ENVIRONMENTAL ASSESSMENT

DOI-BLM-NV-W030-2010-0006-EA;
DOE/EA-1810

SAN EMIDIO GEOTHERMAL EXPLORATION PROJECT
Geothermal Drilling Permits
Geothermal Leases NVN-42707, NVN-75233, and NVN-74196
Exploration Well Numbers 62-4, 68-33, 57-33, 73-9, 84-16, and 87-16
Washoe County, Nevada

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U. S. Department of Energy
Cooperating Agency

BLM

Black Rock Field Office/Nevada

NATIONAL SYSTEM OF PUBLIC LANDS

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/NV/WN/EA-10/31+1792

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Acronyms and Abbreviations

°F	degree(s) Fahrenheit
ACEC	Area of Critical Environmental Concern
Act	Geothermal Steam Act of 1970
AFY	acre-feet per year
APE	Area of Potential Effect
AUM	animal unit month
BAPC	Bureau of Air Pollution Control
BLM	U.S. Bureau of Land Management
BMP	best management practices
BRFO	Black Rock Field Office
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIAA	Cumulative Impacts Assessment Area
DoD	U.S. Department of Defense
DOE/FOE	Determinations of Eligibility and Finding of Effect
EA	Environmental Assessment
EIS	Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impacts
GDP	Geothermal Drill Permit
GHG	greenhouse gas
GPM	gallons per minute
GPS	global positioning system
H_2S	hydrogen sulfide
KGRA	Known Geothermal Resource Area
LAF	Large Aperture Fractures
MFP	Management Framework Plan
mg/L	milligram(s) per liter
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NDOM	Nevada Division of Minerals
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NRHP	National Register of Historic Places
NSO	Nevada State Office of the Bureau of Land Management
NWI	National Wetland Inventory
PEIS	Programmatic Environmental Impact Statement
PFYC	Potential Fossil Yield Classification
PM_{10}	particulate matter smaller than 10 microns in aerodynamic diameter

$PM_{2.5}$	particulate matter smaller than 2.5 microns in aerodynamic diameter
PMU	population management unit
Ppm	part(s) per million
PSInSAR	permanent scatter synthetic aperture radar interferometry
PVC	polyvinyl chloride
ROW	right-of-way
SHPO	State Historic Preservation Office
SPCC	spill prevention, control, and countermeasures
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGN	U S Geothermal Nevada, LLC
USGS	U.S. Geological Survey
VRM	visual resource management
WD	Winnemucca District Office

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1 INTRODUCTION

1.1 Background

The San Emidio geothermal power plant has been operating in the San Emidio Desert Known Geothermal Resource Area (KGRA) since 1988. The power plant is located approximately 90 miles north northeast of Reno, in Washoe County, Nevada (Figure 1). Ormat constructed the Amor II power plant and geothermal injection wells on a site license and federal geothermal leases. On May 1, 1996 Empire Energy, LLC, purchased the facility from Amor II, and in May 2008, the power plant and geothermal lease interests were purchased by US Geothermal Nevada, LLC (USGN).

Geothermal fluids in the San Emidio Desert were used as a heat source for an onion and garlic dehydration facility located approximately one mile north of the San Emidio power plant. The dehydration facility which is no longer in operation has also been purchased by USGN.

In the present operating configuration approximately 4,000 gpm (gallons per minute) of geothermal fluids are produced from wells on private land and piped approximately 1 mile south to the power plant, utilized for power production and then injected into wells. Both the power plant and the injection wells are located on BLM administered land.

USGN proposes to drill and test up to six (6) geothermal resource wells that would be located on BLM administered public lands leased to USGN in the vicinity of the power plant. Their application includes access roads, drill pad construction and drilling, completing, flow-testing and monitoring geothermal resources to various depths along a geological fault line. The total estimated area of new surface disturbance associate with the USGN proposal would be approximately 21.5 acres.

USGN made a request for designation of 20,407.12 acres, more or less, including the proposed project area, under the unitization provisions of the Geothermal Steam Act of 1970. On August 16, 2010 the Bureau of Land Management (BLM) Nevada State Office (NSO) designated the area as a logical unit area and the San Emidio federal geothermal unit agreement was approved effective October 1, 2010. A map identifying the location the proposed San Emidio Geothermal Unit and the Proposed Action are shown in Figure 2.

The Proposed Action would occur on 4 federal geothermal leases that would be within the proposed unit agreement area. BLM conducted analysis of the Proposed Action for operations

that would occur within the proposed federal geothermal unit area at the request of the proponent.

USGN has performed detailed geologic mapping, gravity and ground magnetic geophysical surveys for the entire San Emidio resource area. In July 2008, geothermal exploration drilling began on private lands adjacent to the BLM administered leases. Three exploration well sites and necessary access have been constructed to accommodate drilling. USGN also submitted a Notice of Intent to conduct seismic surveys in two separate areas of interest within the San Emidio geothermal resource.

The Department of Energy (DOE) selected USGN for negotiation of a financial assistance award that would partially fund a proposed project to evaluate the performance of a combination of geothermal exploration techniques. Specifically, USGN would develop and test the combination of three-component, long-offset seismic surveying, permanent scatter synthetic aperture radar interferometry (PSInSAR) and structural kinematic analysis as an integrated method for locating and 3-D mapping of Large Aperture Fractures (LAFs) in shallow to intermediate depth (600-4000 feet) geothermal systems. The proposed scope of work includes testing the methodology on known occurrences of LAFs, and then applying the technology to expand an existing production field and finding a new production field within the San Emidio geothermal resource area. The proposed project is expected to also include drilling of a "stepout" well and a "full diameter exploration well", in areas covered by the geophysical exploration project. The funding of these two wells would either be private or federal wells (part of the proposed BLM six geothermal wells mentioned above). The selection of which wells would be funded has not been completed. However, all possible wells that could be funded are covered in the Proposed Action or cumulative impacts. Another DOE NEPA review would be completed if the wells referenced in the cumulative impacts analysis, reasonably foreseeable action section, are selected for funding.

In situations where another federal agency has ownership of surface land management or funding part of the project, BLM must coordinate activities with those agencies. DOE is funding the drilling and testing of two exploratory geothermal wells within the San Emidio Geothermal resource area and therefore is also a cooperating agency. A Memorandum of Understanding (MOU) between the two agencies was reached on July 6, 2010.

An Environmental Analysis (EA) documents a site-specific analysis of potential impacts that could result with the implementation of a Proposed Action and alternatives to the Proposed Action. An EA also assists the BLM and DOE in project planning and ensuring compliance with the NEPA, and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI).

If the BLM determines that this project has "significant" impacts following the analysis and documented in the EA, then an EIS would need to be prepared for the proposed project. If not, a BLM Decision Record (DR) may be signed for the EA approving the selected alternative,

whether it is the Proposed Action or another alternative. The BLM DR, including the FONSI statement, documents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts (effects). As a cooperating agency, the DOE, would make its own NEPA determination (FONSI or to prepare an EIS) as required by BLM National Environmental Policy Act Handbook H-1790-1.

1.2 Purpose and Need

1.2.1 BLM's Purpose and Need

The purpose of this action is to provide USGN the opportunity to construct access roads, temporary pipelines and well pads for exploration drilling activities that would allow them to test the geothermal reservoir and evaluate the geothermal power development potential of the resource. BLM would do this in a manner that ensures the exploration proceeds as allowed by the terms of the leases and any special lease stipulations.

The need for the action is established by the BLM's responsibility under the Geothermal Steam Act of 1970 and the implementing regulations under 43 C.F.R. 3260; the Minerals Leasing Act of 1920 as amended under the implementing regulation of 43 C.F.R. 2800, and Department of Interior Secretarial Order 3285A1, signed February 22, 2010 which establishes the development of renewable energy as a priority for the Department of Interior and establishes policy to encourage the production, development and delivery of renewable energy.

1.2.2 DOE's Purpose and Need

DOE's purpose is is to provide USGN with a financial assistance award funded under the American Recovery and Reinvestment Act of 2009 in the amount of $3,772,560. The funding would support a project to validate the use of innovative exploration technologies. Specifically, the USGN proposes to explore the San Emidio geothermal resource area by using exploration technologies to drill two exploratory wells, which are intended to confirm the resource and validate the exploration technology.

The funding of these two wells would either be private or federal wells (part of the proposed BLM six geothermal wells mentioned above). The selection of which wells would be funded has not been completed. However, all possible wells that could be funded are covered in the Proposed Action or cumulative impacts sections of this EA. Another DOE NEPA review would be completed once the wells are selected for funding regardless of well selection.

The Proposed Action supports DOE's mission to reduce dependency on fossil fuels and foreign fuel sources. By providing financial assistance to support this project, DOE supports the domestic energy needs and the development of alternative fuel sources (i.e. geothermal), lessening the dependency on foreign fuel sources.

1.2.3 Decisions to be Made

The BLM will decide whether or not to approve the Geothermal Drill Permits (GDPs) and if so under what terms and surface conditions, whether to approve the operations plan and if so under what conditions of approval.

Some consequences of selecting the No Action alternative would include:
Denying the lessee's ability to evaluate the geothermal resource is inconsistent with the purpose of geothermal leases and the federal energy policy which promotes the development of alternative energy sources and would not meet the stated purpose and need.

The No Action alternative would not support the Energy Policy Act of 2005 (Pub. L. 109–58). Section 211 directing the Secretary of Interior to seek to have: "approved non-hydropower renewable energy projects located on the public lands with a generation capacity of at least 10,000 megawatts of electricity before the end of the 10-year period beginning on the date of enactment of this Act."

The No Action alternative would not support the DOE's mission to reduce dependency on foreign or fossil fuels. By not providing financial assistance to support this project, DOE would not support domestic energy needs and the development of alternative fuel sources (i.e. geothermal).

The No Action alternative would not support the BLM's responsibility under the Geothermal Steam Act of 1970 and the implementing regulations under 43 C.F.R. 3260 and the Minerals Leasing Act of 1920 as amended under the implementing regulation of 43 C.F.R. 2800.

The No Action alternative would not support the Department of Interior Secretarial Order 3285A1, signed February 2, 2010 which establishes the development of renewable energy as a priority for the Department of Interior and establishes policy to encourage the production, development and delivery of renewable energy.

It would not support the reasonably foreseeable development scenario related to geothermal energy established under the Sonoma-Gerlach Management Framework Plan.

1.3 Plan Conformance

The project area is subject to the BLM, Winnemucca District (WD) Sonoma-Gerlach Management Framework Plan (MFP), dated July 9 1982. Objective M-5 of the Sonoma-Gerlach MFP states: "Make energy resources available on all public lands and other lands containing federally owned minerals. The MFP goes on to state under Rationale., "Energy self-sufficiency is a national priority and continues to be top priority of Bureau's program."

The Proposed Action is in conformance with the MFP.

1.4 Relationship to Laws, Regulations, Policies, and Plans

The Proposed Action is consistent with the following statutes and implementing regulations, Policies and Procedures:

- The National Environmental Policy Act (NEPA) of 1969, as amended Pub. L. 91-190, 42 U.S.C. 4321 (*et seq.*)
- 40 C.F.R. 1500 (*et seq.*). Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act
- Considering Cumulative Effects under NEPA [CEQ 1997]
- 43 C.F.R. Part 46, Implementation of the National Environmental Policy Act (NEPA of 1969; Final Rule, effective November 14, 2008
- U.S. Department of the Interior (USDI) requirements (Departmental Manual 516, Environmental Quality [USDI, 2004]
- BLM NEPA Handbook (H-1790 1), as updated (BLM, 2008a)
- The Geothermal Steam Act of 1970 (30 USC 1001-1025)
- 43 C.F.R .3200, Geothermal Resources Leasing and Operations; Final Rule, May 2, 2007
- 43 C.F.R. 2800, Rights-of-Way, Principles, and Procedures: Rights of Way under the Federal Land Policy and Management Act and the Mineral Leasing Act. Final Rule, April 22, 2005.
- The 2005 Energy Policy Act; The National Energy Policy, Executive Order 13212
- Best Management Practices (BMPs) as defined in Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, Fourth Edition (Gold Book) (BLM, 2007)

In 2002, the BLM WD completed the "Geothermal Resources Leasing Programmatic Environmental Assessment." Special stipulations developed in the Programmatic EA were applied to geothermal leases subsequently issued by the BLM, including two (NVN-75233 and NVN-74196) of the three federal leases which are the subject of this EA. Copies of these special stipulations are attached to the EA as Appendix B and C. USGN would be required to comply with all special lease stipulations.

1.5 Issues

Scoping has been conducted with an internal BLM Black Rock Field Office (BRFO) Interdisciplinary Team (IDT). Public scoping was conducted though mailing to interested individuals and advertisement in the local newspaper for a 30-day period ending November 30, 2008. By internal and external scoping, the following issues were identified with regard to the Proposed Action:

- What potential effects on air quality could occur as a result of implementation of the Proposed Action?
- How could existing cultural resources, including archaeological sites be affected by implementation of the Proposed Action?
- How could the Proposed Action affect the potential spread of invasive, non-native species?
- How could migratory birds be affected by implementation of the Proposed Action?
- What potential effects could occur on traditional Native American religious concerns and lifestyles, including potential effects on surface water resources?
- What is the potential for hazardous or solid wastes to affect the environment as a result of the Proposed Action?
- What potential impacts to surface or ground water quality and quantity could occur as a result of the Proposed Action?
- How would soils and vegetation be affected by the Proposed Action?
- What potential impacts could occur to wildlife resources and special-status species?
- What potential effects could occur to the local economy from implementation of the Proposed Action?

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

2.1.1 Overview and Location

USGN proposes to drill and test six (6) production diameter geothermal resource exploration wells to be located on BLM administered public lands within the San Emidio Geothermal lease unit and leased to USGN in Washoe County, Nevada. The Site is generally located 12 miles south of Empire Nevada and 3.5 air miles west of State Highway 447, along the east side of the San Emidio Desert (See Figure 1).

The proposed wells are located within Township 29 & 30 North, Range 23 East, sections 4, 9, 16 and 33, Mount Diablo Baseline and Meridian (MDM), on federal geothermal leases N-042707, N-074106, N-074196, & N-075233 (Site)(See Figure2) in two general areas of the Site (See Figures 3 and 4). DOE may provide funding for two(2) of the six (6) proposed production diameter wells or two (2) of the nine (9) private geothermal wells (covered in the cumulative impacts section of this EA as Reasonably Foreseeable Actions) that would be drilled into San Emidio Geothermal resource area covered by the geophysical exploration project.

The proposed well sites were selected to explore a specific geophysical or geologic target. As USGN gains a better understanding of the geothermal resource, they may request to reposition drill site and their associated access within the project area, to meet data gathering needs.

The Proposed Action includes:

- Constructing, improving and/or maintaining 4,565 feet of access roads and 22,161 feet of temporary water pipelines as necessary to access and provide water to the well sites and testing of the wells;
- Constructing six geothermal well drilling pads approximately 300 feet by 350 feet;
- Drilling and completing a geothermal wells to a true vertical depth (TVD) of about 3,500 feet from each of the constructed drill pads;
- Flow testing each completed well to obtain samples of the geothermal fluid and production information from the geothermal reservoir.

Table 1 lists the proposed well locations by lease number, well name (using the Modified Kettleman numbering system), Township and Range, legal description, and approximate UTM coordinates. Figures 3 & 4 illustrate the proposed well site locations.

