			5.0000%	6.5625%	0.5000%	1.2250%	1.7250%	1.0625%
Dora	0.7500%			0.4375%		0.5000%	0.1250%			5.0000%	6.8125%	0.7500%	1.2250%	1.9750%	1.0625%
Elida	1.2500%		0.0625%	0.4375%		0.5000%	0.1250%			5.0000%	7.3750%	1.3125%	1.2250%	2.5375%	1.0625%
Floyd	0.5000%			0.4375%		0.5000%	0.1250%			5.0000%	6.5625%	0.5000%	1.2250%	1.7250%	1.0625%
PORTALES	1.2500%	0.2500%	0.0625%	0.4375%		0.5000%	0.1250%			5.0000%	7.6250%	1.5625%	1.2250%	2.7875%	1.0625%

a Maximum authority for municipalities includes 0.25% for municipal capital outlay, which none of the communities in these three counties have imposed.

b Maximum authority for counties includes up to 0.125% County infrastructure. 0.25% County Capital Outlay, up to 0.25% County Communications and Medical Services, 0.5% County Education, and 0.25% County Hospital Emergency.

Source: New Mexico Taxation and Revenue Department, *Enactment Dates of Local Option Taxes -- as of January 1, 2007*

Table 2.7.5-6 Gross Receipts Tax Distributions: Chaves, Eddy and Lea Counties and Incorporated Municipalities, FY 02 to FY 05

	FY02	FY 03	FY 04	FY 05	FY 06	% Annual Growth FY02-06	FY05-06
CHAVEZ COUNTY							
County Govt	4,538,828	4,491,693	4,467,487	4,362,941	4,558,831	0.1%	4.5%
Dexter	369,493	401,473	438,890	545,133	533,626	9.6%	-2.1%
Hagerman	254,934	208,469	278,428	303,400	254,562	0.0%	-16.1%
Lake Arthur	28,167	29,937	27,744	36,848	28,393	0.2%	-22.9%
ROSWELL	18,221,384	18,893,711	19,712,224	23,100,931	23,751,298	6.9%	2.8%
EDDY COUNTY							
County Govt	5,150,880	4,368,726	5,936,431	7,598,990	7,995,875	11.6%	5.2%
Artesia*	7,400,108	7,251,650	8,109,274	8,789,599	11,450,652	11.5%	30.3%
CARLSBAD	12,032,849	12,786,397	13,390,798	16,495,832	16,438,626	8.1%	-0.3%
Hope	16,593	10,647	7,043	9,102	16,058	-0.8%	76.4%
Loving *	120,894	133,556	258,200	250,922	87,396	-7.8%	-65.2%
LEA COUNTY							
County Govt	3,477,204	3,225,683	3,748,833	5,514,270	6,607,446	17.4%	19.8%
Eunice	1,134,186	1,168,945	1,375,416	1,885,204	2,314,250	19.5%	22.8%
HOBBS	19,905,160	19,235,346	22,252,548	28,751,528	34,154,693	14.5%	18.8%
Jal	656,789	648,589	520,476	688,525	737,064	2.9%	7.0%
Lovington	2,925,999	2,951,055	3,570,609	4,743,855	4,645,842	12.3%	-2.1%
Indust Park							
Tatum*	279,059	279,289	300,446	470,889	411,348	10.2%	-12.6%

NM Dept of Finance, Local Government Division, Financial and Property Tax Data by County and Munipality, various years, and tables available on the Local Government Division, Financial Management Bureau website.

Others, like the municipal street and county road gasoline tax distributions, the fire fund distributions, and the law enforcement protection fund distributions may only be used for certain purposes and must be accounted for in separate special revenue funds. Cigarette taxes are used for recreation programs. While Lea and Eddy counties are not eligible, Chaves County also receives a county equalization distribution of gross receipts tax revenues in September. In FY 06, this distribution amounted to $260 thousand, down from $402 thousand in FY 02 (NMFDA, 2007). Counties and municipalities also receive funding for a number of road-related state assistance programs, including the municipal arterial program and funding for school bus routes, and there are federal distributions, e.g., federal Taylor Grazing Act distributions, as well as a number of federal grant programs for which counties and municipalities may be eligible. Intergovernmental assistance is critical to the provision of local government services in New Mexico.

New Mexico counties and municipalities have authority to impose two special taxes, a lodgers tax, the proceeds of which can be used for certain types of facilities and for tourist promotion, and a local option gasoline tax (1 cent or 2 cents), which may be used for certain types of transportation projects and programs. Table 2.7.5-8 gives the lodgers tax distributions for each county or municipality in the region that has imposed this tax along with the tax rate. No local governments have imposed the local option gasoline tax, which requires a positive referendum. In addition to these taxes, local governments often impose franchise fees or taxes on electricity and gas utilities, and on providers of telecommunications services (e.g., local phone service, cable TV), for the use of local government right-of-way. Thus, in 2006, Eddy County had franchise tax revenues of $8,556 and Lea County generated $24,619 from this source, while franchises taxes produced general fund revenues of $1.4 million for Hobbs, $762 thousand for Carlsbad, and $3.3 million for Roswell.

Table 2.7.5-7 Major State of New Mexico Distributions to Local Governments of Taxes and Other Revenue Sources, Excluding Gross Receipts Tax

TAX AND OTHER REVENUE DISTRIBUTIONS
CHAVES, EDDY & LEA COUNTIES & INCORPORATED MUNICIPALITIES,
FY 05 Unless Otherwise Noted

	Small Cities Assistance	Gasoline Taxes		Motor Vehicle Fees		Cigarette Taxes	Fire Fund Distributions	Law Enforcement Fund Distributions
		Road/Street	General	Road/Street	General			
CHAVEZ COUNTY								
County Govt		334,719	17,572	605,819	128,398	54,383	573,003	42,200
Dexter	81,965	20,145	31,815	1,486	199	1,785	92,502	21,800
Hagerman	81,965	5,356	6,994	999	134	2,172	97,640	21,800
Lake Arthur	81,965	5,004	138	339	45	-	45,402	21,200
ROSWELL		270,363	366,727	119,825	55,197	79,583	376,864	79,800
EDDY COUNTY								
County Govt		301,706	24,669	562,077	155,085	176	858,210	43,400
Artesia*		112,796	156,331	37,657	3,300	27,010	70,232	34,400
CARLSBAD		178,465	254,148	81,242	19,458	54,383	223,545	61,200
Hope	35,000	5,004	623	-	-	23	48,820	20,000
Loving *	81,965	10,384	15,329	-	-	3,075	46,251	20,600
LEA COUNTY								
County Govt		304,111	16,179	571,400	167,529	182,134	126,764	41,000
Eunice	35,000	12,624	14,869	5,574	1,387	4,289	51,389	23,000
HOBBS		232,478	372,956	100,045	18,074	49,533	216,697	69,000
Jal	81,965	10,409	17,343	3,519	876	3,120	48,820	22,400
Lovington	81,965	51,689	77,477	16,996	3,123	15,418	51,389	30,200
Tatum*	37,123	12,362	20,334	1,311	180	2,076	46,251	14,320

NM Dept of Finance, Local Government Division

Table 2.7.5-8 Lodgers Tax Revenues in Imposing Jurisdictions, Chaves, Eddy and Lea Counties

	2002	2003	2004	2005	2006	2007	Annual Growth 2002 - 06	Annual Growth 07 1st half
CHAVEZ COUNTY								
ROSWELL	504,977	515,792	548,021	597,334	639,216	392,518	6.1%	20.8%
rate	5%	5%	5%	5%	5%	5%		
EDDY COUNTY								
County Govt	78,536	82,108	88,424	77,805	69,112	24,612	-3.1%	-30.4%
rate	5%	5%	5%	5%	5%	5%		
Artesia*	118,667	118,177	125,874	125,270	167,874	99,569	9.1%	16.1%
rate	5%	5%	5%	5%	5%	5%		
CARLSBAD	436,251	417,429	421,161	437,792	484,914	275,479	2.7%	9.5%
rate	5%	5%	5%	5%	5%	5%		
LEA COUNTY								
HOBBS	134,598	130,126	150,960	259,741	458,401	304,976	19.6%	29.1%
rate	3%	3%	3%	5%	5%	5%		
Lovington	18,975	18,975	19,880	29,101	44,997	28,213	9.2%	23.1%
rate	3%	3%	3%	3%	5%	5%		

* Lodgers Tax Rate Changes: Hobbs, 2-1-05; Lovington, 7-1-05
NM Dept of Finance, Local Government Division

Finally, New Mexico counties and municipalities impose various fees and charges for services. Certain municipal and county services, like water and sewer systems and airports, are frequently run like enterprise operations, with rates that recover capital as well as operating costs. Enterprise funds in Roswell generated $31.6 million in revenues in FY 06 to offset some $38.3 million in expenditures, while Hobbs enterprise funds raised $11.2 million to cover $11.8 million in total expenditures. Carlsbad enterprise fund revenues were $11.6 million, with total expenditures in 2006 of $7.2 million.

Many general government programs use fees and charges for services to recover some costs and also to discourage over-use. Thus, developers are frequently charged for building permits and local recreation programs may charge fees to participants. Of the $20.5 million in general fund revenues in Carlsbad, $2.6 million came from charges for services, while $192 thousand were generated by various license and permit fees. Charges for services brought $4.0 million into the general fund in Hobbs in 2006, while the various permit fees generated over $200 thousand, together accounting for more than 10% of general fund revenues.

2.7.5.2 Texas

According to the Tax Foundation, in 2004 property taxes per capita in Texas were $1,254, versus $441 in New Mexico. Texas ranked 12th among the states, while New Mexico ranked 48th (Tax Foundation, 2007a). By contrast, state and local gross receipts taxes per capita in Texas in FY 04 were $852, giving the state a ranking of 19th, while per capita gross receipts taxes in New Mexico were $1,028, putting the state in 10th place (Tax Foundation, 2007b). While not a local government revenue source, New Mexico’s personal income tax per capita in 2006 ranked it 36th among the states. Texas, along with Alaska, Florida, Nevada, and South Dakota had no personal income tax (Tax Foundation, 2007c).

2.7.6 Environmental Justice

The purpose of this section is to provide information that can be used to determine if the construction, operation, or decommissioning of the proposed facilities presents a disproportionate risk to a low-income or minority population. The information required generally includes demographic information regarding where minority or low-income populations live and the nature of the risks posed by the facility. The preliminary conclusion is that although there are census tracts within the 50-mile radius that have minority percentages exceeding 64 percent, they are confined to the urban areas which are at least 30 miles from the Site. Consequently, minority inhabitants share the same hypothetical risks as their non-minority neighbors, irrespective of concentric geographic distance from the Site.

2.7.6.1 Regulatory Drivers

Federal Executive Order on Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629), instructs federal agencies to systematically study and address, when indicated, any significant and adverse environmental or health effects associated with their policies, decisions, programs, or activities that have disproportionate impact on low income or minority populations. In December 1997, the Council on Environmental Quality published guidance on environmental justice evaluations under NEPA (CEQ, 1997). Since then several federal agencies including DOE have developed their own guidelines for addressing environmental justice. DOE is in the process of preparing updated guidelines to be used in its NEPA processes. The Nuclear Regulatory Commission (NRC) has developed environmental justice guidelines for siting nuclear facilities. They are published in Appendix C of NUREG-1748 (NRC, 2003).

State of New Mexico Executive Order on Environmental Justice

On November 18, 2005, New Mexico Governor Bill Richardson signed Executive Order 2005-056 (Environmental Justice Executive Order) (NMGO, 2005). The State of New Mexico Executive Order on Environmental Justice states that environmental justice issues exist in New Mexico, as they do in other states, causing concern for some communities, businesses and households that bear the disproportionate impacts of air and water contamination, noise, crowding, reduced quality of life, and depressed land and housing values – many of which could be mitigated by better siting decisions and processes. The New Mexico Executive Order references Federal Executive Order 12898 on Environmental Justice.

There are essentially five requirements articulated in the New Mexico Executive order. They can be summarized as follows: (1) meaningful opportunities for public involvement;
(2) communications in English and Spanish (or other pertinent languages for the area);
(3) utilization of all available environmental and public health data for environmental justice assessments; (4) recommendations to state agencies regarding actions to be taken; and
(5) assistance from state agencies.

For purposes of this discussion, a significant negative environmental or human health impact will be defined as a high and adverse environmental or human health effect. A disproportionate impact to a low-income or minority population is one that exceeds, or is likely to exceed, a similar impact in the community at large. A disproportionately high and adverse human health or environmental impact would obtain when the adverse environmental or human health effect is significant, and the risk or probability of occurrence to a low-income or minority population from exposure to the environmental or health hazard substantially exceeds, or is likely to exceed the magnitude and probability of occurrence of the risk to the general population.

2.7.6.2 Racial and Ethnic Characteristics of the ELEA Study Area

The preliminary environmental justice analysis for the Site addresses the potential for disproportionately high and adverse human health or environmental effects on minority and low-income populations within a 50-mile area of the Site. According to data presented in the DSR Demographic Report Section 2.7.1, minorities represent 44 percent of the population within a 50 mile radius of the Site, and low-income individuals make up 25 percent of the study area population. For the State of New Mexico, the total minority population is 55.3 percent of the total population, and low income persons represent 18.4 percent of the total. Native Americans represent 10.2 percent of the state's total population. By contrast they represent less than one percent of the ELEA study area total.

More specifically, data reported in Section 2.7.1 indicate that the Hispanic population makes up 40 percent of the study area population. Other non-white races (American Indians, Blacks or African Americans, Asians, Hawaiians and Pacific Islanders, and those who identified themselves as two or more races) constitute 4 percent of the study area population. As indicated above, these two groups make up the 44 percent minority population in the region.

Although 44 percent of the population within a 50-mile radius of the Site area is either Hispanic or other minorities, the area within 30-miles of the Site is sparsely inhabited and does not contain any compact and contiguous population enclaves that could be categorized as consisting of a significant number of minority inhabitants. One of the key preliminary site selection criteria for the Site was to find a location that would not, by virtue of proximity, impose disproportionate environmental risk on any identifiable population, irrespective of race or ethnicity. The task of selecting this site was balanced, however, with the notion that existing populations which would be necessary work force and service providers, and could benefit economically from the location of GNEP facilities, would be situated within reasonable commuting distances from the Site.

Also, the Site location was optimized with regard to potential risks associated with the transportation of radioactive materials to and from the proposed GNEP facilities. As indicated in several sections of the DSR, the Site is one-half mile north of Highway 62/180. Also, Highway 62/180, as indicated in the Transportation Infrastructure Section of the Demographic Report, is the final major highway segment on the WIPP Transportation Route. As such, it has been evaluated empirically, along with the entire national transuranic transportation system for transportation safety. As of April 18, 2007, for example, there have been 5,664 shipments of mixed-transuranic waste delivered to the WIPP (DOE, 2007) without a radiation release, or a single death or injury attributable to any of the shipments. Although the transportation of radioactive materials to GNEP facilities may include rail transportation, the track record for highway shipments of WIPP bound waste streams provides a good analog for demonstrating that the network of transportation routes does not systematically impose disproportionate risks on any given population. This record is the result of careful route designation by the corridor states, stringent qualifications imposed on drivers and vehicles, stringent NRC licensing requirements for shipping casks, and equally stringent DOT requirements for radioactive shipments (See Section 2.10 of this DSR).

2.7.6.3 Public Involvement and Bilingual Outreach

As noted in the New Mexico Executive Order, it is important to establish an ongoing dialog with members of the public about potential impacts associated with major projects.

Consistent with the principles articulated in the New Mexico Environmental Justice Executive Order and the Federal Environmental Justice Executive Order No. 12898, the ELEA conducted three (3) extensive Public Participation and Information Meetings in Lovington, Hobbs, and Carlsbad, which are within the 50-mile radius of the Site; and one additional public meeting in Las Cruces on the campus of New Mexico State University.

Each of the meetings was heavily publicized in newspapers of local circulation, and through numerous informal channels in order to inform citizens that the Site was being considered for location of the CFTC and the ARR. Each of the meetings was staffed with a translator who could assist persons of Hispanic origin who do not speak English well or at all in order to ensure that these citizens would be able to understand what was being said about the project and to facilitate any questions they had. As indicated in the ELEA Final Communications Report, the purpose of the discussions was to inform citizens about the nature of the GNEP project and to actively solicit input regarding questions and concerns as well as community attitudes and values. This process, in conjunction with the DOE Scoping Meetings that were held in Hobbs, Carlsbad, Roswell, and Los Alamos, New Mexico, are with EPA guidance regarding environmental justice communications published March, 2006 in the Federal Register.

2.7.6.4 Preliminary Environmental Justice Assessment

Consistent with analyses conducted in the WIPP Supplemental EIS (DOE, 1997) and the LES EIS for the NEF (NRC, 2005) which is now under construction near Eunice, NM, the ELEA GNEP analysis is predicated on the assessment of actual risk associated with populations in close proximity to the Site. Even though the LES project is relatively close to Eunice and Hobbs, New Mexico, the NRC determined that parameters for disproportionate risks to minority populations identified in Eunice and Hobbs did not reach thresholds of regulatory concern.

Much as is the case with the WIPP, the GNEP Site is situated geographically so that it has no nearby or adjacent populations associated with it. Without a geographically identifiable population in place, it follows that it (the population that does not exist) cannot experience any risk much less disproportionate risk.

When determining the real extent for which a disproportionate risk assessment should be conducted for a proposed nuclear facility, NRC guidance (NUREG-1748) indicates that if the facility is outside city limits or is in a rural area, a 4-mile radius may be used. If that standard was applied to the Site, fewer than 10 people could be found in the study area. In the alternative, if the magnitude of the proposed facilities indicates a larger potential impact area, which GNEP projects may in fact do, then a case can be made for using a 50-mile radius.

In such instances NRC guidance suggests that the first tier analysis consider whether the minority population in the study area exceeds 50 percent or is significantly larger than the state or county percentage. In the Site study area, the minority population is 44 percent of the total which is less than the 55.3 percent for the State of New Mexico. It is also below the total minority figure of 45 percent for Lea County, but is two points above Eddy County which is at 42 percent. Generally, NRC guidance on what constitutes significantly larger minority percentages in study areas over state or county proportions is 20 percentage points.

2.7.6.5 Preliminary Conclusion

Although there are census tracts within the 50-mile radius that have minority percentages exceeding 64 percent, they are confined to the urban areas which are at least 30 miles from the Site. Consequently, minority inhabitants share the same hypothetical risks as their non-minority neighbors, irrespective of concentric geographic distance from the Site.

2.7.7 Transportation

This section describes the roads and railroads, from county roads up to U.S. highways on the Site and in the vicinity of the Site. Maps 1, 3, and 16 show the roads and railroads in the area.

2.7.7.1 Roads

There are numerous county and state roads in the vicinity but only four U.S. highways traverse the area. The nearest to the Site is U.S. Highway 62/180 (1/2 mile to the south), which is of four lane construction and the major route between Carlsbad and Hobbs, New Mexico. The nearest Interstate Highway is Interstate 20, 95 miles to the southeast in Odessa, Texas (Sterner, 1995; USA Photomaps, 2007; DeLorme, 2007).

2.7.7.2 Railways

Two railroads service the area. One railroad company operates to the west of the Site and the other to the east. Southwestern Railroad operates the Burlington Northern-Santa Fe (BNSF) Carlsbad Subdivision (Carlsbad to Clovis, New Mexico, plus industrial spurs serving potash mines east of Carlsbad and east of Loving, New Mexico) under a lease agreement. Customers include potash mines, a petroleum refinery in Artesia, New Mexico, and various feed mills and agricultural-related businesses in Roswell and Portales, New Mexico. The Carlsbad spur ends at the Intrepid Mining LLC North facility which is 3.8 miles due west of the Site (BNSF, 2007).

The Texas-New Mexico Railroad (TNMR) operates 104 miles of track near the Texas-New Mexico border from a Union Pacific connection at Monahans, Texas to Lovington, New Mexico. The railroad serves the oil fields of West Texas and Southeast New Mexico. The primary commodities hauled are oilfield chemicals and minerals, construction aggregates, industrial waste, and scrap (UPRR, 2007).

2.7.8 Cultural Resources

The purpose of this section is to provide information for assessing the impacts of constructing, operating, and decommissioning the facilities on historic and cultural resources on the Site.

A literature and archival search to establish baseline data for cultural resources that have already been identified in the 1,040 acre Site and within a 6-mile zone around the Site was performed by Quivira Research Associates (QRA). QRA’s complete report, Cultural Resources in the Eddy-Lea Energy Alliance Project Area, Lea County, New Mexico, March 31, 2007, is provided as Appendix 2D. The complete report includes tabulations of the identified sites both within and local to the Site. This section provides a summary of cultural resources within the Site and 6-mile zone around the Site based QRA’s research.

Based on the estimated frequency of cultural and historical sites in the region, the impacts of construction, operation and decommissioning are expected to be low.

2.7.8.1 Southeastern New Mexico Prehistory and History

Documented human presence in eastern New Mexico dates to 11,000 years ago when PaleoIndian hunters of mammoths, giant bison, and other large mammals followed their prey with spears and atlatl darts tipped with Clovis, Folsom, Eden, Scottsbluff, Agate Basin, and other points for which the period is famous (Sebastian and Larralde, 1989).

Based on radiocarbon dates reported up to 1989 the Archaic habitation ranges from 4,350 B.C. to A.D. 980 with the preponderance of the dates being later than A.D.1 (Sebastian and Larralde, 1989).

In some areas and at some times the Ceramic period, which began sometime between A.D. 600 and 900, was a continuation of the Archaic lifeway with ceramic vessels. At other times and places people lived a more sedentary life and raised gardens. A great deal of variability in reliance on domesticated plants versus hunting and gathering, and residence in permanent villages versus mobility characterizes southeastern New Mexico during this period (Sebastian and Larralde, 1989).

Agriculturalists (Mogollon people) had vanished from the area sometime before A.D. 1400, but Athabaskans arrived from the north about A.D. 1500. They and other Plains groups dominated the area until the early 1800's, first as pedestrian hunters and gatherers and later as mounted hunters focused on buffalo herds. Spanish exploration parties crossed the area, but no European settlement occurred until after the Mexican period began in 1821.

Cattle and sheep ranching dominated southeastern New Mexico for many years, but the discoveries of major natural resources beginning in the late 1920's brought dramatic changes. Chilton et al. (1984) observe "The true wonders of the region lie beneath the surface: in the east, natural gas and oil; in the valley, saline potash; near Carlsbad, the extensive and magnificent caverns." Carlsbad was founded in 1888 as Eddy, but its name was changed to Carlsbad in 1899 (Julyan, 1996). Hobbs was founded in 1910 and changed from a hamlet to a town of 12,000 by late 1930 after the discovery of the Hobbs oil pool in 1928 (Chilton et al., 1984).

2.7.8.2 Archaeological Sites with the State

Only three archaeological sites (LA 22116, 89675, and 89676) have been recorded within or immediately adjacent to the Site. LA 22116, a non-structural site measuring 7.4 acres was identified in 1979 by NMSU (Laumbach, 1979). It contains fire-cracked rock and lithic debitage (the waste from tool manufacture), but is of unknown cultural and temporal affiliation. LA 89675 is a 7.4 acre non-structural Mogollon site dated at A.D. 750-1175. LA 89676 is of unknown cultural and temporal affiliation, measures 7.4 acres, and contains fire-cracked rock and lithic debitage. Both sites were identified in 1992 (Hunt and Martin, 1992).

2.7.8.3 Archaeological Sites within the Six-Mile Zone Around the Site

The 6-mile zone around the Site contains 111 square miles, containing previously recorded archaeological sites totaling 211. However, only a dozen block surveys, most of them small, have been conducted in the zone. The remaining surveys are linear—seismic lines, pipelines, and roads. Linear surveys do not provide reliable data for predicting site density.

The largest block survey, conducted by NMSU for the BLM, covered 717 acres in the Laguna Plata Archaeological District (Laumbach 1979). The survey identified 25 archaeological sites and revisited one previously recorded archaeological site—thus, a total of 26 archaeological sites, or 23.2 archaeological sites per square mile. (It should be noted that the survey crew was spaced 98 feet apart. The standard interval now is 49 feet, so a few small archaeological sites may have been missed by the 1979 survey.)

There are several types of archaeological sites that have been recorded within the 6-mile zone around the Site. It should be noted that some sites are multi-component; for example, the same archaeological site location may have been used by PaleoIndian hunters who left Clovis points in 8000 B.C., by Mogollon farmers who left ceramics in A.D. 1300, and by EuroAmerican settlers who left glass, ceramics, and car parts in 1935. The archaeological sites and components range from PaleoIndian (one) through Archaic (11), Mogollon (125), Plains Village (one), Apache (one), and EuroAmerican (five). Archaeological sites of unknown cultural and temporal affiliation total 109.

Archaeological sites are not evenly distributed in size categories. Two clusters are apparent: the first contains 47 archaeological sites (26 percent) that measure 5,382 square feet or less; the second contains 48 archaeological sites (26 percent) that measure between 2.5 acres and 12.4 acres. Forty archaeological sites (22 percent) range between 5,382 square feet and 1.7 acres, nine archaeological sites (5 percent) range between 12.4 acres and 49.4 acres, and one archaeological site measures 100.9 acres. It is clear that most archaeological sites are smaller than 1.9 acres.

National Register eligibility data are incomplete for the identified archaeological sites. Of the 110 archaeological sites within the 6-mile zone around the Site, 69 have been determined eligible to the National Register of Historic Places (NR), 15 have been determined not eligible, and 26 are of undetermined eligibility (usually because testing may be necessary to determine eligibility).

