PRELIMINARY
ENVIRONMENTAL ASSESSMENT

EA Number: LLNV-WO1000-2009-0002-EA

ORMAT NEVADA INC.
JERSEY VALLEY II
GEOTHERMAL EXPLORATION PROJECT

PERSHING COUNTY, NEVADA

NOVEMBER 2008

Prepared by:

U.S. Bureau of Land Management
Winnemucca Field Office
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BLM

Humboldt River Field Office / Nevada

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.

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Geothermal Drilling Permits
Geothermal Leases NVN-74881, NVN-74883, and NVN-77483
Exploration Well Numbers
77-28 and 13-34

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1 INTRODUCTION

1.1 Background

In May, 2007, the Bureau of Land Management , Humboldt River Field Office (BLM/HRFO), formally known as the Winnemucca Field Office (WFO), completed an environmental assessment (EA) which resulted in a Finding of No Significant Impact and Decision Record to approve Ormat Nevada, Inc.'s (Ormat) operation plan and drilling plan for the Jersey Valley Geothermal Exploration Project. The project is within Pershing County, Nevada and is located approximately 50 miles southeast of the town of Battle Mountain, Nevada (see Figure 1: Project Location Map). The Decision Record allowed Ormat to construct up to five well pads on three federal geothermal leases owned by Ormat. Ormat selected five sites and associated access for exploration drilling. Each of the five well sites was approved for two different types of exploration wells; observation wells and if the results were positive, full-size exploration wells would be drilled from the same drill pads. Total disturbance associated with these approved five well pad locations and access was approximately 9.61 acres. One of the well sites was relocated prior to drilling, with total disturbance remaining less than 10 acres. All five locations have now been constructed. Exploration drilling is currently ongoing.

Effective, June 1, 2007, Ormat entered into a federal geothermal unit agreement known as the Jersey Valley Geothermal Unit (NVN-83483X) which is comprised of five federal geothermal leases NVN-74881, NVN-74883, NVN-77481, NVN-77482 and NVN-77483 and encompasses 8,470.00 acres of public lands. No private lands are included in the Jersey Valley Unit Agreement.

In July, 2008, Ormat submitted to the BLM for review, an amendment to their currently approved exploration Operations Plan. The amendment proposed to construct two new well pads and associated access roads. This would include drilling and testing one geothermal observation well and one exploration well (full-size well) on each of two new drill pads. Several revisions to the amendment were made through review and coordination between the BLM and Ormat to relocate one of the proposed well sites due to resource concerns. The final amendment to the Operations Plan was accepted by the BLM in October, 2008.

These well pads would be located on two of the five federal geothermal leases. Access to one of the well pads would require crossing a third geothermal lease. All disturbance would be within the boundaries of the Jersey Valley Geothermal Unit. Total proposed new disturbance would be 9.75 acres (see Figure 2: Land Status, Past Authorized and Currently Proposed Actions Map). Because the new proposed disturbance would almost double the previously approved disturbance, and several new issues that were identified, the BLM/HRFO has determined an EA would be required.

1.2 Purpose and Need

Ormat's purpose in conducting additional exploration drilling within the Jersey Valley Geothermal Unit is to continue to collect geothermal resource data. This data is needed to further define the geothermal resources and if successful, could lead to the eventual development and utilization of the geothermal resources for the generation of electrical power.
Any subsequent developmental operations proposed as a result of the exploration drilling operations, beyond what are being proposed in this analysis, would require additional permit applications and prior approval from the BLM. Any additional activity would be subject to the National Environmental Policy Act (NEPA).

The BLM/HRFO has determined that an EA would be needed to evaluate and disclose the potential environmental impacts associated with this proposed action and any reasonable alternatives to the proposed action. This would also include a no action alternative. This analysis would also serve to identify any additional mitigation to minimize potential impacts that have not been previously identified.

1.3 Plan Conformance

The Project area is primarily subject to the BLM WFO 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 provides for the development of geothermal resources in noncompetitive areas and all Known Geothermal Resource Areas (KGRAs) except those which are areas of significant environmental conflict or have historical and/or cultural significance.