Table 1: Geothermal Well Sites

Lease No.	Well Name	Township/ Range	Legal Description (Section Number & Aliquot Part)	Approximate UTM Coordinates (NAD 83)	
				Easting (m)	Northing (m)
NVN-42707	87-16 (SE-10)	T29N, R23E	SE1/4, SE1/4, section 16	-3798415	5898619
NVN-42707	84-16 (SE-11)	T29N, R23E	SW1/4, NE1/4, section 16	-3798034	5899346
NVN-75233	62-4 (SE-12)	T29N, R23E	NW1/4, NE1/4, section 4	-3795624	5903022
NVN-74196	68-33 (SE-13)	T30N, R23E	SW1/4, SE1/4 section 33	-3795389	5903518
NVN-74196	57-33 (SE-14)	T30N, R23E	SW1/4, SE1/4 section 33	-3795445	5903844
NVN-75233	73-9 (SE-15)	T29N, R23E	SE1/4, NE1/4, section 9	-3786826	5901161

2.1.2 Access Information

Access to the Site is from State Route 447 (SR447). Travel north from Fernley or south from Gerlach on SR447 to mile marker 60 and turn west on Rodeo Creek Road. Travel west on Rodeo Creek Road approximately 4.9 miles and turn left on the Dehydration/Plant road then travel south to the site.

Existing roads at the Site would be used when appropriate to access the proposed drill sites. Roads would not require widening as they currently provide for a 16-foot wide driving surface. Existing public access through the project area would be maintained throughout the life of the project. When necessary, screened rock would be utilized to provide a durable driving surface.

Additional new roads would be required to access each of the proposed drill sites. They would be constructed with a 16-foot wide driving surface using a dozer and/or road grader using the guidelines identified in the BLM's Gold Book[1] to ensure that BLM construction and management standards are met. The total estimated area of surface disturbance required for new access road construction, assuming a 20-foot wide area of disturbance would be about 2 acres.

2.1.3 Site Preparation Activities

Each drill site would be shaped and graded to create a level pad for the drill rig and support equipment. Drill pad preparation activities would include clearing, earthwork, providing drainage and other improvements necessary for efficient and safe operation and for fire prevention. Clearing would include removal of organic material, stumps, brush and slash. Top

[1] Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The Gold Book) Fourth Edition, 2006

soil and organic material would be segregated and stockpiled separately from subsurface material. The site would be graded to reduce the movement of storm water off of the constructed pad site.

Actual configuration of each drill pad would be established to best match the specific physical and environmental characteristics of the site and to minimize grading (cut and fill). Each well pad would create approximately 300 feet X 350 feet or 2.5 acres in size. Total surface area for all six (6) well pads would be approximately 15 acres.

Fenced reserve pits would be constructed in accordance with best management practices identified in the BLM's Gold Book on each pad for the containment and temporary storage of water, drill cuttings and waste drilling mud during drilling operations. Each reserve pit would be placed in cut portion of the pad and would measure approximately 50 feet x 40 feet by up to 12 feet deep. Surface areas associated with reserve pits are included in well pad area.

The land area associated with road building, surface piping placement, drill pads and the test water pond associated with the Proposed Action on public land would be approximately 21.5 acres. The summary of the surface disturbance associated with the San Emidio Geothermal Exploration Project for public and private land is included in Table 2.

Table 2: Summary of the land disturbance associated with the San Emidio Geothermal Exploration Project on public and private land

Land Disturbance Summary																				
	Type of Disturba	SE-10			SE-11			SE-12			SE-13			SE-14			SE-15			Total	
BLM Surface		Length (feet)	Width (feet)	Acres	Length (feet)	Width (feet)	Acres	Length (feet)	Width (feet)	Acres	Length (feet)	Width (feet)	Acres	Length (feet)	Width (feet)	Acres	Length (feet)	Width (feet)	Acres	Length (feet)	Acres
	Roads	854.00	20.00	0.39	369.00	20.00	0.17	40.00	20.00	0.02	765.00	20.00	0.35	380.00	20.00	0.17	2348.00	20.00	1.08	4756.00	2.18
	Surface Piping	1663.00	3.00	0.11	637.00	3.00	0.04	10005.00	3.00	0.69	2190.00	3.00	0.15	1890.00	3.00	0.13	5776.00	3.00	0.40	22161.00	1.53
	Drill Pads	350.00	300.00	2.41	350.00	300.00	2.41	350.00	300.00	2.41	350.00	300.00	2.41	350.00	300.00	2.41	350.00	300.00	2.41	0.00	14.46
	Test Pond	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	425.00	325.00	3.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.17
	Sub-Total	2517.00	N/A	2.92	1006.00	N/A	2.62	10045.00		3.12	2955.00		6.08	2270.00		2.72	8124.00		3.89	**26917.00**	**21.34**
Private Surface	Roads	216.00	20.00	0.10	0.00	20.00	0.00	0.00	20.00	0.00	0.00	20.00	0.00	0.00	20.00	0.00	270.00	20.00	0.12	486.00	0.22
	Surface Pipe	692.00	2.00	0.03	1193.00	2.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2310.00	0.09
	Sub-Total	908.00	N/A	0.13	1193.00	N/A	0.05	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	270.00	N/A	0.12	**2796.00**	**0.31**
	Well Total	**3425.00**	**N/A**	**3.05**	**2199.00**	**N/A**	**2.68**	**10045.00**	**N/A**	**3.12**	**2955.00**	**N/A**	**6.08**	**2270.00**	**N/A**	**2.72**	**8394.00**	**N/A**	**4.01**	**29713.00**	**21.65**

2.1.4 Water Supply

Water would be used for site construction, dust control, and drilling. Water required for well drilling could average 20,000 gallons per day per geothermal well while requirements for road grading, construction and dust control would be substantially less. One or more portable water tank(s) holding a combined total of at least 10,000 gallons would be maintained on the well sites during drilling operations. Water would be obtained from an existing well located on private lands at Empire Farms. The water is permitted for industrial use and approval for temporary use for drilling would be obtained from the Nevada Department of Water Resources. Surface disturbance associated with constructing a fresh water pipeline would be included in the road disturbance foot print.

2.1.5 Aggregate

Gravel for road building material and drill pad construction would be obtained from a private source located in Township 30 N., Range 22 E., section 35, which is northwest of the site approximately 4 miles. Approximately 350 cubic yards of gravel would be hauled from the source southeast on the power plant pipe line road, then north from the power plant to the project area; a distance of approximately 8 miles. USGN would use dust suppression measures described in section 2.1.9 during haulage. They would make any necessary repairs to road surfaces that would result from the haulage. Each road segment and drill pad would be covered with gravel as necessary to create an all-weather surface.

2.1.6 Geothermal Exploration Well Drilling, Testing and Monitoring

Each well would be drilled with a large rotary drill rig that stands approximately 70 feet tall when erected. The typical drill rig and associated support equipment (rig floor and stands; draw works; mast; drill pipe; trailers; mud, fuel and water tanks; diesel generators and air compressors) would be brought to the drill pad on flat bed tractor-trailer trucks. Additional equipment and supplies would be brought to the drill site during drilling and testing operations. Several tractor-trailer truck trips would be generated each day and about eight small trucks/service vehicles/worker vehicles would be driven to the site each day throughout a 30-day drilling process. Drilling would be conducted 24-hours per day, 7-days per week by a crew of nine to twelve. The drilling supervisor, mud logger and crew would live in RV trailers on the active drill site while the well is being drilled.

The wells would each be cased to a depth of approximately 2,300 feet. Final depth would be dependent upon the geothermal resources encountered and drilling conditions. Following the cementing of the surface casing, “blowout” prevention equipment would be installed and inspected and approved by the BLM and the Nevada Division of Minerals. Geothermal fluids would not be allowed to flow uncontrolled to the surface or comingle with intermediate aquifers. A hydrogen sulfide monitoring system would be placed on the drill rigs, the mud tanks, and shaker system to protect workers, consistent with the Occupational Safety and Health Administration Safety and Health Regulations (Title 29, CFR, Section 1910.1 to 1910.1500).

The well bore would be drilled using non-toxic, temperature-stable drilling mud composed of a bentonite clay-water or polymer-water mix for all wells. Additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight, and prevent mud loss. Additional drilling mud would be mixed and added to the mud system as needed to maintain the required quantities.

The drilling mud, rock cuttings, and any reservoir fluids brought to the surface would be diverted to the reserve pit. The residual drilling mud and cuttings would be flowed from the well bore and discharged to the reserve pit. This would be followed by one or more flow tests.

Each flow test would entail discharging the well into a portable steel tank to facilitate monitoring geothermal fluid temperatures, pressures, flow rates, and chemistry and then through 8 inch steel pipe to a holding pond. Geothermal water may also be pumped back to the production zone to evaluate use of the well as an injection site.

After the short-term flow test(s), one or more long-term flow test(s) would likely be conducted to more accurately determine long-term geothermal reservoir productivity. The long-term flow test(s), each lasting approximately five days or more, would be conducted by either pumping the geothermal fluids from the well through on site test equipment closed to the atmosphere (using a line shaft turbine pump or electric submersible pump), or allowing the well to flow naturally to the surface, where the produced steam and non-condensable gases (including any hydrogen sulfide), separated from the residual geothermal fluid, would be discharged into the atmosphere. In either case, a surface booster pump would then pump the residual produced geothermal water/fluid through a temporary 8" diameter pipeline to either inject the fluid into one of the other geothermal wells drilled within the Site area or to the flow test pond. The temporary pipeline would be laid "cross-country" and on the surface of the disturbed shoulders of the access roads. No earthwork or removal of vegetation would be used to lay the pipeline cross-country or along the driving surface of roads. The anticipated surface disturbance associated with cross-country placement of the pipeline would be 22,160 linear feet or 3 acres. The on-site test equipment would include standard flow metering, recording, and sampling apparatus.

2.1.7 Well Abandonment

When a proposed well would no longer be required for testing or evaluation, USGN would remove all equipment, and the well bore would be abandoned according to Federal and State regulations. The well pad would then be restored in conformance with BLM surface reclamation requirements.

All reclamation of disturbed areas would be completed within one year from the date of proper plugging and abandonment of the well. Any constructed roads, drill pads and reserve pits would be recontoured to original grade, salvaged topsoil spread on the disturbed area and the site scarified. The disturbed area would be seeded by hand broadcasting or drilling with the BLM recommended seed mixture. The area would be raked or dragged to cover the seed if broadcast seeding is used. If testing results are favorable, phased reclamation would be

completed as described above. USGN would restore the well pad to the size needed for future production. USGN would notify the BLM (BRFO) in writing when reclamation operations commence and are completed.

2.1.8 Schedule of Exploration Activities

USGN proposes to initiate activities in late 2010 or early 2011. The project would be implemented over the next one to four years.

2.1.9 Adopted Environmental Protection Measures and Environmental Protection Lease Stipulations

USGN would comply with all special lease stipulations attached to leases NVN-74196 and NVN-75233 which apply to Proposed Action (Appendices A, and B). They would implement the following environmental protection measures described in their operations plan:

- Water would be applied to the ground during the construction and utilization of the drill pads and access roads, as necessary, to control dust.
- Portable chemical sanitary facilities would be available and used by all personnel during periods of well drilling and/or flow testing. These facilities would be maintained by a local contractor.
- Solid wastes (paper trash and garbage) generated by the operations would be transported offsite to an appropriate landfill facility.
- A Spill or Discharge Contingency Plan would be maintained on site and followed.

2.2 No Action Alternative

The proponent modified the proposed action to avoid environmental conflicts; therefore, the No Action alternative was the only other alternative analyzed in this EA.

The No Action alternative would require BLM to reject the Proposed Action and not approve the six drilling permits. No exploration wells would be drilled on public land and USGN would be unable to evaluate the geothermal power development potential. The No Action alternative would preclude the proposed lease evaluation and leave the potential for energy production from the project area untested.

The DOE would not fund the two proposed geothermal wells.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The location of the proposed wells is typical of higher elevation Nevada valleys and range fronts, with wide open spaces covered originally with species of low brush. The project is situated on gently sloping alluvial fans at the west base of the Lake Range. Elevation at the project site ranges from 4,400 to 4,800 feet. Humidity and precipitation are low. The valleys receive the least precipitation, generally no more than 6 inches a year at altitudes of 4,500 feet. At the project location, range front faults approximately 2000' to 3000' below ground surface create pathways for geothermal water to travel upward from deep fault systems. Thermal springs are not present in the project area.

3.1 Supplemental Authorities

Supplemental authorities of the human environment are subject to requirements specified in statute, regulation, or executive order and must be addressed in any document prepared pursuant to NEPA. According to the BLM NEPA Handbook (H-1790-1), 1988, if the supplemental authority is not present or is not affected by the Proposed Action or alternatives, this may be documented in the EA as a negative declaration. The following fifteen (15) critical elements were taken into consideration: Air Quality, Areas of Critical Environmental Concern (ACECs), Cultural Resources, Environmental Justice, Floodplains, Invasive Nonnative Species, Migratory Birds, Native American Religious Concerns, Prime or Unique Farmland, Threatened and Endangered Species, Wastes, Hazardous or Solid, Water Quality (Surface and Ground), Wetlands and Riparian Zones, Wild and Scenic Rivers, and Wilderness.

This Proposed Action was also reviewed to determine if any additional supplemental authorities would apply as defined in the revised BLM NEPA Handbook. No issues were identified beyond what has already been described.

Table 3: Critical Elements of the Human Environment and other Supplemental Authorities

Supplemental Authorities (formerly referred to as Critical Elements)	Not Present	Present Not Affected	Present Affected	Reference Section	Comments
Air Quality			X	3.1.1, 4.1.1	
Areas of Critical Environmental Concern (ACECs)	X			N/A	The proposed project is not located in or near any ACECs.
Cultural Resources			X	3.1.2, 4.1.2	
Environmental Justice	X			N/A	There are no environmental justice issues associated with the project.

Floodplains	X			N/A	The proposed project is not located in any FEMA-designated floodplains.
Supplemental Authorities (Continued)	**Not Present**	**Present Not Affected**	**Present Affected**	**Reference Section**	**Comments**
Invasive, Nonnative Species			X	3.1.3, 4.1.3	
Migratory Birds			X	3.1.4, 4.1.4, & 5.4.1	
Native American Religious Concerns		X		3.1.5	
Prime or Unique Farmlands	X			N/A	The proposed project is not located in or near any prime or unique farmlands.
Threatened and Endangered Species	X			N/A	No threatened or endangered species or suitable habitat is located on the project area.
Wastes, Hazardous or Solid	X			N/A	No hazardous wastes or hazardous materials are known to occur in Site Area. The operation would not utilize or generate hazardous or solid wastes.
Water Quality (Surface and Ground)			X	3.1.6, 4.1.5	
Wetlands and Riparian Zones	X			N/A	There is no riparian habitat within the proposed project area.
Wild and Scenic Rivers	X			N/A	The proposed project is not located in or near any wild and scenic rivers.
Wilderness	X			N/A	The proposed project is not in or adjacent to any wilderness area.

3.1.1 Air Quality

The project area is within an area that has been designated as a nonattainment area for criteria air pollutants. The Washoe County Health District Air Quality Management Division in coordination with the Air Pollution Control Hearing Board is required by federal law to permit stationary sources of air pollution for compliance with both federal requirements and local air quality regulations. The purpose of the operating permits for stationary sources is to regulate the amount and type of air pollutants by stipulating specific permit conditions to comply with ambient air quality standards and to meet the goals of Health People 2010.

The Proposed Action is not located in or within 100 miles of any Class I Federal Air Quality areas.[2] Class 1 lands are areas that have been granted the most restrictive air quality

[2] http://www.epa.gov/region09/air/maps/nv_clss1.html

protections under Section 162(a) of the federal Clean Air Act. Class 1 federal lands include areas such as national parks, national wilderness areas, national monuments and wildlife refuges. 40 CFR Section 51.307 requires the operator of any new major stationary source or major modification located within 100 kilometers of a Class I area to contact the federal land managers for that area.