2.7.8.4 Site Visit

A site visit was conducted by QRA on March 14, 2007 in order to make a general assessment as to the probability of cultural sites in the area. QRA determined that food would have been abundant in the area, especially after a season of heavy precipitation. Rabbits, birds, and plant foods, mesquite being particularly prolific, were all noted during the site visit. Mesquite is considered an important component of both the prehistoric and historic diet of communities living in the Southwest.

2.7.8.5 Summary of Estimated Cultural Sites

- Archaeological sites ranging in cultural/temporal affiliation from 10,000 or 11,000 year-old PaleoIndian sites through Archaic to Mogollon, Plains Village, and historic Apache and EuroAmerican archaeological sites may be expected. Given the frequency of Mogollon archeological sites in this region it is not unreasonable to assume that they will be most abundant, but will be trailed closely by archaeological sites for which cultural and temporal affiliation cannot be determined.
- Archaeological site densities of 23+ archaeological sites per square mile (640 acres) are indicated by the single large (717 acres) block survey in the 6-mile radius zone around the Site.
- Most archaeological sites will probably be small (1.7 acres), but larger sites are a definite possibility.
- Two-thirds of newly discovered archaeological sites will be determined eligible for listing on the NR, which will require avoidance or data recovery. The NR-eligibility of one-fourth will be undetermined and will require testing or, if historic, appropriate historical research, such as literature and archival reviews, interviewing, etc. A few archaeological sites will be determined ineligible for listing on the NR at the time of survey.

2.8 Waste Management

2.8 Waste Management

The purpose of this section is to describe the waste management capability in the vicinity of the Site or available to the operator of the GNEP facilities at the Site. The purpose of this information is to determine any impacts associated with the timely and proper disposal of waste from resulting from construction, operation, and decommissioning of the proposed facilities. Based on the available information, several facilities are available to handle hazardous and non-hazardous waste that would be expected from the proposed facilities. This included low-level radioactive waste, radioactive mixed waste, hazardous waste, solid (sanitary) waste, and industrial waste. It is assumed that high-level waste would go to a federal repository.

Subtitle D Solid Waste and Industrial Waste. There are three facilities that have permits from the state of New Mexico to handle non-hazardous waste. Two are permitted municipal landfills and the third is an industrial waste landfill.

The Sandpoint Landfill is 25 miles west of the Site and serves Eddy County. The service area covers 4,200 square miles and has a population of 49,000. The County and the City of Carlsbad jointly own the Landfill, which is operated by Waste Connections, Inc. The City of Artesia operates a transfer station, as does the County at the Village of Loving. Commercial collection services are available to most county residents living outside the incorporated areas of the county.

The Lea County Solid Waste Authority has a service area that covers 4,400 square miles and has a population of 55,800. The Lea County Solid Waste Authority consists of Lea County and all of the incorporated municipalities in the County. Commercial collection service is available to County residents living outside of the incorporated areas. The Authority's landfill is east of Eunice New Mexico, opened in July 1999 and is operated by Waste Connections, Inc. (NMED, 2000).

Lea Land, Inc. operates an industrial waste landfill three miles from the Site. The landfill is permitted to take non-hazardous industrial waste under a permit issued by the State of New Mexico, Environment Department (Lea Land, Inc., 2007).

Low Level Radioactive Waste (Mixed and Non-mixed). It is not unreasonable to assume that GNEP facilities will produce low-level radioactive waste. The disposal facility available to the GNEP plants is located in Hanford, Washington. The Hanford facility accepts waste from the Northwest and Rocky Mountain compacts. Hanford is licensed by the State of Washington to receive Class A, B, and C wastes, but not mixed waste. As New Mexico is a member of the Rocky Mountain Compact, the proposed GNEP facilities would be able to ship low-level radioactive waste to Hanford for disposal provided that the waste meets the Waste Acceptance Criteria for the facility.

WCS currently owns and operates a Resource Conservation and Recovery Act (RCRA)/Toxic Substance Control Act (TSCA) landfill and provides treatment and storage services for hazardous and mixed low-level radioactive waste. WCS is in the process of obtaining licenses from the State of Texas to add federal and compact low-level radioactive waste and 11(e) 2 (by-product material) disposal to its current services. Current Texas Low-Level Radioactive Disposal Compact member states include Texas and Vermont.

The WCS facility is adjacent to the NEF on the New Mexico/Texas state line on a 16,000-acre parcel of land north of Texas Highway 176. It is 400 feet east of the New Mexico state line. The WCS facility is 40 miles east of the Site. Currently 1,338 acres are permitted for waste operations.

WCS currently holds a RCRA Part B permit to receive ignitable, corrosive, toxic, reactive, and non-hazardous wastes. Liquids, sludges, solids, lab packs in approved containers, and liquids in bulk tankers are also accepted. WCS can accept over 2,000 RCRA waste codes (TSCA waste). The Site is approved to receive Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) waste (WCS, 2007a). The Site is also permitted to receive Polychlorinated Biphenyl (PCB) and PCB-contaminated waste.

In 2004, WCS submitted to the State of Texas an application for licenses to authorize near-surface land disposal of low-level radioactive waste (LLRW) and 11(e)2 by-product material. The license applications are pending approval (WCS, 2007b). Should WCS obtain all the licenses it is seeking, it will have a total permitted disposal capacity of 11,000,000 cubic yards.

2.9 Noise

2.9 Noise

The purpose of this section is to provide information to assess the impacts of noise at the Site during construction, operation, and decommissioning. Noise levels at the Site will be principally created by construction equipment and traffic on nearby oilfield service roads. After construction, most noise would be expected to be traffic related. Since the Site is over one-half mile from Highway 62/180 and the nearest resident is 1.5 miles away, construction noise impacts are expected to be low. Noise restrictions that are in place during certain hours and months of the year to protect the Lesser Prairie Chicken would not pose an impact on construction due to the distance from favorable habitat.

The Noise Control Act of 1972 requires the EPA to publish information on the acceptable levels of environmental noise for the protection of the public (GSA, 2007). Following these guidelines, the Department of Housing and Urban Development (HUD) developed Noise Assessment Guidelines (HUD, 2007). Both the Noise Control Act and the HUD Noise Assessment Guidelines do not provide guidance for areas away from population areas such as the Site. Since no guidelines exist for construction activities in non-populated areas and no guidelines exist for the county or state control of noise levels, the Site is not subject to noise requirements.

The Site is within a BLM sound restriction area for noise control for the Lesser Prairie Chicken (Mote et al., 1998). Drilling for oil and gas and 3-D geophysical operations are not allowed by BLM regulations within potential habitat that occurs within shinnery oak cover, or within two miles of a historic lek site, from March 15 to June 15, the Lesser Prairie Chicken booming season. During that period, activities that produce noise or involve human activity are not allowed between the times of 3:00 am and 9:00 am, excepting normal around the clock operations such as venting, flaring, or pumping, which do not require a human presence. The BLM noise standard includes additional exceptions of areas where Lesser Prairie Chickens have not bee observed. The BLM timing area is shown in Appendix 2A as Map 11.

2.10 Applicable Regulatory Requirements

2.10 Applicable Regulatory Requirements

This section provides a summary of the Federal, State, and local laws and regulations that apply to the CFTC and/or ARR facilities located at the Site. For each applicable law or regulation, the Site is evaluated to determine whether the available site environmental characteristics support the regulatory requirements with respect to successfully licensing and permitting the facilities. This section also identifies any legislative or regulatory prohibitions that might prevent siting and permitting the CTFC and ARR facilities at the Site.

The role of the Federal and State agencies that would be involved with the licensing and permitting of a CFTC and/or ARR at the Site is also discussed.

A list of pertinent licenses, permits, certifications, and notifications applicable to the CFTC and/or ARR at the Site is provided in Table 2.10.0-1 along with a discussion of the pertinent site characteristics or facility features. Lastly, a comparison is provided in Table 2.10.5-1 summarizing the environmental site characteristics for each of the major areas reviewed.

Table 2.10.0-1 Required Federal and State Licenses and Permits

Requirement	Agency	Comments
Federal		
10 CFR Part 50, 10 CFR Part 20, 10 CFR Part 30, 10 CFR Part 40 10 CFR Part 51	NRC	Assumes the facilities will be licensed by the NRC.
NPDES General Permit for Industrial Stormwater	EPA Region 6[a]	The facility could file under the Multi-Sector General Permit or obtain an individual NPDES permit.
NPDES Construction Stormwater General Permit	EPA Region 6[a]	The facility would file for coverage under the General Construction Permit for all construction activities onsite. The facility owner would develop a Stormwater Pollution Prevention Plan and file a Notice of Intent at least two days prior to construction commencement.
State		
Access Permit	NMDOT	The owner and Lea County would coordinate to obtain approval, if necessary, for upgrading the current access road and adding a second entry point, if required, from New Mexico Highway 180 and 62. The permit, once issued, would stipulate any safety enhancements necessary to the highway.
Air Construction Permit	NMED/AQB	Air Construction Permit requirements will be determined once design information on the facilities is developed and emission rates quantified.
Air Operation Permit	NMED/AQB	Air Operation Permit requirements will be determined once design information on the facilities is developed and emission rates quantified.
Air Quality Permit	NMED/AQB	An onsite concrete batch plant during facility construction would require a permit.
Air Quality Permit	NMED/AQB	If diesel generators are used during site construction, a permit may be required.
NESHAPS Permit	NMED/AQB	NESHAPS permit requirements will be determined once design information on the facilities is developed and emission rates quantified.

Requirement	Agency	Comments
Groundwater Discharge Permit/Plan	NMED/WQB	A permit is required for facilities that discharge an aggregate waste water of more than 2,000 gallons per day to septic systems. A permit may also be required for discharges to surface impoundments such as evaporative basins. It is likely the facility will require a ground water discharge permit. The nearby National Enrichment Facility recently received a ground water discharge permit for discharges to evaporative basins and domestic treatment facilities. The nearby Waste Isolation Pilot Plant (WIPP) project is permitted for a facultative sewage treatment facility and the treatment of industrial waste water in lined evaporation ponds. It is anticipated that this facility will be able to obtain this permit.
NPDES Industrial Stormwater	NMED/WQB[a]	The facility could file under the Multi-Sector General Permit or obtain an individual NPDES permit
NPDES Construction Stormwater Permit	NMED/WQB[a]	The facility would file for coverage under the General Construction Permit for all construction activities onsite. The facility owner would develop a Stormwater Pollution Prevention Plan and file a Notice of Intent at least two days prior to construction commencement.
EPA Notification of Hazardous Waste Activity to obtain an EPA ID Number	NMED/HWB	This identification (ID) number is required for the offsite shipment of hazardous waste. The proposed facilities would apply for an ID number prior to the generation of waste during facility construction.
Machine-Produced Radiation Registration (X-Ray Inspection)	NMED/RCB	Registration is required for security nondestructive inspection (x-ray) machines. The registration would occur once equipment specifications are available.
Rare, Threatened, & Endangered Species Survey Permit	NMDFG	This permit is required for conducting surveys for both plants and animals.
Right-of-Entry Permit	NMSLO	The Site is not on state land and, therefore, this permit is not required. If any State lands are used for background or offsite monitoring locations, a permit would be required.
Class III Cultural Survey Permit	NMSHPO	The owner will obtain the permits, as required.
Public Water Supply License and Operator Certification	NMED/DWB	Required for facility to supply water to end users.
Food Service Permit	NMED/EHD/FP	Required for facility to dispense food.
Septic System Permits	NMED/EHD/ LWP (Septic Systems)	Required if septic systems are utilized to treat domestic sanitary waste.
Petroleum Storage Tank Registration	NMED/EIB	The owner will register petroleum storage tanks, as required.

(a) NMED may assume NPDES permitting authority from EPA Region 6 sometime in the future.

2.10.1 Federal

This section describes the Federal laws, regulations, Executive Orders, and agencies that would apply or be involved with licensing and permitting a CFTC and/or ARR at the Site. The CFTC could be privately owned and operated. Under this scenario, NRC would license the facility. As an alternative, the CFTC could be DOE owned and operated by or on behalf of DOE. It would then be subject to DOE regulation and oversight or potentially NRC licensing. Similarly, depending on ownership and operation, the ARR could be subject to NRC licensing or DOE regulations

2.10.1.1 National Environmental Policy Act 1969, as Amended (42 U.S.C. § 4321 et seq.)

The National Environmental Policy Act (NEPA) establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment to ensure all Americans a safe, healthful, productive, and aesthetically and culturally pleasing environment. NEPA provides a process for implementing these specific goals within the Federal agencies responsible for the action. As part of the licensing process for the proposed facilities, the NRC will prepare an EIS in accordance with NEPA requirements and NRC regulations (10 CFR Part 51) for implementing NEPA.

2.10.1.2 Atomic Energy Act of 1954, as Amended (42 U.S.C. § 2011 et seq.)

The Atomic Energy Act, as amended, and the Energy Reorganization Act of 1974 (42 U.S.C. § 5801 et seq.) give the NRC the licensing and regulatory authority for nuclear energy uses within the commercial sector. If the license application for the proposed facilities is approved, the NRC would license and regulate the possession, use, storage, and transfer of licensed nuclear materials to protect public health and safety.

If the CFTC is a commercial facility, then the primary regulation governing the CFTC could be either a 10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities, which provides requirements for a license for production and utilization facilities or a 10 CFR Part 70, Domestic Licensing of Special Nuclear Material, which provides requirements for a license to possess and use special nuclear materials. If the ARR is not a test facility, but provides power to the grid, then it would be regulated under 10 CFR Part 50. Other applicable regulations for both include 10 CFR Part 20, Standards for Protection Against Radiation, 10 CFR Part 30, Rules of General Applicability to Domestic Licensing of Byproduct Material, 10 CFR Part 40, Domestic Licensing of Source Material, and 10 CFR 71, Packaging and Transportation of Radioactive Material. Either of the primary regulations, 10 CFR Part 50 or 10 CFR Part 70, invoke Appendix B of 10 CFR Part 50 for Quality Assurance, 10 CFR Part 51 for implementation of NEPA for NRC decisions on granting licenses, and 10 CFR Parts 73, 74, and 75 for physical protection, material control and accountability, and International Atomic Energy Agency (IAEA) requirements. Other NRC regulations such as 10 CFR Parts 2, 10, 11, 25, 26, 95, 170 and 171 apply for the licensing process, security clearances, special nuclear material access authorization, fitness-for-duty, NRC fees, and other programs required for the license. See additional detail in Section 2.10.1.20.

2.10.1.3 Clean Air Act, as Amended (42 U.S.C. § 7401 et seq.)

The Clean Air Act (CAA) establishes regulations to ensure air quality and authorizes individual States to manage permits. The Clean Air Act: (1) requires the EPA to establish NAAQS as necessary to protect the public health, with an adequate margin of safety, from any known or anticipated adverse effects of a regulated pollutant (42 U.S.C. § 7409 et seq.); (2) requires establishment of national standards of performance for new or modified stationary sources of atmospheric pollutants (42 U.S.C. § 7411); (3) requires specific emission increases to be evaluated so as to prevent a significant deterioration in air quality (42 U.S.C. § 7470 et seq.); and (4) requires specific standards for releases of hazardous air pollutants (including radionuclides) (42 U.S.C. § 7412). These standards are implemented through implementation plans developed by each State with EPA approval. CAA requires sources to meet air-quality standards and obtain permits to satisfy those standards. CCA authority has been delegated to the state of New Mexico, see Section 2.10.2.1.

2.10.1.4 Clean Water Act, as Amended (33 U.S.C. § 1251 et seq.)

The Clean Water Act (CWA) requires the EPA to set national effluent limitations and water-quality standards, and establishes a regulatory program for enforcement. Specifically, Section 402(a) of the Act establishes water-quality standards for contaminants in surface waters. The CWA requires a National Pollutant Discharge Elimination System (NPDES) permit before discharging any point source pollutant into waters of the EPA Region 6 administers this program with an oversight review by the New Mexico Environment Department Water Quality Bureau (NMED/WQB). The NPDES General Permit for Industrial Stormwater is required for point source discharge of stormwater runoff from industrial or commercial facilities to State waters. Construction of the proposed facilities would require an NPDES Construction Stormwater General Permit from EPA Region 6 and an oversight review by the NMED/WQB. Section 401 of the CWA requires States to certify that the permitted discharge would comply with all limitations necessary to meet established State water-quality standards, treatment standards, or schedule of compliance. Section 404 of the CWA requires a permit to place dredged or fill material into waters of the U.S. The EPA implements the CWA in 40 CFR 100-135.

In April 2004, the State of New Mexico began the process of assuming NPDES permitting responsibilities within the State (NMED, 2004a). Jurisdiction would be transferred from EPA Region 6 to the New Mexico Environment Department Surface Water Quality Bureau. After the transfer of jurisdiction is complete, State implementation of NPDES permitting would be phased in over a five-year period (NMED, 2004b). See additional detail in Section 2.10.1.20.

2.10.1.5 Resource Conservation and Recovery Act, as Amended (42 U.S.C. § 6901 et seq.)

The Resource Conservation and Recovery Act (RCRA) requires the EPA to define and identify hazardous waste; establish standards for its transportation, treatment, storage, and disposal; and require permits for persons engaged in hazardous waste activities. Section 3006 of the RCRA (42 U.S.C. § 6926) allows States to establish and administer these permit programs with EPA approval. EPA Region 6 has delegated regulatory jurisdiction to the New Mexico Environment Department Hazardous Waste Bureau for nearly all aspects of permitting in accordance with the New Mexico Hazardous Waste Act (See Section 2.10.2.6).

The RCRA addresses underground storage tanks (USTs) containing petroleum products or hazardous chemicals. The NMED has also been authorized to by EPA to regulate USTs in accordance with 20.5 NMAC. NMED also regulates above ground petroleum storage tanks.

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

The Low-Level Radioactive Waste Policy Act of 1980 amended the Atomic Energy Act to specify that the Federal Government is responsible for disposal of low-level radioactive waste generated by its activities and that States are responsible for non-federal low-level radioactive waste generated in their state. The Low-Level Radioactive Waste Policy Act of 1980 provides for and encourages interstate compacts to carry out the State responsibilities. Low-level radioactive waste would be generated from activities conducted from the proposed facilities. The State of New Mexico is a member of the Rocky Mountain compact (See Section 2.8).

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

The Emergency Planning and Community Right-to-Know Act of 1986, which is the major amendment to the CERCLA (42 U.S.C. § 9601), establishes the requirements for Federal, State, and local governments; Indian tribes; and industry regarding emergency planning and “Community Right-to-Know” reporting on hazardous and toxic chemicals. The “Community Right-to-Know” provisions increase the public’s knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities working with facilities can use the information to improve chemical safety and protect public health and the environment. This Act requires emergency planning and notice to communities and government agencies concerning the presence and release of specific chemicals. The EPA implements this Act under regulations found in 40 CFR Parts 355, 370, and 372. This Act requires the proposed facilities to report on hazardous and toxic chemicals used and produced at the facility, and to establish emergency planning procedures in coordination with the local communities and government agencies. New Mexico has parallel legislation (See Section 2.10.2.7). See additional information in Section 2.10.1.20.

2.10.1.8 Safe Drinking Water Act, as Amended (42 U.S.C. § 300f et seq.)

The Safe Drinking Water Act (SDWA) was enacted to protect the quality of public water supplies and sources of drinking water. The New Mexico Environment Department Drinking Water Bureau, under 42 U.S.C. § 300g-2 of the Act, established standards applicable to public water systems. These regulations include maximum contaminant levels (including those for radioactivity) in public water systems. Other programs established by the SDWA include the Sole Source Aquifer Program, the Wellhead Protection Program, and the Underground Injection Control Program. In addition, the Act seeks to protect underground sources of drinking water from contaminated releases and spills (for example, implementing a Spill Prevention Control and Countermeasure Plan). The EPA delegated authority for ensuring compliance with the SDWA's National Primary Drinking Water Standards by approving the NMED's Drinking Water Regulations (DWRs).

2.10.1.9 Noise Control Act of 1972, as Amended (42 U.S.C. § 4901 et seq.)

The Noise Control Act delegates the responsibility of noise control to State and local governments. Commercial facilities are required to comply with Federal, State, interstate, and local requirements regarding noise control. Lea County does not have a noise control ordinance. Noise is addressed in Section 2.9.

2.10.1.10 National Historic Preservation Act of 1966, as Amended (16 U.S.C. § 470 et seq.)

The National Historic Preservation Act (NHPA) was enacted to create a national historic preservation program, including the National Register of Historic Places and the Advisory Council on Historic Preservation (ACHP). Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties. The Advisory Council on Historic Preservation regulations implementing Section 106, found in 36 CFR Part 800, were revised and became effective on August 5, 2004 (ACHP, 2004). These regulations call for public involvement in the Section 106 consultation process, including Indian tribes and other interested members of the public, as applicable. Historical and cultural resources near and within the Site are described in Section 2.7.8. No issues were identified that would preclude licensing and permitting the proposed Site facilities. The New Mexico Statute covering cultural resources can be found in Section 2.10.2.15.

2.10.1.11 Endangered Species Act of 1973, as Amended (16 U.S.C. § 1531 et seq.)

The ESA was enacted to prevent the further decline of endangered and threatened species and to restore those species and their critical habitats. Section 7 of the Act requires consultation with either or both the USFWS of the U.S. Department of the Interior and the National Marine Fisheries Service of the U.S. Department of Commerce to determine whether endangered and threatened species or their critical habitats are known to be in the vicinity of the proposed action. The regulations stemming from this legislation are addressed in Section 2.6.3. There are no threatened or endangered species on the Site. New Mexico has similar legislation (Section 2.10.2.11). See additional information regarding Federal implementation in 2.10.1.20.

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

The Occupational Safety and Health Act establishes standards to enhance safe and healthy working conditions in places of employment throughout the United States. The Act is administered and enforced by the Occupational Safety and Health Administration (OSHA), a U.S. Department of Labor agency. The OSHA regulates mitigation requirements and mandates proper training and equipment for workers. New Mexico implements state OSHA statutes (see Section 2.10.2.18). See additional information in Section 2.10.1.20.

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

The Hazardous Materials Transportation Act regulates transportation of hazardous material (including radioactive material) in and between States. According to the Act, States may regulate the transport of hazardous material as long as they are consistent with the Act or the U.S. Department of Transportation (DOT) regulations provided in 49 CFR Parts 171-177. Title 49 CFR Part 173, Subpart I, contains regulations regarding packaging for transportation of radionuclides. Transportation of the hazardous material (including radioactive material) to and from the proposed facilities would require compliance with the DOT regulations. See additional information in Section 2.10.1.20.

2.10.1.14 Bald and Golden Eagle Protection Act of 1972, (16 U.S.C. § 668-668d)

The Bald and Golden Eagle Protection Act makes it unlawful to take, pursue, molest, or disturb both bald and golden eagles. The statute imposes criminal and civil sanctions, as well as an enhanced penalty provision for subsequent offenses.

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

These regulations establish the maximum doses to the body or organs resulting from operational normal releases received by members of the public. These regulations were promulgated under the authority of the Atomic Energy Act of 1954, as amended. Portions of the proposed facilities would be required to comply with these regulations for its releases due to normal operations. This regulation would apply to the CFTC since it will reprocess spent uranium fuel. It would not apply to the ARR.

2.10.1.16 National Emission Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR Part 61)

If the CFTC and ARR are licensed by the NRC, then radionuclide releases are exempt from NESHAPS in accordance with Subpart I. If the CFTC and ARR are DOE facilities, then they are subject to Subpart H. See Section 2.10.2.18 for further information on air quality permits that the facility may require from New Mexico.

2.10.1.17 International Atomic Energy Agency

The Energy Research and Development Administration became DOE under this Act. The Act directed DOE to address environment, safety and health, socioeconomics, institutional, and technology development in an integrated manner.

2.10.1.18 Migratory Bird Treaty Act

The Migratory Bird Treaty Act establishes regulations to protect birds that have common migratory flyways between the United States and Canada, Mexico, Japan, and Russia. The act makes it unlawful “at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, or attempt to take, capture, or kill…any migratory bird, any part, nest, or eggs of any such bird” unless specifically authorized by the Secretary of the Interior by direction or through regulations permitting and governing these actions.

2.10.1.19 Applicable Executive Orders

Executive Order 11514

This Executive Order directs Federal agencies to monitor and control their activities to protect and enhance the quality of the environment. It also requires the agencies to include the public in the decision-making process for agency actions. The public will be included in any environmental evaluations performed by NRC or DOE.

Executive Order 11988

This Executive Order directs Federal agencies to establish procedures to ensure that the potential effects of flood hazards and floodplain management are considered for any action undertaken in a floodplain and that floodplain impacts be avoided to the extent practicable. As described in Section 2.2.4, the proposed facilities are not within a floodplain.

Executive Order 12898

This Executive Order requires Federal agencies to address environmental justice in minority populations and low-income populations (59 FR 7629), and directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. Environmental justice is assessed in Section 2.7.6. No environmental justice related issues were identified that would preclude licensing the Site.

Executive Order 13007

This Executive Order directs Federal agencies to protect and preserve American Indian Tribes' religious practices by providing access to and ceremonial uses of sacred sites by Tribal religious practices where feasible and permitted by law. This Order also states that Federal agencies will maintain government-to-government relations with Tribal governments. The NRC and/or DOE will contact regional federally recognized Indian tribes, soliciting their interest in being consulting parties in the consultation process for the proposed project.

Executive Order 13175

This Executive Order directs Federal agencies to establish processes to ensure meaningful and timely input through consultation and collaboration with Tribal officials in the development of regulatory policies that have Tribal implications. The NRC and/or DOE will contact regional Federally recognized Indian tribes, soliciting their interest in being consulting parties in the consultation process for the proposed project.

Executive Order 13186

This Executive Order directs each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within two years, a process to support the conservation intent of the migratory bird conventions, restore and enhance the habitat of migratory birds, as practicable, and prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds. Although Laguna Gatuna may attract migratory birds, the poor water quality provides a very poor habitat.