1.4 Relationship to Laws, Regulations, Policies, and Plans

The EA has been prepared in accordance with the following statutes and implementing regulations, Policies and Procedures:

- The National Environmental Policy Act (NEPA) of 1969, as amended (Public Law [PL] 91-190, 42 U.S.C. 4321 (*et seq.*);
    - 40 CFR 1500 (*et seq.*). Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.
    - Considering Cumulative Effects under the NEPA [CEQ 1997];
    - 43 CFR Part 46, Implementation of the National Environmental Policy Act (NEPA of 1969; Final Rule, Effective November 14, 2008.
    - USDI requirements (Departmental Manual 516, Environmental Quality [USDI 2004]
    - BLM NEPA Handbook (H-1790 1), as updated (BLM 2008c)
- The Geothermal Steam Act of 1970 (Act) (30 USC 1001-1025).
    - 43 CFR 3200, Geothermal Resources Leasing and Operations; Final Rule, May 2, 2007.
- The 2005 Energy Policy Act; The National Energy Policy, Executive Order 13212, and
    - Best Management Practices as defined in the Oil and Gas *"Gold Book",* Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development", *Fourth Edition,* (Gold Book).

In 2002, the BLM WFO completed the "Geothermal Resources Leasing Programmatic Environmental Assessment" (BLM, 2002). Special stipulations developed in this Programmatic Environmental Assessment were applied to geothermal leases subsequently issued by the BLM, including the three federal leases (NVN-77483, NVN-74881, and NVN-77883) issued to Ormat. Copies of these special stipulations are attached to the EA as Appendix A, Appendix B, and Appendix C. Ormat is required to comply with these special lease stipulations.

Environmental Assessment (EA) NV-020-07-EA-01 for the Jersey Valley Geothermal Exploration Project was approved in May, 2007 (BLM 2007). The 2007 EA analyzed the potential impacts from the construction of five well pads for observation and full-size well drilling and testing on three federal geothermal leases: NVN-77483, NVN-74881 and NVN-74883.

Where applicable, the information in these EAs will be incorporated by reference into this EA by providing a summary of and a citation to the applicable information. The Decision Records (DRs) and Findings of No Significant Impacts (FONSIs) are available for review at the Humboldt River Field Office.

1.5 Issues

For EA NV-020-07-EA-01 the BLM received several comments during a 30 day public comment period that ended on May 7, 2007. Comments received during the public comment period were addressed in EA NV-020-07-EA-01. EA NV-020-07-EA-01 identified, described and evaluated resource protection measures that were included as COAs and stipulations to mitigate the possible impacts geothermal exploration analyzed in 2007.

Scoping for this proposed action has been limited primarily to an internal BLM/HRFO interdisciplinary team. Two additional issues that have been identified for the two proposed well sites that were not analyzed in the previous EA are:

- The need for additional Native American Consultation.
- Paleontological concerns.

Figure 1: Project Location Map

Figure 2: Land Status, Past Authorized and Currently Proposed Actions Map

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

2.1.1 Overview and Location

Ormat proposes to conduct additional observation well and geothermal exploration well drilling in the Jersey Valley Geothermal Exploration Project area. The purpose of the additional proposed drilling is to continue efforts to locate and test geothermal resources at two additional sites.

The proposed well sites are listed in Table 1 by lease number, well name (using the Modified Kettleman numbering system), township and range, legal description, and approximate UTM coordinates. Figure 2 illustrates 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-74881	77-28	T27N, R40E	SE1/4SE1/4, Section 28	459220	4447781
NVN-77483	13-34	T27N, R40E	SW1/4, NW1/4, Section 34	459546	4446949

The proposed Project includes:

- Constructing two observation well drill pads; and drilling and completing an observation well to a true vertical depth (TVD) of about 3,000 feet from each of the constructed drill pads;
- Next, the two observation well drill pads would be enlarged to full-size well drill pads; and drilling and completing a full-size well to a TVD of about 7,000 feet from each of the constructed full-size well drill pads;
- Flow-testing each completed observation and full-size well to obtain samples of the geothermal fluid and production information from the geothermal reservoir;
- Constructing, improving and/or maintaining access roads, as necessary; and
- Drilling temporary, shallow water wells from the proposed drill sites.

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

Each observation well, and each full-size well, would require its own separate geothermal drilling permit application, subject to engineering review by the BLM and by the State of Nevada, Division of Minerals. Each geothermal drilling permit also requires approval by the BLM District after engineering review is completed.

2.1.2 Access Information

Principal access to the unit area from the south is from U.S. Highway 50 north on Churchill County's Dixie Valley Road, then north on Pershing County's Jersey Valley Road. From the north, principal access is southwest from Interstate 80 at Battle Mountain on State Route 305, then southwest on Lander County's Buffalo Valley Road, then southwest on Pershing County's Jersey Valley Road (see Figure 2).