3.1.2 Cultural Resources

The project area contains evidence of human occupation in prehistoric and historic times. Prehistoric peoples first entered the Great Basin around 12,000 years before present (B.P.). During this Paleo-Indian period large game, including now-extinct megafauna, were among the most important resources exploited. Fluted spear points ("Clovis" and "Folsom") are the most distinctive artifacts in the lithic tool kit. As climate changed after the last Ice Age and the Holocene era began, human adaptive strategies changed as well. The time 11,000-7,000 years (B.P.) is known as the Western Pluvial Lakes Tradition. It is believed that during this period human populations primarily relied on the resources to be found along lake and stream margins and sites dating to this period ring the shorelines of now dry Pleistocene Lakes. The Archaic period (7,000 B.P. through western contact) reflects a more generalized adaptive strategy. Hunting and gathering strategies were dependent on the seasonal availability of plants and the migration patterns of game. Rabbit, antelope and deer were among the animals hunted. The pinyon pine nut became a staple food source in areas in and around pinyon forests. Prehistoric sites in the project area reflect the mobility of the native population. Small temporary camps and tool manufacturing sites dominate while only a few sites that may have been used repeatedly over the years as seasonal camps have been located. Projectile points recovered from the region suggest the area was occupied from at least 8,000 B.P to the ethnohistoric period.

The area around the northern part of the project area is included in a prehistoric archaeological district known as the Lake Range Quarry Archaeological District. It is a complex of 18 archaeological sites related to the extraction and processing of opalitic chert which occurs naturally just north of the project area. Most of the sites in the district are quarries, lithic reduction sites, and campsites where the multi-colored, variable quality material was extracted from pits and colluvial deposits. The Quarry itself (CrNV-02-2716/26WA3012) is located just over ¼ miles from the San Emidio Project Area of Potential Effect (APE). The sites closest to the APE are secondary lithic reduction sites.

European Americans entered the area about 150 years ago. Mineral exploration, especially placer mining was conducted in the region in the early 20th century and later ranching also played a role in the use of the valley. Historically, only a few scattered parcels were privatized, but remain under ranching use to this day.

Three drill pads were inventoried in the South Study Area, no sites or isolates were recorded. Previous work in the area had identified several isolated finds outside of the newly inventoried parcels. Three drill pads, alternate drill pad locations, access roads, a test pond, and the route of an over-ground pipeline were inventoried in the North Study Area. Five lithic concentrations were recorded near Site CrNV-22-4181 (a National Register-eligible site) and

the site boundary was expanded to encompass these newly recorded concentrations. The route of the access road and pipeline pass through Site CrNV-22-4181, but no artifacts were identified along these routes. Site CrNV-22-4181 is a large site with widely scattered sparse lithic concentrations which appear to represent expedient use of the Lake Range Quarry chert that has either been brought to the site area or has been transported downhill from the bedrock deposits of lithic material. The potential for the presence of subsurface deposits is considered low. An additional inventory was conducted by BLM staff to identify an alternate pipeline route to avoid the newly recorded lithic concentrations in CrNV-22-4181.

Six additional sites (lithic scatters) and several isolated finds were recorded in the North Study Area. None of these sites were determined eligible for the National Register of Historic Places, but because of the cultural sensitivity of the project area, locations of drill pads were adjusted to avoid some of these sites.

3.1.3 Invasive, Nonnative Species

The state of Nevada lists 45 noxious weed species that require control[3]. BLM lists eleven of these invasive nonnative species that have been inventoried and are known to occur within the WD. The Proposed Action is within the Gerlach Cooperative Weed Management Area and USGN is a member of the early detection and rapid response program.

Regional weed inventories have documented several occurrences of the noxious weed Russian knapweed *(Acroptilon repens)*. Perennial pepperweed *(Lepidium latifolium)* has been documented within a few miles of the proposed project along State Route 447.

3.1.4 Migratory Birds

In the BRFO all birds except California quail, sage grouse, chukar partridge, gray partridge, ring-necked pheasant, mountain quail, and sharp-tailed grouse are considered migratory birds.[4] Conversely, all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, and swallows are considered migratory birds. Migratory birds may be found in the project area as either seasonal residents or as migrants and are protected under the Migratory Bird Treaty Act (MBTA).

The relative utilization, density, and number of migratory bird species that utilize a particular geographic area for primary life functions is related to the availability of appropriate topographic, vegetative, and aquatic habitat components. The San Emidio Valley is relatively limited in habitat complexity and diversity. As a result, migratory bird use is also limited when compared to other regions of the Great Basin with higher vegetation complexity. Vegetation in the project area provides less that 10% canopy cover, less than 25% ground cover and there is no naturally occurring surface water. Songbirds, waterfowl, shorebirds, doves, pigeons, small raptors, crows, swifts, martins, and swallows are transient and migrant in the project area. Hawks, owls, and shrikes are seasonal residents while golden eagles, prairie falcons, ravens,

[3] Nevada Administrative Code 555.10
[4] USDI, USFWS, 50CFR10.12, http://ecfr.gpoaccess.gov/cgi/t/text/text

and horned larks are year round residents. Within the footprint of the Proposed Action, horned larks are the most likely migratory bird to be encountered.

3.1.5 Native American Religious Concerns

The San Emidio Desert, where the project is located, is within the area traditionally used by the Northern Paiute or Paviotso. The Northern Paiute were hunting-gathering bands that generally traveled seasonal rounds in small family groups subsisting on a variety of plant foods, insects, small game, and fish. Game animals available to Native Americans in the planning area included antelope, rabbits, and a variety of small mammals, reptiles, and birds. Antelope and rabbits were often hunted communally. Seeds and roots were the primary plant foods gathered. Plant and animal products were also used for clothing, shelter, and other functional and ceremonial articles. Medicinal plants were used for healing purposes and springs, especially hot springs are still considered to be spiritual places.

During Native American consultation efforts, depletion of hot springs, general use of water, chemical emissions and possible damage to medicinal or other plants were mentioned as potential issues, but no specific locations were identified as sensitive. Although the San Emidio Project is in a geothermal area, there are no surface hot springs or other natural surface water in the project area.

3.1.6 Water Quality (Surface and Ground) and Water Quantity (Although Water Quantity is not a supplemental authority, it is being addressed with Water Quality in this EA due to its relevance to the topic)

The project site is located in the San Emidio Desert Hydrographic Area (Number 22 of 232 in the State of Nevada) within the Black Rock Desert Hydrographic Region (Number 2 of 14 in the State of Nevada). The 305 square mile San Emidio Desert Hydrographic Area is a closed surface water basin bounded by the Fox Mountains on the west, the Lake Range on the south and east and the Black Rock Desert on the north. The Nevada Department of Resources has "designated" the basin which means the permitted ground water rights approach or exceed the estimated average annual recharge (4600 acre-feet per year) and the water resources are being depleted or require additional administration. Annual precipitation in the vicinity of the power plant is approximately six (6) inches[5] most of which generally occurs during the winter months. Bateman and Hess (1978) also report that annual evaporation (from a free water surface) at the San Emidio Desert playa is approximately 47 inches.

Although numerous springs are present within the mountains bounding the area, especially the northwest corner of the Fox Mountains, surface water flows from the surrounding mountains to the playa is ephemeral, and much of the flow produced on the higher elevation areas infiltrates along the mountain flanks prior to reaching the desert floor. A fairly well-developed channel heading west, then northwest and north toward the playa floor begins just south and west of the power plant, and apparently drains local precipitation runoff. One spring was reported to be

[5] Bateman, Richard L. and John W. Hess, January 1978. Hydrologic Inventory and Evaluation of Nevada Playas, Project Report No. 49, Water Resources Center, Desert Research Institute

historically present (circa late 1970's) immediately west of an altered zone, in S½ SE¼ SW¼ Sec. 9, T29N, R23E (www.nbmg.unr.edu/geothermal/) approximately one half mile northwest of site SE-11. This spring does not appear on any topographic maps of the area nor is it described in any other geothermal or water resource reports. The altered zone appears to be an indication of ancient hot springs activity (Bonham, 1969). The hot spring (79°F) was sampled by Robert Mariner, USGS, and its quality was similar to the quality of the geothermal fluids in the area.

The San Emidio Desert playa appears to be a discharging playa with a high water table, which means that the hydraulic gradient is upwards toward the atmosphere rather than downward through the playa soils. During most, if not all, of a given year, the playa actively discharges groundwater by capillary action and evaporation, and soils remain saturated within two to three inches of the surface.[6] Groundwater flow directions beneath the playa are unknown due to the lack of wells in the area but groundwater is believed to flow in a direction similar to surface water although some groundwater may move into the Black Rock Desert Hydrographic Area to the north.

Wells within the area are used for industry, irrigation, mining and milling, quasi-municipal and stock water. Presently, geothermal fluids are produced from wells near the dehydration facility to the north of the Empire power plant. Geothermal production is from zones approximately 1,000 feet below the surface. It is expected that this fluid originates at a depth of approximately 10,000 feet and flows up the fault system, where it is intercepted by the 1,000 foot wells. The fluid then flows through the outflow zone and intermixes with the shallow aquifer. The temperature and chemistry of the fluid intercepted in Well 65C-16 and shallow wells at the power plant supports this hypothesis. The near-surface water chemistry is very similar to the geothermal fluid produced from other wells at the site. [7] Groundwater temperatures in shallow drill holes reportedly had temperatures of about 127 °F (53°C) at about one to three feet below the ground surface (Garside and Shilling, 1979) which is similar to production wells and total dissolved solids average above 4000 parts per million. Groundwater quality is very poor in the vicinity of the project area with mixing of the shallow groundwater with geothermal fluids based on a similar chemistry and temperature. The nearest stock water well is the Threemile Canyon Well located approximately 1.5 miles southwest of the project area. The closest potable water is produced from a well located approximately five miles north-northwest of the project area at Empire Farms.

[6] Environmental Assessment, December 2001, Proposed 180-day Surface Discharge of Geothermal Fluids in the San Emidio Desert, Empire Energy, LLC
[7] (Empire Energy, LLC, EA NV-020-08-05 dated 10/13/1987)

Additional Affected Resources

Table 4: Other Important Elements of the Human Environment

Resource	Not Present Not Affected	Present Not Affected	Present Affected	Reference Section	Comments
Geology		X		N/A	The potential for induced seismicity is not known. Induced seismicity would not be expected to occur related to exploration activities.
Range Resources		X		N/A	Proposed Action would impact less than 1 AUM
Socio-Economic Values		X		N/A	Activities related to the Proposed Action would be of short duration. The potential for short term employment for a small number of workers would be possible.
Paleontological Resources			X	3.1.7 & 4.1.7	
Soils			X	3.1.8, 4.1.8 & 5.4.2	
Special Status Species		X		3.1.10 & 4.1.7	
Visual Resources		X		N/A	The site is in a VRM Class 3 designated area. The Proposed Action is within the permissible limits of landscape alteration for this VRM classification.
Vegetation			X	3.1.9, 4.1.6 & 5.4.3	
Wildlife			X	3.1.10,.4.1.7 & 5.4.4	
Wild Horses and Burros		X		N/A	Burros are not present. No surface water would be affected so no anticipated affect on

					horses in the Fox and Lake HMA

3.1.7 Paleontological Resources

Portions of the San Emidio Geothermal Exploration project area are identified as possessing a potential fossil yield classification of 3a, or moderate potential. IM-2008-009 states that "If a Class 3a (Moderate Potential) unit underlies the area; the local geologic conditions should be considered, as well as any known localities in the region.

The geology of the San Emidio Valley is characterized by a thick sequence of Tertiary volcanic and sedimentary rocks that accumulated on an erosional surface developed on the Mesozoic metamorphic basement. Miocene Age rocks consist of a volcaniclastic assemblage of tuffaceous sandstones, lahars and ash flow tuffs are present in the project area. Lahars or volcanic mud flows may contain scientifically important fossils. However, lahars generally represent a small part of any geologic unit which is dominated by lava flows or volcanic ash flows. Coarse-grained alluvium and beach gravels to fine-grained lake sediments deposited by Lake Lahontan are present. Most of the fine-grained lake sediments which may have contained scientifically important fossils have been eroded from the project site.

3.1.8 Soils

The San Emidio Desert is a closed surface water basin with an eight-square-mile playa that receives all water from direct precipitation or shallow groundwater from the surrounding mountains. The San Emidio desert consists of lake terrace alluvium between the Lake Mountain flanks and the lower elevation of the playa. As indicated in the Soil Survey of Washoe County Central Part by the Natural Resource Conservation Service (NRCS, 1997), soils in the playa, west of the project area, are mapped as low permeability soils within the Umberland silty clay loam series.[8]

Surface disturbing activities related to the Proposed Action are within Trocken-Mazuma association soil unit 1060. The Trocken soil is found on alluvial fans. It is a gravelly sandy loam that is slightly saline with high permeability and low available water capacity. Trocken soils have a low wind and water erosion hazard. The Mazuma soil is found on alluvial fan skirts and at slightly lower elevations than Trocken soils. The Mazuma soil is a sandy loam with slight to high salinity, high permeability and low available water capacity. Mazuma soils have a low wind and water erosion hazard.[9]

3.1.9 Vegetation

JBR Environmental of Reno, Nevada conducted vegetation surveys during August of 2008 of the north and south exploration areas. These survey sites are identified in Figure 5. The South Survey Area is on the lower alluvial fan on the west side of the Lake Range. The slopes are

[8] Environmental Assessment, December 2001, Proposed 180-day Surface Discharge of Geothermal Fluids in the San Emidio Desert, Empire Energy, LLC
[9] National Resources Conservation Service (NRCS). 1994. Soil Survey of Washoe County, Nevada, North part. http://websoilsurvey.sc.egov.usda.gov/wssproduct

dominated by shadscale (*Atriplex confertifolia*) and/or bud sage (*Artemisia spinescens*). Big sagebrush (*Artemisia tridentata*) is also present, and is locally dominant along some of the larger washes. The North Survey Area is also on the lower alluvial fan (dominated by shadscale) but it extends farther west onto saline flats, which are dominated by greasewood (*Sarcobatus vermiculatus*) with some iodine bush (*Allenrolfea occidentalis*). No rare plants were found in either survey area however, three cactus plants (*Grusonia pulchella*) were observed near the eastern side of the south survey area. The only injurious weed observed was halogeton (*Halogeton glomerata*), which is common along roads and in other disturbed areas.[10]

3.1.10 Wildlife and Special Status Species

The relative utilization of an area by wildlife for primary life functions is related to the availability of appropriate topographic, vegetative, and aquatic habitat components. The San Emidio Valley has limited habitat components and diversity. As a result, the project area does not provide notable or unique wildlife habitat components. Vegetation in the project area provides less that 10% canopy cover, less than 25% ground cover and there is no naturally occurring surface water. As a result wildlife and non-migratory bird use is limited.

Similar to the general wildlife inventories in the region and wildlife observations in similar type habitats, common species include antelope ground squirrel (*Ammospermophilus leucurus),* black-tailed jackrabbit *(Lupus californicus),* Great basin whip-tail *(Cnemidophorus tigris tigris),* and the gopher snake *(Pituophis catenifer).* Big game use is minimal and limited to transient groups or individual pronghorn antelope *(Antilocaptra americanana)* that may be found in the vicinity. It was determined through consultation with the U.S. Fish and Wildlife Service that no listed, proposed or candidate species occur in the project area.

Non-migratory birds that could use the area include chukar partridge and greater sage-grouse. Chukar and sage-grouse are upland game birds, introduced and native respectively. Sage grouse are found on the sage-steppe habitats throughout the West, primarily in areas dominated by sagebrush (Artemesia spp.), forbs, and grasses. Chukar are common in upland sites with rim rock or rock outcrops with stands of grasses, often non-native grasses and free water. The San Emidio area contains many of the habitat requirements but free water is limited.