2.10.1.20 Involved Federal Agencies

Nuclear Regulatory Commission

The Atomic Energy Act of 1954, as amended, gives the NRC regulatory jurisdiction over the design, construction, operation, and decommissioning of the facility specifically with regard to assurance of public health and safety. The NRC would perform periodic surveillance of construction, operation and maintenance of the proposed facilities.

The 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.

If the CFTC is a commercial facility, then the primary regulation governing the CFTC could be either a revised 10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities, which provides requirements for a license for production and utilization facilities or 10 CFR Part 70, Domestic Licensing of Special Nuclear Material, which provides requirements for a license to possess and use special nuclear materials. It is assumed in this report that the ARR would be regulated under 10 CFR Part 50. Other applicable regulations for both facilities include 10 CFR Part 20, Standards for Protection Against Radiation, 10 CFR Part 30, Rules of General Applicability to Domestic Licensing of Byproduct Material, 10 CFR Part 40, Domestic Licensing of Source Material, and 10 CFR 71, Packaging and Transportation of Radioactive Material. Either of these primary regulations, 10 CFR Part 50 or 10 CFR Part 70, invoke Appendix B of 10 CFR Part 50 for Quality Assurance, 10 CFR Part 51 for implementation of the National Environmental Policy Act for NRC decisions on granting licenses, and 10 CFR Parts 73, 74, and 75 for physical protection, material control and accountability, and IAEA requirements. Other NRC regulations such as 10 CFR Parts 2, 10, 11, 25, 26, 95, 170 and 171 apply for the licensing process, security clearances, special nuclear material access authorization, fitness-for-duty, NRC fees, and other programs required for the license.

U.S. Environmental Protection Agency

The EPA has primary authority relating to compliance with the CAA, CWA, SDWA, and RCRA. Except for the CWA, EPA Region 6 has delegated regulatory jurisdiction to the New Mexico Environmental Department (NMED) Hazardous Waste Bureau (HWB) 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 2.10.2.

Environmental Standards for the Uranium Fuel Cycle (40 CFR 190 Subpart B) (CFR, 2007a) 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, 2007b) establishes limits on emission of radionuclides to air such that the public would not receive an effective dose equivalent exceeding 10 mrem/yr.

SDWA provides for protection of public water supply systems and underground sources of drinking water. 40 CFR 141.2 (CFR, 2007c) 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. The proposed facilities will not use site groundwater or surface water supplies. The proposed facilities will obtain potable water from nearby municipal water supply systems.

The Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 350 to 372) (CFR, 2007d) 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.

NPDES General Permit for Industrial Stormwater 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.

A NPDES General Permit for Construction Stormwater is required since construction of the facility will involve the grubbing, clearing, grading or excavation of more than 1 acre of land. This will require a NPDES Construction Stormwater General Permit (CGP) from the EPA Region 6 and an oversight review by the NMED/WQD. Various land clearing activities such as offsite borrow pits for fill material may also be covered under this general permit. As part of this permitting process, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and a Notice of Intent (NOI) will be filed with the EPA at least two days prior to the commencement of construction activities.

U.S. Department of Transportation

Transport of licensed nuclear materials will require 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, 2007e)
- 49 CFR 171, General Information, Regulations and Definitions (CFR, 2007f)
- 49 CFR 173, Shippers – General Requirements for Shipments and Packages, Subpart I: Radioactive Materials (CFR, 2007g)
- 49 CFR 177, Carriage by Public Highway (CFR, 2007h)
- 49 CFR 178, Specification for Packagings (CFR, 2007h)

All provisions of these enabling regulations will be met prior to the transport of any licensed nuclear material.

U.S. Army Corps of Engineers

CWA 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 facilities will not impact or involve any wetlands, surface waters, dams, or other waterways. Therefore, a Section 404 permit will not be required. The need for USACE permits is addressed in Section 2.5.2.

Occupational Safety and Health Administration

The Occupational Safety and Health Act of 1970 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. Applicable regulations are found in 29 CFR 1910 (CFR, 2007i) for general industry and 29 CFR 1926 (CFR, 2007j) for construction activities. OSHA regulates mitigation requirements and mandates proper training and equipment for workers.

If either the CFTC or ARR is DOE-owned, then chemical and industrial safety will be overseen by DOE. A Memorandum of Understanding between OSHA and NRC allows NRC to identify any violations to the licensee for correction, if correction does not occur, then NRC will notify the regional Federal OSHA office.

U.S. Department of Interior

The USFWS is responsible for the protection of threatened and endangered species. As discussed in Section 2.6.3, there are no threatened or endangered species on the Site.

2.10.2 State

This section describes the State laws, regulations, and agencies that would apply or be involved with licensing and permitting a CFTC and/or ARR at the Site.

2.10.2.1 New Mexico Air Quality Control Act

New Mexico Statutes Annotated (NMSA), Chapter 74, "Environmental Improvement," Article 2, "Air Pollution," and implementing regulations in NMAC Title 20, Environmental Protection, Chapter 2, "Air Quality," establishes air-quality standards and permit requirements prior to construction or modification of an air-contaminant source. These regulations also define requirements for an operating permit for major producers of air pollutants and imposes emission standards for hazardous air pollutants. See Section 2.10.2.20 for further information on air quality permits.

2.10.2.2 New Mexico Radiation Protection Act

NMSA, Chapter 74, Article 3, "Radiation Control," establishes State requirements for worker protection from radiation sources. If the facilities are privately owned, the State will require registration of security X-ray machines. The implementation regulations are in NMAC, Title 20, Chapter 3.

2.10.2.3 New Mexico Water Quality Act

NMSA, Chapter 74, Article 6, “Water Quality,” and implementing regulations found in NMAC Title 20, Chapter 6, “Ground and Surface Water Protection,” establishes water-quality standards and applies to permitting prior to construction, during operation, closure, post-closure, and abatement, if necessary. Generally, a permit is required for discharges that could impact surface or ground water. Any impoundments for sewage treatment facilities, cooling water or other discharges that exceed the standards listed in 20.6.2.3103 NMAC or contain toxic constituents require a permit. No environmental or site issues were identified that would preclude permitting the facilities at the Site.

2.10.2.4 New Mexico Groundwater Protection Act

NMSA, Chapter 74, Article 6B, “Groundwater Protection,” and the implementing regulations found at NMAC Title 20, Chapter 5, establishes State standards for protection of groundwater from leaking underground and above ground storage tanks.

2.10.2.5 New Mexico Solid Waste Act

NMSA, Chapter 74, Article 9, “Solid Waste Act,” and implementing regulations found in NMAC Title 20, Environmental Protection, Chapter 9, “Solid Waste,” establishes State standards for the management of solid wastes.

2.10.2.6 New Mexico Hazardous Waste Act

NMSA, Chapter 74, Article 4, “Hazardous Waste,” and implementing regulations found in NMAC Title 20, Environmental Protection, Chapter 4, “Hazardous Waste,” establishes State standards for the management of hazardous wastes. The NMED regulations implementing the RCRA are found in 20.4. Regulations imposed on a generator or on a treatment, storage, and/or disposal facility vary according to the type and quantity of material or waste generated, treated, stored, and/or disposed. The method of treatment, storage, and/or disposal also impacts the extent and complexity of the requirements. The proposed facilities may generate hazardous waste during construction and operation. These hazardous wastes will be temporarily stored and shipped off-site for treatment and disposal in accordance with applicable NMAC and RCRA requirements. Source, special nuclear or by-product material as defined by the Atomic Energy Act is specifically excluded from the definition of a solid waste and therefore cannot be a hazardous waste regulated under RCRA. Therefore, it is assumed that the CFTC and ARR facilities will not treat, store (other than temporarily) or dispose of a hazardous waste and not require a permit under the authority of RCRA or the New Mexico Hazardous Waste Act.

2.10.2.7 New Mexico Hazardous Chemicals Information Act

NMSA, Chapter 4, Article 4E-1, “Hazardous Chemicals Information Act,” implements the hazardous chemicals information and toxic release reporting requirements of the Emergency Planning and Community Right-to-Know Act of 1986 (Superfund Amendments and Reauthorization Act (SARA) Title III) for covered facilities.

2.10.2.8 New Mexico Wildlife Conservation Act

NMSA, Chapter 17, Game and Fish, Article 2, “Hunting and Fishing Regulations,” and Part 3, “Wildlife Conservation Act,” requires a permit and coordination if a project may disturb habitat or otherwise affect threatened or endangered species. As described in Section 2.6.3, no threatened or endangered species occur on the Site.

2.10.2.9 New Mexico Raptor Protection Act

NMSA, Chapter 17, Articles 2-14 makes it unlawful to take, attempt to take, possess, trap, ensnare, injure, maim, or destroy any species of hawks, owls, and vultures.

2.10.2.10 New Mexico Endangered Plant Species Act

NMSA, Chapter 75, Miscellaneous Natural Resource Matters, Article 6, “Endangered Plants,” requires coordination with the State if a proposed project affects an endangered plant species. As described in Section 2.6.3, no threatened or endangered species occur on the proposed Site.

2.10.2.11 Threatened and Endangered Species of New Mexico

NMAC Title 19, Natural Resources and Wildlife, Chapter 33, "Endangered and Threatened Species," 19.33.6.8, establishes the list of threatened and endangered wildlife species. As described in Section 2.6.3, no threatened or endangered species occur on the Site.

2.10.2.12 Endangered Plant Species

NMAC Title 19, Chapter 21, "Endangered Plants," establishes an endangered plant species list and rules for collection. As described in Section 2.6.3, no threatened or endangered species occur on the Site.

2.10.2.13 Transportation and Highway

NMAC Title 18, Chapter 31, Part 6, "State Highway Access Management Requirements," establishes state highway access management requirements that will protect the functional integrity of and investment in, the state highway system.

2.10.2.14 State Trust Lands Land Exchanges

NMAC Title 19, Chapter 2, Part 21, "Land Exchanges," establishes State standards and procedures for exchanges of lands held in trust, including consideration of cultural and natural resources and wildlife.

2.10.2.15 New Mexico Cultural Properties Act

NMSA, Chapter 18, Libraries and Museums, Article 6, "Cultural Properties," establishes the SHPO and requirements to prepare an archaeological and historic survey and consult with SHPO.

2.10.2.16 Registration of Tanks

NMAC, Title 20, Chapter 5, Part 2, "Registration of Tanks," establishes the State standards for the regulation of petroleum storage tanks.

2.10.2.17 New Mexico Night Sky Protection Act

NMSA Chapter 74, Article 12, "Night Sky Protection," establishes requirements to preserve and enhance the state's dark sky while promoting safety, conserving energy and preserving the environment for astronomy. These requirements would be addressed during detailed design of the facility.

2.10.2.18 New Mexico Occupational Safety and Health

NMSA, Chapter 50, Sections 1-25, and implementing regulations at NMAC Title 11, Labor Workers Compensation, Chapter 5, "Occupational Safety and Health" establishes State requirements for assuring safe and healthful working conditions for every employee.

2.10.2.19 Environmental Improvement Act-Drinking Water Regulations

NMSA 1978, Sections 74-1-8 and 74-1-13.1 require the establishment of drinking water standards for New Mexico. These regulations are found at 20.7.10 NMAC. The proposed facilities would not use onsite groundwater or surface water supplies and would obtain potable water from nearby municipal water supply systems. Under the New Mexico drinking water regulations at Title 20 Chapter 7, the facility would be classified as a non-transient, non-community water supply system if it regularly serves greater than 25 people.

2.10.2.20 Involved State Agencies

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. The general and specific NMED permits and permit requirements are discussed below under the NMED Bureau that has responsibility for reviewing and approving the permitting action.

New Mexico Air Quality Bureau (NMED/AQB)

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 as follows (NMAC, 2002a):

- Construction Permits are required for any person constructing a stationary source which has a potential emission rate greater than 10 lbs per hour or 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 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 regulation, the potential emission rate for nitrogen dioxide is based on total oxides of nitrogen; all sources with the potential emission rate greater than 10 lbs per hour, or 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 100 tons per year for criteria pollutants. In addition, major sources also include facilities that have the potential to emit greater than 10 tons per year of a single Hazardous Air Pollutant, or 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.

New Mexico Water Quality Bureau (NMED/WQB)

NPDES General Permit for Industrial Stormwater 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 NMED/WQB. The facility may be eligible to claim the “No Exposure” exclusion for industrial activity of the NPDES Stormwater Phase II regulations. As such, the owner would submit a No Exposure Certification immediately prior to initiating operational activities at the Site. The owner also has the option of filing for coverage under the Multi-Section General Permit (MSGP). If this option is chosen, the owner will file a Notice of Intent (NOI) with the EPA at least two days prior to the initiation of operations. There is also an option to obtain an individual NPDES permit. The facility may be required to obtain this type of permit based on facility final design. A decision regarding which option is appropriate for the facility will be made in the future.

A NPDES General Permit for Construction Stormwater will be required. Construction of the facility will involve the grubbing, clearing, grading or excavation of more than 1 acre 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 may also be covered under this general permit. The owner will also develop a SWPPP and file a NOI with the EPA at least two days prior to the commencement of construction activities.

The New Mexico Water Quality Bureau requires that facilities that discharge an aggregate waste water of more than 2,000 gal per day septic systems apply for and submit a groundwater discharge permit and plan. Discharges to surface impoundments, such as evaporative basins, may also require a groundwater discharge permit. This requirement is based on the assumption that these discharges have the potential of affecting groundwater. The facility will likely require a groundwater discharge permit. Based on experience at two nearby nuclear facilities (see Table 1.7-1), it is concluded that the facility will be able to secure this permit. The groundwater discharge permit/plan is required under New Mexico Administrative Code (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. Following completion of the public notice process, the NMED will issue a draft permit for review and comment. 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.

An Aquatic Resource Alteration Permit (ARAP/Section 401 Certification) 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. Under Section 401 of the federal Clean Water Act, states can review and approve, condition, or deny all federal permits or licenses that might result in a discharge to State waters, including wetlands. A 401 certification confirms compliance with the State water quality standards. Activities that require a 401 certification include Section 404 permits issued by the USACE. The State of New Mexico has a cooperative agreement and joint application process with the USACE relating to 404 permits and 401 certifications. No Corps of Engineers jurisdictional wetlands were identified on the Site as discussed in Section 2.5.2. Based on site conditions, a 404 permit or 401 certification will not be required.

New Mexico Hazardous Waste Bureau (NMED/HWB)

The NMED/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. In general, the regulations promulgated pursuant to the Hazardous Waste Act incorporate the federal requirements under RCRA, 40 CFR 260-283, by reference. 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 are required for the treating, storing or disposing of hazardous wastes. Source, special nuclear or by-product material as defined by the Atomic Energy Act is specifically excluded from the definition of a solid waste and therefore cannot be a hazardous waste regulated under RCRA. Therefore, it is assumed that the CFTC and ARR facilities will not treat, store (other than temporarily) or dispose of a hazardous waste and not require a permit under the authority of RCRA or the New Mexico Hazardous Waste Act. 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 some hazardous waste will be accumulated at the facility for eventual offsite disposal in accordance with the hazardous waste generator requirements. The actual generation category (conditionally exempt, small quantity or large quantity generator) will be determined as the facility is designed.

New Mexico State Land Office (NMSLO)

A Right–of-Entry Permit is required to access state land. 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. Since the Site is not State-owned land, a Right-of-Entry Permit will not be required. If any State lands are used for background or offsite monitoring locations, a permit would be required.

New Mexico Department of Game and Fish (NMDGF)

Rare, Threatened and Endangered Species Survey permits will be required to conduct site surveys. 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. Permits will be obtained to conduct rare, threatened and endangered (RTE) surveys for both plants and animals.

New Mexico Energy, Minerals and Natural Resources Department (NMED/EMNRD)

The mission of he Forestry Division within EMNRD includes the protection of endangered plant species. The program describes the rules and permitting requirements during scientific investigations and collection activities. As described in Section 2.6.3, no threatened or endangered species occur on the proposed Site.

New Mexico Radiological Control Bureau (NMED/RCB)

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, 2001). 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. The facility is likely to use non-destructive (x-ray) inspection systems for package security requirement. If the output at 1 foot from the unit exceeds 0.5 mR/hr, then the x-ray unit must be registered with the State Radiological Control Bureau under NMAC 20.3.11.

New Mexico State Historic Preservation Office (SHPO)

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. Information on historic, archaeological, and cultural resources is provided in Section 2.7.8. Any cultural sites that are eligible for listing on the National Registry of Historic Places will be avoided or data recovery will be performed. These efforts would be coordinated with the SHPOs.

New Mexico Office of the State Engineer (OSE)

Groundwater monitoring wells are permitted through OSE and well locations along with the boring logs are submitted to the OSE.

2.10.3 Local Agencies

The purpose and objectives of this site evaluation have been communicated and coordinated with local organizations. Officials in Lea and Eddy Counties have been contacted for pertinent information to support this preliminary site assessment.

Emergency support services for the proposed facilities at the Site would be coordinated at the appropriate time with State and local agencies. These services would include central dispatch points of contact for fire, Emergency Medical Services (EMS) and local law enforcement personnel. Mutual aid agreements exist between local police departments, county sheriff departments, and the New Mexico State Police, which are activated if additional police support is needed. Mutual aid agreements also exist for additional fire and medical services.

Memorandum of Understanding (MOU) would be developed between the facility operator for police, fire and medical emergency services. Signees would include local police departments, local sheriff offices, and the New Mexico Department of Public Safety, which includes both the New Mexico State Police and the New Mexico Office of Emergency Management. Similar MOUs have been implemented to provide support for the LES NEF under construction near the City of Eunice in Lea County, New Mexico and the DOE's WIPP. Local emergency responders and medical facilities are well prepared and trained to respond to releases of radioactive materials and contaminated personnel. Routine emergency response drills and specialized training has been conducted by the DOE for local personnel as well as emergency responders along the major transportation corridors to and from the Lea and Eddy County areas as a contingency for any TRU waste incidents related to shipment to the WIPP facility.

2.10.4 Required Licenses and Permits

Various licenses and permits would be required for construction and operation of a CFTC and/or ARR at the Site. These licenses and permits are listed in Table 2.10.0-1 along with a discussion of the Site characteristics and facility features associated with each license or permit that has been considered in this preliminary site evaluation.

Building Permits for foundations, structures, electrical and mechanical would be required from New Mexico Regulation and Licensing/Construction Industries Division (NMRL/CID). These permits are required for temporary construction-related structures, such as office trailers, and all permanent structures. Site security fencing will also require a permit from NMRL/CID.

There are no local or county zoning issues that would preclude use of the Site.

2.10.5 Summary and Conclusions of Regulatory Review

This regulatory review identified local, regional, state and national regulatory and environmental licenses and permits required for the facility. Existing regional and site environmental data and additional site environmental data collected during this study has been utilized to compare site characteristics with licensing and permitting requirements. The comparisons, summarized in Table 1.7-1, demonstrate that the information collected to date shows that the Site is very suitable for the proposed facilities. In addition, no legislative or regulatory prohibitions were identified that might prevent siting and permitting the CTFC and ARR facilities at the Site. This conclusion is supported by the results of the review and by the demonstrated successful federal licensing and state permitting of two nearby nuclear facilities: the Waste Isolation Pilot Plant in Eddy County, New Mexico and the National Enrichment Facility in Eunice, Lea County, New Mexico.

2.11 Cleanup and Remediation

2.11 Cleanup and Remediation

This section of the DSR addresses the results of a review of the National Priorities List (NPL) and the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) to determine if the Site is currently listed in these databases. It also presents the results of the Phase I and limited Phase II Environmental Site Assessment (ESA) of oil industry related existing contamination at the Site. Naturally occurring radioactive materials (NORM) are evaluated. The construction materials for an existing potable water pipeline crossing the Site were researched and the results are presented.

2.11.1 NPL and CERCLIS Information

There were no listings of the Site on the National Priorities List or on the Federal Comprehensive Environmental Response, Compensation and Liability Information System.

2.11.2 Summary of Phase I Environmental Site Assessment (ESA)

A Phase I ESA of the Site has been performed for the ELEA. Appendix 2G provides the full report. The purpose of the ESA is to identify recognized environmental conditions (RECs) in connection with the Subject Property, to the extent feasible, pursuant to the processes prescribed in the ASTM Practice E 1527-05 entitled "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process" (ASTM Standard), and the EPA Rule entitled, "Standards and Practices for All Appropriate Inquiries; Final Rule" (AAI Rule, 40 CFR Part 312) (EPA, 2007c) and professional judgment.

The ASTM Standard defines RECs as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws."

The scope of the Phase I ESA consisted of the following tasks:

- Records Review
- Site Reconnaissance
- Interviews

This assessment has revealed the following evidence of RECs in connection with the Subject Property:

- Portions of the Subject Property were used for oil-field brine and oil-field solids (drill cuttings, mud and tank bottoms) disposal. It is not actually known what waste was accepted. There is potential that hazardous or NORM waste was disposed of in the area where oil field solids have been landfilled.
- The New Mexico Oil Conservation Division (OCD) has detected hydrocarbons in brine seeping from the disposal facility in Section 18, indicating hydrocarbons have possibly impacted Laguna Gatuna
- Stained soil and old tank bottoms were identified in various locations of the property associated with oil field production activities

The following other potential environmental concerns, including de minimis conditions, at the Site have been identified:

- The property has been associated with oil and gas exploration and development with numerous plugged oil or gas wells located on the property. Based on the age of the wells (1940s through the 1980s) the pits associated with these wells were likely not lined or closed properly and are potential source of contamination.
- Commercial brine disposal operations as well as past oil production operations have resulted in discharges of large quantities of brine into Laguna Gatuna. This may have caused an increase of

salinity of any fresh water present in the subsurface or created brine groundwater saturation beneath the Site.

The construction zone shown in Figure 2.11.2-1 avoids the identifiable RECs associated with the Site.

2.11.3 Limited Phase II ESA Media Sampling and Analysis

During the Site investigation, surface and subsurface soil and groundwater samples were collected for laboratory analyses. Laboratory analyses were performed as follows:

- ***Soil***
  - Volatile Organic Compounds (VOCs)
  - Semivolatile Organic Compounds (SVOCs)
  - Organochlorine Pesticides (OCPs)
  - Polychlorinated Biphenyls (PCBs)
  - Polyaromatic Hydrocarbons (PAHs)
  - Metals
  - Oil and Grease
  - Density
  - Chloride
  - Total Petroleum Hydrocarbons (TPH)
  - Radionuclides – Gamma
  - Radionuclides – Total
- ***Water***
  - VOCs
  - Anions
  - Mercury
  - Total Recoverable Metals
  - Alkalinity
  - Specific Conductance
  - Ammonia
  - Total Nitrogen (TN)
  - pH
  - Specific Gravity
  - Total Dissolved Solids (TDS)
  - Total Kjeldahl Nitrogen (TKN)
  - Total Suspended Solids (TSS)
  - Cyanide
  - Total Inorganic Carbon (TIC)
  - Total Organic Carbon (TOC)
  - Total Metals
  - Total Radionuclides

Media sample locations are depicted on the map in Figure 2.11.3-1. Sample locations are described as follows.