Neither of the well sites can be accessed directly off of existing roads; new roads would need to be constructed. New access roads with a 20-foot wide road bed would be constructed using a dozer and/or road grader. The following new access roads are required (see Figure 2):

- About 1,900 feet of new road would be constructed to 77-28; and
- About 800 feet of new road would be constructed to 13-34.

The total estimated area of surface disturbance required for new access road construction, assuming a 25-foot wide area of disturbance would be about 1.55 acres.

2.1.3 Site Preparation Activities

Each drill site would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Drill pad preparation activities would include clearing, earthwork, drainage and other improvements necessary for efficient and safe operation and for fire prevention. Only those drill pads scheduled to be drilled would be cleared. Clearing would include removal of organic material, stumps, brush and slash. The site would be graded to prevent the movement of storm water from the pad off of the constructed site.

Actual dimensions of each drill pad would be modified to best match the specific physical and environmental characteristics of the site and to minimize grading (cut and fill). Each observation well pad would be approximately 300 feet X 350 feet, if only observation well drilling proceeds. Each full-size well pad would be approximately 400 feet X 450 feet. If a full-size well is drilled first, before driling an observation well, the larger well pad would be constructed from the beginning of operations. Total surface disturbance for well pad construction would not exceed 8.20 acres.

Fenced reserve pits would be constructed in accordance with best management practices identified in the "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The Gold Book)" (Fourth Edition – 2006) on each pad for the containment and temporary storage of water, drill cuttings and waste drilling mud during drilling operations. For the drilling of each observation well, the reserve pit would measure approximately 15 feet by 100 feet by up to 10 feet deep. For the drilling of each full-size well, the reserve pit would measure approximately 75 feet by 200 feet by up to 10 feet deep.

2.1.4 Water Supply

Water would be used for site construction, dust control, and drilling. Water required for well drilling could average 30,000 gallons per day (approximately 21 gallons per minute during drilling operations). Water requirements for site and road grading, construction and dust control

would average substantially less. One or more portable water tank(s) holding a combined total of at least 10,000 gallons, but not more than 60,000 gallons, would be maintained on the well sites during drilling operations.

Water would be obtained from shallow well(s) drilled on one or both of the two new proposed well pad sites under a waiver for the temporary use of ground water from the Nevada Department of Water Resources. Each water well would be temporary, drilled by a licensed water well driller to a depth necessary to intersect productive sands, gravels or fractures (estimated at approximately 150 feet), and plugged and abandoned in accordance with NAC 534. No additional surface disturbance would be associated with the drilling of each temporary water well.

Alternatively, water would be obtained from Home Station Ranch and trucked to the applicable drill sites over existing roads or the roads proposed in this EA (see Figure 2).

2.1.5 Aggregate

Drill pad and road building material (gravel) would be obtained from an established aggregate pit in NE1/4, SE1/4, Section 21, T27N, R40E (see Figure 2).

Each drill pad would be covered with up to 10 inches of gravel. Gravel would be applied to the access roads, as necessary, to create an all-weather surface. Total aggregate required for the entire exploration Project is estimated at 5,700 cubic yards.

2.1.6 Geothermal Observation Well Drilling, Testing and Monitoring

The observation and full-size wells would be drilled with a rotary drilling rig such as those currently used for the existing drilling operations at the Project. The rigs would be equipped with diesel engines, fuel and drilling mud storage tanks, mud pumps, and other typical auxiliary equipment. During drilling the top of the drill rig derrick would be from 30 to 70 feet above the ground surface, depending on the rig used. An average of four to six small trucks/service vehicles/worker's vehicles would be driven to the active observation well site each day throughout the typical 15-day drilling process. Difficulties encountered during the drilling process, including the need to re-drill the observation well, could as much as double the time required to successfully complete each observation well. Drilling would be conducted 24-hours per day, 7-days per week by a crew of up to three workers. Other support personnel (geologists, suppliers, etc.) could bring the total number of workers on site at one time to as many as ten or more persons.