Optimum sage-grouse habitats are generally characterized as mature sagebrush stands with dense understory of native perennial grasses and native forbs. The San Emidio area does not contain, not does it have the potential for sage-grouse nesting or brooding habitat. There is some potential for winter habitat in sagebrush dominated communities near the top of the Fox and Lake ranges outside the project area.

[10] Arnold (Jerry) Tiehm, Empire Project Site Vegetation Survey Report, JBR Environmental, Project No. 08.00388.01, August 2008

4 ENVIRONMENTAL CONSEQUENCES

This section identifies the impacts associated with the proposed project. All potential direct and indirect consequences related to the Proposed Action of road construction, drill pad construction, and geothermal exploration drilling are addressed. Cumulative impacts are addressed in Chapter 5. Impacts identified after environmental measures and lease stipulations are identified and the cause, extent and relative importance are discussed. The Proposed Action will not cause any major unavoidable impacts. The proposed activities would cause minor environmental impacts.

4.1 Proposed Action

4.1.1 Air Quality

Fugitive dust generated from earth-moving activities and travel on unpaved roads during drill pad and road construction and drilling activities would be controlled by watering. Diesel engines would release criteria air pollutants, criteria air pollutant precursors, and air toxics during construction and drilling activities.

No residual air quality impacts would result from this proposal and no further evaluation of air quality is warranted.

4.1.2 Cultural Resources

The only historic property affected by the San Emidio Geothermal Exploration Project is CrNV-22-4181. The overland pipeline and the access road pass through this site. The area affected by the pipeline and access road is considered to have no adverse effect on the site because no artifacts were observed in the survey corridor along the pipeline and access road route and the potential for subsurface deposits is low. In addition, the amount of surface disturbance would be minimal because the pipeline would be constructed on the surface and vehicle traffic on the access route would be overland with minimal earth-disturbing construction. The BLM has determined that there would be no adverse effect to Site CrNV-22-4181 as a result of the project.

Other potential effects include increased possibility of unauthorized collection of artifacts due to increased visitation to the project area. This possibility is considered to be low because the types of artifacts present are not usually attractive to looters.

Because there is a chance that the location of one or more of the proposed drill pads may change during the course of the project as a result of on-going seismic studies, a Programmatic Agreement between BLM and the Nevada State Historic Preservation Office (SHPO) has been drafted to lay out procedures that will be followed to assure that significant cultural resources not already identified are protected. The Programmatic Agreement is consistent with the provisions of the Nevada State Protocol between BLM and SHPO.

4.1.3 Invasive, Nonnative Species

The Proposed Action has the potential to increase the spread of invasive, non-native species. Weed seeds can germinate when soils are disturbed by construction activities, particularly where available soil moisture is increased by application of water for dust suppression. Weeds could also be introduced by construction equipment brought to the project from infested areas or by the use of seed mixtures or mulching materials containing weed seeds. The potential for the Proposed Action to increase the spread of invasive, non-native species would be minimized through USGN maintenance of a noxious weed program consisting of monitoring and eradication for species on the Nevada Designated Noxious Weed List (NRS 555.010) as required in the lease stipulations.

4.1.4 Migratory Birds

Birds protected under the MBTA include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows and others, including their body parts (feathers, plumes etc), nests, and eggs. A complete list of protected species is found under title 50, part 10.13 of the Code of Federal Regulations. Take is defined as to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities and includes include habitat destruction or alteration where there is a direct taking of birds, nests, or eggs.[11] Activities which are most likely to result in take of migratory birds on geothermal exploration projects are clearing or grubbing of access roads and drill pads that are located in migratory bird nesting habitat and where construction is implemented during the nesting season when eggs or young are likely to be present.

Project construction would result in the loss of up to 21 acres of potential migratory bird habitat. Indirect impacts are related to construction and drilling noise and general human activity that would cause birds to be displaced and avoid the area. Direct impacts to migratory birds would only be expected in cases where a nest, eggs or young are destroyed by construction activity.

The Proposed Action is temporary and short term; however, the sites are not expected to be able to support the density, species diversity of cover conditions that exist prior to disturbance. A total of 21 acres is expected to be removed from or reduced in long term vegetation productivity and species diversity. Although the impacts represent only 0.018% of the San Emidio drainage basin, the indirect affects to migratory and non-migratory birds would be long term.

4.1.5 Native American Religious Concerns

Four tribal groups, the Summit Lake Paiute Tribe, the Pyramid Lake Paiute Tribe, the Susanville Indian Rancheria, and the Reno-Sparks Indian Colony were consulted about the San Emidio Project and a site visit with all four groups was conducted. A meeting with representatives of USGN and BLM was held with the tribal groups before the field visit. During the meeting concern was expressed about depletion of surface water and hot springs,

[11] http://www.fhwa.dot.gov/environment/migbird.htm

evaporation of water during the operation of geothermal plants, surveys of medicinal and economic plants of interest to Native Americans, and emission of toxic chemicals during drilling or geothermal operations. After the field visit, conversations and phone calls indicated that none of the groups had serious issues with the project but they wanted to be able to review the Environmental Assessment and comment on any issues they felt affected their concerns.

4.1.6 Paleontology

Under the Proposed Action, potential effects to paleontological resources could occur during earth-disturbing activities associated with geothermal exploration drilling and excavation of ponds for disposal of water and drilling fluids. However, because the potential for preservation of significant fossils is considered moderate and the area of subsurface disturbance at each of the six drill pads is quite small, any effects are considered minimal.

If any vertebrate fossils are uncovered during construction activities, work around the find will halt until BLM is contacted, the area is examined, and permission is granted to proceed with construction in that location.

4.1.7 Soils

The project would disturb up to 21.5 acres. Design features of the Proposed Action and associated construction activity are consistent with the BLM's Gold Book Standards for Road Construction and the Sonoma-GerlachMFP.

Construction activities would result in direct effects to soils such as such as displacement, loss of moisture holding capacity, and loss of microbiotic processes. Indirect effects are related to increased runoff potential and increased erosion. The potential for water and wind erosion on the disturbed soils in the project area is slight to moderate. Disturbed areas would be contoured as necessary and reclaimed in accordance with applicable BLM and lease requirements. Due to the nature of this disturbance, the commitment to stockpile topsoil and reclaim the disturbed lands, project impacts on soil productivity are low. Impacts would be localized and short term until the site has been stabilized.

The Proposed Action and design features would prevent excessive erosion, control runoff and stabilize disturbed soils.

4.1.8 Vegetation

Surface disturbing activities from the project would result in the loss of approximately 21 acres of the regional, common plant community. Disturbed areas could have an increase in cheatgrass as compared to undisturbed areas. Weed management and concurrent reclamation would minimize the spread of invasive, nonnative species and would prevent residual impacts to vegetation.

4.1.9 Water Quality (surface and ground) and Water Quantity

There are no perennial streams, surface geothermal fluids or other naturally occurring spring waters located in the project area. As a result, the project would have no potential for adversely affecting surface water.

No impacts to geothermal water sources have been identified and the potential for any impacts from or to ground water or geothermal water are minimal. The ground water and geothermal aquifers would be protected through implementation of standard industry practices and monitoring.

4.1.10 Wildlife and Sensitive Species

The project would result in the temporary loss of 21.5 acres of low quality wildlife habitat. The direct displacement of wildlife would result from the surface disturbance required for construction of the drilling pads and access roads. A slight reduction in wildlife carrying capacity would be expected to occur for some species, but most wildlife would be expected to adjust and relocate to similar habitat that is abundant in the project vicinity. The only fencing to be installed is located immediately around the drilling "mud pit" in an area of approximately 100' long and 50' wide. Newly established fencing could create a collision.

Over time and subsequent to site reclamation, reclamation species may provide forage and cover. However, due to difficult growing conditions and lack of available moisture, suitable wildlife habitat would be difficult to restore. Although this project is short-term and temporary, there would be long term impacts to the number of species and amount of ground cover that can be established through reclamation. Wildlife use would increase over time as reclamation and plant re-colonization occurs. As a result wildlife impacts are expected to low but long term.

Project generated noise could keep some animals away from areas directly affected by surface disturbance during the on-site project construction and drilling activities. Other indirect affects could result from general human activity, which could displace individuals or reduce breeding success of species that are sensitive to human activity. The indirect affects would be temporary and short-term. In addition, wildlife would be able to re-occupy the disturbed areas upon completion of these short-term operations. There should be few residual impacts to wildlife resources.

No sage grouse habitat or leks have been mapped or identified in the project area. Lack of habitat is evidenced by sparse forbs and grasses, no canopy cover, and lack of suitable water sources. Therefore, there would be no impact to sage-grouse.

The Proposed Action would not result in or contribute to the loss of critical habitat, listing of species, or the demise of local populations of terrestrial or avian fauna. The Proposed Action supports the BLM's and Sonoma-Gerlach MFPs wildlife management objectives. The Proposed Action also supports the BLM's and Sonoma-Gerlach MFP's grazing management

objective to provide for a sustained level of livestock grazing consistent with other resource objectives and public land use allocations.

Suggested Mitigation

Place flagging on newly established fences to help make them visible to wildlife and reduce potential wildlife collisions with the temporary fences. If mitigation is implemented, impacts to pronghorn antelope movements or migration would be expected to be negligible.

4.2 The No Action Alternative

Under this alternative, the project would not be authorized and therefore, no disturbance would occur. None of the previously described environmental consequences associated with the proposed activity would occur.

There would be no impact to Air Quality, Cultural Resources, Invasive, Non Native Species, Migratory Birds, Native American Religious Values, Water Resources, Paleontological Resources, Soils, Vegetation, Sensitive Species or Wildlife from the No Action alternative.

The No Action alternative would limit the continued data gathering and resource analysis that could lead to development of geothermal resources in the San Emidio Valley. The potential to define commercial quantities of geothermal resources that would occur as a result of the Proposed Action would be deferred or foregone under the No Action alternative.

5 CUMULATIVE IMPACTS ANALYSIS

The CEQ regulations for implementing NEPA (40 CFR 1508.7) define cumulative impacts as: ". . . the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time"

The following analysis identifies other past, present or reasonably foreseeable future actions which, together with the project, may incrementally impact the environment, and addresses the potential cumulative impacts of these actions and the project.

5.1 Cumulative Effects Study Area

The Cumulative Effects Study Area (CESA) for this environmental assessment has been designated as the San Emidio Valley which encompasses approximately 192,000 acres (297 square miles). Although a typical CESA would utilize the appropriate hydrographic area, the San Emidio Valley presents unique hydrologic and geographic characteristics. Specifically, the San Emidio Valley is a closed hydrologic system that has no natural source of fresh water and is not visible from any state road.

5.2 Past and Present Actions

Past and present activities include agricultural operations, livestock grazing, an interstate power transmission corridor, hard rock mineral development, and geothermal development. Surface disturbance associated with this activities is approximately 4,000 acres or 2.08% of the CESA.

Surface disturbances related to the Wind Mountain Mine are in the reclamation phase under care and maintenance by Kinross Gold Corp. Approximately 820 acres were disturbed by mining and ore processing at the site located within the CESA. More than 85% of the site has met the reclamation standards for release. The remainder of the mine reclamation is being evaluated annually for revegetation performance. The final reclamation bonding has not been released.

US Gypsum Company currently operates a gypsum mine and wall board manufacturing plant on private land within the CESA. Existing production is dependent on economic conditions and is expected to fluctuate according to the demand by the housing construction industry. Approximately 475 acres of disturbance of private land and 75 acres of public land have been disturbed by these operations.

Existing farming and ranching interests are anticipated to continue at current levels into the foreseeable future. Approximately 1,660 acres are currently under cultivation on private land within the CESA.

US Geothermal Nevada operates a geothermal power generation facility in the San Emidio Desert which includes a warehouse structure that was previously used as a garlic dehydration plant which used geothermal energy for the process. Existing surface disturbance associated with the power plant is approximately 64 acres.

In July 2008, geothermal exploration drilling began on private lands adjacent to the BLM administered leases. Three exploration well sites and necessary access have been constructed. Exploration drilling is expected to commence in September 2010 as additional geophysical data is evaluated. Disturbance associated with this action is less than 5 acres.

5.3 Reasonable Foreseeable Future Actions

For this analysis it is assumed that the "foreseeable future" is a three year period for implementation of the Proposed Action plus a subsequent 2-3 year period of care and maintenance to ensure that reclamation efforts are successful. It is assumed that minerals exploration and livestock grazing activities would continue into the reasonable foreseeable future in the same manner and to the same degree as they have been conducted in the present and recent past.

USGN is in the planning phases to expand the power output from the existing geothermal wells and up to nine (9) additional new geothermal wells located on private land. The facility and up to nine (9) new geothermal wells would result in approximately five (5) acres of new surface disturbance approximately 0.5 miles north of the current facility. DOE may fund of two of these private wells if the BLM wells are not selected. The selection of which wells would be funded has not been completed, but will occur after complete analysis of the geophysical work. Further NEPA review would be completed by DOE once the wells are selected for funding.

If the Proposed Action is successful in locating additional geothermal resources, a reasonable development scenario is that USGN would propose construction and operation of a new geothermal power facility to be located on BLM administered and private lands. A new geothermal facility would include the construction and operation of geothermal wells, geothermal power plant, and associated support facilities encompassing approximately 15 additional acres (<35 total acres or less than approximately 0.018% of the San Emidio drainage basin). Under this development scenario, a new proposal would be submitted and evaluated under the NEPA.

Also, the Pyramid Lake Paiute Reservation is proposing to develop a possible geothermal resource at the Astor Pass Site first drilling two exploratory wells. The Bureau of Indian Affairs would be the lead NEPA agency and authorizing agency for this project. DOE would be a cooperating agency funding geophysical and drilling activities. The exploration wells would be analyzed in detail during any future NEPA environmental review of those Proposed Actions.

5.4 Cumulative Impacts to Affected Resources

Cumulative impacts to air quality, cultural resources, invasive, non-native species, Native American religious concerns, water quality, and paleontological resources were considered and eliminated from further analysis as no cumulative impacts are expected to these resources.

Surface disturbance associated with past, present, proposed and RFFAs would be approximately 4035 acres or 2.1% of the CESA. The incremental increase in disturbance from the Proposed Action would be 21.5 acres or 0.53% of the total disturbance. The proposed environmental protection measures incorporated into the Proposed Action and the lease stipulations would help reduce or limit the potential effects of the project on migratory birds and other wildlife, and impacts to soils and vegetation. Impacts from the increase in disturbance from the Proposed Action would be a minor contribution to any cumulative impacts in the CESA.

5.5 No Action Alternative

No project activities would be undertaken if the No Action alternative were selected. There would be no cumulative effects on air quality; cultural resources; invasive, nonnative species; migratory birds; Native American consultation; paleontological resources; candidate and special status species; water quality (surface and ground); soils; vegetation; wildlife; range resources; water quantity; paleontology from implementation of the No Action alternative.

5.6 Irreversible and Irretrievable Commitment of Resources

No irreversible and irretrievable commitment of resources is expected.

6 MITIGATION AND MONITORING

As described in Chapters 2 and 4, there are lease specific environmental protection stipulations from BLM geothermal leases NVN-42707, NVN-75233, and NVN-74196 that would apply to this project included as Appendix A. Additionally, the recommended mitigation measures developed in this document would apply to the current project proposal if chosen by the Authorizing Official.

6.1 Applicable Lease Stipulations

6.1.1 Sage Grouse

A No Surface Occupancy within 2 miles of known leks at all times has been instituted to protect sage grouse leks.

- An avoidance stipulation with a range of between 0.6 and 2 miles has been established for known nesting, brood–rearing, and winter habitat.

6.1.2 Vegetation

- All areas of exploration disturbance will be reclaimed including recontouring disturbed areas and reseeding the areas with a diverse perennial weed-free seed mix.

6.1.3 Hazardous Materials

- An emergency response plan will be developed prior to commencing exploration.