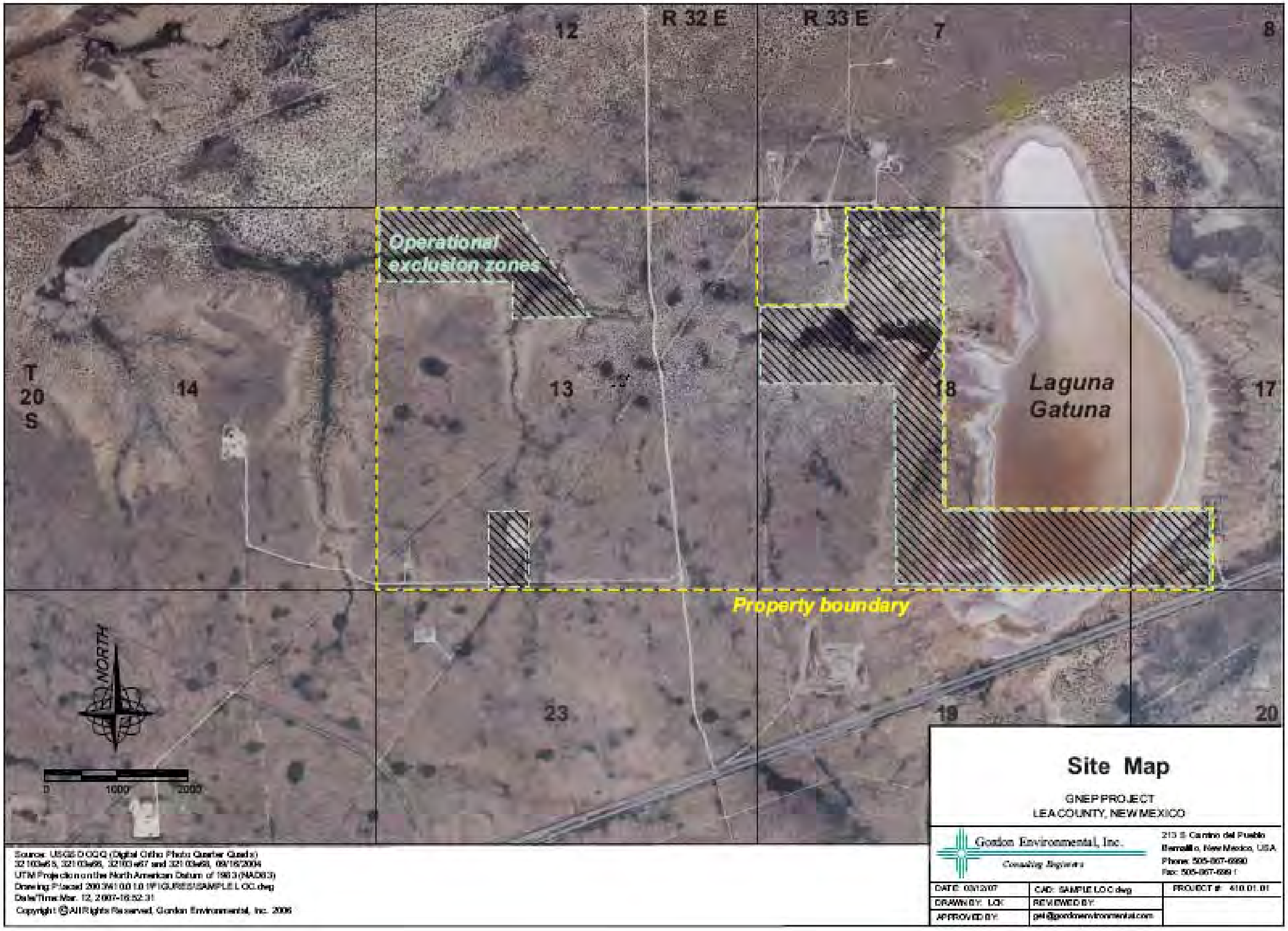


Figure 2.11.2-1 Site Map Showing the Construction Zone

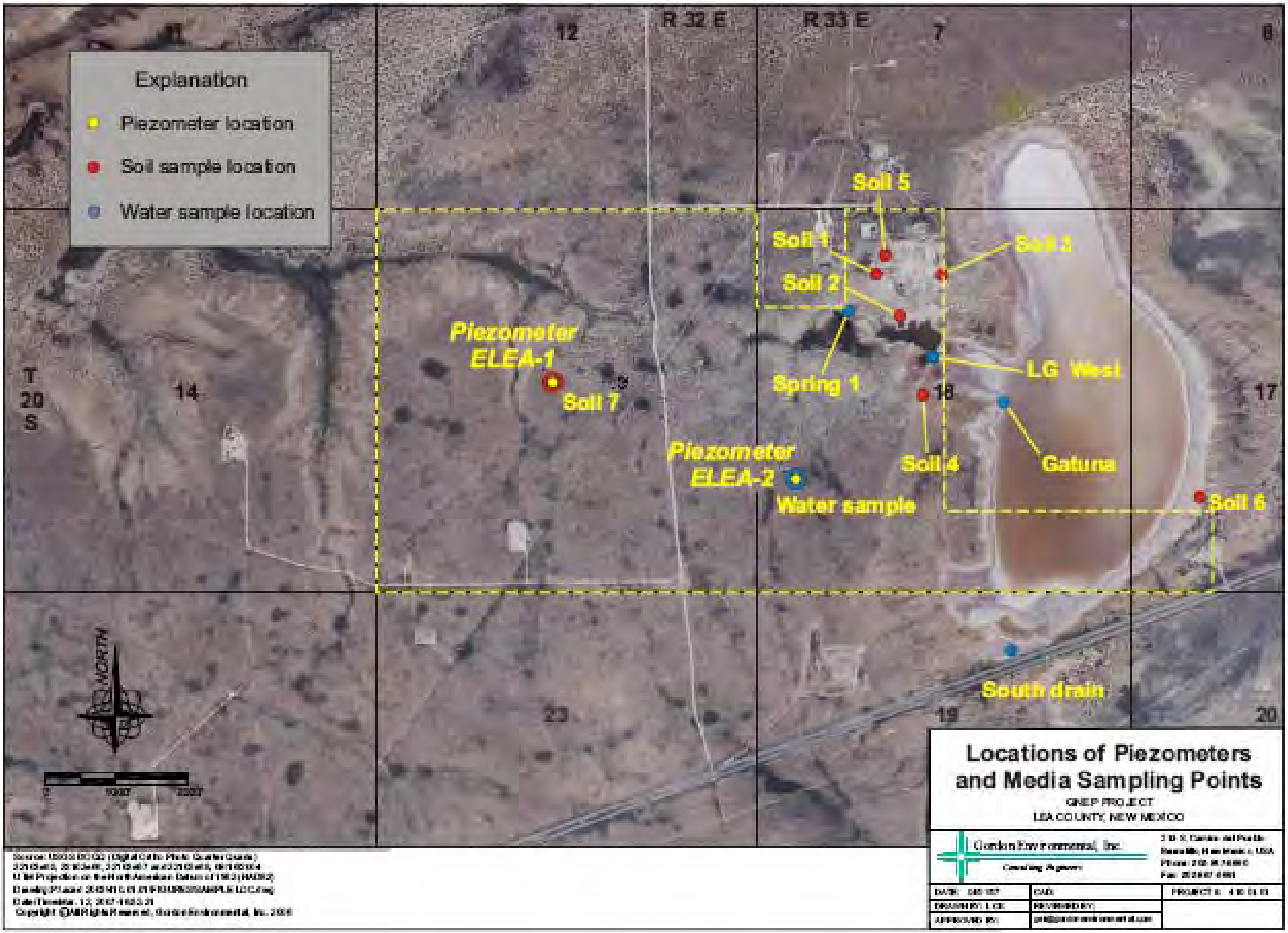


Figure 2.11.3-1 Location of Piezometer and Media Sampling Points

Figure 2.11.3-2 Oilfield Disposal Sites and Impact Areas

2.11.3.1 Soil Sample Locations

- **S-1** – collected from the southwest portion of the PCI disposal facility. Sample consisted of oilfield solids, including tank bottom residue and drilling mud from a former disposal cell (See Figure 2.11.3-3)
- **S-2** – collected on the north bank of the west tributary surface water impoundment from lacustrine-eolian sediments
- **S-3** – collected from southeast area of the PCI facility. Sample consisted of tank bottom residue and drilling mud
- **S-4** – collected from Triassic redbed outcrop on the south flank of the west tributary (See Figure 2.11.3-4)
- **S-5** – collected from near plumbing equipment and partially-buried tank at the PCI disposal site (See Figure 2.11.3-5)
- **S-6** – collected from lacustrine materials immediately downgradient from disposal pits at the Southeast Laguna Gatuna brine disposal site
- **ELEA-1 (P-1)** – composite drill cutting sample taken from Triassic redbeds in the interval 50-70 feet below grade, approximately 25 feet below the top of the bedrock surface

2.11.3.2 Water Sample Locations

- **Spring 1** – a brine spring emanating from the contact of lacustrine and Triassic redbed deposits and permeable eolian deposits above on the north flank of a prominent drainage entering Laguna Gatuna from the west. This location is immediately downhill from the PCI and Pronghorn solids and brine disposal facilities. Several brine seeps are present along the north flank of the tributary drainage immediately south of the disposal facilities (See Figure 2.11.3-2).
- **Laguna Gatuna West (LG West)** – this sample was collected from water impounded behind an earthen dike that was constructed to prevent non-aqueous phase liquids (floating oil) from entering the main playa.

Figure 2.11.3-3 Soil Sample from Oilfield Solids Disposal Pit in Landfill Area

Figure 2.11.3-4 Soil Sample Collection in Triassic Outcrop on South Flank of West Tributary of Laguna Gatuna

Figure 2.11.3-5 Plumbing and Partially Buried Tank at the Pollution Control Inc. Landfill Area

- **Laguna Gatuna (Gatuna)** – this sample was collected from the main water body of Laguna Gatuna.
- **ELEA 2 Piezometer (P-2)** – this sample was collected from the piezometer ELEA-2 located approximately 2,600 feet west of Laguna Gatuna. This piezometer penetrated water-bearing fractures in the Triassic redbeds at a depth of about 85 feet, approximately 60 feet below the top of the bedrock. Static water level elevation in this well is approximately 3 feet higher than the current water level in Laguna Gatuna.

2.11.4 Laboratory Analytical Results

Results of lab analyses indicate soil, surface water, and groundwater have been impacted by oilfield waste disposal in the area. In general, the data indicates that organic, metal, and radiological impacts to soil are localized to the immediate vicinity of the two primary disposal sites. No volatile or semivolatile organic compounds, pesticides or PCB’s were detected in any of the soil or water samples. Copies of laboratory reports for soil and water testing are included in Appendix 2I.

2.11.4.1 Soil Test Results

Table 2.11.4-1 summarizes the results of soil sample analyses. Lab results area also summarized on organic, metals and radiochemistry data maps in Figures 2.11.4-1, 2.11.4-2, and 2.11.4-3, respectively. Significant findings of soils sampling and analysis are:

- No VOCs or SVOCs were detected in any soil samples that were analyzed for these parameters.
- No pesticides or PCBs were detected in any soil samples that were analyzed for these parameters.

Table 2.11.4-1 Summary of Laboratory Testing for Soil Samples at the Site

Volatile Organic Compounds (VOCs)

Parameter	Analytical Test Method	Sampling Location and Test Result (mg/Kg)						
		P-1	S-1	S-2	S-3	S-4	S-5	S-6
*All parameters non-detect; refer to Appendix 2H for full parameter list.	8260B							

Semi-Volatile Organic Compounds (SVOCs)

Parameter	Analytical Test Method	Sampling Location and Test Result (mg/Kg)						
		P-1	S-1	S-2	S-3	S-4	S-5	S-6
*All parameters non-detect; refer to Appendix 2H for full parameter list.	8270C							

OCPs, PCBs, PAHs, METALS, RADIONUCLIDES & OTHER

Parameter	Analytical Test Method	Sampling Location and Test Result (mg/Kg)							Table A-1 Standards (mg/Kg)
		P-1	S-1	S-2	S-3	S-4	S-5	S-6	
Organochlorine Pesticides (OCPs)									
Aldrin									1.12
Alpha-BHC									3.99
Beta-BHC									14.0
Delta-BHC									—
Gamma-BHC (Lindane)									19.3
Chlordane									71.9
Dieldrin									1.20
Endosulfan I									—
Endosulfan II									—
Endosulfan Sulfate	8081	NA							—
Endrin									205
Endrin Aldehyde									—
Heptachlor									4.26
Heptachlor Epoxide									—
Methoxychlor									—
Toxaphene									17
4-4' DDE									17.4
4-4' DDD									111
4-4' DDT									78.1
Polychlorinated Biphenyls (PCBs)									
Arochlor 1016									41.3
Arochlor 1221									8.26
Arochlor 1232									8.26
Arochlor 1242	8082	NA							8.26
Arochlor 1248									8.26
Arochlor 1254									8.26
Arochlor 1260									8.26
Polyaromatic Hydrocarbons (PAHs)									
1-Methylnaphthalene									—
2-Methylnaphthalene									—
Acenaphthene									31.9
Acenaphthylene									—
Anthracene									1.93
Benz(a)anthracene									23.4
Benzo(a)pyrene									2.34
Benzo(b)fluoranthene									23.4
Benzo(g,h,i)perylene	8310	NA	0.43						—
Benzo(k)fluoranthene									234
Chrysene									0.955
Dibenz(a,h)anthracene									2.34
Fluoranthene									24,400
Fluorene									39.7
Indeno(1,2,3-cd)pyrene									2.34
Naphthalene									92.5
Phenanthrene			5.2						20,500
Pyrene									21.3
Metals									
Arsenic, As			**30**	5.3	**20**	14	**21**	16	**17.7**
Barium, Ba			360	60	910	17	830	57	78,000
Cadmium, Cd	6010B								564
Chromium, Cr			110	5.4	23	14	38	5.3	3,400
Lead, Pb		NA	220	0.79	48	6.0	650	0.71	800
Mercury, Hg (7471)	7471		0.13		0.28		0.26		100,000
Selenium, Se									5,680
Silver, Ag	6010B								5,680
Thallium, Tl									74.9
Uranium, U									—
Other									
Oil and Grease (mg/Kg)	413.2	NA	94,000		59,000		42,000	31	—
Density (g/cc)	E1109	2.50	1.61	2.27	1.39	2.27	1.67	2.50	—
Chloride, Cl^- (mg/Kg)	9056A	NA	7,300	43,000	26	97	760	150	—
TPH (mg/Kg)	418.1	NA	**68,000**		**59,000**		**42,000**	31	**100**
Radionuclides - Gamma									
Actinium-228 (pCi/g - dry)	E901.1	1.6 ± 0.6	NA	NA	NA	NA	NA	NA	—
Bismuth-214 (pCi/g - dry)	E901.1	0.9 ± 0.3	NA	NA	NA	NA	NA	NA	—
Lead-212 (pCi/g - dry)	E901.1	1.8 ± 0.3	NA	NA	NA	NA	NA	NA	—
Lead-214 (pCi/g - dry)	E901.1	1.4 ± 0.5	NA	NA	NA	NA	NA	NA	—
Potassium-40 (pCi/g - dry)	E901.1	29.3 ± 6.2	NA	NA	NA	NA	NA	NA	—
Radium-226 (pCi/g - dry)	E901.1	0.9 ± 0.3	15.4 ± 2.1	1.7 ± 0.4	17.8 ± 2.2	1.8 ± 0.6	20.7 ± 2.7	1.3 ± 0.3	—
Radium-228 (pCi/g - dry)	E901.1	NA							—
Gross Gamma (pCi/g - dry)	E901.1	34.1 ± 7.6	NA	NA	NA	NA	NA	NA	
Radionuclides - Total									
Gross Alpha (pCi/g - dry)	E900.0	7.4 ± 0.6	34.4 ± 1.2	7.2 ± 0.6	37.2 ± 1.2	7.1 ± 0.6	38.2 ± 1.2	12.3 ± 0.8	—
Gross Beta (pCi/g - dry)		30.1 ± 0.7	35.7 ± 0.8	14.8 ± 0.6	41.8 ± 0.8	25.0 ± 0.7	45.2 ± 0.8	13.2 ± 0.6	—

Notes:

Blank entry means parameter not detected

NA = Not Analyzed

E = EPA Method (Subcontractor designation)

(yellow) — No state or federal soil standard

(blue) Table A-1 or other standard (e.g., TPH) exceedance

(orange) *NMED Underground Storage Tank Bureau, Guidelines for Corrective Action, March 13, 2000, Ch. 1.0, p. 1-2, Sec. 1.3*

Table A-1 = *NMED Hazardous Waste Bureau and Groundwater Quality Bureau Voluntary Remediation Program, Technical Background Document for Development of Soil Screening Levels, Revision 3.0, August 2006, Appendix A, Table A-1, Industrial/Occupational Soil*

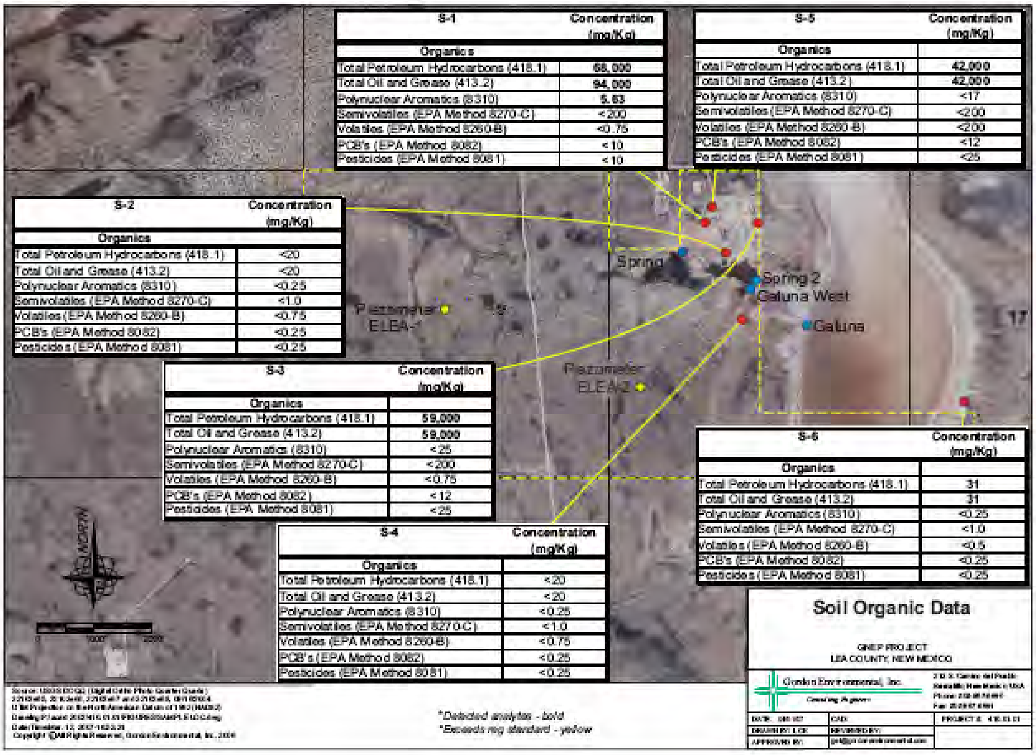


Figure 2.11.4-1 Soil Organic Sampling Results

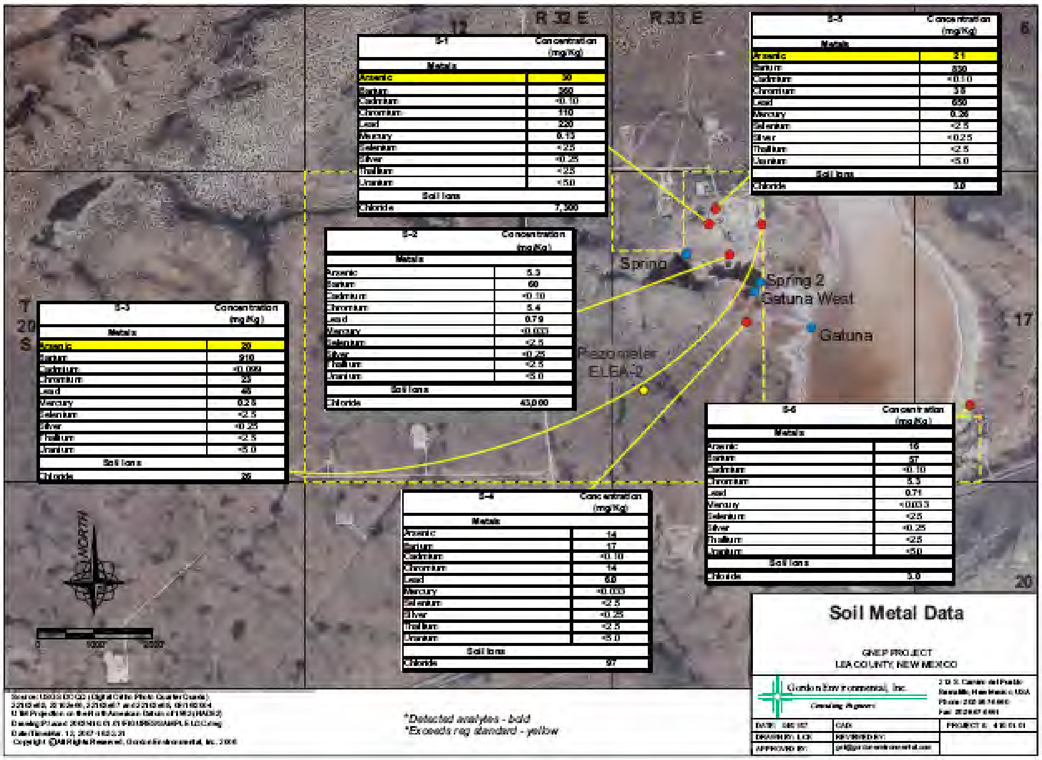


Figure 2.11.4-2 Soil Metals Sampling Results

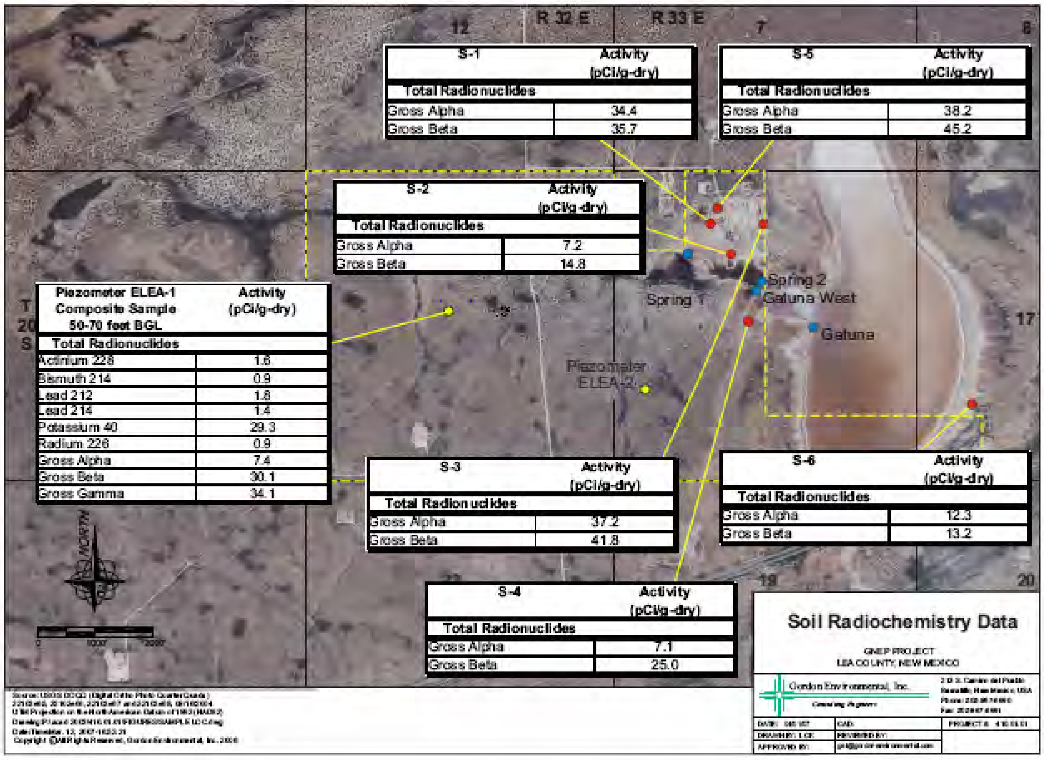


Figure 2.11.4-3 Soil Radiochemical Sampling Results

- Levels of arsenic in soil samples S-1, S-3, and S-5 (collected from oil field land farm sediments) exceeded New Mexico Environment Department Soil Screening Guidelines (Table A-1) for industrial-occupational soils. Sub threshold elevated levels of barium, chromium, lead, and mercury were also generally found in these samples.
- Two PAHs were detected in S-1; benzo (g,h,i) perylene has no Table A-1 standard & phenanthrene was detected below the Table A-1 standard. These parameters are typically detected in coal tar, coal tar distillates, coal, oil, gas, burning garbage, unrefined crude oil; no PAHs were detected in the other soil samples analyzed for these parameters.
- Arsenic, barium, lead, and chromium appear to have been somewhat mobile from the landfill site and were detected in the down gradient soils sample S-2 in concentrations ranging from about 5 to 16 percent of those detected in the disposal cell sample.
- Chloride was detected in all soil samples analyzed for this parameter with the highest concentration found in S-2 (43,000 mg/l); there is no standard for this parameter.
- High levels of TPH were found in the land farm samples (S-1, S-3, and S-5). These levels exceed the standard of 100 mg/kg. Since no VOCs or SVOCs were found in these samples, it is concluded that the residual hydrocarbons are relatively long-chain, low-mobility and low-toxicity hydrocarbons. Soil samples collected from areas immediately down gradient of the disposal sites lack significant TPH concentrations indicating limited mobility of hydrocarbons.
- All soil samples were found to have somewhat elevated levels of radioactivity. Samples S-1, S-3, and S-5 had alpha and beta radiation levels more than double the samples collected from the lacustrine deposits, the Triassic redbeds had radiation levels slightly higher than the lacustrine deposits.

2.11.4.2 Water Test Results

Table 2.11.4-2 provides a summary of laboratory results for water testing at the site. Water quality test results are also depicted in the water ionic data, metals data and inorganic and radiological data maps in Figures 2.11.4-4, 2.11.4-5, and 2.11.4-6. Water quality analytical results are summarized as follows:

- No VOCs were detected in any of the water samples. TOC was detected in all water samples. Concentrations range from 8.4 micrograms per liter (mg/l) in the sample collected from Piezometer ELEA-2 to 146 mg/l in the sample collected from the main playa at Laguna Gatuna.
- Arsenic, boron, thallium, and uranium were detected in all water samples above their respective New Mexico Water Quality Control Commission (WQCC) standards.
- Iron was detected in the Gatuna sample above the WQCC standard; lead was detected above the standard in the LG West sample; magnesium, which has no standard was detected at high levels in all of the water samples; manganese was detected at levels exceeding the standard in all but the LG West sample.
- All of the water samples collected are highly mineralized; WQCC standards for chloride, sulfate and TDS were exceeded by orders of magnitude in all samples. Water from the main body of Laguna Gatuna is the most mineralized, containing 300,000 parts per million (ppm) TDS. The samples from Laguna Gatuna West, Spring 1 and Piezometer ELEA-2 were somewhat less salty, containing 180,000 ppm, 120,000 ppm, and 83,000 ppm TDS, respectively.
- Radium 226 and radium 228 were detected in all water samples. WQCC standards for radium 226 were exceeded in the Spring 1, Gatuna, and P-2 samples; and radium 228 standards were exceeded in Gatuna and P-2 samples.