The drilling supervisor and mud logger would typically sleep in a trailer on the active drill site while the well is being drilled. The drilling contractor may also elect to have the drilling crew live "on site" during the drilling operations to reduce the substantial hours and miles otherwise required for the crew to commute daily. If the crew would be housed "on site" during the drilling operation, the drilling contractor would provide a self-contained "bunkhouse" (sleeping quarters, galley, water tank and septic tank) or portable trailers which would be placed on one of the drill sites not being actively drilled to accommodate the drill rig workers.

Each observation well would be drilled or cored and completed to a nominal depth of approximately 3,000 feet, plus or minus 300 feet. Final depth would be dependent upon the geothermal resources encountered and drilling conditions. Once drilled or cored to the final depth, the drilling mud in the well would be circulated out of the well bore using water. The water

and/or geothermal fluid in the well would be bailed from the well by either lifting with a mechanical bailer or by lifting with air pumped into the well bore so that a clean sample of the geothermal fluid in the reservoir could be obtained for chemical analysis. Alternatively, if the well is capable of flowing, the well may be flowed to the surface through a small steam separator/muffler to separate the steam (which is discharged into the air) from the geothermal water (which is discharged into steel tanks or the reserve pit) so that the geothermal fluid can be sampled.

The observation well would be drilled with air or a non-toxic, temperature-stable drilling mud composed of a bentonite clay-water or clay-polymer-water mixture. The drilling mud is used to lubricate and cool the drill bit, bring the rock cuttings to the surface for discharge into the mud tank, and prevent loss of drilling fluids into the rock. Additional additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight, and prevent mud loss, in conformance with the submitted drilling mud program. Additional drilling mud would be mixed and added to the drilling rig's mud system as needed to maintain the required quantities of the drilling mud.

Following the cementing of the surface casing, "blowout" prevention equipment (BOPE) would be installed. The BOPE, which is typically inspected and approved by the BLM and/or the Division of Minerals of the Nevada Commission on Mineral Resources (NDOM), as applicable, would be installed, tested and ready for use while drilling the observation well to ensure that any geothermal fluids encountered do not flow uncontrolled to the surface.

2.1.7 Full-Size Geothermal Exploration Well Drilling, Testing and Monitoring

Each full-size well would be drilled with a large rotary drill rig. During drilling, the top of the drill rig mast could be as much as 160-170 feet above the ground surface. 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; air compressors; etc.) would be brought to the prepared pad on 25 or more large tractor-trailer trucks. Additional equipment and supplies would be brought to the drill site during ongoing drilling and testing operations. As many as ten or more tractor-trailer truck trips would be generated on the busiest day, although on average about two to three large tractor-trailer trucks (delivering drilling supplies and equipment), and about eight small trucks/service vehicles/worker vehicles, would be driven to the site each day throughout the typical 45-day drilling process. Difficulties encountered during the drilling process, including the need to work over or to re-drill the hole, could double the time necessary to successfully complete a full-size well. Drilling would be conducted 24-hours per day, 7-days per week by a crew of nine to ten workers. During short periods, the number of workers on site during drilling would be as high as 18.

The drilling supervisor and mud logger would typically sleep in a trailer on the active drill site while the well is being drilled. The drilling crew live may also live "on site" during the drilling operations in a self-contained "bunkhouse" (sleeping quarters, galley, water tank and septic tank) or portable trailers which would be placed on one of the drill sites not being actively drilled to accommodate the drill rig workers.

The full-size wells would each be drilled and cased to a design depth of approximately 7,000 feet, plus or minus 700 feet. Final depth would be dependent upon the geothermal resources encountered and drilling conditions. Following the cementing of the surface casing, "blowout" prevention equipment (BOPE) would be installed. The BOPE, which is typically

inspected and approved by the BLM and/or the Division of Minerals of the Nevada Commission on Mineral Resources (NDOM), as applicable, would be installed, tested and ready for use while drilling the observation well to ensure that any geothermal fluids encountered do not flow uncontrolled to the surface.

During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic, non-hazardous barite (barium sulfate) would likely be stored at each well site for use in preventing uncontrolled well flow ("killing the well"), as necessary.

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. Variable concentrations of additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight, and prevent mud loss. Some of the mud additives may be hazardous substances, but they would only be used in low concentrations that would not render the drilling mud toxic. Additional drilling mud would be mixed and added to the mud system as needed to maintain the required quantities.