6.1.4 Invasive, Non-native Species

- During all phases of exploration and development, the lessee shall maintain a noxious weed control program consisting of monitoring and eradication for species listed on the Nevada Designated Noxious Weed list (NRS 555.010).

6.1.5 General Mitigation and Monitoring:

- This approval is contingent upon the lessee/operator being in receipt of and incompliance with all appropriate state and local permits.

- The lessee/operator must abide by the Lease Terms, Lease Stipulations, Conditions of Approval, and all environmental protection measures and mitigation measures included in the Geothermal Drilling Permits and Operations Plan.

- When cultural or paleontological resources, including but not limited to historic ruins, prehistoric artifacts and fossils, are discovered in the performance of the permit, the resources shall be left intact and immediately brought to the attention of the BLM authorized officer.

- Pursuant 43 CFR 10.4(g) the holder of this authorization must notify the authorized officer, by telephone, with written confirmation, immediately upon the discovery of

human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined at 43 CFR 10.20). Further, pursuant to 43 CFR 10.4(c) and (d), the lessee/operator shall immediately stop all activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the BLM authorized officer.

- No hazardous materials shall be used during any phase of the operations unless prior approval has been obtained from the BLM authorized officer. All on-site drilling materials and chemicals shall be properly stored to ensure the prevention of spills. No chromate or other heavy metals or environmentally harmful additives will be used.

- No chemicals, fuels, oils, lubricants, or noxious fluids shall be disposed of at the drill sites, in the reserve or flow pits or down the wells.

- If any chemicals, fuels, oils, lubricants, and/or noxious fluids are spilled during drilling operations, they shall be cleaned up immediately. The lessee/operator shall have absorbent on site for spill containment. After clean up, the chemicals, fuels, oil, lubricants and/or noxious fluids and any contaminated material shall be removed from the drill site and disposed of at an approved disposal facility.

- The lessee/operator shall be responsible for all cost associated with any releases of chemicals and/or subsurface fluids resulting from their operations and practices.

- Material Safety Data Sheets for all drilling mud components are to be provided to the Hazmat coordinator at the Winnemucca District Office.

- Portable chemical toilets shall be used for human waste. The human waste shall not be buried on site.

- All equipment and machinery shall be equipped with spark arresters and mufflers.

- The lessee/operator shall be responsible for all suppression costs for any fire resulting from their operations and practices.

- Trash and other debris shall be contained on site and then hauled to an approved landfill. Burial and/or burning on site shall not be permitted.

- Except where otherwise noted, all test equipment, both surface and subsurface, shall be removed at the completion of this drilling and testing, as well as all other debris associated with this exploration.

- For a period of three years following the commencement of construction, project sites shall be inventoried by the lessee for the presences of invasive, nonnative species. Inventory data shall be reported to the BLM BRFO project lead within one week of

receipt by the lessee. The area shall be treated with BLM certified pesticides following BLM approval of a pesticide use proposal if species are present.

- Following the three year period, periodic inventory for the presence of invasive nonnative species would be performed at project sites, with treatment occurring as necessary. The periodic inventory and treatment would occur until the BLM determines that final reclamation of the project site is complete and acceptable.

- Roads to be constructed, improved or reclaimed as part of the project would be reviewed by the BLM and required to conform to the requirements of BLM Manual 9 1 13 and the "Gold Book" ("Oil and Gas Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development"), as applicable to the intended project use.

- The reserve pit shall maintain a minimum of two feet of freeboard at all times.

- Where excavation is required, topsoil will be salvaged during construction and stockpiled for use during subsequent reclamation of the disturbed areas.

- Wellhead equipment left on the drill site following the completion of drilling would be painted a color, subject to approval by the authorized officer, which would blend with the landscape. Prior to paint selection, USG would contact the BLM/BRFO project lead.

- All drill rig and well testing facility lights would be limited to those required to safely conduct the operations, and would be shielded and/or directed in a manner which focuses direct light to the immediate work area.

- If any well will be sitting idle for longer than one year, the well pad shall be scarified and seeded with the recommended seed mix.

- Upon abandonment of the wells, the following shall be done:

    - The wells shall be plugged to comply with all Federal and State of Nevada regulations.

      All reclamation of disturbed areas shall be completed within one year from the date of proper plugging and abandonment of the well. Any constructed roads, drill pads and reserve pits shall be recontoured to original grade, salvaged topsoil spread on the disturbed area and the site scarified. The disturbed area shall be seeded by hand broadcasting or drilling with the BLM recommended seed mixture. The area shall be raked or dragged to cover the seed if broadcast seeding is used. The BLM Winnemucca Field Office shall be notified in writing when reclamation operations commence and are completed.

  - Seeding of disturbed areas will be completed between October1 and December 31 using a BLM approved seed mixture and application rate.

- A copy of the Spill or Discharge Contingency Plan must be maintained at the drill site during active operations.

6.2 Recommended Mitigation Measures

Wildlife – Newly established fences associated with project should be flagged to minimize wildlife collisions.

No other recommended mitigation measures resulted from evaluation of the environmental consequences of the Proposed Action.

7 LIST OF PREPARERS

Bureau of Land Management
Mark Gingrich, Project Lead, Geology, Minerals and Hazardous Materials
Lynn Ricci, NEPA Compliance
Jill Nannenga, Range Resources
Roger Farschon, T&E Species, Special Status Species, Migratory Birds and Wildlife
Jeanette Black, Water Quality, Surface and Ground
Kathryn Ataman, Ph.D., Cultural Resources, Paleontological Resources and Native American Religious Concerns
Robert Burton, Invasive, Nonnative Species
Mike Zielinski, Air Quality, Soil Resources and Vegetation
Al Wilcox, Engineering

United States Department of Energy, Golden Field Office – Cooperating Agency
Christopher Carusona II, NEPA Compliance

Cultural Resource Management Consultants
Mark Druss, PhD, RPA, Cultural Resources

Logan Simpson Design
Mark Karpinski, M.A., RPA, Cultural Resources

JBR Environmental Consultants Inc.
Catherine Clark, Project Managment
Richard Duncan, T&E Species, Special Status Species, Wildlife and Migratory Birds
Christine Johnson, GIS

USGN LLC
Scott Nichols, Preparation of the Initial Draft EA
Donna Stammers
Robert Cline

8 CONSULTATION AND COORDINATION

8.1 Native American

Tribes consulted during scoping for the development of this EA includes:
Susanville Indian Rancheria
Reno-Sparks Indian Colony
Pyramid Lake Paiute Tribe
Summit Lake Paiute Tribe

Additionally, the Fallon Paiute Shoshone Tribe and the Cedarville Rancheria were invited to participate in review of the preliminary EA.

8.2 Other Consultation

United States Fish and Wildlife Service, Nevada Fish and Wildlife Office
Robert D. Williams, Field Supervisor

Nevada Natural Heritage Project
Eric S. Miskow, Biologist III/Data Manager

9 PUBLIC INVOLVEMENT

Public scoping was conducted through mailing our intention to prepare an EA for the Proposed Action to interested individuals and advertisement in the local newspaper for a 30-day period ending November 30, 2008. The scoping letter was also posted on the BLM's web page. Issues identified during the scoping process are listed in section 1.5 of this document.

On August 31, 2010, the Preliminary EA was posted on the Winnemucca District Office NEPA webpage at www.blm.gov/nv/st/en/fo/wfo/blm_information/nepa0.html. A letter to interested parties requesting substantive comments on the preliminary EA by September 13, 2010 was sent to interested parties and commenters during the scoping period. As a result of a substantive comment from NDOW, a recommended mitigation was added to the Final EA to minimize impacts to wildlife. A comment from a nearby private land owner involving use of private land to access the some components of the Proposed Action did not require modification to the analysis. If it is determined that access is needed other than described in the Proposed Action, additional NEPA analysis may be needed.

10 REFERENCES

Bureau of Land Management (BLM), Winnemucca District Office (WFO). 2002. Geothermal Resources Leasing: Programmatic Environmental Assessment. August 2002.

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Nevada Natural Heritage Program (NNHP). 2008. Sensitive Taxa recorded in San Emidio Valley. Nevada Department of Conservation and Natural Resources. Carson City, Nevada. February 4, 2008.

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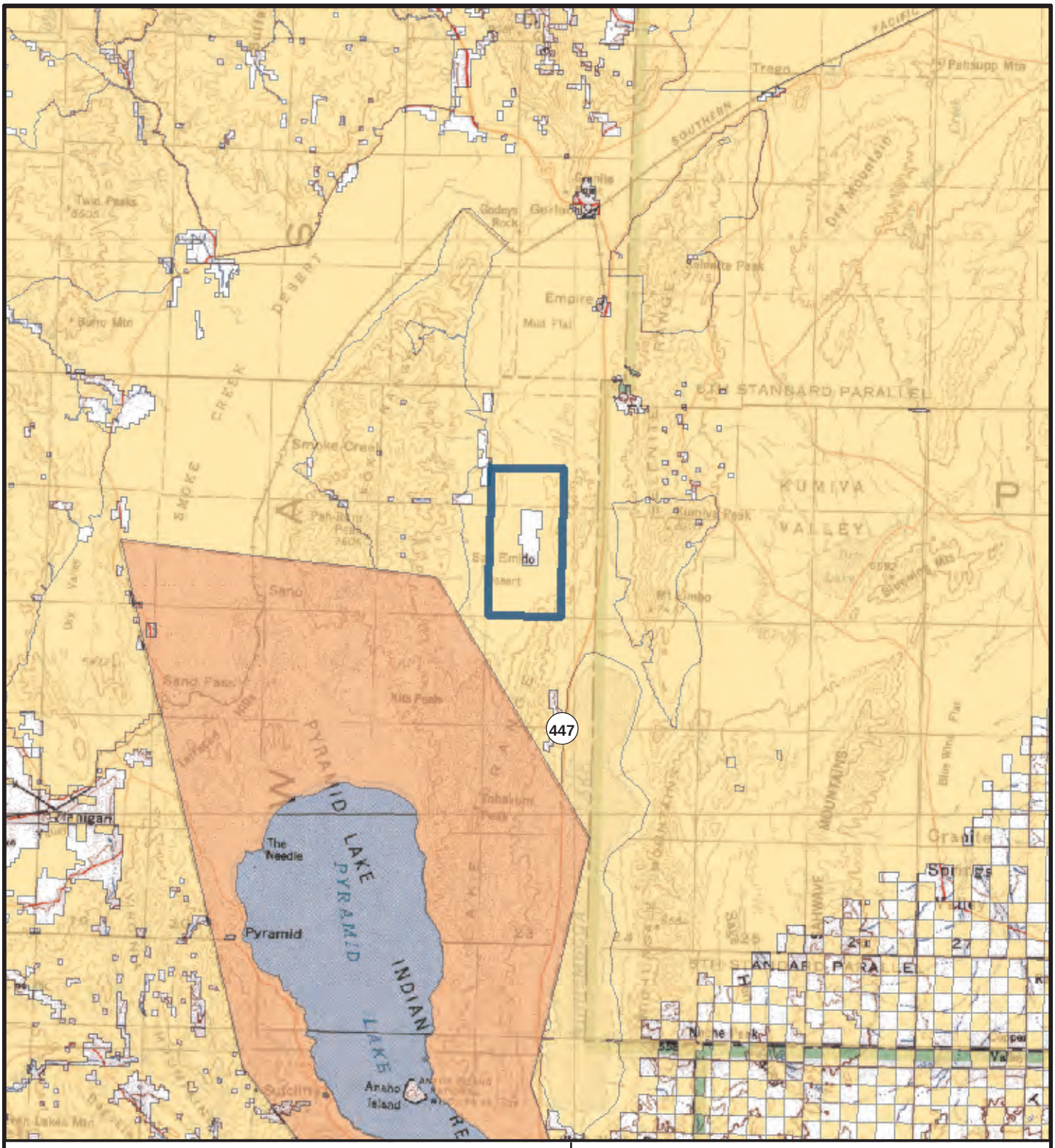
Appendix A: Special Geothermal Lease Stipulations, Lease NVN-42707, NVN-75233, and NVN-74196

11 FIGURES

FIGURE 1: PROJECT LOCATION MAP – The project is located in Northern Washoe County, 15 miles south of Gerlach, Nevada.



BASE IMAGE: USGS 1:500,000-Scale Topographic Map

- San Emidio Unit Boundary
- BLM
- Private
- Bureau of Indian Affairs

0 3.75 7.5 15 Miles

MAP DATE: July 16, 2010

N

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

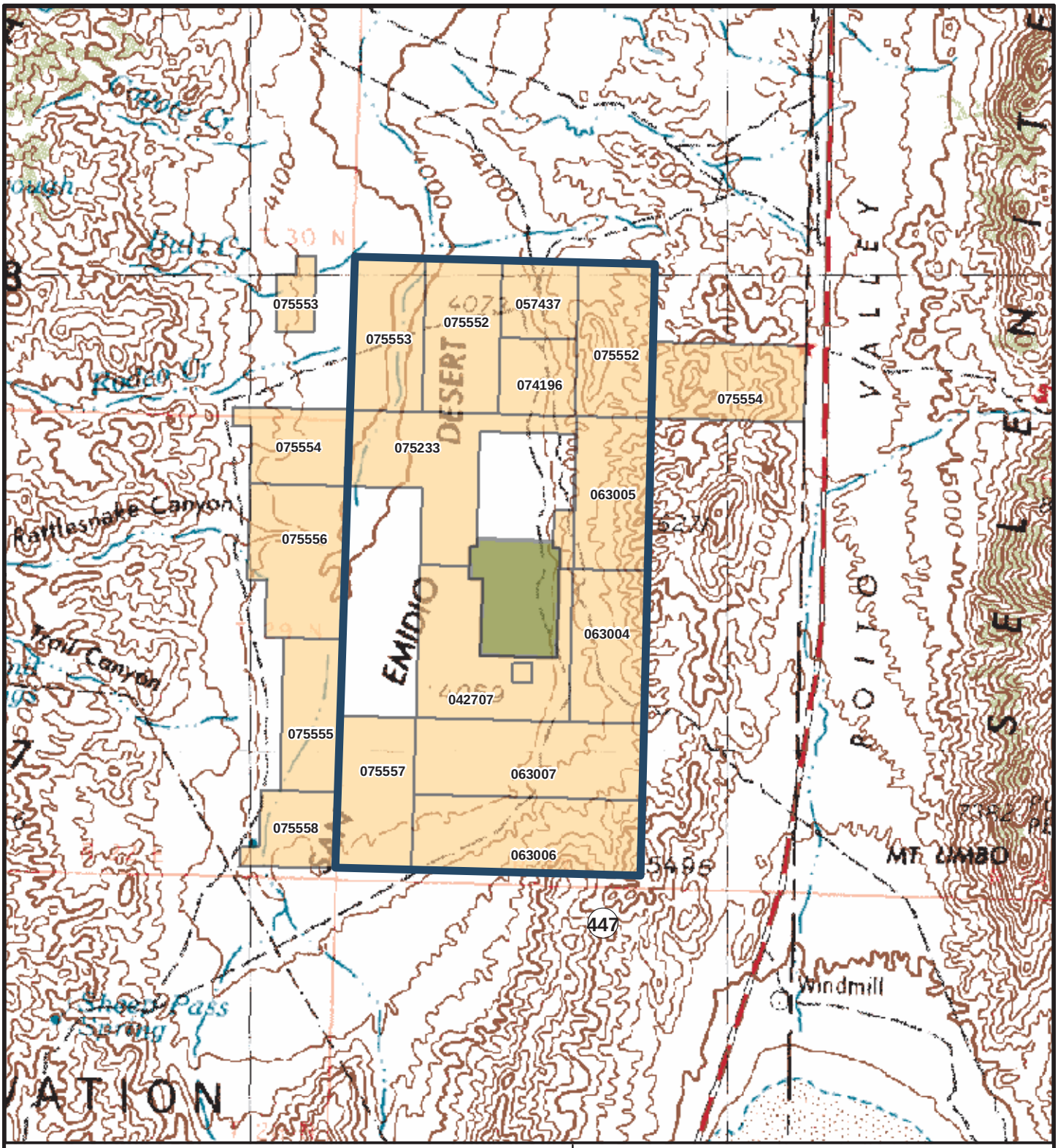
U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