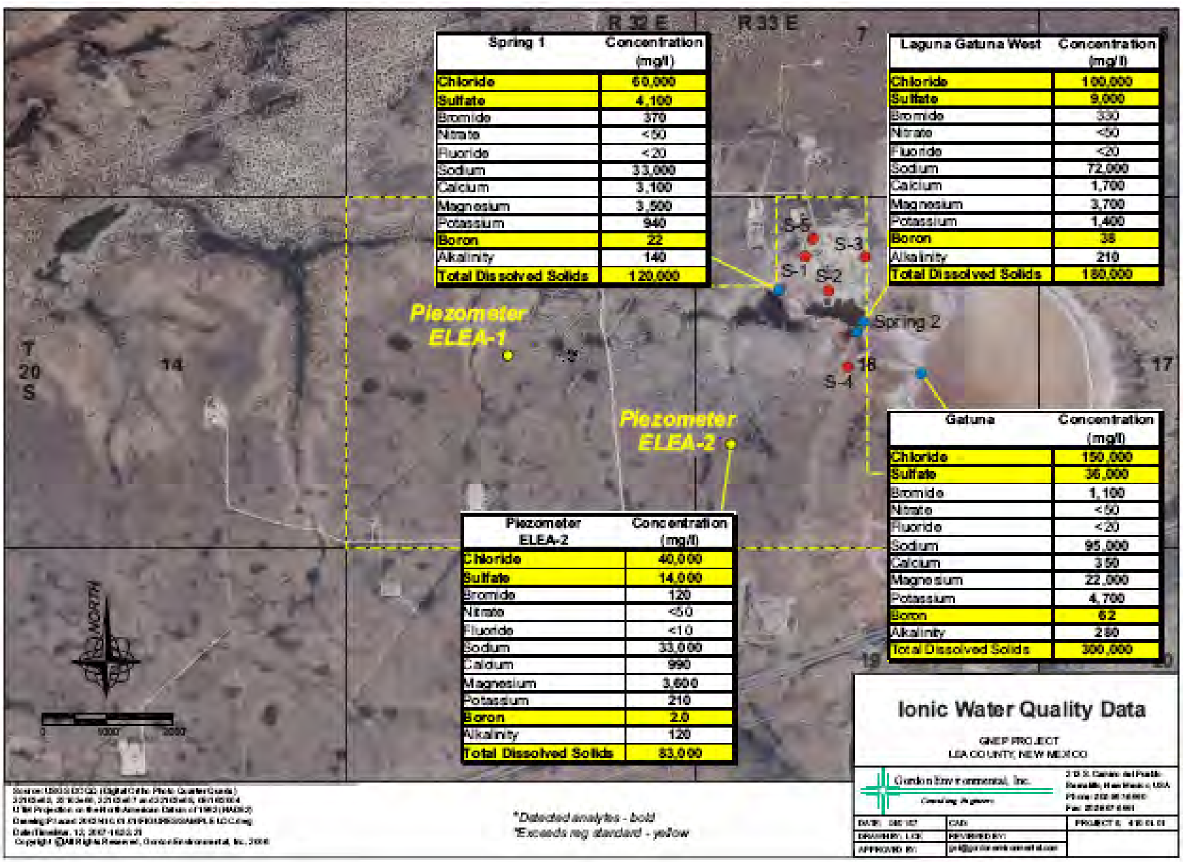


Figure 2.11.4-4 Water Ionic Sampling Results

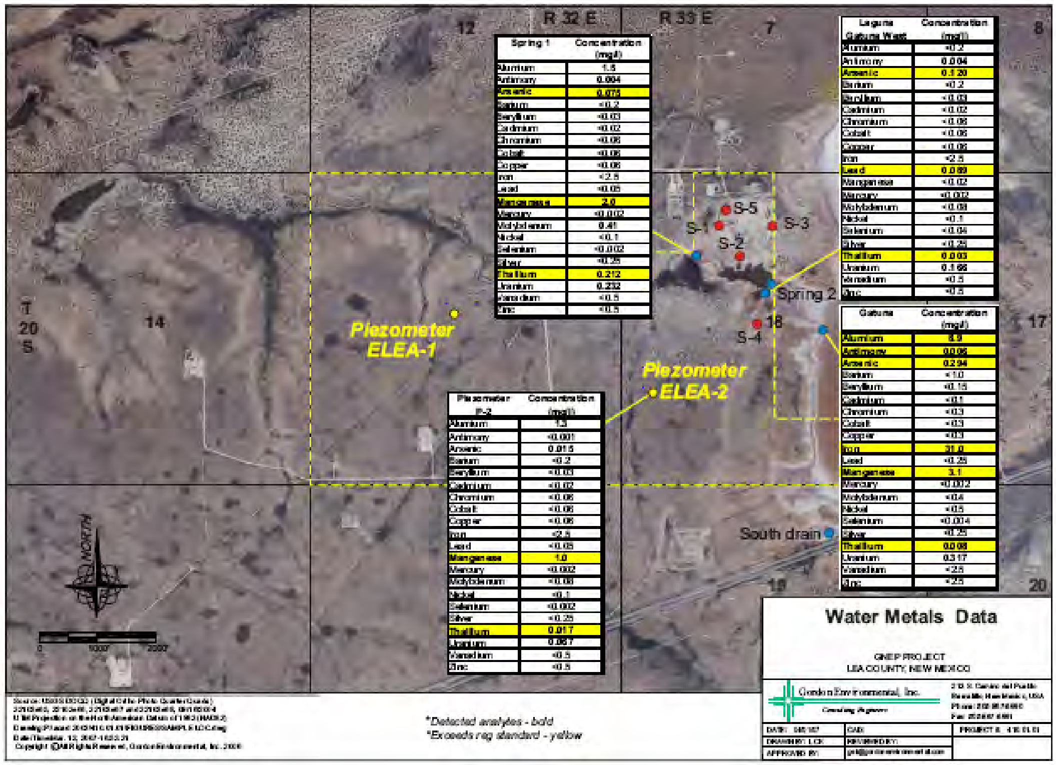


Figure 2.11.4-5 Water Metals Sampling Results

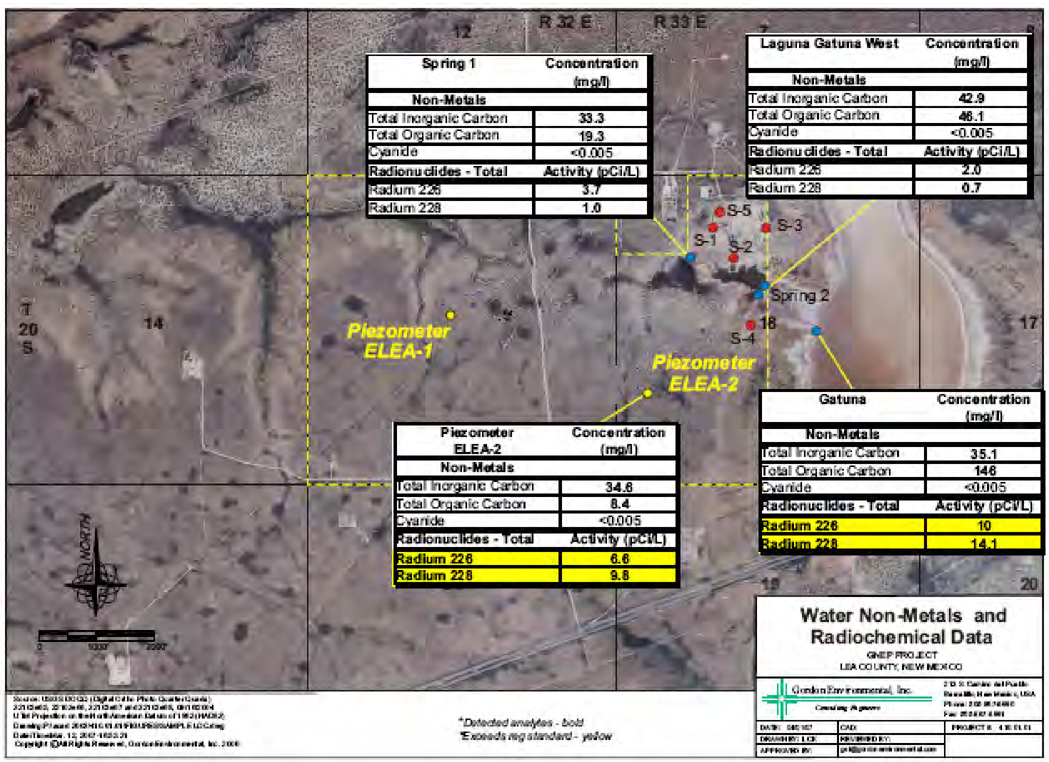


Figure 2.11.4-6 Water Non-Metals and Radiochemical Sampling Results

Table 2.11.4-2 Summary of Laboratory Testing for Water Samples at the Site

VOLATILE ORGANIC COMPOUNDS (VOCs)

Parameter	Analytical Test Method	Sampling Location and Test Result (mg/L)			
		Spring 1	LG West	Gatuna	P-2
*All parameters non-detect; refer to Appendix 2H for full parameter list.	8260B				

INORGANICS

Parameter	Analytical Test Method	Sampling Location and Test Result (mg/L)				NM Solid Waste Regs Table I		
		Spring 1	LG West	Gatuna	P-2	GWPS	PQL	AML
Anions								
Fluoride, F^-	300.0					1.6	0.4	0.8
Chloride, Cl^-		**60,000**	**100,000**	**150,000**	**40,000**	**250**	5.0	187.5
Bromide, Br^-		370	330	1,100	120	—	—	—
Nitrate (as N) + Nitrite (as N)						10	1.0	5.0
Sulfate, SO_4^{2-}		**4,100**	**9,000**	**36,000**	**14,000**	**250**	5.0	187.5
Mercury								
Mercury, Hg	7470					0.002	0.001	0.001
Total Recoverable Metals								
Aluminum, Al	6010B	1.5		**8.9**	1.3	**5.0**	3.0	3.75
Barium, Ba						1.0	0.02	0.50
Beryllium, Be						0.004	0.002	0.002
Boron, B		**22**	**38**	**62**	**2.0**	**0.75**	0.5	0.5625
Cadmium, Cd						0.005	0.002	0.0025
Calcium, Ca		3,100	1,700	350	990	—	—	—
Chromium, Cr						0.05	0.01	0.025
Cobalt, Co						0.05	0.03	0.0375
Copper, Cu						1.0	0.06	0.75
Iron, Fe				**31**		**0.3**	0.1	0.225
Lead, Pb			**0.089**			**0.05**	0.01	0.025
Magnesium, Mg		3,500	3,700	22,000	3,600	—	—	—
Manganese, Mn		**2.0**		**3.1**	**1.0**	**0.05**	0.03	0.0375
Molybdenum, Mo		0.41				1.0	0.75	0.75
Nickel, Ni						0.2	0.05	0.1
Potassium, K		940	1,400	4,700	210	—	—	—
Silver, Ag						0.05	0.01	0.025
Sodium, Na		33,000	72,000	95,000	30,000	—	—	—
Vanadium, V						—	0.08	0.156
Zinc, Zn						5.0	0.05	3.75
Alkalinity								
Alkalinity, Total (as $CaCO_3$)	310.1	140	210	280	120	—	—	—
Carbonate, CO_3^{2-}						—	—	—
Bicarbonate, HCO_3^-		140	210	280	120	—	—	—
Other								
Specific Conductance, SC (µmhos/cm)	120.1	220,000	320,000	600,000	170,000	—	—	—
Ammonia, NH_3^- (as N)	350.2	9.9	2.4	3.9	1.4	—	—	—
Total Nitrogen, TN	Calculation	9.1	5.6	**19**	2.1	**10**	1.0	5.0
pH (pH Units)	150.1	7.40	7.43	7.05	7.26	6.5-8.5	0.1	—
Specific Gravity, SG	SM2710F	1.1	1.1	1.2	1.0	—	—	—
Total Dissolved Solids, TDS	160.1	**120,000**	**180,000**	**300,000**	**83,000**	**500**	5.0	375.0
Total Kjeldahl Nitrogen, TKN	351.3	9.1	5.6	19		—	—	—
Total Suspended Solids, TSS	160.2	240	29	7,000	270	—	—	—
Non-Metals								
Cyanide, CN^-	E335.4					0.2	0.1	0.1
Total Inorganic Carbon, TIC	SW9060	33.3	42.9	35.1	34.6	—	—	—
Total Organic Carbon, TOC	A5310B	19.3	46.1	146	8.4	—	—	—
Total Metals								
Antimony, Sb	SW6020	0.004	0.004	0.006		0.006	0.003	0.003
Arsenic, As	SW6020	**0.075**	**0.120**	**0.294**	**0.015**	**0.01**	0.005	0.005
Selenium, Se	SW6020					0.05	0.005	0.025
Thallium, Tl	SW6020	**0.012**	**0.003**	**0.008**	**0.017**	**0.002**	0.001	0.001
Uranium, U	SW6020	**0.232**	**0.166**	**0.317**	**0.067**	**0.03**	0.015	0.015
Total Radionuclides								
Radium-226 (pCi/L)	E903.0	**3.7 ± 1.0**	2.0 ± 0.7	**10.0 ± 2.1**	**6.6 ± 1.2**	**5.0**	2.5	2.5
Radium-228 (pCi/L)	RA-05	1.7 ± 0.9		**14.1 ± 2.5**	**9.8 ± 1.1**			

Notes:

Blank entry means parameter not detected

E = EPA Method (Subcontractor designation)

SM = Standard Method (Subcontractor designation)

A = Standard Method (Subcontractor designation)

SW = Solid Waste (Subcontractor Designation)

— (yellow)	No state or federal groundwater standard
(blue)	Groundwater Protection Standard (GWPS) exceedance

The NM Solid Waste Regs Table I GWPSs, PQLs, and AMLs for the inorganic parameters As, Ni, Se, and U have been updated to reflect to most recent changes to 20 NMAC 6.2.3102 (NMWQCC) and federal MCLs.

2.11.4.3 Naturally-Occurring Radioactive Materials

Potential sources of naturally-occurring radioactivity at the Site include earth materials at and near land surface, oilfield residues near disposal sites, and cosmic radiation. The most abundant emitter of natural radioactivity is Potassium-40, an unstable isotope of the element potassium, which is the eighth most abundant element in the earth's crust. Potasssium-40 is 15 times more abundant than Thorium-230 and 39 times more abundant than Uranium-238, the second and third most abundant emitters of terrestrial radiation (Morse, 1983). Variations in the natural radioactivity of earth materials is the basis for the most commonly used downhole wireline geophysical logging tool – the natural gamma radiation log. Generally, clay-bearing or shaly rocks contain more potassium, thorium and uranium and are more radioactive than sandstones, limestones or igneous rocks. Radioactive elements may also be more concentrated as salt-filling in subsurface fractures and other permeable zones.

Surficial radiation surveys have been employed in mineral exploration for many years. Gregory (1956) investigated lines of airborne radiometric survey data over a number of oil-producing areas and concluded that levels of natural radiation at land surface are controlled by surface geology, hydrology and soil pedology. Soil thickness exerts significant influence over radiation level. Where soils are thin or absent on bedrock, radioactivity level of the bedrock unit predominates; where bedrock is mantled by thick soil, radioactivity of the soil predominates (Kilmer, 1986). Downhole wireline log analysts conclude that 90% of gamma emissions measured in a well survey originate within six inches of the wellbore (Dresser, 1974).

Based upon conditions of the Site, it is anticipated that natural radioactivity levels will be low on the portion of the Site for development where at least 25 feet of relatively well sorted sands and caliche cover shale bedrock. Laguna Gatuna contains abundant lacustrine clay, as well as evaporation-concentrated salts; therefore natural levels of radioactivity are expected to be higher there. It is also anticipated that the oilfield solids disposal area which contains quantities of clay-rich drilling mud will exhibit elevated radioactivity.

Results of radiochemical analyses of soil and water samples obtained from the Site during limited phase two testing comports with expectations for natural radioactivity based on site conditions. The highest levels of radioactivity detected in soil samples were found in samples collected from the oilfield solids disposal area. Analyses of water samples indicated that samples collected from the main playa lake (Gatuna) and from piezometer ELEA-2 contained greater amounts of radium-226 and -228 than the other samples.

2.11.5 Water Pipeline Material

A waterline that is labeled as an "aqueduct" on the Site topographic map was investigated during Site reconnaissance. The waterline right-of-way is currently owned by Intrepid Potash. Intrepid's Chief Engineer was contacted in order to provide information regarding the construction materials used for the pipeline. Intrepid state their belief that the waterline is constructed with concrete cylinder pipe which is asbestos-free.

Intrepid was unable to document its construction. However, a visual inspection of a portion of the waterline confirmed Intrepid's belief; the waterline is constructed of a concrete cylinder pipe.

2.11.6 Summary

The Site is situated in an area where the potential for impacts to groundwater from surface contamination is low. Drilling and testing performed at the Site indicates that the base of the alluvium at the top of the Triassic shale bedrock, or the shallowest and most susceptible potential water-bearing zone, is dry. Further, groundwater in the shallow alluvium elsewhere in the vicinity of the Site is too mineralized to qualify for protection under WQCC regulatory framework. Other potential water-bearing zones beneath the Site are approximately 400 feet beneath the top of the relatively impermeable shale bedrock; these zones have very low susceptibility to any impacts from surface sources at the Site. The highest areas of soil contamination are localized to the oilfield disposal sites and impacted areas identified as RECs in the

Phase I ESA. Soil sampling results confirm that areas of high contamination appear to be localized at these facilitates. These areas are excluded from the Site construction zone (Figure 2.11.2-1). Therefore, results of the Phase I and Limited Phase II investigations suggest that the Site is suitable for the proposed facilities. The waterline that crosses the Site is constructed of concrete pipe and poses no environmental risk for relocation.

References

Abell, M., 2007, *Personal communication*, Water Superintendent for the City of Carlsbad, New Mexico, Friday, March 09, 2007

ACHP (Advisory Council on Historic Preservation), *Title 36, Code of Federal Regulations, Part 800, Protection of Historic Properties*, August 5, 2004.

AGH (Artesia General Hospital) (), 2007, *Interviews with staff*, http://www.artesiageneral.com

Artesia News, 2007, http://www.artesianews.com/city.htm

ASTM (American Society for Testing Materials), *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, ASTM Practice E 1527-05.

Bachman, G.O., 1973, *Surficial Features and Late Cenozoic History in Southeastern New Mexico,* United States Geological Survey Open-File Report.

Bachman, G.O., 1974, *Geologic Processes and Cenozoic History Related to Salt Dissolution in Southeastern New Mexico*: United States Geological Survey Open-File Report.

Bachman, G.O., 1976, *Cenozoic Deposits of Southeastern New Mexico and an Outline of the History of Evaporite Dissolution*: United States Geological Survey Journal of Research, Vol. 4, no 2, p 135-149.

Bachman, G.O., and Johnson, R, *Stability of Salt in the Permian Salt Basin of Kansas, Oklahoma, Texas, and New Mexico:* United States Geological Survey Open-File Report.

BBER (Bureau of Business and Economic Research), 2007, http://www.unm.edu/~bber/

BEA (Bureau of Economic Analysis), 2007, http://www.bea.gov/index.htm

Beasley, J., 2007, *Interview*, http://www.cityofcarlsbadnm.com/community_development

BISON-M, (Biota Information System of New Mexico). *BISON-M home page*. http://www.bison-m.org

BLM (Bureau Land Management), 1997, *Carlsbad Resource Management Plan*,BLM-NM-PT-98-004-1610

BLM, Bureau of Land Management. *Roswell Field Office Database,* 2004.

BLM, *BLM base map* at http://www.nm.blm.gov/cfo/GIS_data.htm, 2007a.BLM, 2007b, *Black River Recreation Area*, http://www.nm.blm.gov/recreation/carlsbad/black_river_rec_area.htm.

BLM, 2007c, *La Cueva*, http://www.nm.blm.gov/recreation/carlsbad/la_cueva.htm.

BLM, 2007d, http://www.geocommunicator.gov; http://blm.gov.1r2000; and http://octane.nmt.edu/slo.

BLM, undated, *VRM manual 8410* http://www.blm.gov/nstc/VRM/8410.html.

BNSF (Burlington Northern Santa Fe Railroad), 2007,http://www.bnsf.com.

Brokaw, A.L., Jones, C.L., Cooley, M.E., and Hays, W.H, 1972, *Geology and Hydrology of the Carlsbad Potash Area, Eddy County, and New Mexico*: United States Geological Survey Open-File Report 72-49.

Carlsbad Medical Center (CMC), 2007, *Discussions with staff*, http://www.carlsbadmedicalcenter.com

City of Carlsbad, 2007, *City Parks*, http://www.cityofcarlsbadnm.com/

Council on Environmental Quality (CEQ), 1997, *Environmental Justice Guidance under the National Environmental Polity Act*

CFR, 2007a, *Title 40, Code of Federal Regulations, Part 190, Environmental Radiation Protection Standards for Nuclear Power Operations*.

CFR, 2007b, *Title 40, Code of Federal Regulations, Part 61, National Emission Standards for Hazardous Air Pollutants*.

CFR, 2007c, *Title 40, Code of Federal Regulations, Parts 141-143, National Primary and Secondary Drinking Water Regulations*.

CFR, 2007d, *The Emergency Planning and Community Right-to-Know Act of 1986* [40 CFR Parts 350 to 372], U.S. Environmental Protection Agency.

CFR, 2007e, *Title 49, Code of Federal Regulations, Part 107 through Part 400 Hazardous Materials Sections*.

CFR, 2007f, *Title 49, Code of Federal Regulations, Part 171, General Information, Regulations and Definitions*.

CFR, 2007g. Title 49, Code of Federal Regulations, Part 173, Shippers – General Requirements for Shipments and Packaging.

CFR, 2007h. Title 49, Code of Federal Regulations, Part 177-179, Specifications for Tank Cars.

CFR, 2007i. Title 29, Code of Federal Regulations, Part 1910, Occupational Safety and Health Standards.

CFR, 2007j. Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction.

Chilton, L., Chilton, K., Arango, P.E., Dudley, J., Neary, N., Stelzner, P., *New Mexico: A New Guide to the Colorful State,* University of New Mexico Press, 1984.

CID (NM Construction and Industries Division), 2007, http://rld.state.nm.us/cid/

City of Carlsbad, 2005, *Municipal Water System 2005 Annual Consumer Report on the Quality of Your Drinking Water.*

Claiborne, H.C., and Gera, F., 1974, Po*tential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico*, ORNL-TM 4639, Oak Ridge National Laboratories, Oak Ridge, TN.

Cohee, G. V., chm., 1962, *Tectonic map of the United States, exclusive of Alaska and Hawaii,* United States Geological Survey and American Association of Petroleum Geologists, U.S. Geol. Survey, Scale 1:2,500,000.

Degenhardt, W.G., Painter, C.W., and Price, A.H., *Amphibians and Reptiles of New Mexico.* University Of New Mexico Press, Albuquerque, 1996.

DeLorme, 2007, *Topo USA 6.0.*

Desert Rough Riders Club (DRC), www.nmdrc.com.

DOE, 1997, *Disposal Phase Supplemental Environmental Impact Statement, Waste Isolation Pilot Plant*, DOE/EIS-0026-S-2

DOE, 1999, *Annual Site Environmental Report for 1998*, *Waste Isolation Pilot Plant,* DOE/WIPP-99-2225.

DOE, 2000, *Annual Site Environmental Report for 1999*, *Waste Isolation Pilot Plant,* DOE/WIPP-00-222.

DOE, 2001, *Annual Site Environmental Report for 2000*, *Waste Isolation Pilot Plant,* DOE/WIPP-01-2225.

DOE, 2002a, *Annual Site Environmental Report for 2001*, *Waste Isolation Pilot Plant,*

DOE/WIPP-02-2225

DOE (U.S. Department of Energy), 2002b, *Waste Isolation Pilot Plant Land Management Plan,* DOE/WIPP 93-004.

DOE, 2003, *Annual Site Environmental Report for 2002*, *Waste Isolation Pilot Plant,* DOE/WIPP-03-2225.

DOE (U.S. Department of Energy), 2004a, *Title 40 CFR Part 191 Subparts B and C Compliance Recertification Application 2004*, DOE/WIPP 2004-3231.

DOE, 2004b, *Annual Site Environmental Report for 2003,* Waste Isolation Pilot Plant, DOE/WIPP-04-2225

DOE, 2005, *Annual Site Environmental Report for 2004*, Waste Isolation Pilot Plant, DOE/WIPP-05-2225

DOE, 2006, *Annual Site Environmental Report for 2005*, *Waste Isolation Pilot Plant,* DOE/WIPP-06-2225.

DOE, 2007, WIPP TRU News Website, http://www.wipp.energy.gov/teamworks/index.htm

Dunlap, D., 2007, *Phone conversation*, April 3, 2007

Dresser Industries, 1974, Geophysical Log Analysis and Review, Dresser Industries, Inc.

DuChene, H.R., and Cunningham, K.I., 2006, *Tectonic influences of Speleogenesis in the Guadalupe Mountains, New Mexico and Texas*: *New Mexico Geological Society Guidebook, 57th Field Conference, Caves and Karst of Southeastern New Mexico*, p. 211-218.

EAI**,** 2007, *Tornado Probability Map of the United States (All Intensities)*, Huntsville, Alabama, http://www.mindspring.com/~eai/EAIcntus.gif

ELEA, (Eddy Lea Energy Alliance), 2006, *Option Agreement between "optionors" and Eddy-Lea Energy Alliance LLC.*

ENMRD (NM Energy, Minerals and Natural Resources Department), 2007a, *Living Desert State Park,* www.emnrd.state.nm.us/PRD/LivingDesert.htm

ENMRD, 2007b, *Brantley Lake State Park,* http://www.emnrd.state.nm.us/PRD/ParksPages/Brantley.htm

ENMRD, 2007c, *Lake Avalon*, http://www.emnrd.state.nm.us/PRD/BOATINGWeb/boatingwatersavalonreservoir.htm

ENMRD, 2007d, *Bottomless Lakes State Park,* www.emnrd.state.nm.us/PRD/bottomless.htm

Enterprise Products Partners L.P., 2006, *PowerPoint for RBC Dain Rausher Luncheon Meeting*, *May 18, 2006,* http://library.corporate-ir.net/library/80/805/80547/items/198857/epd_DainRauscher05_18_06.pdf

Environmental Laboratory. 1987. *Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Mississippi* (included are suggestions and clarifications from the 1997 internet version).