In the event that very low pressure areas are encountered, compressed air may be added to the drilling mud, or used instead of drilling mud, to reduce the weight of the drilling fluids in the hole and assist in carrying the cuttings to the surface. The air, any drilling mud, rock cuttings, and any reservoir fluids brought to the surface would be diverted through a separator/muffler to separate and discharge the air and water vapor to the air and the drilling mud and cuttings to the reserve pit.

Each full-size well may need to be worked over or redrilled if mechanical or other problems are encountered while drilling or setting casing which prevent proper completion of the well in the targeted geothermal reservoir or if the well does not exhibit the anticipated permeability, productivity or injectivity. Depending on the circumstances encountered, working over a well may consist of lifting the fluid in the well column with air or gas or stimulation of the formation using dilute acid or rock fracturing techniques. Well redrilling may consist of reentering and redrilling the existing well bore; reentering the existing well bore and drilling and casing a new well bore; or sliding the rig over a few feet on the same well pad and drilling a new well bore through a new conductor casing.

Once the slotted liner has been set in the bottom of the well bore, and while the drill rig is still over the well, the residual drilling mud and cuttings would be flowed from the well bore and discharged to the reserve pit. This may be followed by one or more short-term flow tests, each lasting from two to four hours and also conducted while the drill rig is over the well. Each test would consist of flowing the well into portable steel tanks brought onto the well site while monitoring geothermal fluid temperatures, pressures, flow rates, chemistry and other parameters. An "injectivity" test may also be conducted by injecting the produced geothermal fluid from the steel tanks back into the well and the geothermal reservoir. The drill rig would likely be moved from the well site following completion of these short-term test(s).

One or more long-term flow test(s) of each full-size well drilled would likely be conducted following the short-term flow test(s) to more accurately determine long-term well and 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" to 10" diameter pipeline to either inject the fluid into one of the other geothermal wells drilled within the Project area or to the reserve pit on another well pad. The temporary pipeline would either be laid "cross-country" or on the surface on the disturbed shoulders of the access roads connecting the geothermal full-size wells (as required, roads would be crossed by trenching and burying the temporary pipe in the trench). The on site test equipment would include standard flow metering, recording, and sampling apparatus.

2.1.8 Well Abandonment

When an observation well is no longer required for monitoring, or if a full-size well is judged to have no production potential, all equipment would be removed, 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, which typically includes re-grading the pad, if necessary to restore grade; placing the stockpiled topsoil (if any) back over the site; and, if necessary to re-vegetate the disturbed areas, seed the recontoured pad with a diverse perennial seed mix certified as being free of noxious weed materials.

2.1.9 Schedule of Exploration Activities

Ormat proposes to initiate activities in 2008. The Project would be implemented over the next one to four years.

2.1.10 Adopted Environmental Protection Measures and Environmental Protection Lease Stipulations

Ormat would implement the following operational 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 is a part in the Operations Plan.

Ormat would also comply with all special lease stipulations attached to leases NVN-77483, NVN-74881, and NVN-74883, which apply to Project operations (Appendices A, B, and C).

2.2 No Action Alternative

The only alternative considered besides the proposed action is the No Action Alternative. The No Action Alternative would require BLM to reject the proposed action and not approve additional drilling permits for the Jersey Valley Geothermal Exploration Project. Under the No Action Alternative the observation and full size exploration wells would not be drilled. This would impair the ability to identify producible geothermal resources. Impairment of data gathering capability may also impair geothermal lease development. Both impairments are

inconsistent with the federal energy policy to promote the development of alternative energy sources and would not meet the stated purpose and need.

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 only with species of small brush. Although the adjacent Fish Creek Mountains reach a high elevation of over 8,000 feet six miles to the east, the Project is situated on gently sloping alluvial fans at the west base of this mountain 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 create openings for thermal springs to reach the surface. This occurs below the proposed drill sites, at approximately 4,600 and 4,400 feet elevation.

3.1 Critical Elements and other Supplemental Authorities

Critical elements 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. The BLM NEPA Handbook (H-1790-1), 1988, stipulates that if the critical element or 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 in EA NV-020-07-01 (pgs.22-30): 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. EA NV-020-07-01 identified whether any of the fifteen critical elements would be affected and were included in the analysis.

Air Quality, Cultural Resources, Native American Religious Concerns, Migratory Birds, Water Quality (Surface and Ground), Water Quantity, and Wetlands and Riparian Zones have been identified as needing additional analysis for the two new proposed well sites as identified in the proposed action and will be carried through in this document. Paleontological Resources were not analyzed in EA NV-020-07-01 and will be analyzed for the two new well sites.