FIGURE 1
PROJECT LOCATION MAP

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

FIGURE 2: SITE MAP FOR GEOTHERMAL UNIT AND LEASE BOUNDARIES – This map identifies USGN San Emidio Federal leases and the San Emidio Unit Boundary



BASE IMAGE: USGS 1:250,000-Scale
Topographic Map, Lovelock Quadrangle

- San Emidio Unit Boundary
- San Emidio Federal Lease
- San Emidio Private Lease

1 in = 2 miles

0 0.5 1 2 Miles

MAP DATE: July 16, 2010

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

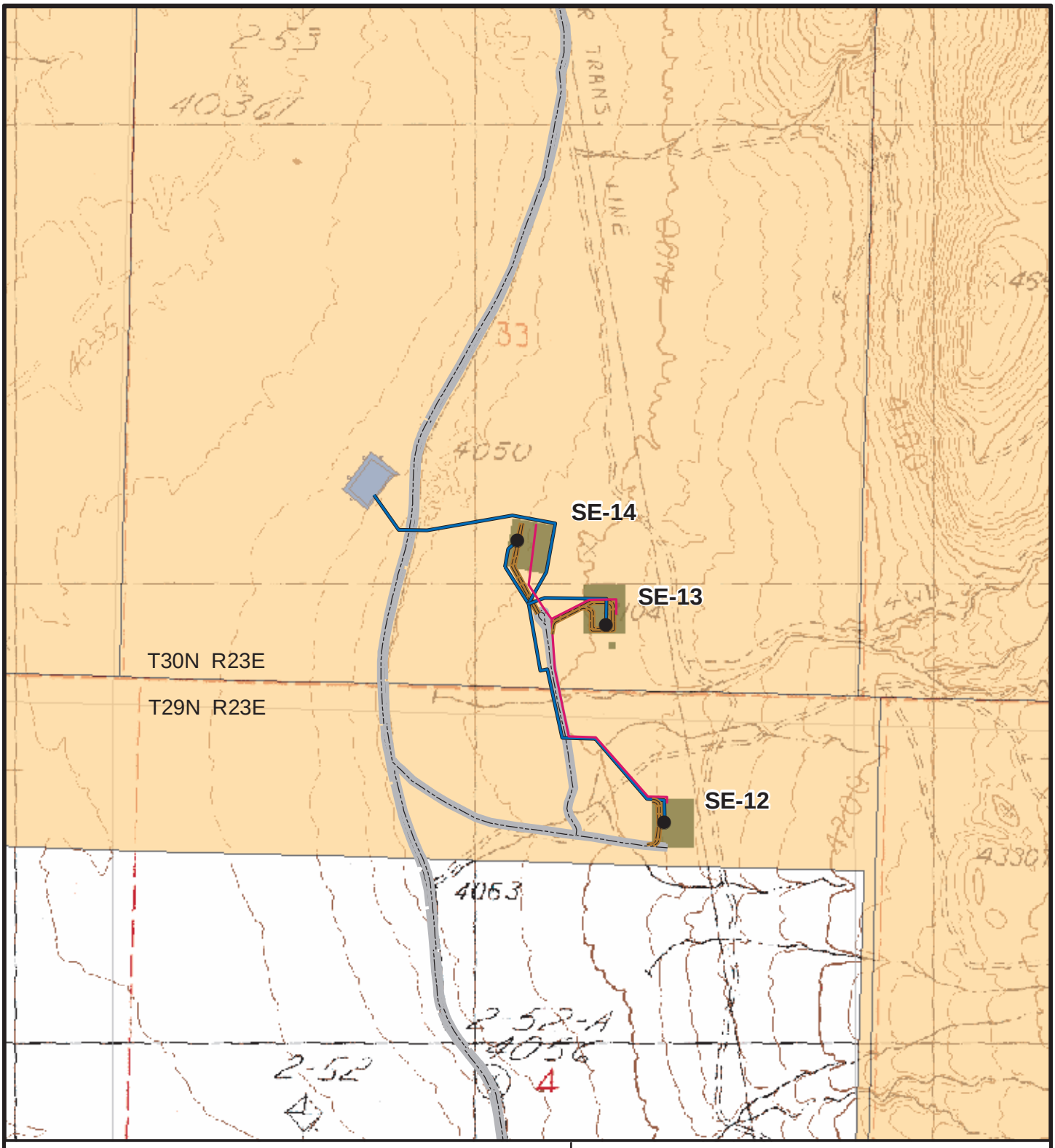
U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

FIGURE 2
UNIT AND LEASE BOUNDARY MAP

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

FIGURE 3: NORTH EXPLORATION AREA – Site map for geothermal well SE-12 in T29N, R23E, section 4, and geothermal wells SE-13 and SE-14 in T30N, R23E, section 33.



BASE IMAGE: USGS 7.5' Quad, 1990,
San Emidio Desert North

MAP DATE: July 16, 2010

- Geothermal Well
- Well Pad Access Road
- Pipeline - Temporary
- Water Line to Drill Rig
- Primary Access Road
- BLM Well Pads
- Pond
- San Emidio Federal Lease

1 inch = 1,000 feet

0 550 1,100 2,200 Feet

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

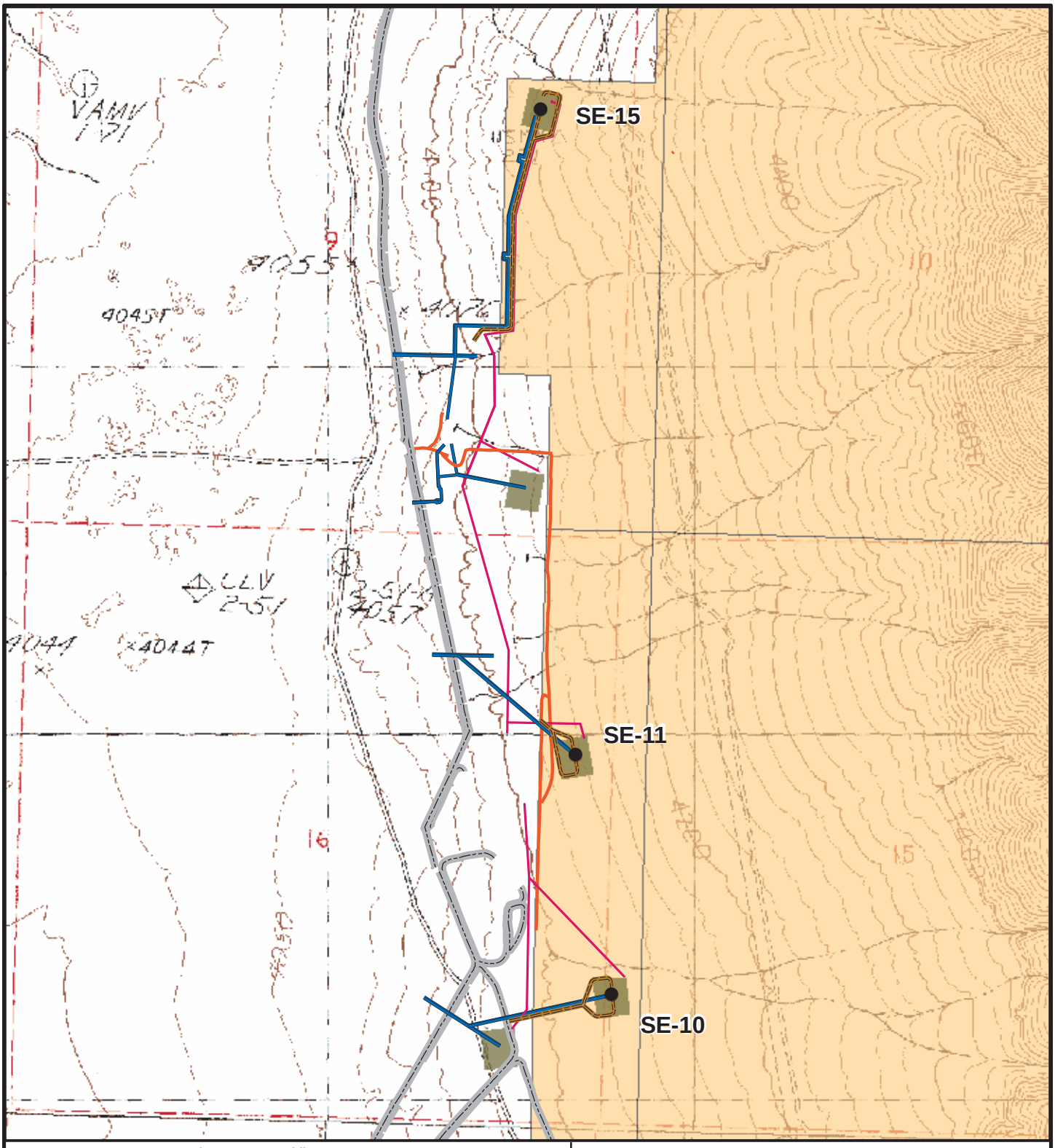
U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

FIGURE 3
NORTH EXPLORATION AREA

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

FIGURE 4: SOUTH EXPLORATION AREA – Site map for geothermal wells SE 15 in T29N, R23E, section 9 and geothermal wells SE-13 and SE-14 in section 33.



BASE IMAGE: USGS 7 5' Quad, 1990,San Emidio Desert North and South
T29N R23E SECTION 21

MAP DATE: July 16, 2010

- Geothermal Well
- Well Pad Access Road
- Pipeline - Temporary
- Water Line to Drill Rig
- Primary Acess Road
- JEEP-TRAIL
- BLM Well Pads
- San Emidio Federal Lease

1 inch = 1,250 feet

0 650 1,300 2,600 Feet

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

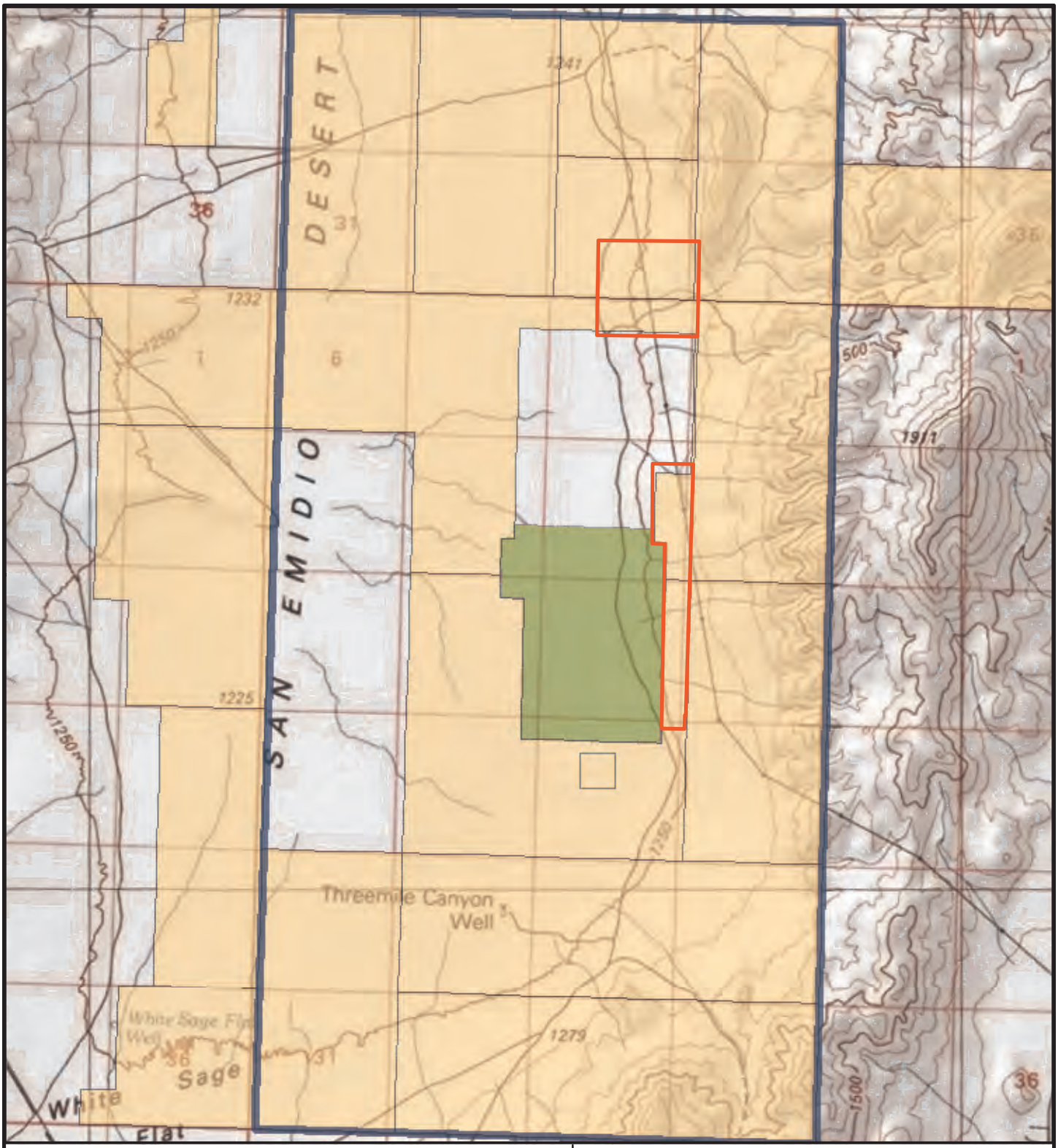
FIGURE 4
SOUTH EXPLORATION AREA

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

FIGURE 5: VEGETATION STUDY AREAS – Identifies the location of the vegetation study areas within the San Emidio Unit where the proposed drilling would occur.