EPA (U S Environmental Protection Agency), 2007a, *Non-Attainment Area Map*, United States Environmental Protection Agency Green Book, http://www.epa.gov/oar/oaqps/greenbk/mapnpoll.html

EPA**,** 2007b, *National Ambient Air Quality Standards (NAAQS)*, United States Environmental Protection Agency Office of Air Quality Planning and Standards, http://www.epa.gov/air/criteria.html

EPA, 2007c *Standards and Practices for All Appropriate Inquiries; Final Rule,* (AAI Rule), 40 CFR Part 312.

E-TRANSIT, 2007, *U.S. Landfalling Hurricane Probability Project*, http://www.e-transit.org/hurricane/welcome.html

Federal Emergency Management Agency website. http://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1, March 2007.

FutureGen, 2007, *Personal Conversation with Stephanie Sparkman*, http://www.futuregenalliance.org/about/timeline.stm

Geer, I.W**.,** editor**,** 1992, Glossary of Weather and Climate, With Related Oceanic and Hydrologic Terms, American Meteorological Society

Google Earth, 2007.

.

Gregory, A. F., 1956, *Analysis of radioactive sources in aeroradiometric surveys over oil fields*, American Association of Petroleum Geologists Bulletin, V. 40.

Hawley, J.W, (with others) 1993, *Stratigraphic Nomenclature Chart*, New Mexico Geological Society Guidebook, 44th Field Conference.

Hawley, J.W., 1986, *Physiographic Provinces*, *in* New Mexico in Maps: University of New Mexico Press, Albuquerque, New Mexico.

Hayes, P.T., 1964, *Geology of the Guadalupe Mountains, New Mexico*, United States Geological Survey Professional Paper No. 446.

HELP, 2007, www.helpnm.com

Hendrickson, G.E., and Jones, R.S., 1952, *Geology and Ground-Water Resources of Eddy County, New Mexico*, New Mexico Bureau of Mines and Mineral Resources, Ground Water Report 6, p. 16.

Hiss, W.L., 1973, *Capitan Aquifer Observation-Well Network Carlsbad to Jal New Mexico*. Technical Report 38. New Mexico State Engineer. Santa Fe New Mexico.

Hitchcock, A.S., 1971, *Manual of the Grasses of the United States.* Volumes 1&2, Second Edition, Dover Publications, Inc. New York.

Hobbs, 2007, http://www.hobbsnm.org/senior.html

HPWD, (High Plains Underground Water Conservation District No. 1), 2007, http://www.hpwd.com/the_ogallala.asp

HUD (U S Department of Housing and Urban Development), 2007, Noise Assessment Guidelines.

Hughes, David, 2007, Field Investigations on March 5, 2007 and March 27, 2007.

Hunt, J.E., and Martin, R.J., *Archaeological Clearance Report for Dawson Geophysical Company's Seismic Testing Lines nos. 20-NM-92 and 21-NM-92 Situated on Public Lands in Lea County, N.M.,* Pecos Archaeological Consultants Reports 92019.

ICC, 2003, *International Building Code 2003*

.

Intrepid Mining Co, 2007, http://www.intrepidllc.com

Johns, Jim, Construction Buyer at the National Enrichment Facility near Eunice, New Mexico, Personal Communication, March 2007.

Julyan, R., *The Place Names of Mexico,* University of New Mexico, 1996.

Kelly, C. 2007, *Personal communication*, Wastewater Manager for the City of Lovington, New Mexico, Thursday, March 15, 2007

Kelley, V.C., 1971, Geology of the Pecos Country, southeastern New Mexico: New Mexico, Bureau of Mines and Mineral Resources Memoir 24.

Kelly, T.E., 1979, *Water Resources Study of the Carlsbad Potash Area*, New Mexico: consultant report to the Bureau of Land Management, Denver Colorado, Contract No. YA-512-CT8-195.

Kelly, T.E., 1984*, Hydrologic Assessment of the Salt Lakes Area, Western Lea County, New Mexico*: Consultant report to Pollution Control, Inc., Lovington New Mexico.

Kilmer, 1986

Kilmer, L.C., 1986, *Developments in exploration radiometrics*, Oil and Gas Journal.

Lang, B. and D.C. Rogers. 2002. Biodiversity survey of large branchiopod crustacean in New Mexico. For Bureau of Land Management, NM State Office, Santa Fe.

Laumbach, K., *A Cultural Resource Inventory of the Proposed Laguna Plata Archaeological District.* New Mexico State University Cultural Resources Management Division Reports 335, 1979.

Lea County, 2007, County Assessor's Records at Lea County Courthouse.

Lea Land Inc., 2007, *Fact Sheet,* http://www.oklahoma.net/~enviro/lealand.html

Lea Regional Medical Center (LRMC), 2007, *Interviews with staff*, http://www.learegionalmedical.com

Loften, Owen, *Personal Communication*, March 26, 2007.

Lovington Good Samaritan Center (LGSC), 2007, http://lovington.leaco.net/family.htm

Lovington, 2007, http://lovington.leaco.net/family.htm

Mercer, J.W., and Orr, B.R., 1977, *Review and analysis of hydrogeologic conditions near the site of a potential nuclear waste laboratory, Eddy and Lea Counties, New Mexico*, United States Geological Survey Open-File Report.

Morse, J.G. and Rana, M.H., 1983, *New perspectives on radiometric exploration for oil and gas*, Oil and Gas Journal.

NCDC, 2007, S*torm Events online database*, http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?/wwevent-storms

NCES (National Center for Education Statistics), 2007, http://nces.ed.gov/index.asp

NEF (National Enrichment Facility), 2004, *Safety Analysis Report,* Revision 3, Section 1.3.3.3.

NEF, 2007a, *About the National Enrichment Facility*, http://www.nefnm.com/v2b/about.asp

NEF, 2007b, *Personal interview with the public information officer*, http://www.nefnm.com/v2b/about_impact.asp

New Mexico Kids, 2007, Telephone interviews with daycare providers, www.newmexicokids.org

Nicholson, A., and Clebsch, A., *Geology and Ground-Water Conditions in Southern Lea County, New Mexico*, *Ground-Water Report 6*, State Bureau of Mines and Minerals, Resources New Mexico Institute of Mining & Technology, Socorro, New Mexico. 1961.

NMAC, 2000, New Mexico Administrative Code 20.4.1, Hazardous Waste Management, June 2000.

NMAC, 2001, New Mexico Administrative Code 20.3.2, Radiation Protection, Registration of Radiation Machines and Services, November 200.

NMAC, 2002a, New Mexico Administrative Code 20.2.78, air Quality Emission Standards for Hazardous Air Pollutants, February 2002.

NMAC, 2002b, State of New Mexico, Standards for Groundwater of 10,000 mg/L TDS Concentrations or Less, 20.6.2.3103 NMAC, New Mexico Water Quality Control Commission, September 2004.

NM Bureau of Geology and Minerals, 2003, *Geologic Map of New Mexico*, 1:500,000.

NMDFA (N M Department of Finance and Administration), 2007, *Financial and Property Tax Data by County and Municipality, Fiscal Year 2006 (2005 – 2006),* Local Government Division

NMDOH (N M Department of Health), 2007, *Vital Statistics*, http://www.health.state.nm.us/

NMDOL (N M Department of Labor), 2007, *Quarterly Census of Employment*, http://laser.state.nm.us/

NMDOT, 2007, *CHDB Road Segments by Posted Route/Point with AADT Counts*, Data from 2005, Faxed communication from Maria Hinojos

NMED Web Portal – Facility Information, http://eidea.state.nm.us/eTempoWeb/PortalFrontPage

NMED, (New Mexico Environment Department), *Solid Waste in New Mexico*, 2000, *2000 Annual Report.*

NMED, 2004a, Letter dated May 17, 2004, from J. Schoeppner (NMED) regarding Administrative Completeness Determination and Applicant's Public Notice Requirements, DP-1481, National Enrichment Facility.

NMED, 2004b, Technical Background Document for Development of Soil Screening Levels, New Mexico Environment Department: Hazardous Waste Bureau, Ground Water Quality Bureau, and Voluntary Remediation Program, Revision 2.0, February 2004.

NMFWD (N M Fish and Wildlife Department), 2007, *S Huey Management Area,* http://www.wildlife.state.nm.us/conservation/wildlife_management_areas/documents/WSHueyWA.pdf

NMGO (N M Governor's Office), 2005, E*nvironmental Justice Executive Order,* Executive Order 2005-056

NM LPC/SDL Working Group**,** 2005**,** *Lesser Prairie-Chicken and Sand Dune Lizard in New Mexico, Findings and Recommendations of the New Mexico LPC/SDL Working Group,* Executive Summary, http://www.nm.blm.gov/misc/conservation_strategy/docs/PrairieChicken.pdf

NM State Land Office, 2007, State Land Office data portal at http://octane.nmt.edu/slo.

NMT (New Mexico Tourism), 2007, *Guadalupe Back Country Byway,* www.nmtourism.org

NMTRD (New Mexico Taxation and Revenue Department), 2007, *Gross Receipts and Compensating Taxes: An Overview July 1, 2006 - June 30, 2007.*

NOAA, 2005a, *Local Climatological Data Annual Summary with Comparative Data for Midland-Odessa, Texas,* ISSN 0198-5124

NOAA**,** 2005b, *Local Climatological Data Annual Summary with Comparative Data for Roswell, New Mexico*, ISSN 0198-3512.

NOAA, 2007a*, Enhanced F Scale for Tornado Damage*, Storm Prediction Center, National Weather Service, http://www.spc.noaa.gov/faq/tornado/ef-scale.html.

NOAA, 2007b. *Monthly State, Regional, and National Cooling Degree Days Weighted by Population.*

Nor Lea, 2007, *Interviews with staff* Information is from http://www.nlgh.org

NPS (National Park Service), 2007a, *Carlsbad Caverns National Park*, http://www.nps.gov/cave/

NPS, 2007b, *Guadalupe Mountains National Park,* http://www.nps.gov/guadalupe/

NRC (U S Nuclear Regulatory Commission), 2003, *Environmental Review and Guidance for Licensing Actions Associated with NMSS Programs, Final Report*

NRC, 2005, *Environmental Impact Statement for the Proposed National Enrichment Facility in New Mexico Final Report,* NUREG-1790, Vol. 1.

NRC, 2006, *Draft Regulatory Guide DG-1143, Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants,* Proposed, Revision 1 of Regulatory Guide 1.76.

Oriel, S.S., Myers, D.A., Crosby, E.J., 1967, *West Texas Permian Basin Region*, in Paleotectonic Investigations of the Permian System in the United States: United States Geological Survey Professional Paper 515, p. 21-60.

OSE (New Mexico Office of the State Engineer), 2000, *Lea County Regional Water Plan. http://www.ose.state.nm.us/isc_regional_plans16.html*..

OSE (New Mexico Office of the State Engineer), 2004, New *Mexico State Water Plan Appendix A, Water Resources Issues.*

Powers, D. W., Lambert, S. J., Shaffer, S. E., Hill, L. R., and Weart, W. D., eds., 1978, *Geological Characterization Report for the Waste Isolation Pilot Plant (WIPP) Site, Southeastern New Mexico.* SAND78-1596, Vols. I and II. Sandia National Laboratories.

Powers, Dennis, *Email communication to Bill Jaco, "GNEP",* March 8, 2007.

Sanford and Toppozada, 1974, *Seismicity of Proposed Radioactive Waste Disposal Site in Southeastern New Mexico,* Circular 143, New Mexico Bureau of Geology and Mineral Resources Stipp, T.F., 1954, *Editorial Comments*, United States Geological Survey Open-File Report.

President of the US, 1994, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Population*s, Executive Order 12898

Public Lands, 2007, http://www.publiclands.org/explore/site.php?id=92&PHPSESSID=23cfeb7c9

Roxy, 2007,*Personal communication,* City of Eunice, New Mexico on Monday, March 26, 2007

Sanford, A., 2007, http://www.ees.nmt.edu/Geop/recentquakes.html

Sanford, Allan R., Lin, Kuo-wan, Tsai, I-ching, and Jaksha, Lawrence H, 2002, *Earthquake Catalogs for New Mexico and Bordering Areas: 1869 – 1998,* Circular 210, New Mexico Bureau of Geology and Mineral Resources.

Seabastian, L., Larralde, S., *Living on the Land: 1,000 Years of Human Adaptation in South eastern New Mexico,* New Mexico State Office, Bureau of Land Management, 1989.

Sena, A., 2007, *Personal communication*, Wastewater Superintendent for the City of Carlsbad, New Mexico, Friday, March 09, 2007

SNMCAC, 2007, www.snmcac.org

Stratigraphic Research Committee, Roswell Geological Society, 1958, *North-South Stratigraphic Cross Section, Delaware Basin – Northwest Shelf, Southeastern New Mexico.*

Stroud, M., 2007, *Personal communication,* Wastewater Supervisor for the City of Artesia, New Mexico, Tuesday, March 13, 2007.

Tax Foundation, 2007a, http://www.taxfoundation.org/taxdata/show/251.html

Tax Foundation, 2007b, http://www.taxfoundation.org/taxdata/show/275.html

Tax Foundation, 2007c, http://www.taxfoundation.org/taxdata/show/1389.html

Therapists Unlimited, 2007, http://therapistunlimited.com/rehabs

Turner, M.T., Cox, D.N., Mickelson, B.C., Roath, A.J., and Wilson, C.D., *Soil Survey of Lea County, New Mexico.* USDA, Soil Conversation Service.

United Way, 2007, United Way of Eddy County.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, U.S. Department of Army Corps of Engineers, and the U.S. Department of the Interior Bureau of Reclamation Hydrometeorological Report No. 55A. *Probable Maximum Precipitation Estimates – United States between the Continental Divide and the 103rd Meridian*,. Silver Spring, MD, June 1988.
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, U.S. Department of Army Corps of Engineers, and the U.S. Department of the Interior Bureau of Reclamation Hydrometeorological Report No. 55A. *Probable Maximum Precipitation Estimates – United States between the Continental Divide and the 103rd Meridian*,. Silver Spring, MD, June 1988.
UPRR Union Pacific Railroad, 2007, http://www.uprr.com

USA Photomaps, 2007.

USCB (U S Census Bureau), 1993, *Technical Documentation, Appendix B. Definitions of Subject Characteristics*

USCB, 2007a, *Summary File 1*, http://www.census.gov/Press-Release/www/2001/sumfile1.html

USCB, 2007b, *Summary File 2*, http://www.census.gov/Press-Release/www/2001/sumfile2.html

USCB, 2007c, *Summary File 3*, http://www.census.gov/Press-Release/www/2002/sumfile3.html

USCB, 2007d, *Summary File 4*, http://www.census.gov/Press-Release/www/2003/sumfile4.html

USFS (US Forest Service), 2007, *Lincoln National Forest,* (http://www.fs.fed.us/r3/lincoln/aboutus.shtml

USFWS (U S Fish and Wildlife Service), 2007, U*SFWS Threatened and Endangered Species System (TESS*), http://ecos.fws.gov/tess_public/StartTESS.do

USGS (U S Geological Survey), 1974, 1:250,000 *Scale Topographic Map NI 13-8 Roswell.*

USGS, 1976, 1:250,000 *Scale Topographic Map NI 13-11 Carlsbad*.

USGS, 2007a, *Database for Quaternary Faults*, http://earthquakes.usgs.gov/regional/qfualts

USGS, 2007b, *Earthquake Database*, http://earthquake.usgs.gov/eqcenter for latitude 32.583 degrees N and longitude 103.708 degrees W.

USGS, 2007c, *Earthquake Probability Interactive USGS Website*, (http://earthquake.usgs.gov/research/hazmaps/products_data/48_States/index.php)

USGS, 2007d, http://earthquake.usgs.gov/index.php

USGS, 2007e, http://ne.water.usgs.gov/html/highplains/hpchar.htm

USGS, 2007f, *Probabilistic Ground Motion Website*, http://earthquake.usgs.gov/regional

UT University of Texas, Petroleum Extension Service, Division of Continuing Education, 1986 *Fundamentals of Petroleum,* Third Edition.

Ventrees, C.D., Atchison, C.H., Evans, G.L., 1959, *Paleozoic Geology of the Delaware and Val Verde Basins, in Geology of the Val Verde Basin Field Trip Guidebook*, West Texas Geological Society p. 64-73.

Vine, J.D., 1963, *Surface Geology of the Nash Draw Quadrangle, Eddy County, and New Mexico*: United States Geological Survey Bulletin 1141-B.

WCS, 2007 (Waste Control Specialists), *Description of Waste Control Specialists,* http://www.bechteljacobs.com/bs_vendorwcs.shtml

WCS, 2007a, http://www.wcstexas.com/

WCS, 2007b, http://64.224.191.188/wcs/

Western US Climate Historical Summaries, http://www.wrcc.dri.edu/summary/Climsmnm.html, March 2007.

WGI, 2007a. *Washington Group Field Data.*

WGI (Washington Group International), 2007b, *Discussion of the WIPP site as an example of their nuclear waste management and disposal facilities*, http://www.wgint.com/about_us.html

Wong, I., Olig, S, Dober, M., Silva, W., Wright, W., Thomas, P., Gregor, N., Sanford, A., Lin, K-W, and Love, D., 2004, *Earthquake scenario and probabilistic ground-shaking hazard maps for the Albuquerque–Belen–Santa Fe, New Mexico, corridor*, New Mexico Geology.

Woomer, T., 2007, *Personal communication*, Director of Utilities for the City of Hobbs, New Mexico, Tuesday, March 13, 2007

WRCC (Western Regional Climate Center), 2007, *Hobbs, New Mexico, NCDC 1971-2000 Monthly Normal*, Desert Research Institute, 2215 Raggio Parkway, Reno, Nevada, 89512, http://www.wrcc.dri.edu/.

Wright, J, 2007, *High-Temperature Teaching and Test Reactor Research Facility: FACT SHEET*

WUSRCC, 2000

Xcel Energy, 2007, http://www.xcelenergy.com

Xcel Energy, 2007a, *Results that Really Matter*, Xcel 2006 Annual Report, http://thomson.mobular.net/thomson/7/2326/2557/

Xcel Energy, 2007b, *2007 Fact Card*, http://www.xcelenergy.com/docs/factcard2007.pdf

Xcel Energy, 2006, *New power plant to boost area capacity with minimal environmental impact*, Press Release, October 26, 2006.

THE EDDY-LEA ENERGY ALLIANCE, LLC
GLOBAL NUCLEAR ENERGY PARTNERSHIP
Award Number: DE-FG07-07ID14799
City of Lovington Public Participation Meeting
Troy J Harris City Center
March 21, 2007
6:00 p.m.

Lovington (Lea County), New Mexico, was the first location of four Public Participation Meetings (PPM) held by the Eddy-Lea Energy Alliance, LLC (ELEA). These meetings are being held to solicit public opinion regarding the Global Nuclear Energy Partnership (GNEP) siting study, as well as to provide specific information regarding both program and site-specific aspects of the GNEP process and to address the identified local stakeholder concerns, issues, and values.

Public Notice and Public Outreach

Public notice appeared in the *Lovington Leader News Paper* two weeks prior to the PPM. Newspaper ads ran March 13th and 20th (*See Attachment A*). In addition, public outreach involved communicating with Lovington city officials Pat Wise, City Manager; Rhonda Jones, Chief Financial Officer; and Charles Kelly, Deputy City Manager, to identify and reserve the most accommodating facility in Lovington for conducting the PPM, as well as utilizing their local expertise to best determine how to maximize public input and participation. The Economic Development Corporation of Lea County (EDCLC) was essential in its support and outreach in alerting the city of Lovington about the PPM. The Lovington and Hobbs EDCLC chapters distributed an e-mail notifying and encouraging members to attend (*See Attachment B*). Both of the chapters verbally informed community members about the meeting.

The Public Participation Meeting

ELEA requested that the communications team customize the PPM to each community accordingly, ensuring that the surrounding and impacted communities are well informed and have an opportunity to participate. Each PPM is transcribed and a Spanish translator was in attendance for anyone requiring translation services. Since the City of Lovington had not been the site of one of the DOE Scoping Meetings in New Mexico, ELEA felt it was necessary to provide the City of Lovington with a detailed overview of the program issues associated with GNEP. The agenda for the Lovington PPM addressed the ELEA objectives for the City of Lovington (*See Attachment C*). The agenda consisted of a Welcome from City Manager, Pat Wise; presentation of the Eddy-Lea Energy Alliance LLC structure by Secretary, Jim Maddox; description of the Corporate Partnership between Washington Group International (WGI) and AREVA by Bob Kehrman and Jim Medford respectively; and GNEP Overview and Public Comment was presented by Dr. Mark Turnbough, the ELEA Principle Site Investigator.

The Eddy-Lea Energy Alliance, LLC

Given the small venue, the ELEA Public Participation Meeting in Lovington was well attended with a number of public officials and civic leaders expressing interest in learning more about the GNEP proposal (*See Attachment D*). Mr. Maddox began the PPM by providing a historical perspective of the development of ELEA utilizing a Power Point presentation *(See Attachment E*). The first slide depicted the 25 percent ownership breakdown between the four partners of the LLC: Eddy County, Lea County, the City of Hobbs, and the City of Carlsbad. He further emphasized the commitment and collaboration present among all four entities and how they have each, equally, invested their commitment to the GNEP project. The subsequent slide emphasized the leadership positions and community involvement of the ELEA Board members: Alliance Chairs Johnny Cope (Lea) and Mayor Bob Forrest (Carlsbad), Secretary and Commissioner Jim Maddox (Hobbs), and Treasurer Janelle Whitlock (Eddy). The community leadership, strength, and commitment of the alternate members for the Alliance board (Former Chairman of the Lea County Board of Commissioners Harry Teague (Lea), State Representative John Heaton (Carlsbad), Mayor Monty Newman (Hobbs), and County Manager Steve Massey (Eddy)) illustrate the depth of strength the Alliance board holds. The community was also introduced to the ELEA Team; Principle Investigator, Dr. Mark Turnbough; Communications Group Shoats and Weaks; Gordon Environmental; and corporate partners AREVA and WGI. The attendees were then shown the final slide that detailed the ELEA/GNEP site located approximately halfway between Hobbs and Carlsbad on U.S. Highway 62/180 (the WIPP Route).

The Corporate Partnership

Jim Medford of AREVA described the corporation and its experience and involvement in Nuclear Energy. He then presented a DVD that illustrated AREVA's technology and existing process at La Hague (*AREVA DVD will be submitted with final communications report*). Mr. Medford stressed the fact that the existing AREVA reprocessing system is different from the one proposed for the GNEP.

Bob Kerman from WGI provided an overview of the company's evolution and its involvement with the development of WIPP in New Mexico. The presentation reviewed WGI's involvement with the start-up of WIPP and described the significant role WGI played in securing the Remote Handled Waste Permit Modification for WIPP from the New Mexico Environment Department. Mr. Kehrman also emphasized WIPP's safety and compliance record. Currently, WGI is the construction management contractor for the LES uranium enrichment facility being built near Eunice, New Mexico. Gordon Environmental prepared 14 color exhibits mounted on foam core boards to illustrate the extensive site-specific information that the site characterization team has collected at the proposed ELEA site. Mr. Kehrman discussed the exhibits and encouraged all attendees to review and ask questions. (*Gordon Environmental Site Characterization exhibits will be submitted with the final communications report*)

GNEP Overview

Dr. Turnbough presented an overview of the information initially provided at DOE's Scoping Meeting on GNEP. Attendees received a booklet with inserts from the DOE Scoping Meeting, along with a number of educational handouts on nuclear energy (*See Attachment F*). Dr. Turnbough discussed the benefits of an improved nuclear fuel cycle, the scientific sophistication, and the economic and environmental sensibility of expanding the use of nuclear energy. This presentation illustrated how GNEP would address concerns about management of high-level waste, proliferation of transuranics, as well as mitigation of the potential economic and environmental problems that can be attributed to fossil fuels. Dr. Turnbough indicated that he believes there are smarter and more environmentally sound ways to use fossil fuels while offsetting the demand for electrical energy with a closed nuclear fuel cycle as proposed by GNEP. The presentation then shifted to the practicality of locating the CTFC and the ARR at the ELEA site. He detailed the corridor of innovative and existing facilities that would enhance the location of GNEP at the ELEA site and build on the nuclear expertise that currently exists in the Permian Basin throughout Central and South East New Mexico, as well as West Texas. This corridor extends from WIPP in Carlsbad and The Carlsbad Monitoring and Environmental Research Center (CMERC) to the LES uranium enrichment facility in Eunice, New Mexico, and the site of Waste Control Specialists (WCS) in Andrews County, Texas: a disposal site for low-level radioactive waste that will accommodate the depleted uranium waste from LES. In addition, there is a significant amount of academic support in Central and South Eastern New Mexico as well as West Texas. The New Mexico State Legislature appropriated funds to begin a nuclear research facility in Hobbs (staffed by New Mexico Tech University), and the University of Texas is planning to construct a research reactor in Andrews County. Work on the research reactor is in concert with Sandia and Los Alamos National Laboratories.

Dr. Turnbough then discussed the existing characteristics/infrastructure that make the ELEA site a practical and feasible location for the GNEP facility. Transportation and highway infrastructure were discussed and Dr.Turnbough highlighted the transportation routes that WIPP is currently required to use. The WIPP route is equipped with a GPS tracking system to determine location of vehicles. This portion of the presentation also included brief discussions of the existing rail infrastructure located 3.8 miles west of the ELEA site, the abundance of available water, accessibility to adequate electrical power, and, ultimately, why the availability of these resources is critical to a project with the magnitude of GNEP.