Other resources that were identified as being affected in the previous analysis were: range resources, realty and lands, soils, vegetation, geology and minerals, wildlife, visual (VRM), economic, and recreation (EA NV-020-07-01, pgs.22-30).

Soil, vegetation, geology and minerals, and wildlife resources have been identified as needing additional analysis for the two new proposed well sites as identified in the proposed action and will be carried through in this document.

This proposed action was also reviewed to determine if any additional supplemental authorities would apply as defined in the revised BLM NEPA Handbook (H-1790-1), January, 2008. No issues were identified beyond what has already been described.

3.2 Air Quality

Air quality in the Project area has been designated as “attainment/unclassified” for all criteria air pollutants. The Project area is not located in or adjacent to any mandatory Class I (most restrictive) Federal air quality areas, U.S. Fish and Wildlife Service Class I air quality units, or American Indian Class I air quality lands (BLM 2007, page 21).

3.3 Cultural Resources

The Project area has been frequented and utilized in prehistoric, historic and modern time. Prehistoric peoples first entered the Great Basin around 12,000 before present (B.P.). During this Paleo-Indian period the Pleistocene Megafauna were relied on for subsistence. Fluted spear points (“Clovis” and “Folsom”) dominated the lithic tool kit. As climate changed, and the Holocene began, adaptation strategies changed as well. The time 11,000-7,000 year (B.P.) is known as the Western Pluvial Lakes period. It is believed that during this period human populations primarily relied on the resources to be found along lake and stream margins.

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 hunted. The piñon pine nut became a staple food source.

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 Jersey Valley, and Buffalo Valley to the north, range from Humboldt Series to Desert Side Notch and suggest the area was occupied from at least 8,000 B.P.

European Americans entered Jersey Valley about 150 years ago. Mineral exploration, reflected by a number of sites ranging from test trenches to small mining camps, dots the valley and the ridges immediately east of the Project area. 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.

Cultural resource surveys of the proposed well sites and access roads were conducted by Kautz Environmental Consultants. A draft inventory report was submitted to the BLM/HRFO indicating that no cultural resources were identified within the two proposed well pad sites area of potential effect (KEC 2008).

3.4 Migratory Birds

Migratory birds may be found in the Project area as either seasonal residents or as migrants. All birds, except California quail, sage grouse, chukar partridge, gray partridge, ring-necked pheasant, mountain quail, and sharp-tailed grouse, in the Winnemucca Field Office district are considered neotropical migratory birds (BLM 2007, page 24).

3.5 Native American Religious Concerns

Jersey Valley hot springs is believed to have some cultural significance to the Battle Mountain Band of the Te-Moak Tribe of the Western Shoshone (BLM 2007, page 25) and the Summit

Lake Paiute Tribe. Consultation was re-initiated in October 2008 via certified letter to the tribes. Consultation is ongoing.

3.6 Water Quality (Surface and Ground) and Water Quantity

The Project area is located in the Jersey Valley Hydrographic Area (BLM 2007, page 25). The Nevada Division of Water Resources, Department of Conservation and Natural Resources-Department of Water Resources (NDCNR-DWR) map of static groundwater level in Nevada lists the depth to groundwater in the hydrographic area as greater than 100 feet (NDCNR-DWR 1974 and BLM 2007, page 25).The Jersey Valley Hydrographic Area is a "designated" area or groundwater basin. The NDCNR-DWR hydrographic summary for Jersey Valley reports perennial yield is 250 acre-feet (NDCNR-DWRa).

The stream channels in the vicinity of the Project are ephemeral, flowing only during or immediately after rainfall, although some may be classified as intermittent (flowing part of the year, but dry the rest of the year (BLM 2007, page 25).

Up to ten cool water springs have been mapped within the geothermal lease unit agreement area. These springs are perched or contact springs. The source for these springs is infiltrating precipitation that has been captured and concentrated in areas where fractured or unconsolidated material is underlain by less permeable material (aquitards) that inhibit the downward migration of water. These springs seep out where the aquitard intersects with the surface of the ground. These ten springs occur at elevations of 5,000 feet and higher, above the proposed Project activity, and also at elevations of 4,640 feet and below, downslope from the proposed Project activities. Springs of this type are not directly connected with the surrounding water table and are generally unaffected by groundwater flow.