BASE IMAGE: National Geographic Society U.S.Topographic Map

MAP DATE: July 16, 2010

Vegetation Survey Boundary
San Emidio Unit Boundary
San Emidio Federal Lease
San Emidio Private Lease

1 in = 1 miles

0 0.5 1 2 Miles

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

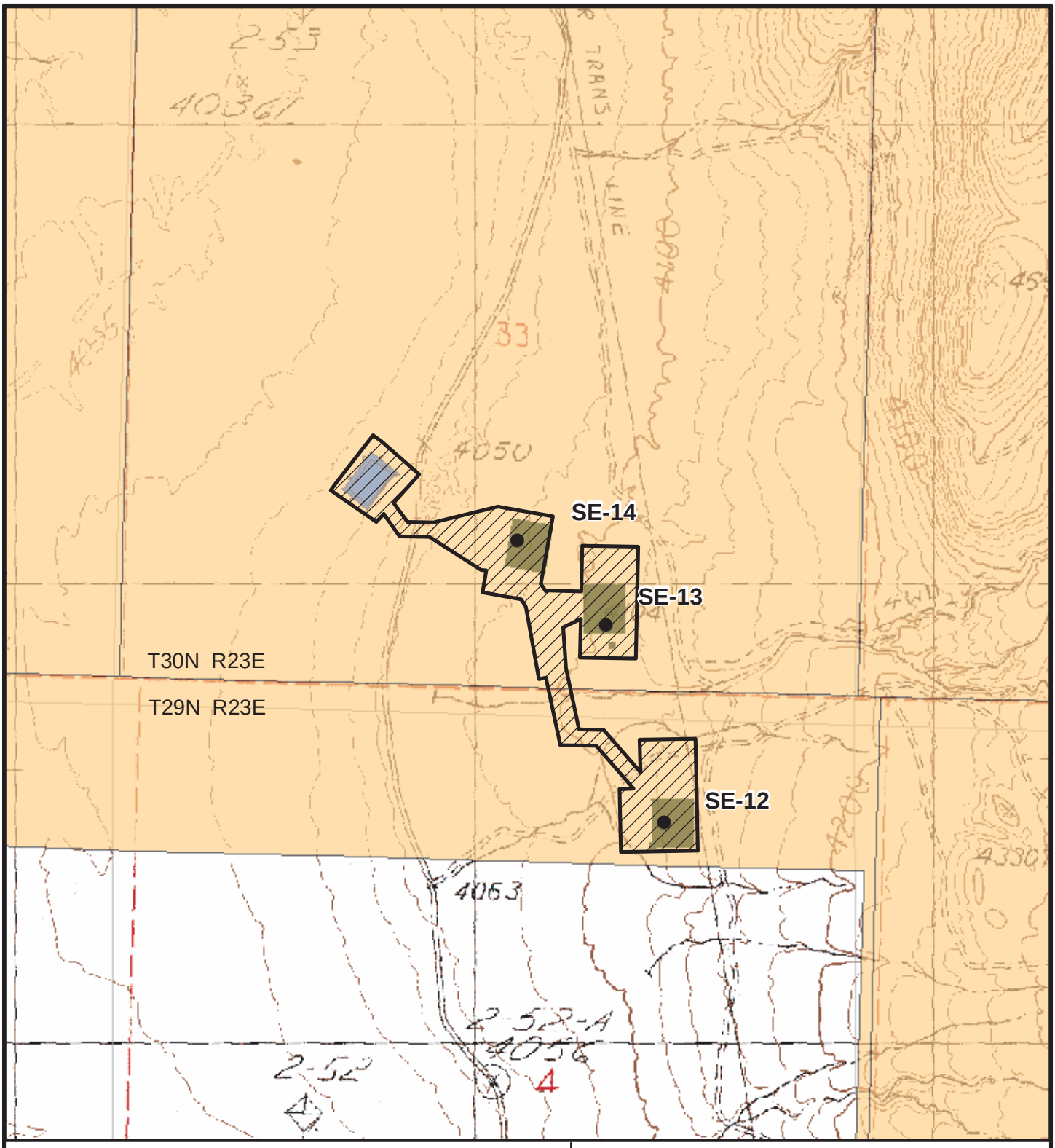
FIGURE 5
VEGETATION STUDY AREAS

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

FIGURE 6: ARCHAEOLOGICAL STUDY AREA NORTH – Identifies the location of the archaeological study in the project's north exploration area.



BASE IMAGE: USGS 7.5' Quad, 1990,
San Emidio Desert North

MAP DATE: July 16, 2010

Geothermal Well
Archaeological Study Area
BLM Well Pads
Pond
San Emidio Federal Lease

1 inch = 1,000 feet

0 550 1,100 2,200 Feet

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

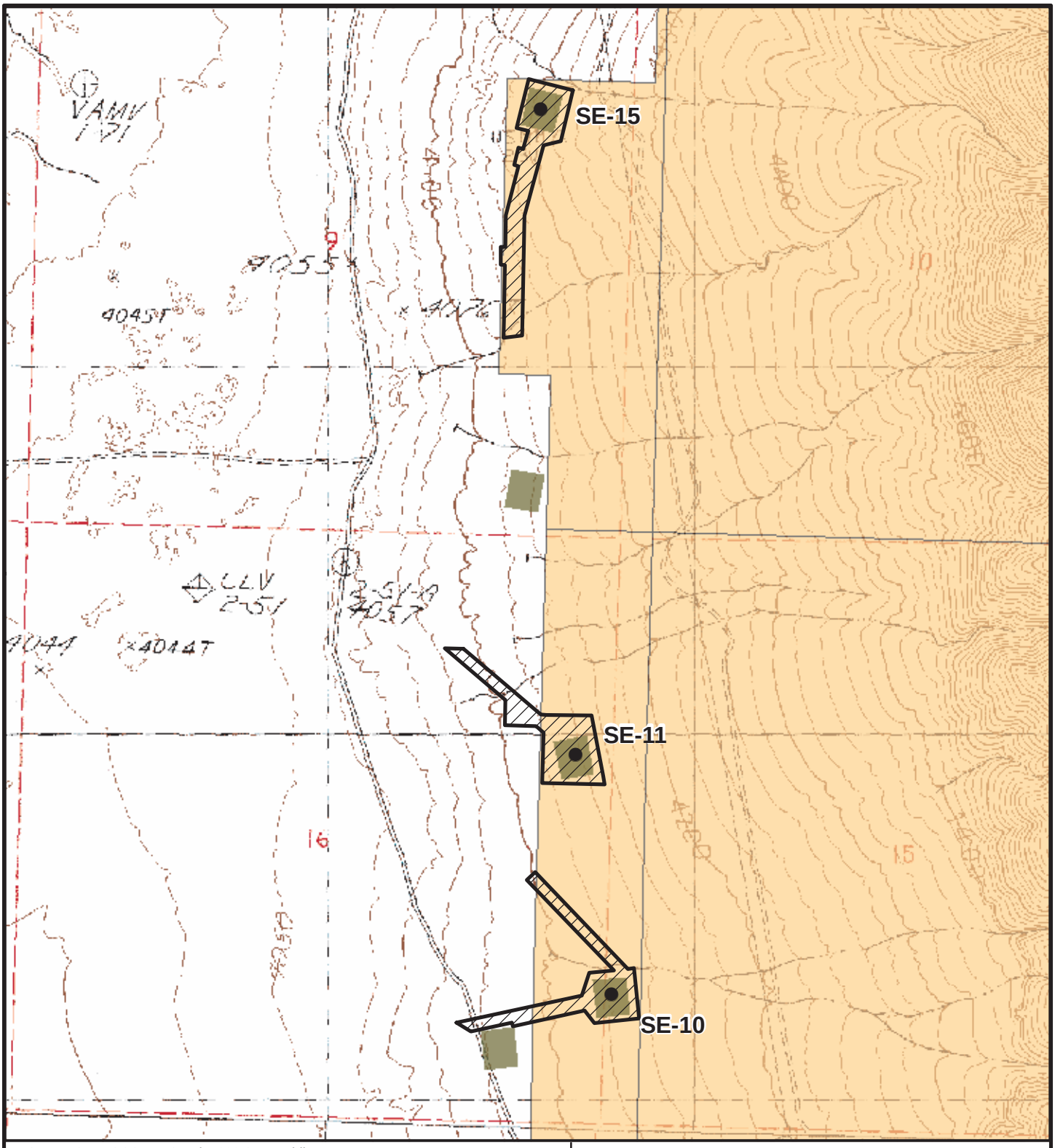
U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

FIGURE 6
ARCHAEOLOGICAL STUDY AREA NORTH

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

FIGURE 7: ARCHAEOLOGICAL STUDY AREA SOUTH – Identifies the location of the archaeological study in the project's south exploration area.



BASE IMAGE: USGS 7 5' Quad, 1990,San Emidio Desert North and South
T29N R23E SECTION 21

MAP DATE: July 16, 2010

Geothermal Well
Archaeological Study Area
BLM Well Pads
San Emidio Federal Lease

1 inch = 1,250 feet
0 750 1,500 3,000 Feet

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

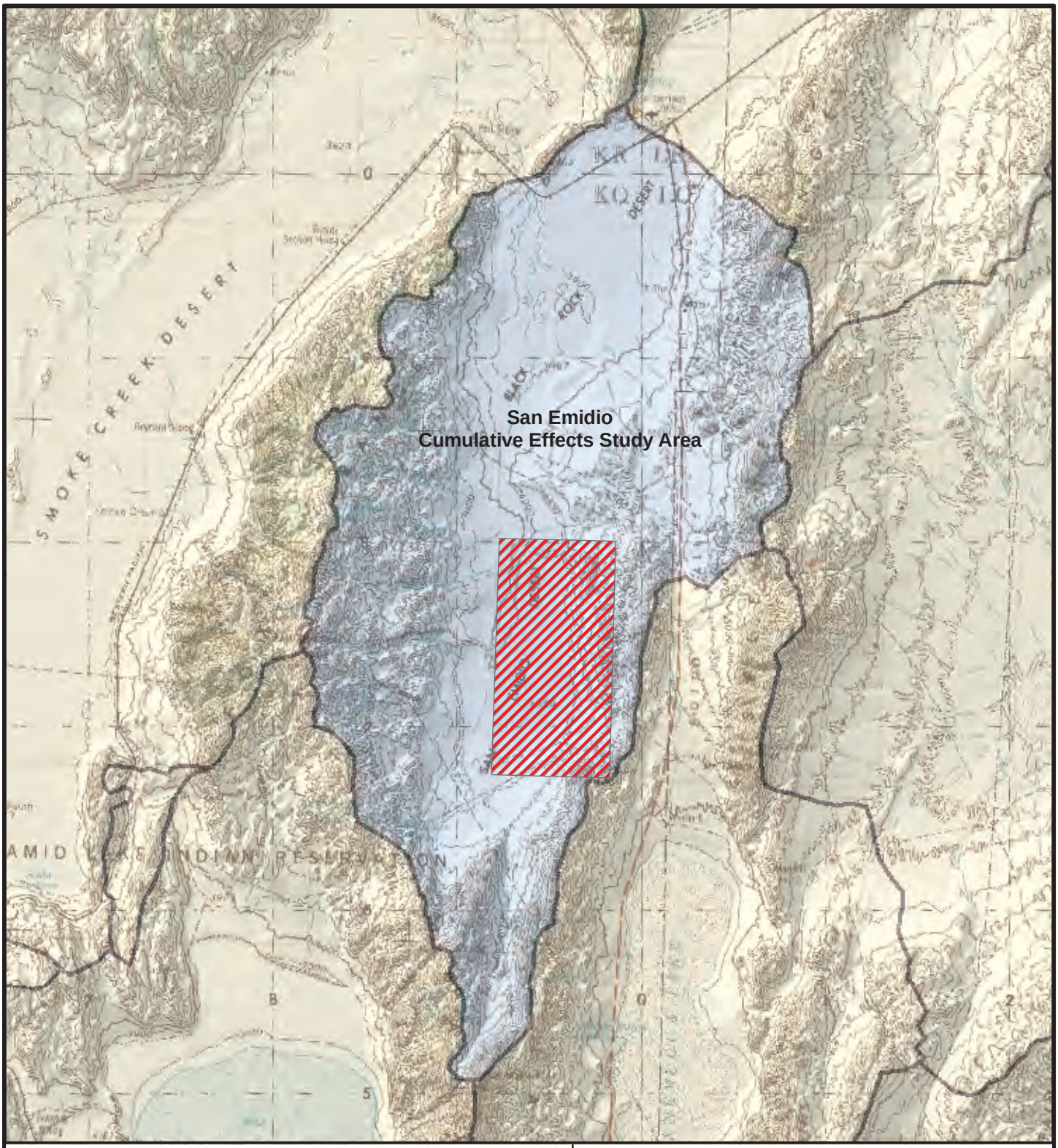
U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

FIGURE 7
ARCHAEOLOGICAL STUDY AREA SOUTH

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

FIGURE 8: CUMULATIVE EFFECTS STUDY AREA – Identifies the boundary of the cumulative effects study area considered during analysis.



BASE IMAGE: National Geographic Society
U.S.Topographic Map

MAP DATE: July 16, 2010

San Emidio Unit Boundary

Other Hydrographic Areas

San Emidio Cumulative Effects Study Area

1 in = 5 miles

0 2.5 5 10 Miles

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

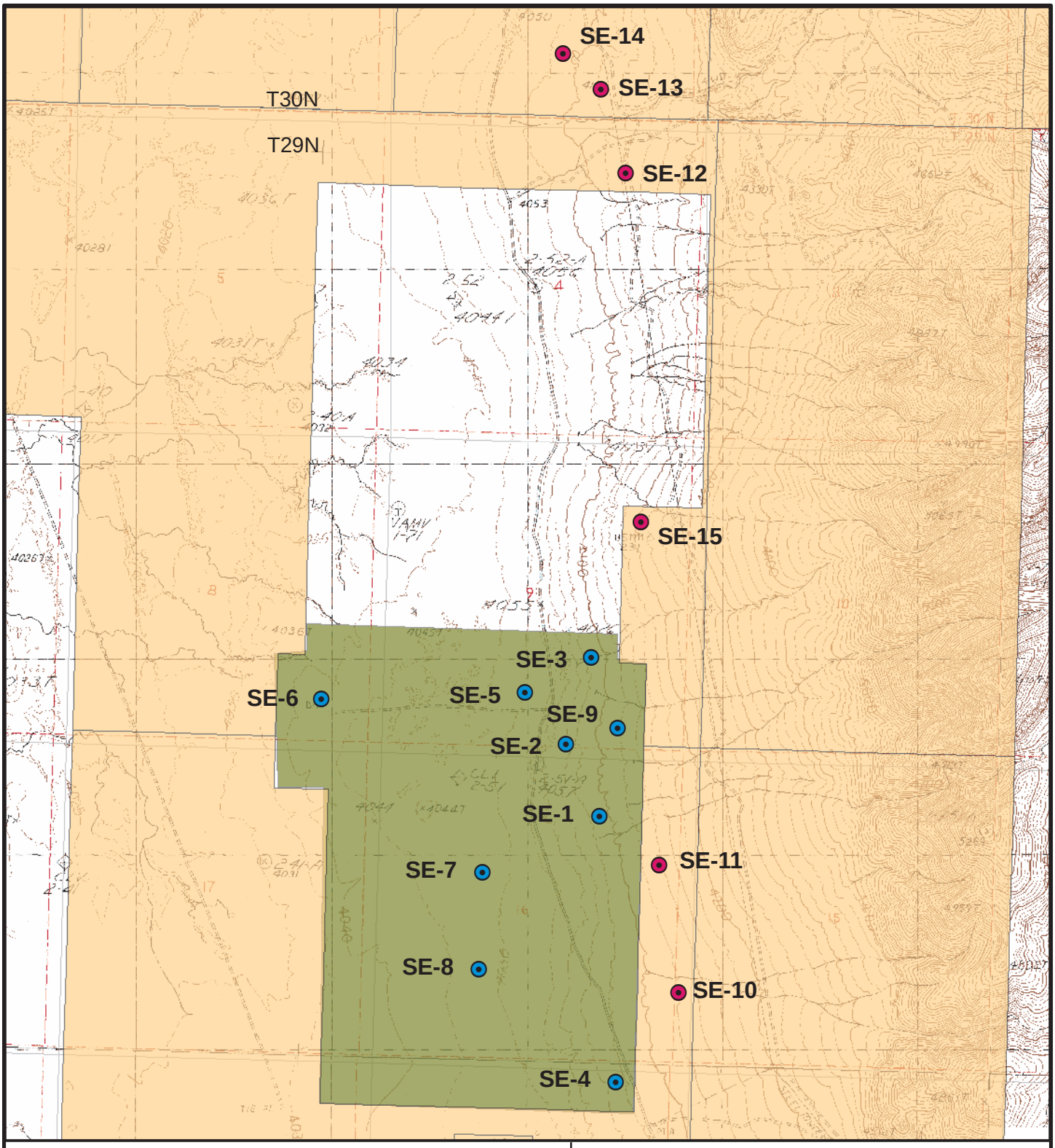
U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

FIGURE 8
CUMULATIVE EFFECTS STUDY AREA

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

FIGURE 9: LOCATION OF REASONABLY FORSEEABLE ACTION – Identifies the location of potential geothermal wells on private land.