Public Comment

Dr. Turnbough encouraged audience members to ask questions or to make comments. Marla Shoats, of Shoats and Weaks Communications, expressed support for the ELEA site on behalf of New Mexico State Senators Carroll Leavell and Gay Kernan, as well as State Representatives Don Bratton and Shirley Tyler. The New Mexico State Legislators were unable to attend due to the Special Legislative Session being held in Santa Fe, New Mexico.

There were several audience members from Lovington that expressed their support for the GNEP site and stated that the City of Lovington has historically been supportive of the LES, WCS, and WIPP. There were several comments made stating that the presentation by ELEA provided them with a greater understanding of the project and facility.

A Reporter from *The Lovington Leader Newspaper* was in attendance and most of his questions were based on the prospective tax implications of a project the size of GNEP and whether or not DOE had considered engaging in a Public/Private venture.

Citizens Against Radioactive Dumping (CARD) had a representative present from Albuquerque, New Mexico. He expressed several concerns that were addressed by Dr. Turnbough and Mr. Medford. His concerns focused on the safety of the transportation route, the impact of the public participation meetings, and site characterization. There were extensive discussions on transportation concerns and informative discussion regarding the reality that used fuel is currently being moved between reactors and has been for the past 30 years. CARD's representative stated that he had concerns about DOE's level of interest in public input. Dr. Turnbough emphasized that it is a critical component to the process and the siting of the GNEP facility anywhere in the United States. Dr. Turnbough then discussed CARD's concern about due diligence on the site selection and addressed questions that CARD had regarding the karstic topography. Ultimately, the CARD representative stated that his questions were answered but that the philosophy of CARD was against all nuclear energy processes. However, he added that they were satisfied with the site specific information and the expertise of the presenters and their due diligence on the project.

Faldo Carrasco, a Roswell resident, had concerns about any GNEP site located in New Mexico. He asked Mr. Medford why North Carolina, where Mr. Medford resides, had not applied for a grant. Mr. Medford replied that North Carolina has two nuclear reactors but was unsure why the State of North Carolina did not apply for the GNEP grant and that neighboring states had applied for and received GNEP awards.

Mr. Carrasco asked if the environmental justice issue had been discussed in this region. Dr. Turnbough replied that it had been evaluated extensively relative to WIPP, WCS, LES, and the UT Research Facility. Survey research conducted in Lea County in 2006 indicated that approximately 70 percent of the sample supported the facilities, 15 percent opposed, and 15 percent had no opinion. This information was derived from a January 2006 public opinion survey conducted by BASELICE and Associates of Andrews, Ector, Gaines, and Lea County.

A representative from Congressman Steve Pearce’s office stated that Congressman Pierce was in support and that the office appreciated the transparency of the presentation and ELEA’s efforts to inform the interested communities.

Summary

The prevailing response in the PPM was that the City of Lovington is very supportive of the ELEA site. The only concerns raised were by the representative from CARD and an individual from Roswell. These concerns were discussed extensively. The responses by Dr. Turnbough, Mr. Medford, and Bob Kehrman were thoughtful, detailed, and informative. All interested parties attending the PPM appreciated the presentation and the discussion that ensued.

THE EDDY-LEA ENERGY ALLIANCE, LLC GLOBAL NUCLEAR ENERGY PARTNERSHIP Award Number: DE-FG07-07ID14799 Hobbs Public Participation Meeting Lea County Special Events Center March 22, 2007 6:00 p.m.

Hobbs (Lea County), New Mexico, was the second location of four Public Participation Meetings (PPM) held by the Eddy-Lea Energy Alliance LLC (ELEA). These meetings are being held to solicit public opinion regarding the Global Nuclear Energy Partnership (GNEP) siting study, as well as to provide specific information regarding both program and site-specific aspects of the GNEP process and to address the identified local stakeholder concerns, issues, and values.

Public Notice

Public notice appeared in the *Hobbs Sun Newspaper* 10 days prior to the PPM. Newspaper ads ran March 13th and 22nd (*See Attachment A*)**.** A press release was issued by ELEA on March 19th; receipt of the press release was confirmed by Rich Trout, the newspaper's editor. An article concerning the public meetings appeared in *The Hobbs Sun* the day of the scheduled meeting (*See Attachment B*)**.** Hobbs-based radio station KLEA announced the scheduled GNEP meeting and the location during their Community Calendar segment. In addition, *The Hobbs Sun* published an article the following day summarizing attendance and the information provided at the PPM (*See Attachment C*).

Public Outreach

Public outreach was maximized as a result of the cooperative effort of Hobb's local elected officials, community leaders, community activists, and the Economic Development Corporation of Lea County (EDCLC). Community leaders facilitated the effectiveness of the outreach efforts by the cumulative strength of the leadership as well as their level of involvement with the ELEA. Mayor Monty Newman, ELEA Chair Johnny Cope, and ELEA Secretary Jim Maddox personally contacted numerous individuals in Hobbs and assisted the communications group in developing an agenda to provide stakeholders with comprehensive and detailed information. The Economic Development Corporation of Lea County (EDCLC) was instrumental in assisting the ELEA. They utilized their local expertise and knowledge of local grass roots organizations and community leaders to best determine how to maximize public input and participation in the PPM. To ensure that key members of the EDCLS were contacted and aware of ELEA's efforts, Bethe Cunningham worked closely with Shoats and Weaks, Inc.

To further augment our efforts to outreach as thoroughly as possible, Ms. Cunningham distributed an e-mail notifying members of the scheduled PPM in Hobbs (*See Attachment D)*. Shoats and Weaks, Inc. followed up by making individual phone calls to key EDCLC members. (*See Attachment E)*.

The Public Participation Meeting PPM

As directed by ELEA, Shoats and Weaks, Inc. customized the agenda for the Hobbs Public Participation Meeting (PPM) building on information regarding GNEP provided at the DOE Scoping Meeting offering more in-depth explanations of the technical aspects of GNEP and the existing infrastructure in Lea County, ultimately addressing ELEA's objectives for the City of Hobbs (*See Attachment F*). Chairman Johnny Cope presented an overview and explanation of the Eddy-Lea Energy Alliance LLC, Bob Kehrman and Jim Medford presented the corporate partnership between Washington Group International (WGI) and AREVA, respectively. Dr. Mark Turnbough, ELEA Principle Site Investigator, presented the Technical Parameters of GNEP and The Practical Necessity of Fuel Recycling and The Infrastructure Requirements of GNEP and Marla Shoats, ELEA communication group, facilitated Public Comment.

The meeting began with Marla Shoats highlighting the format of the PPM, informing the participants that the PPM was being transcribed and that a Spanish translator was available, and requesting that all participants sign in **(***See Attachment G).*

Eddy-Lea Energy Alliance, LLC

Chairman Johnny Cope welcomed the audience and provided a historical perspective of the development of ELEA utilizing a Power Point presentation *(See Attachment H*). The first slide depicted the 25 percent ownership breakdown between the four partners of the LLC: Eddy County, Lea County, the City of Hobbs, and the City of Carlsbad. He further emphasized the commitment and collaboration present among all four entities and how they have each, equally, invested their commitment to the GNEP project. The subsequent slide emphasized the leadership positions and community involvement of the ELEA Board members: Alliance Chairs Johnny Cope (Lea) and Mayor Bob Forrest (Carlsbad), Secretary and Commissioner Jim Maddox (Hobbs), and Treasurer Janelle Whitlock (Eddy). The community leadership, strength, and commitment of the alternate members for the Alliance board (Former Chairman of the Lea County Board of Commissioners Harry Teague (Lea), State Representative John Heaton (Carlsbad), Mayor Monty Newman (Hobbs), and County Manager Steve Massey (Eddy)) illustrate the depth of strength the Alliance board holds. The community was also introduced to the ELEA Team: Principle Investigator, Dr. Mark Turnbough; communications consultant Shoats and Weaks; Gordon Environmental; and corporate partners AREVA and WGI. The attendees were then shown the final slide that detailed the ELEA/GNEP site located approximately halfway between Hobbs and Carlsbad on U.S. Highway 62/180 (the WIPP Route).

The Corporate Partnership

Jim Medford, AREVA, described the corporation and its experience and involvement in Nuclear Energy. He then presented a DVD that illustrated AREVA's technology and existing process at La Hague (*AREVA DVD will be submitted with final communications report*). Mr. Medford stressed the fact that the existing AREVA reprocessing system is different from the one proposed for the GNEP.

Bob Kerman from WGI provided an overview of the company's evolution and its involvement with the development of WIPP in New Mexico. The presentation reviewed WGI's involvement with the start-up of the WIPP and described the significant role WGI played in securing the Remote Handled Waste Permit Modification for WIPP from the New Mexico Environment Department. Mr. Kehrman also emphasized WIPP's safety and compliance record. Currently, WGI is the construction management contractor for the LES uranium enrichment facility being built near Eunice, New Mexico. Gordon Environmental prepared 14 color exhibits mounted on foam core boards to illustrate the extensive site-specific information that the site characterization team has collected at the proposed ELEA site. Mr. Kehrman discussed the exhibits and encouraged all attendees to review and ask questions. (*Gordon Environmental Site Characterization exhibits* *will be submitted with the final communications report*).

Technical Parameters of GNEP and the Practical Necessity of Fuel Recycling

Dr. Turnbough gave a Power Point presentation that detailed GNEP from a technical perspective (*See Attachment I*). This presentation illustrated the differences between the Open Fuel Cycle system and the Closed Fuel Cycle system. Dr. Turnbough proceeded to discuss the two proposed facilities, the Consolidated Fuel Reprocessing Center (CFTC) and the Advanced Recycling Reactor (ARR); the GNEP proposed time line; and existing worldwide GNEP-related facilities and the experiences of those facilities.

In addition to the Power Point presentation, the attendees were given a series of educational handouts on nuclear energy. They consisted of "*The Future of Nuclear Energy*," "*The Nuclear Fuel Cycle Fact Sheet*," "*Managing Used Nuclear Fuel*" and "*Used Nuclear Fuel Treatment and Recycling*" (*See Attachment J*). Dr. Turnbough discussed the benefits of an improved nuclear fuel cycle, the scientific sophistication, the economic and environmental sensibility of expanding the use of nuclear energy. This presentation illustrated how GNEP would address concerns about management of high-level waste, proliferation of transuranics, as well as mitigation of the potential economic and environmental problems that can be attributed to fossil fuels. He indicated that he believed that there are smarter and more environmentally sound ways to use fossil fuels while offsetting the demand for electrical energy with a closed nuclear fuel cycle as proposed by the GNEP.

The Infrastructure Requirements of GNEP

Dr. Turnbough began this agenda item by emphasizing the practicality of locating the CTFC and the ARR at the ELEA site. He detailed the corridor of innovative and existing facilities that would enhance the location of GNEP at the ELEA site and build on the nuclear expertise that currently exists in the Permian Basin throughout Central and South East New Mexico, as well as West Texas. This corridor extends from WIPP in Carlsbad and The Carlsbad Monitoring and Environmental Research Center (CMERC) to the LES uranium enrichment facility in Eunice, New Mexico, and the site of Waste Control Specialists (WCS) Andrews County, Texas: a disposal site for low-level radioactive waste that will accommodate the depleted uranium waste from LES. In addition, there is a significant amount of academic support in Central and South Eastern New Mexico, as well as West Texas. The New Mexico State Legislature appropriated funds to begin a nuclear research facility in Hobbs, (staffed by New Mexico Tech University), and the University of Texas is planning to construct a research reactor in Andrews County. Work on the research reactor is in concert with Sandia and Los Alamos National Laboratories.

Dr. Turnbough then discussed the existing characteristics/infrastructure that makes the ELEA site a practical and feasible location for the GNEP facility. Transportation and highway infrastructure were discussed and Dr. Turnbough highlighted the transportation routes that WIPP is currently required to use. The WIPP route is equipped with a GPS tracking system to determine location of vehicles. This portion of the presentation also included brief discussions of the existing rail infrastructure (located 3.8 miles west of the ELEA site), the abundance of available water, accessibility to adequate electrical power, and, ultimately, why the availability of these resources is critical to a project with the magnitude of GNEP.

Public Comment

Ms. Shoats facilitated the Public Comment section. All of those individuals that commented were supportive of the GNEP and the proposed ELEA site. The range of questions and comments were quite diverse.

The public comment section began with some comments about the existing industries that surround the ELEA site. An example given is the potash industry and the potash mines that are in the vicinity of the proposed site. Dr. Turnbough, gave a historical perspective of the communication and due diligence that occurred when selecting the ELEA site. That effort also took into account future potential development that may occur from existing industries.

The Executive Director of the Energy Technology Initiative, Stephanie Sparkman, was very supportive of the location of the GNEP site along the Permian Basin. Ms. Sparkman resides in Midland, Texas. She stated that the combination of the WCS site, LES site, and the WIPP are uniting to form the nation's nuclear corridor and that the GNEP and FutureGen are logical additions to the corridor. She also emphasized her concerns with the United States' dependency on foreign oil and that the residents of the Permian Basin need to unite to educate others about the energy crises and our role and opportunity to be part of the solution.

The elected officials of Eddy County showed their support for the ELEA site. State Senator Carroll Leavell spoke first in strong support of the project and the ELEA site. He emphasized the strength of academic excellence surrounding the community and that academic strength would be a substantial support base for the proposed ELEA/GNEP site. State Senator Gay Kernan provided her support for the project and thanked Dr. Turnbough for the detailed presentation that addressed a very technical scientific process in a manner that was easy for the general public to understand. She emphasized that the community had the strength and support to participate in an effort to change how the country will meet the future demands of our national energy needs. Ms. Shoats then read letters of support from State Representative Shirley Tyler and State Representative Donald Bratton who were unable to attend (*See Attachment K*). City of Hobbs Mayor Monty Newman stated his support for GNEP and the ELEA site. He emphasized the importance of economic vitality of the area and the concentration and focus on energy related businesses. He stated that this project has the support of the Mayor's office and the City Commission of Hobbs.

Summary

The Public Participation Meeting held in Hobbs on March 22, 2007, was well attended. The PPM presentation enhanced the information provided to the community of Hobbs during the DOE Scoping Meeting. The comments of the participants were positive and supportive of the ELEA site and the GNEP. Participants commented that they appreciated the educational and succinct presentations, and that they now had a better understanding of the magnitude of the project. The participants left the PPM enthusiastic and better informed about the prospects of GNEP. The comments from local elected officials, residents, and business owners were diverse and overwhelmingly supportive of the proposed ELEA site. The transcriptions of this meeting will be included in the final communication report.

THE EDDY-LEA ENERGY ALLIANCE, LLC
GLOBAL NUCLEAR ENERGY PARTNERSHIP
Award Number: DE-FG07-07ID14799
City of Carlsbad Public Participation Meeting
Pecos River Conference Center
March 28th, 2007
6:00p.m

Carlsbad, New Mexico, located in Eddy County, was the third location of four for Public Participation Meetings (PPM) held by the Eddy-Lea Energy Alliance, LLC (ELEA). The purpose of the meetings are to solicit public opinion regarding the Global Nuclear Energy Partnership (GNEP) siting-study, as well as to provide specific information regarding both program and site-specific aspects of the GNEP process and to address the local stakeholder concerns, issues, and values.

Public Notice and Public Outreach

Public advertisement appeared in the *Carlsbad Current Argus* daily newspaper March 25th and 27th. Legal notices were published on March 18th, 25th, and 27th (*See Attachment A*). In addition, direct telephone and electronic mail communications were made with Eddy County, Lea County, Hobbs, and Carlsbad local elected and appointed officials and members of the state legislative delegation from the involved areas. Shoats and Weaks, the ELEA Communications lead, placed telephone calls to approximately 130 citizens identified from a list of local citizens provided by Carlsbad Mayor Bob Forrest (*See Attachment B*). There were 83 individuals in attendance at the public hearing, with 63 signing in and providing contact information (*See Attachment C*). The meeting was held at the Pecos River Conference Facility, a publicly owned and managed center that is ADA compliant.

The Public Participation Meeting

ELEA requested that the communications team customize the PPM agenda to each community, ensuring that surrounding and impacted communities are well informed and have an opportunity to participate. Each PPM is transcribed and a Spanish translator was in attendance for anyone requiring translation services. The agenda for the Carlsbad PPM addressed the ELEA objectives for the City of Carlsbad and Eddy County specifically (*See Attachment D*). Ms. Marla Shoats of Shoats & Weaks opened the meeting by summarizing the agenda and introducing the presenters, including Mayor Forrest and Commissioner Whitlock. Attendees were welcomed and given an overview of ELEA by Bob Forrest, Mayor of Carlsbad, and Janelle Whitlock, Eddy County Commission Chairperson. Mayor Forrest provided a historical perspective of the development of ELEA utilizing a Power Point presentation (*See Attachment E*). The first slide depicted the 25% ownership breakdown between the four partners of the LLC: Eddy County, Lea County, the City of Hobbs, and the City of Carlsbad. He further emphasized the commitment and collaboration present among all four entities and how they have each, equally, invested their commitment to the GNEP project. The subsequent slide emphasized the leadership positions and community involvement of the ELEA Board members: Alliance Chairs Johnny Cope (Lea) and Mayor Bob Forrest (Carlsbad), Secretary Jim Maddox (Hobbs), and Treasurer Janelle Whitlock (Eddy). The community leadership, strength, and commitment of the alternate members for the Alliance board [Former Chairman of the Lea County Board of Commissioners Harry Teague (Lea), State Representative and Chairperson of Radioactive and Hazardous Materials Committee John Heaton (Carlsbad), Mayor Monty Newman (Hobbs), and County Manager Steve Massey (Eddy)] illustrate the depth of strength the Alliance board holds. The community was also introduced to the ELEA Team: Principle Investigator, Dr. Mark Turnbough; communications consultant Shoats and Weaks; Gordon Environmental; corporate partners AREVA and WGI. The attendees were then shown the final slide that detailed the ELEA/GNEP site located approximately halfway between Hobbs and Carlsbad on U.S. Highway 62/180 (the WIPP Route).

Both Mayor Forrest and Commissioner Whitlock expressed their pleasure at having ELEA being selected as a possible site for GNEP and graciously welcomed the PPM attendees. They also lauded the uniqueness of the bi-county effort and the cooperative nature of the ELEA partnership. They noted that the membership of ELEA represented the elected and community leadership of the involved communities and the involved political jurisdictions. Mayor Forrest pointed out that Carlsbad was experienced in dealing with Department of Energy projects and noted the success and safety of the Waste Isolation Pilot Plant (WIPP) and the very positive and productive partnership that the City of Carlsbad and the community has with the WIPP and its contractors. Mayor Forrest also complimented Lea County officials and the communities of Hobbs and Eunice in the successful handling of the LES project. The Mayor further noted that the projects are examples of the experience and synergy of the communities and individuals involved with the ELEA and are excellent reasons why the ELEA should be highly regarded in consideration for the GNEP site. Commissioner Whitlock stated that the support of the Eddy County Commission for the GNEP was unanimous. She indicated that the ELEA site was the best location due to the characterization, community support, and the quality of the ELEA team. In addition, she further emphasized the community's experience with the WIPP project and that the Department of Energy's historic involvement in the community was an additional asset. Following the Mayor and Commissioner the agenda included presentations from Bob Keherman from Washington Group International, Sunita Kumar from AREVA, and Dr. Mark Turnbough, Principal Investigator on behalf of ELEA's GNEP proposal.

The Corporate Partnership

Bob Kehrman, Washington Group International (WGI), gave a history and overview of WGI. Mr. Kehrman explained that WGI employed over 25,000 people and operated in 40 states and over 30 counties. The corporation has vast experience in energy and environmentally related concerns including WIPP and was integrally involved in the development of the Washington TRU Solutions transportation project, management of WIPP operations, and securing the remote-handled permit. WGI's safety record at WIPP as well as other projects and programs internationally is excellent. There are three units of WGI presently in operation in Carlsbad: Washington Environmental and Regulatory Services, Engineering Products Division, and Washington TruSolutions. WGI is also presently involved in the development and construction of the LES facility in Eunice. WGI's role in the GNEP as a partner is to manage site selection and development, as well as to manage fieldwork and all subcontractors. Mr. Kehrman reported that work on the site is progressing well and that WGI's experience with projects such as WIPP and LES has resulted in WGI being well integrated within the communities, culture, and people of Lea and Eddy Counties. Fourteen color exhibits prepared by Gordon Environmental were also presented on display easels illustrating site-specific information regarding site characterization of the ELEA site that is located halfway between Hobbs and Carlsbad on U.S. Highway 62/180, the WIPP route (*Gordon Environmental Site Characterization exhibits will be submitted with the final communication report*).

Sunita Kumar represented AREVA. Ms. Kumar gave a brief history and overview of the corporation and explained to the audience that AREVA had a significant corporate presence in the U.S. with over 5,000 employees at 40 locations. The company's focus is on providing fuel and related services to nuclear plants, including operations and maintenance. A DVD was shown, presenting a corporate overview of AREVA as well as an explanation of the nuclear fuel cycle including uranium mining/enrichment, fuel fabrication, reactor services, recycling, and used fuel management (*AREVA DVD will be submitted with final communication report*). Ms. Kumar closed noting that AREVA is involved with all phases of the nuclear energy process and has a worldwide presence and expressed AREVA's commitment to ELEA and GNEP.

GNEP OVERVIEW

Dr. Mark Turnbough, the Principal Investigator on the project, presented an overview of GNEP and noted the strength and suitability of the ELEA site with respect to GNEP needs. Dr. Turnbough noted that ELEA offers a perfect combination of site suitability and community support and that the economic, human, scientific, and environmental dynamics associated with the project were very encouraging. Dr. Turnbough indicated that GNEP and the current conditions regarding worldwide energy problems presented a unique opportunity to affect a major shift in public policy related to energy issues.

Dr. Turnbough gave a Power Point presentation detailing GNEP from a technical perspective (*See Attachment F*). The presentation explained the differences between a Closed Fuel Cycle system and an Open Fuel Cycle system and some of the related exigent issues regarding such forms of energy production. Dr. Turnbough explained that the goal of GNEP was multifaceted: energy sufficiency, making nuclear energy a more viable energy alternative, safeguarding and control of nuclear waste, and developing better and more efficient recycling technology. Two projects and potential solutions were discussed that involve the development of two facilities: the Consolidated Fuel Treatment Center (CFTC) and the Advanced Recycling Reactor. Dr. Turnbough also noted that several handouts were included in the brochure and materials given to attendees and went over the various briefs that included "The *Future of Nuclear Energy*," "*The Nuclear Fuel Cycle Fact Sheet*," "*Managing Used Nuclear Fuel*," and "*Used Nuclear Fuel Treatment and Recycling*" (*See Attachment G*). Dr. Turnbough indicated that the solution to the world's energy problems could be addressed through a combination of technological changes in the production of energy through the use of fossil fuels, development of other forms of alternative energy production, and the criticality on managing these waste streams.

The Infrastructure Requirements of GNEP

Dr. Turnbough reviewed the infrastructure needs of the ELEA site and pointed out some of the site characteristics that demonstrate that the site is the most suitable for locating the CFTC and the ARR. The site is geographically stable and it is free of any surficial complexity that could cause problems with the construction and long-term operation of the GNEP. Also noted was the fact that there isn't any karst topography in the area or any threat on the proposed site to animals or plants currently on the endangered species list. The site meets all GNEP criteria and is relatively isolated.

In addition, the site has access to a large volume of dedicated water in the Ogallala Aquifer in the Lea County Basin and water rights are secured. Electrical power lines run to the north and south of the site with 220kV and 114kV lines. There is an existing, operable rail spur about 3.8 miles from the site. The site is adjacent to U.S. Highway 62/180, the last leg of the WIPP transportation route. Dr. Turnbough pointed out that the transportation system was recently subjected to intense review during the permitting process that allows for the WIPP to receive remote-handled waste. This has set a precedent for addressing some of the transportation issues that will need to be considered for the GNEP facility. In conclusion, the ELEA site and the existing infrastructure is physiographically suitable and has access to water, electricity, rail, the WIPP-approved highway system (with no encroachment issues), and offers proximity to existing nuclear-related facilities in LES, WCS, and WIPP.

Public Comment

Marla Shoats thanked Dr. Turnbough and recognized the importance of public participation to the GNEP process. Ms. Shoats opened the floor to audience questions and/or comments asking the state legislators in attendance to begin with their comments. Twenty-three individuals spoke during the public comment segment of the meeting.

Legislator comment indicated that the region has historically supported nuclear-related projects such as WIPP and LES, as well as the Andrews County Texas project involving Waste Control Specialists (WCS). Senators Leavell and Asbill and Representative Heaton applauded the level of attendance and expressed their support of ELEA and assured the group that they would work hard to secure necessary state and federal support to facilitate the siting process and infrastructure development. The legislators noted that support for the project reflected a pervasive "culture" in the community in support of WIPP, LES, WCS, and now the GNEP. They indicated that support was not only among the political and business leaders but the general population as well. Representative Heaton stated that when campaigning door-to-door, during the fall election, he would often ask constituents about these projects and never received negative feedback. Representative Heaton commented on the positive safety record of WIPP, as well as the professional management and community sensitivity exhibited by the WIPP operators. Senator Leavell commented that the existing and proposed projects would greatly enhance economic development of the region, resulting in an increase in quality jobs and careers, and encouraging future generations to remain in their communities. Senator Leavell stated that the state's universities and national labs would be valuable assets to the project. He also announced that an appropriation has been made to New Mexico Tech during the recently completed legislative session to fund a Southeast New Mexico Center for Energy Studies.

Senator Asbill shared his support for the project and stated that he is proud that the communities had come together in such a strong and cohesive manner to promote this site. Senator Asbill also said that given the circumstances surrounding the energy industry and the issues with nuclear waste, the project was not only viable but also imperative.