Three thermal springs are located within the Project area (BLM 2007, page 25). The westernmost spring is located in the center of section 29, more than one mile west of the current Project proposal. This spring includes a pond of several acres. The pond may also be supported by water flowing from the thermal spring located in the SE1/4SE1/4 of Section 29.

The two springs located in the SW1/4SW1/4 of Section 28 and the SE1/4SE1/4 of Section 29, have been singly and collectively referred to as Jersey Hot Springs. These springs have temperatures reported at 29°C to 57°C (84°F to 135°F) (NBMG 2004 and BLM 2007, page 25). The source of the waters and heating are summarized in the Geothermal Resources Leasing Programmatic Environmental Assessment" (BLM 2002, pages 3.94-95). A portion of the precipitation that falls on the Fish Creek Mountains infiltrates the mountain through fractures and faults. This water migrates to depth and for time sufficient for heating the water, which then rises through fractures and faults to discharge as hot springs. In the model referenced the Geothermal Resources Leasing Programmatic Environmental Assessment" (BLM 2002, pages 3.94-95), geothermal and groundwater reservoirs are interconnected by virtue of the source water supply (precipitation), the geologic media through which the water flows, and the flow system proximity. Thus, the geothermal systems function in a manner very similar to groundwater systems having the same water source and following similar paths to the valley.

3.7 Wetlands and Riparian Zones

The three thermal springs described in EA section 3.6 are surrounded by water dependent vegetation. Hot spring surface features include pools, mineral deposits, and outflows. No

detailed inventory has been conducted at the exploration drilling phase, but it is expected that the thermal springs described above could have several species of algae, bacteria, fungus, molds, yeast, invertebrates, and/or other small plants (BLM 2002, pages 1.6 and 3.72)

There is a small man-made reservoir, about 30 feet by 30 feet, developed many years ago at the "Jersey Hot Spring" in section 29. The water right for this spring is privately owned. The reservoir is allowed to fill. Then water is allowed to flow into a 6-inch wide by 6-inch deep channel that flows to a weir box, thence to an underground pipeline that carries the water to private land in section 7 at the old Home Station Ranch where it is used to water cattle. Periodically, the small reservoir is allowed to empty, when water is pumped, or to allow for cleaning the reservoir.

3.8 Geology and Minerals

The Project area is situated within the north-central Basin and Range physiographic province characterized by narrow, north-northeast-trending tilted block-faulted mountains separated by similarly aligned, alluvial-filled basins (BLM 2007, page 26).

The southwest three-quarters of the Jersey Valley basin has been mapped by the U.S. Geological Survey and Reheis (1999), as a high stand shoreline area for Pleistocene Lake Lahonton. As with other lakes from that era, Lake Lahonton evaporated into the rain shadow desert that typifies the Great Basin region. Fine silt found in the southeast portion of section 33, may be evidence of ancient lake silt deposits. That portion of the Project also displays slightly greater slopes that the northern project area, and contains several shallow ephemeral or abandoned range front drainage channels.

3.9 Soils

Soil types in the project area were identified using the 1994 "Pershing County East Part" soil survey by the National Resources Conservation Service (NRCS 1994).

Surface disturbing activities related to proposed site 77-28, its associated access road, and a portion of the access road for proposed site 13-34 would occur within soil unit 662, the Oxcorel-Whirlo-Trocken Variant association (NRCS 1994). The Oxcorel soil has very slow permeability, medium runoff potential, and a slight erosion hazard by water and wind. The Whirlo and Trocken Variant soils have moderately rapid permeability, medium runoff potential, and a slight erosion hazard by water and wind. The soil association has a low potential for wind erosion (NRCS 1994 and BLM 2007, page 26).

Surface disturbing activities related to proposed site 13-34 and a portion of its associated access road would occur within soil unit 673, the Misad-Golconda-Tenabo association (NRCS 1994). The Misad soil has a moderately rapid permeability, medium runoff potential, and a slight hazard for water erosion. The Golconda soil has very slow permeability, medium runoff potential, and a slight hazard for water erosion. The Tenabo soil has a very slow permeability, medium runoff potential, and a slight erosion hazard by water. The soil association has a moderate hazard for wind erosion (NRCS 1994).

3.10 Vegetation

All surface-disturbing activities from the Project would occur in the areas identified as shadscale plant community (BLM 2007, page 26).