BASE IMAGE: USGS 7.5' Quad, 1990,
San Emidio Desert North; San Emidio Desert South

Map Date August 26, 2010

- Planned Geothermal Wells on Private Land
- Proposed Geothermal Wells on Federal land
- San Emudio Private Lease
- San Emidio Federal Lease

1 inch = 2,350 feet

0 1,175 2,350 4,700 Feet

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

U.S.GEOTHERMAL
SAN EMIDIO GEOTHERMAL PROJECT

FIGURE 9
POTENTIAL GEOTHERMAL WELLS BY OWNERSHIP

NATIONAL SYSTEM OF PUBLIC LANDS

BLM Winnemucca District
Black Rock Field Office
5100 East Winnemucca Blvd.
Winnemucca, NV 89445

APPENDIX A

APPENDIX "A"

SAN EMIDIO GEOTHERMAL EXPLORATION PROJECT
Geothermal Drilling Permits
Federal Geothermal Leases NVN-42707, NVN-75233, and NVN-74196
Exploration Well Numbers 62-4, 68-33, 57-33, 73-9, 84-16, and 87-16

CONDITIONS OF APPROVAL

1. This approval is contingent upon the lessee/operator being in receipt of and in compliance with all appropriate federal, state, and local permits.

2. The operator must abide by the Lease Terms, Lease Stipulations, Conditions of Approval, and all environmental protection measures and mitigation measures included in the Geothermal Drilling Permits and Operations Plan.

3. When cultural or paleontological resources, including but not limited to historic ruins, prehistoric artifacts and fossils, are discovered in the performance of the permit, the resources shall be left intact and immediately brought to the attention of the BLM authorized officer.

4. Pursuant 43 CFR 10.4(g) the holder of this authorization must notify the authorized officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined at 43 CFR 10.20). Further, pursuant to 43 CFR 10.4(c) and (d), the lessee/operator shall immediately stop all activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the BLM authorized officer.

5. A careful examination of each area to be disturbed during the breeding season (April 15 to July 15), shall be done to assure no nests with eggs or young are present. Surveys shall be conducted by a qualified biologist acceptable to the Bureau of Land Management (BLM) Authorized Officer. If active nests are found, they shall be avoided by an appropriate distance to prevent destruction of the nest and disturbance of the nesting birds until they have fledged. Ground clearing activities outside of the breeding season are not subject to this condition of approval.

6. No hazardous materials shall be used during any phase of the operations unless prior approval has been obtained from the BLM authorized officer. All onsite drilling materials and chemicals shall be properly stored to ensure the prevention of spills. No chromate or other heavy metals or environmentally harmful additives will be used.

7. No chemicals, fuels, oils, lubricants, noxious fluids shall be disposed of at the drill site, in the reserve or flow pits or down the well.

8. If any chemicals, fuels, oils, lubricants, and/or noxious fluids are spilled during drilling,

testing, and completion operations, they shall be cleaned up immediately. The lessee/operator shall have absorbent on site for spill containment. After clean up, the chemicals, fuels, oil, lubricants and/or noxious fluids and any contaminated material shall be removed from the drill site and disposed of at an approved disposal facility.

9. The lessee/operator shall be responsible for all costs associated with any releases of chemicals and/or subsurface fluids resulting from their operations and practices.

10. Material Safety Data Sheets for all drilling mud components are to be provided to the Hazmat coordinator at the Winnemucca Field Office.

11. A copy of the Spill or Discharge Contingency Plan must be mIntianed at the drill site during active operations.

12. The reserve pit shall be fenced on three sides during drilling. Upon completion of the drilling operation, when the site is unoccupied, the fourth side shall also be fenced until the liquid has evaporated out of the reserve pit.

13. Flagging shall be placed on all newly erected fencing to increase visibility to wildlife.

14. Portable chemical toilets shall be used for human waste. The human waste shall not be buried on site.

15. All equipment and machinery shall be equipped with spark arresters and mufflers.

16. The lessee/operator shall be responsible for all suppression costs for any fire resulting from their operations and practices.

17. Trash and other debris shall be contained onsite and then hauled to an approved landfill. Burial and/or burning onsite shall not be permitted.

18. The lessee/operator shall be responsible for controlling all noxious weeds and other undesirable invading plant species in the disturbed operating and reclaimed area until the revegetation activities have been determined to be successful and accepted by the BLM authorized officer. The lessee/operator shall obtain approval from the BLM authorized officer for any application of herbicide, and the request must include descriptions of the types and quantities. Unless certified weed free seed is procured for the reclamation of this project, all seed shall be tested for purity, noxious, poisonous and or prohibited plant species, and the test results submitted to and approved by the BLM authorized officer.

19. Once the wells are successfully completed, the drill pad shall be reduced in size to only that necessary for production, injection, testing, working over, re-entering, or observation operations.

20. If a completed well will be sitting idle for more than a year, the site shall be scarified and seeded with the BLM recommended seed mix.

21. Upon abandonment of the geothermal wells, the following shall be done:

a. The wells shall be plugged to comply with all Federal and State of Nevada regulations.

b. All reclamation of disturbed areas shall be completed within one year from the date of proper plugging and abandonment of the well. Any constructed roads, drill pads and reserve pits shall be recontoured to original grade, salvaged topsoil spread on the disturbed area and the site scarified. The disturbed area shall be seeded by hand broadcasting or drilling with the BLM recommended seed mixture. The BLM Winnemucca Field Office shall be notified in writing when reclamation operations commence and are completed.

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

FINDING OF NO SIGNIFICANT IMPACT

San Emidio Geothermal Exploration Project Environmental Assessment DOE/EA-1810; DOI-BLM-NV-W030-2010-0006-EA

AGENCY: U.S. Department of Energy, Golden Field Office (DOE)

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: The U.S. Department of Energy (DOE) proposed to authorize the expenditure of federal funding[1] to U.S. Geothermal Nevada, Inc. (USGN) to validate the use of innovative geothermal technologies to locate large aperture fractures (LAFs) and to drill two (2) production diameter geothermal wells on BLM-administered public lands in the San Emidio resource area. The innovative geothermal technologies would include using a three-component long-offset surface seismic survey, permanent scatter synthetic aperture radar interferometry (PSInSAR) and structural kinematic analysis to locate and map the LAFs.

The U.S. Department of Interior, Bureau of Land Management, Black Rock Field Office (BLM) is the lead federal agency with DOE as a cooperating agency on the *San Emidio Geothermal Exploration Project Environmental Assessment, Washoe County Nevada; DOI-BLM-NV-W030-2010-0006-EA; DOE/EA-1810*, which included an evaluation of the potential environmental impacts associated with DOE's proposed action and a no action alternative. DOE was invited by BLM to participate in the NEPA process as a cooperating agency (40 CFR 1501.6 and 1508.5). DOE accepted formal cooperating agency status (by a Memorandum of Understanding signed July 6, 2010) and retained review and comment responsibility pertaining to the EA. The EA was prepared in accordance with NEPA, as amended, the CEQ Regulations for Implementing of NEPA (40 CFR 1500 to 1508), the Federal Land Policy and Management Act (FLPMA) of 1976, and BLM's NEPA Handbook (H-1790-1; 2008).

DOE hereby adopts the above referenced EA: *San Emidio Geothermal Exploration Project Environmental Assessment, Washoe County Nevada; DOI-BLM-NV-W030-2010-0006-EA; DOE/EA-1810* and incorporates this EA by reference into this Finding of No Significant Impact (FONSI).

[1] Prior to the issuance of this FONSI, DOE authorized U.S. Geothermal Nevada, Inc. (USGN) to use a percentage of their federal funding for preliminary activities, which include preparation of the *San Emidio Geothermal Exploration Project Environmental Assessment (DOE-BLM-NV-W030-2010-0006-EA)* (EA), and scientific gathering. These activities are associated with the Proposed Project and do not significantly impact the environment nor represent an irreversible or irretrievable commitment by the Department of Energy in advance of the conclusion of the EA for the Proposed Project.

This FONSI was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA, as amended, 40 CFR 1508.13; and DOE NEPA Regulations, 10 CFR 1021.322.

PROJECT DESCRIPTION:

DOE's proposed action is to authorize the expenditure of approximately $3.7 million[2] of federal funds by USGN under the *American Recovery and Reinvestment Act of 2009* for the purpose of validating innovative exploration technologies. USGN is seeking to drill and test up to six (6) geothermal resource wells in the San Emidio resource area to acquire scientific data about the geothermal resource and the subsurface geologic structure over a portion of its federal geothermal leases on BLM-administered public lands. USGN anticipates drilling up to a total of 15 proposed geothermal wells, six (6) wells on BLM-administered land and nine (9) wells on private lands in the San Emidio resource area. As part of the DOE funded project, DOE proposed to fund the drilling and testing of two (2) of the six (6) wells on BLM-administered lands or two (2) of the nine (9) private geothermal wells (covered in the cumulative impacts section of the above referenced EA as Reasonably Foreseeable Actions). By providing financial assistance to support this project, DOE would further its mission to reduce dependency on fossil fuels, as well as support national energy needs and the development of alternative fuel sources.

The proposed project is located approximately 70 miles northeast of Reno, in Washoe County, Nevada, on three federal geothermal leases held by USGN within the existing San Emidio geothermal unit area. The proposed project and the associated federal leases are on the west flank of the Lake Range in areas identified as appropriate for future geothermal use. Data from the proposed project would be used to test the geothermal reservoir and evaluate geothermal power development potential of the resource.

The production diameter geothermal resource exploration wells would each be drilled to depths of approximately up to 3,500 feet. Drilling would be done with a large rotary drill rig that stands approximately 70 feet tall when erected, similar to those used for typical drilling activities. Individual drilling sites would be 300 x 350 feet for each site. Existing roads at the site would be used when appropriate to access the proposed drill sites. However, additional new roads (approximately 4,756 feet in total) would be required to access each of the proposed drill sites. The total estimated area of surface disturbance required for new access road construction, assuming a 20-foot wide area of disturbance would be about 2 acres. In addition, the drilling activities would require construction for the placement of approximately 22,160 feet of temporary water pipeline. The temporary pipeline would be laid "cross country" and on the surface of the disturbed shoulders of the access roads. No earthwork or removal of vegetation would be required to lay the pipeline cross country or along the driving surface of roads. However, each drill site would be shaped and graded to create a level pad for the drill rig and support equipment, requiring clearing, earth work, drainage and other improvements for efficient and safe operation, and for fire prevention. The total surface area for all six well pads would be approximately 15 acres. The combined total area disturbed for the six wells, including the land area associated with road building, surface piping placement, drill pads and test water pond would be approximately 21 acres.

[2] As noted earlier, DOE previously authorized USGN to expend a portion of these funds for preliminary activities.

USGN would install "blowout" prevention equipment approved by BLM and the Nevada Division of Minerals. Geothermal fluids would be flowed back into an existing reinjection well (to prevent mixing with surface and ground waters), and a hydrogen sulfide monitoring system would be in place to protect workers. USGN would conduct flow tests on the geothermal wells. After short-term flow test(s), one or more long-term flow test(s) would occur to determine long-term geothermal reservoir productivity.

USGN proposes to initiate activities in early 2011. The project would be implemented over the next one to four years. When a well is no longer required for testing and evaluation, it is plugged and abandoned and each site would be restored in conformance with BLM surface reclamation requirements.

PUBLIC INVOLVEMENT IN THE EA PROCESS: BLM initiated the scoping process to provide an early and open process to gather information from the public and interested agencies on the issues and alternatives to be evaluated in the EA. In October 2008, scoping letters were mailed to interested individuals, organizations, agencies, and tribes to provide notification of the proposed project and to solicit comments. The scoping letter was also posted on BLM's web page and through advertisement in the local newspaper.

BLM continued consultations with the Susanville Indian Rancheria, Reno-Sparks Indian Colony, Pyramid Lake Paiute Tribe, and Summit Lake Paiute Tribe throughout the NEPA process. Additionally, the Fallon Paiute Shoshone Tribe and the Cedarville Rancheria have been invited to participate.

BLM received two letters as a result of the scoping effort from the Nevada Division of Water Resources and an interested party in favor of further developing the geothermal resource at the San Emidio site. These issues identified during this scoping were reviewed and used to help develop issues and guide the environmental analysis and preparation of the EA.

BLM and DOE prepared the Preliminary EA and made it available for public comment for 15 days beginning August 31, 2010. The Preliminary EA was available on BLM's and DOE's websites and BLM issued a news release.

BLM received a total of four comment letters including three comment letters from Nevada State agencies and one public comment letter from a nearby landowner during the 15-day comment period. The Nevada Division of Wildlife comment letter recommended mitigation to minimize wildlife collisions with new safety fences associated with drill sites. The Nevada Department of Administration requested that the comment period be extended to 30 days. The Nevada Division of Water Resources identified no water rights for drilling the exploration wells. The nearby landowner provided comments regarding access across private land to access some components of the project. All comments submitted during the public comment period were considered prior to finalizing the EA.

DOE's process for carrying out its responsibilities for its NEPA review is consistent with its implementing regulations at 10 CFR 1021. DOE conducts a rigorous environmental analysis

through the NEPA process for all proposed funding actions to evaluate the potential environmental impact associated with the project and public comments are sought at various points in the process. As a cooperating agency with BLM, DOE was involved in the development and review of the EA. The Preliminary EA was available to the public and to Federal, state and local agencies for review and comment prior to a final decision on the Proposed Action.

DETERMINATION: Based on information presented in the EA, DOE determined that authorizing the expenditure of federal funds by USGN to validate the use of innovative geothermal technologies to locate large aperture fractures (LAFs) and to drill two (2) production diameter geothermal wells in the San Emidio resource area on BLM-administered public lands would not be a major federal action significantly affecting the quality of the human environment, as defined by NEPA. If USGN determines that it is necessary to drill the two geothermal wells identified for DOE funding on private land, DOE would undergo additional NEPA review for the change in location.[3]

The environmental protection measures committed to by the applicant and identified in the EA and BLM FONSI/DR shall be incorporated and enforceable through DOE's funding award documents. The measures include but are not limited to, incorporating mitigating features in the project design and during construction to minimize potential adverse effects such as flagging of fences to minimize wildlife collisions, water application to the ground during construction and utilization of the drill pads and access roads (as necessary) to control dust, the provision of portable chemical sanitary facilities for personnel during periods of well drilling and/or flow testing, solid waste transport to an offsite and appropriate landfill facility, and a Spill or Discharge Contingency Plan to be maintained on-site and followed.

Additionally, USGN would comply with all special lease stipulations attached to leases NVN-74196 and NVN-75233, which apply to the Proposed Action. USGN also would be required to comply with BLM's Other Conditions of Approval, which also have been adopted by DOE to ensure environmental compliance. BLM will be responsible for monitoring approved operations to ensure compliance with Conditions of Approval for the Operations Plan, Geothermal Drilling Permits (GDPs) and associated leases. DOE will share the responsibility of monitoring the implementation and effectiveness of the mitigation measures. The preparation of an Environmental Impact Statement is not required and DOE is issuing this Finding of No Significant Impact.

[3] To be eligible for DOE funding, the two wells identified for DOE funding must meet certain technical requirements. After USGN defines the geothermal resource, it will be able to better identify which wells would meet the technical requirements for the DOE funding. Outside of the wells to be drilled on BLM-administered public lands, USGN intends to drill additional wells on its private leaseholds in the San Emidio resource area. After USGN completes the analysis of the geophysical work, there is a possibility that the two wells identified for DOE funding could be located on USGN's private leaseholds in the San Emidio resource area and not on BLM administered public lands.

Copies of the Final EA are available at http://www.eere.energy.gov/golden/Reading_Room.aspx or from:

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For further information on DOE NEPA process contact:

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Issued in Golden, Colorado, the 17th day of December, 2010.

Derek G. Passarelli
Acting Executive Director for Field Operations