Comments were then received from approximately 24 members from the audience.

All of the public comments were positive toward the projects and supportive of the ELEA organization and efforts to secure GNEP. Most individuals indicated that although there was some initial skepticism regarding the WIPP, the operation has proven to be a very safe, well managed, and a significant economic driver for the community. Many statements were made regarding the potential jobs and opportunities that would come with GNEP. The Associate Director of the Carlsbad Environmental Monitoring Research Institute (CEMRC), which is part of the Institute of Energy and Environment, New Mexico State University Engineering Department, spoke and explained that his organization monitored the health of nonoccupational workers and the population in and around Carlsbad, and reported that there have not been any problems related to WIPP. He encouraged the participants to look at the CEMRC web site for more information. In addition, he offered continued assistance from CEMRC to ELEA. Another participant voiced her strong support for GNEP, sharing that as a German immigrant she was able to obtain her advanced degrees and establish a career working for WIPP in part due to the strong support from WIPP and the community. Several participants spoke of the supportive culture and values of the community relative to nuclear energy and the history of the area's involvement and understanding of the oil and gas industry. One speaker specifically related her negative experience in the Denver area as a worker at Rocky Flats and the discriminatory and disparaging manner in which the community treated her and her family. She noted that those attitudes did not exist in Carlsbad and that the community was proud to have nuclear-related industry located in the community and that the community's attitude was very understanding and positive.

Summary

The public comments at the ELEA Public Participation Meeting in Carlsbad, New Mexico, were extremely positive and demonstrated a solid understanding of the GNEP project and the nuclear industry in general. The participants of the community stated repeatedly that their collective experience with WIPP, LES, and WCS has provided residents, businesses, and the labor force with thorough knowledge of nuclear energy and the health and safety concerns associated with the industry. The community of Carlsbad was enthusiastic about the educational, environmental, and economic opportunities that the GNEP project could bring to the area.

THE EDDY-LEA ENERGY ALLIANCE, LLC
GLOBAL NUCLEAR ENERGY PARTNERSHIP
Award Number: DE-FG07-07ID14799
City of Las Cruces Public Participation Meeting & Round Table Discussion
New Mexico State University
April 4, 2006
3:00p.m

Las Cruces, Dona Ana County, New Mexico, was the site of the fourth Public Meeting and a Round Table discussion held by the Eddy-Lea County Energy Alliance (ELEA) in order to solicit professional opinion, technical information, and to foster collaboration with the universities, colleges, and academic institutions throughout Southern and South Eastern New Mexico regarding the Global Nuclear Energy Partnership (GNEP) proposal and the ELEA-proposed site. In addition, the public meeting and roundtable discussion provided information regarding the economic, workforce, and academic readiness issues involved with the GNEP as well as identified local stakeholders and public concerns, issues, and values related to the project and siting.

Public Notice and Public Outreach

The public meeting and round table discussion was held at New Mexico State University (NMSU) in the Clinton P. Anderson Physical Science Center. The emphasis for the meeting and roundtable discussion was on academic collaboration, work force development, and business involvement. Academic outreach included discussions with Dr. Michael Martin, President of NMSU; Dr. Dan Lopez, President of New Mexico Tech; and Dr. Ed Askew, Associate Director of the Carlsbad Environmental Monitoring and Research Center (CEMRC) to assess who should participate in the roundtable discussion on behalf of their respective academic institutions. Dr. Martin and Dr. Lopez were not able to personally attend but were enthusiastic about the GNEP proposal and were eager for their respective academic institutions to participate. They requested additional information and ongoing communication about the status of the GNEP and the ELEA site. The Eddy Economic Development Center LLC and Carlsbad Development Center were invited to discuss business involvement. The United Association of Plumbers and Steam Fitters was invited to discuss workforce development. Representatives from the ELEA, Washington Group International (WGI), and AREVA were also requested to attend and participate.

Public notice of the ELEA public meeting appeared in the *Las Cruces Sun News* on March 31, April 1, and April 3, 2007 *(Attachment A. Affidavits of Public Notice)*

The Public Participation Meeting & Round Table Discussion

The Las Cruces meeting was specifically directed toward including academic institutions, elected officials, representatives of various workforce organizations, and business leaders. Transcription services and a Spanish translator were present. There were 27 individuals in attendance, 14 of who signed in and provided contact information *(Attachment B. Sign In Sheets)*. The agenda for the Las Cruces meeting included a welcome and historical perspective of the ELEA, the Corporate Partnership with WGI and AREVA, the GNEP Overview, Development of the Energy Corridor, and University Research and Funding Opportunities *(Attachment C. ELEA Agenda).*

The Public Meeting and Roundtable discussion was opened by Ms. Marla Shoats of Shoats and Weaks, the communication group for ELEA, who summarized the agenda, welcomed and recognized the roundtable panelists, and asked each to introduce themselves and to identify whom they were representing. She then explained the format for the meeting. The members present at the Roundtable were:

- Dean Steven Castillo, NMSU College of Engineering
- Dr. Ed Askew, CEMRC
- John Heaton, New Mexico Legislator and ELEA Board Alternate
- Anthony Burris, NMSU Physical Science Lab
- Jerry Vaughn, United Association of Plumbers and Steam Fitters
- Dr. Mark Turnbough, Principal Site Investigator, ELEA
- Fredric Bailly, AREVA
- Bob Kehrman,WGI
- Dan Weaks, Shoats and Weaks, ELEA

Ms. Shoats indicated that public input and involvement was an integral part of the GNEP site and project selection process. She gave an overview of the three previous Public Participation Meetings that had been held in Lovington, Hobbs, and Carlsbad in addition to the Department of Energy's (DOE's) project scoping meetings that were held earlier in Hobbs, Carlsbad, Roswell, and Los Alamos. Ms. Shoats noted that the purpose of this meeting was to provide the participating academic institutions information about the technical, scientific, and infrastructure realities of the GNEP project. Additionally, it would serve as a forum to discuss academic readiness and workforce development relative to the needs of the project and the opportunities it would bring to the region and the state. Ms. Shoats indicated that participants were encouraged to pose any questions as the presentations were made and that comment did not have to wait until the end of the meeting so that there would be an opportunity for in-depth conversation on the various aspects of the GNEP as presented.

Introduction of the Eddy Lea Energy Alliance and the GNEP

Ms. Shoats then turned the floor over to Representative John Heaton to discuss the Eddy-Lea Energy Alliance LLC and the proposed ELEA site. Representative Heaton introduced himself and noted that he was an elected state representative from Carlsbad and was in his 11th year as a representative. He said the communities of Hobbs and Carlsbad were extremely enthusiastic about GNEP. He explained that both communities were unique and that both had experience with large projects involving nuclear energy – WIPP for 30 years and LES more recently. Representative Heaton said the communities had the same reservations and curiosities that people anywhere would have when nuclear facilities are considered for location in their area. Concerns included transportation, health and safety, and the economic impact on the community.

Representative Heaton said that the communities in the area went through a very intensive education process over five or six years and as a result of that education and knowledge they became proponents of the WIPP project. He also praised the DOE for continually providing information, holding numerous public meetings, and being open about the regulatory process and safety issues. The DOE continues to provide information and be receptive and responsive to community concerns and education. WIPP has provided the host community and the world with an excellent example of how a nuclear facility can go through the siting, permitting, and opening processes, as well as the on-going operational management, all with the overarching issue of safety at the forefront.

Representative Heaton also referred to CEMRC, the center that was established to conduct baseline and on-going environmental health studies relative to the WIPP and the surrounding communities. He stated that the WIPP might be the only DOE site that deals with nuclear material that has a resource equivalent to CEMRC. NMSU has played a major role in that development. The WIPP has had independent oversight through an academic institution and that is a great asset insofar as the ELEA site is concerned.

Representative Heaton then turned to a discussion of the necessity of moving toward re-energizing the nuclear power industry in this country and the world, coupled with new technology allowing for greater reprocessing capabilities and a reduction in waste storage requirements by citing growth trends, consumption, environmental concerns, and alternative energy options. He also described some of the successful clean-up projects such as Rocky Flats and the progress at Hanford, and applauded the new RH permit for WIPP. He then summarized the basic attributes of the ELEA site and indicated that it should be considered as a serious alternative for the DOE. He further emphasized many of the outstanding characteristics of the ELEA site *(Attachment D. ELEA slides)*.

Representative Heaton then turned the floor over to Ms. Shoats who reiterated the strengths of the ELEA and the strong corporate partnership and community support.

The Corporate Partnership

Ms. Shoats then recognized Mr. Bob Kehrman to present WGI's involvement in the ELEA/GNEP site. Mr. Kehrman is stationed in Carlsbad and works at the WIPP on behalf of WGI. Mr. Kehrman presented a corporate history of WGI and its evolution into the global corporation it is today, explaining the various corporate activities and structure of WGI particularly as they relate to energy projects and the WIPP. WGI's local involvement includes Rust Constructors in Eunice, New Mexico, the site of the National Enrichment Facility, and Washington TRU-Solutions, which is the management and operations contractor for the WIPP, as well as the Engineered Products Division that builds shipping containers for hazardous and nuclear waste.

Mr. Kehrman explained that the role WGI has in the GNEP grant includes management support and participation in the site characterization studies. The site study work is being done in partnership with AREVA and Gordon Environmental, Inc. WGI, its affiliates, and its partners have a great deal of experience in the area due to the fact that they were responsible for establishing the environmental monitoring program at the WIPP. Mr. Kehrman introduced three of his staff members, Stuart Jones, Art Chavez, and Miriam Watley. These individuals, as Mr. Kehrman noted, are all locally educated at NMSU and the College of the Southwest. He indicated that it was WGI's policy to hire locally whenever possible and that WGI will be actively recruiting from local universities and colleges.

Mr. Kehrman concluded by stating that it was an honor to be chosen as corporate partners with the Alliance and recounted Carlsbad's Mayor Forrest reference to the partnership as the "dream team". Mr. Kehrman stated that the work was progressing well and that the site was absolutely everything GNEP would require. Mr. Kehrman then turned the floor back to Ms. Shoats who introduced Mr. Medford, the representative from AREVA.

Mr. Medford expressed his excitement about being involved with ELEA and the partners on the GNEP project. Mr. Medford gave a presentation on the background of AREVA. AREVA is a French company and is a world leader in nuclear energy that is vertically integrated from uranium mining to reactors to waste reprocessing. AREVA has about 6,000 employees in the United States and 60,000 worldwide. AREVA's interest in GNEP is due to the fact that the proposed recycling facility and the fast reactor really are right in the company's core competency. Mr. Medford noted that AREVA has been reprocessing fuel since 1976 in France. AREVA supplies fuel to over 70 plants worldwide. AREVA's research and development budget is approximately $750 million, much of which is directed toward GNEP-type projects. Mr. Medford pointed out that AREVA was working with "gen three-plus" reactors, which will be the next wave of reactors in the U.S.

Mr. Medford explained the three business units of AREVA: the front-end division, which includes mining, chemistry, and fuel enrichment; the reactors and services division, which includes plants; and the back-end division that does waste treatment, spent fuel management, reprocessing and recycling. AREVA's presence in the U.S at this time includes support for commercial utilities, support to the DOE complex, two fuel fabrication facilities, and various component and mechanical operations. In addition, AREVA is involved in licensing and eventual U.S deployment of a new reactor design, the European pressurized water reactor (EPR).

Mr. Medford stated that AREVA was involved locally with the LES uranium enrichment project and provided assistance with siting, licensing, and environmental reports, as well as design activities for the facility. This involvement segues into the GNEP activities including parts of the site report; regulatory plan, and environmental activities, coupled with knowledge of reprocessing and fast reactors. Mr. Medford then played a DVD depicting the company's organization and operations *(AREVA DVD will be submitted with the final communications report*).

GNEP Overview and Development of Energy Corridor

Ms. Shoats then recognized Dr. Mark Turnbough, ELEA Principal Site Investigator, for a presentation on the major objectives and projects associated with the GNEP and a discussion of the development of the existing energy corridor in eastern New Mexico and West Texas.

Dr. Turnbough gave an overview on the GNEP. He discussed the shifting policy focus regarding nuclear energy in this country, open versus closed fuel cycles, and the emergence of GNEP as a significant component of the Energy Policy Act of 2005. The basic concept DOE took from the enabling legislation was to move forward with non-proliferating technology that reuses transuranics, like plutonium, in the fuel cycle. Other strategic initiatives of GNEP are to develop and provide economically viable and environmentally safe nuclear power resources to developing countries and safely manage the fuel they use. Objectives in the U.S. include selecting a site on which at least two of three major proposed GNEP facilities could be located. ELEA is promoting a site between Carlsbad and Hobbs that could accommodate the Consolidate Fuel Reprocessing Center and an Advanced Recycling Reactor. The ELEA site is one of twelve sites around the country presently under consideration. The third facility is a research facility for the advanced fuel cycle. Dr. Turnbough indicated that the research facility would likely go to an existing national lab, a consortium of labs, or a consortium of labs and universities but that it was location-independent of the other two facilities.

Dr. Turnbough said that DOE was following an aggressive timeline on GNEP and that a site location decision is scheduled for June

2008. The current list of sites would likely be reduced to four or five and then subjected to further analysis in the programmatic environmental impact statement. Final site selection would occur in June of 2008. ELEA was organized to identify and promote a site in southeastern New Mexico and he believes that the site selected is well characterized and meets all the criteria necessary for the development of the two facilities envisioned by GNEP.

Dr. Turnbough reiterated the strong points of the ELEA site and moved into a discussion of the energy corridor concept as a consideration relative to GNEP siting. He noted the close proximity of several energy related facilities such as WIPP; Waste Control Specialists in the adjacent Andrews County, Texas; LES; and the proposed construction of the University of Texas research reactor, also in Andrews County. Dr. Turnbough cited the relative proximity of several major research universities and national labs (Sandia and Los Alamos) that are relatively close to the ELEA site.

Dr. Turnbough played a video of the operations of the AREVA reprocessing plant in La Hague, France, to demonstrate the major steps in reprocessing *(AREVA DVD will be submitted with the final communications report)*. Following the video Dr. Turnbough explained that the process at La Hague is different than the proliferation-resistant process proposed in the GNEP.

Dr. Turnbough explained that one of the primary objectives of GNEP is to reduce the amount of unusable long-lived radio-nuclides in order to make long-term disposal projects such as Yucca Mountain more feasible and long lived.

Dr. Turnbough stated that the scope of GNEP will provide a significant opportunity to utilize the tremendous intellectual resources that exist at the region's national labs and research universities. It will also be able to draw from a very receptive, mobile, highly trained, and reliable workforce of skilled technicians and trades persons that are currently in place to handle the development construction and operation of LES. The existing experience of the communities in the region with respect to nuclear energy projects has to be considered as an advantage of the energy corridor. A culture of public knowledge and acceptance based on the safe operation of existing facilities and the open processes followed in siting of existing and developing projects is beneficial.

Round Table Discussion and Public Comment

Ms. Shoats recognized Dr. Askew who described CEMRC's role in researching the epidemiological data of Carlsbad and Eddy County residents, which began two years prior to any active shipments to the WIPP site. These baseline data are unique to the ELEA site and help reassure the public that these facilities are operated safely and professionally and consequently do not pose an undue health or safety risk to the community.

Dr. Askew also pointed out that he was working with the Carlsbad Branch of NMSU to establish a two-year training program for energy industry workers. The Associate Degree would be granted in hazardous and radioactive material technology management. There is also a one-year program being developed for tradesmen and craftsmen working in the industry. In addition, Dr. Askew is working with the Department of Engineering at NMSU to develop a minor in nuclear engineering and chemistry. The Carlsbad Branch is also developing programs in Engineering Technology for advanced welding machining and other technologies. He said, "We are very vested in providing education and training for all these projects."

Ms. Shoats thanked Dr. Askew for his comments and recognized Dr. Castillo, Dean of the College of Engineering at NMSU. Dr. Castillo expressed his excitement for the project and further noted the role of the university in serving the needs of the citizens of New Mexico and that the mission of the land-grant institution is education, outreach, and research. Dr. Castillo stated that having a well-educated and trained workforce was essential to economic development and that research – especially in the critical area of energy – was critical to address the challenges facing the United States and the world. He related his experience to the leaders of the ELEA and expressed his support for the projects and the GNEP and appreciated the opportunity to work with the partnership. Dr. Castillo discussed several NMSU programs such as the Waste Education and Research Consortium (WERC) that does environmental research that could be utilized on projects such as GNEP. He also referenced other programs at New Mexico Tech and the University of New Mexico that could also be beneficial to the GNEP effort and that by working together these institutions could provide a significant portion of the manpower required.

Ms. Shoats thanked Dr. Castillo and recognized Representative Heaton for comment.

Representative Heaton stated that Dr. Castillo sits on the board of the Center for Excellence and Hazardous Materials Management based in Carlsbad and that he has been a very productive member of the Board. Representative Heaton also stated that in terms of nuclear engineering there are probably only 16 to 18 such programs in existence in the U.S at the present time and encouraged the development of new programs now that "nuclear" is re-emerging.

Ms. Shoats recognized Jerry Vaughn, Business Agent for the United Association of Plumbers and Steam Fitters. Mr. Vaughn stated that historically the Permian Basin has experienced feast or famine where economic upturns and downturns are concerned and it has been totally dependent on the oil and gas industry. He hopes that these new projects – WIPP, LES, and hopefully the GNEP and other developments – will stabilize the area economically. Mr. Vaughn indicated that the New Mexico Building Trades have already committed to put in the resources, time, and effort to assist in training workers for the LES projects and would do the same for the GNEP. Mr. Vaughn also pointed out the ripple effect on the local economy of all the new well-paying and permanent jobs.

Representative Heaton noted that the community was used to having a large influx of workers come into the community because of the experience with the boom-and-bust cycle of the oil and gas industry and that it was not unusual for the community to adjust and accommodate 1500 new workers in a matter of a few months. Representative Heaton also said the timing of the completion of construction on the LES facility and the timeline for the beginning of construction on GNEP facilities would correspond well and that the LES construction workforce could move into the GNEP projects.

Ms. Shoats thanked Mr. Vaughn for his participation and commitment to help provide a critical element in the project, which is a stabile, well trained workforce. Ms. Shoats then asked Mr. Weaks of Shoats and Weaks Inc. to present information on some of the programs, resources, and projects that are in place at the universities and in state government that could assist in the GNEP.

Mr. Weaks reiterated the magnitude of the project and the potential job creation. He stated that such growth would create a significant challenge with respect to workforce development and training. This will require every higher-education institution (two-year and research), local government, state government, the state legislature, public school, labor organization, and business to collaborate in the effort to develop the workforce to enable the projects to be developed.

Mr. Weaks indicated that there are presently several programs that the legislature has funded that could be utilized for actual training relative to projects like the GNEP. These existing programs include the Geophysical Research Center, to be run by New Mexico Tech in Hobbs, for which the legislature appropriated $250,000 this session; the New Mexico Research Collaborative, which includes a consortium of all higher-education institutions that is chaired by former Governor Carruthers, who is now director of the Arrowhead Center for Economic Development at NMSU. This organization has received up to $2 million in appropriations and an estimated $500,000 was appropriated during the 2007 legislative session.

Mr. Weaks added that the President of New Mexico Tech, Dr. Dan Lopez, and his Vice President for Research and Development, Dan Romero, unfortunately had a last-minute scheduling conflict and were unable to attend. However, Dr. Lopez sent his regrets and wanted to state that Tech is very supportive of this effort and looks forward to participating in the GNEP project. Dr. Lopez is also the Chairman of the Council of University Presidents in New Mexico and will bring the project to the attention of that group and arrange for their participation as well.

Mr. Weaks began the discussion of the DOE funding opportunities that are program grants for academic readiness relative to GNEP and the development of research collaborative. Copies of the grants were distributed *(Attachment E. Federal Grant Proposals)*. Mr. Turnbough noted that the response deadlines for two of the programs were in May and early June and encouraged participation. One of the grants in particular is to specifically enhance synergies by partnering with nontraditional institutions, such as colleges and universities with strong minority enrollment. The Roundtable discussed the strength that New Mexico's academic institutions have in regard to minority enrollment and recruitment.

The Roundtable discussed an additional activity that should be considered relative to the preparation for GNEP: To develop an inventory of existing workforce resources, working with the two-year institutions, labor organizations, the Technology Research Collaborative, State government agencies, national labs, and retired scientists and engineers that may have an interest. Representative Heaton stated that he thought he would be chairing the legislative interim committee on Radioactive and Hazardous Materials this year. The Roundtable discussed the importance of the ELEA presenting the GNEP to the appropriate legislative interim committees and that the timeline for the GNEP is very aggressive and the work-force readiness and academic readiness are not issues that can be handled in a month or two. There was agreement within the Roundtable that there would have to be a great collaborative effort to get ahead of the curve on the project and take advantage of the biggest economic development opportunity in the recent history of the state.

Dr. Turnbough then stated that it was his understanding that DOE had extended the public comment process into June and if that was the case then we should maintain continuity in the communications process among interested parties such as the university system and of course the public. ELEA will be requesting that DOE continue funding so that ELEA can follow-up on some of the initiatives Mr. Weaks spoke about in order to consolidate the institutional support system. Dr. Turnbough again stated that the site was more that acceptable, but that the ELEA really needed to demonstrate that we have the university infrastructure to build on the proposed technology.

Dr. Turnbough said that the scope of the project is so big that DOE is starting to realize the costs are going to be very significant and that the corporate partners that are involved with ELEA were strong and capable of participating financially in order to get the projects done by accelerating the timetable and drawing on existing university resources. The end result is the development of a viable, safe and economically profitable closed-fuel cycle that generates electricity, and a lot of it.

Representative Heaton discussed a new appropriation that the legislature made during the 2007 Legislative Session of approximately $10 million for alternative fuels research and development that was to be directed toward universities and the private sector.

Dr. Castillo asked for additional information about the future of federal funding for GNEP given the recent changes in Congress.

Dr. Turnbough responded that the budget for these initiatives was recently published in the Federal Register. Representative Heaton noted that Congress is quickly coming to the realization that in order to remain competitive in the world economy the U.S has to solve its energy problems and that we can no longer import 65% of our oil from politically unstable countries. GNEP is a big part of the answer, especially the solution of dealing with waste.

Dr. Castillo thanked everyone and said he was scheduled to attend a banquet for the WERC program that evening where Senator Bingaman would be the keynote speaker. He said he would be talking to the Senator about the GNEP proposal.

Ms. Shoats recognized Mr. Tony Burris, the associate dean and deputy director of the Physical Science Laboratory (PSL) at NMSU. Mr. Burris explained the role and activities of the PSL at NMSU and noted that they received funds from contracts from various federal agencies and private enterprise. Mr. Burris said that PSL has worked on several projects in Carlsbad and has been discussing the possibility of doing some work on radiological dispersal devices. He said that he could certainly see where this capability would allow for related research and engineering that would look at the signatures of the plants and their capabilities. He stated the PSL capabilities would be available to assist in the GNEP as needed.

Dr. Askew then added that he would like to get started on applications for the GNEP university readiness grants immediately. Specifically, Dr. Askew would like to develop an inventory of related resources among higher-education institutions, including two-year schools. He requested that the partners WGI and AREVA provide copies of job descriptions for types of jobs that the GNEP will require. This will enable the curriculum planners and administrators to acquire "off-the-shelf and accredited classes" and develop faculty qualifications and class structures designed to turn out qualified workers. Dr. Askew indicated he would like to work with anyone interested in pursuing this grant and project and stressed the criticality of moving inclusively and quickly.

Ms. Shoats then asked if anyone else in attendance would like to comment.

Mr. Dominic Silva, a resident of Las Cruces and a businessman, indicated that he attended the meeting to learn more about the project and to understand the technology and scope of GNEP. He indicated that the closed-fuel cycle concept was something that he was not fully aware of but found it to be a fascinating issue. He also stated that he believed GNEP to be a great opportunity for the universities to coordinate with the public sector and to do really good things for the rural communities.

Mr. Silva said the economic development would create stability in those areas. He encouraged the universities and colleges to get on board with the projects and fully participate.

Mr. Rudy Zamora introduced himself as the marketing representative for the Plumbers and Pipe Fitters. Local Union 412 in Southern New Mexico and ten southern counties in Texas. Mr. Zamora also represents the New Mexico Construction Trades Council with over 7,000 members. Mr. Zamora expressed his excitement about the project and being able to attend the meeting. He noted that he appreciated the information that was presented and that it helped to explain the concept of the GNEP and the experience and qualifications of the partners. Mr. Zamora said that he wanted to understand not only the aspects of the project and facilities relative to construction and building but also the partnership and community participation and workforce requirements. Mr. Zamora indicated that the organizations he represents could be of great assistance in providing training, apprenticeship programs, technical trades classes and all types of instructional safety classes. He also pointed out that there were already examples of building and maintenance agreements with Sandia National Labs and Los Alamos Laboratory and that they were in discussions with LES. Mr. Zamora stated his organizations enthusiasm to reach out to all those involved in the GNEP proposal and indicated he wanted to work together on the project.

In conclusion, Ms. Shoats then asked if there were any more comments from either the Roundtable or other attendees. She stated that many significant comments were made about continuing the collaboration efforts with the ELEA for the GNEP. She noted that the Roundtable Discussion and Public Meeting in Las Cruces demonstrated the strength and support of the academic community in New Mexico, and that the previous three Public Participation Meeting's were heavily attended and strongly supported. She indicated that the results of the Public Participation Meetings and the strength of the Academic Institutions further demonstrate the unique characteristics of the ELEA site. Ms. Shoats thanked NMSU for hosting the meeting at which point the ELEA Public Meeting and Roundtable Discussion in Las Cruces was adjourned.