3.11 Wildlife and Sensitive Species

It was determined through consultation with the U.S. Fish and Wildlife Service that no listed, proposed or candidate species that no listed, proposed, or candidate species occur in the Project area *(BLM 2007, Appendix D). The following list identifies special status wildlife species observed by Battle Mountain Field Office personnel in the general area of the Proposed Action (BLM 2007, page 29):

Mammals	
Antrozous pallidus	pallid bat
Brachylagus idahoenis	pygmy rabbit
Corynorhinus townsendii	Townsend's big-eared bat
Ovis Canadensis nelsoni	desert bighorn sheep

Birds	
Agelaius tricolor	Tricolored Blackbird
Aquila chrysaetos	Golden Eagle
Athene cunicularia	Burrowing owl
Buteo regalis	Ferruginous Hawk
Buteo swainsoni	Swainson's Hawk
Centrocecus urophasianus	Greater Sage Grouse
Falco mexicanus	Prairie Falcon
Falco peregrinus	Peregrine falcon
Lanius ludovicianus	Loggerhead Shrike
Numenius americanus	Long-billed Curlew

Of the above species, the desert bighorn sheep and pygmy rabbit were eliminated from further analysis, as the project area does not provide suitable habitat for these species (BLM 2007, page 30).

The pallid and Townsend's big eared bat use natural caves and cracks in rock outcrops or man-made cavities for breeding, rearing, and/or hibernating habitat. There is a major bat maternity colony and hibernaculum located within one mile of one of the proposed drill sites (BLM 2007, page 30). These bats also use some of the mine adits located in Sections 27 and 34 in T27N, R40E on the east side of lease NVN-77483.

Sage grouse are upland game birds found on the sage-steppe habitats throughout the West, primarily in areas dominated by sagebrush (Artemesia spp.), forbs, and grasses. Optimum sage grouse habitats are generally characterized as mature sagebrush stands with dense understory of native perennial grasses and native forbs. Sage grouse have been found to require a diversity of habitats for wintering, breeding, nesting, and brood rearing. Wintering sage grouse utilize medium to tall sagebrush communities (25-80cm) on south and west facing slopes. Breeding leks are typically located in sparsely vegetated areas. Nests are located under sagebrush plants often in mountain sagebrush habitats but bitterbrush and rabbitbrush sites may also be utilized. Brood rearing habitats are typically found where forb abundance is greatest.

The project area does provide some foraging opportunities for the other identified special status bird species. It is not known whether any special status invertebrate species occur within the hot (or warm) springs found in the project area.

3.12 Paleontological Resources

A literature review of the proposed Project area and vicinity was conducted by Cogstone Resource Management, Inc. to determine the potential for the rock units in the proposed Project area to produce significant fossil resources. The majority of the rock units present in the Project area were not expected to produce fossils. Only the unnamed Miocene to Pliocene sedimentary rocks, “Qtoa” and “Ts”, have moderate to high potential to yield fossils. All other sedimentary formations are of low potential and the numerous igneous rock units present have no potential (Cogstone 2008).

4 ENVIRONMENTAL CONSEQUENCES

This section identifies the impacts associated with the proposed project. All potential consequences related to the proposed action of road construction and geothermal exploration drilling are addressed. Impacts identified after mitigation 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 (BLM 2007, page 14).

Combustion emissions of criteria air pollutants criteria air pollutant precursors and air toxics would be released during drill pad and road construction and drilling activities from the diesel engines used (BLM 2007, page 31).

No residual air quality impacts are expected.

4.1.2 Migratory Birds

The lease specific environmental protection stipulation for migratory birds in BLM geothermal lease NVN-77483, Pershing County portion, and BLM geothermal lease NVN-74881 would apply to this Project (see Appendices A and B). The migratory bird lease stipulation incorporates protective measures for surface disturbing activities from exploration through development.

Well pad construction (regardless of the season constructed) could result in the direct loss of up to 9.75 acres of potential migratory bird habitat. This Project is temporary and short-term. Migratory birds would adjust and relocate to abundant similar habitat in the 8,470 acres of the geothermal unit agreement area and beyond.

Project-generated construction and drilling noise could also keep some migratory birds away from areas generating this noise. Other adverse indirect effects could result from general human activity, which could displace individuals or reduce breeding success of species that are sensitive to human activity (BLM 2007, page 32). The indirect effects would be temporary and short-term. In addition, migratory birds would be able to re-occupy the disturbed areas upon completion of these short-term operations, which would prevent residual impacts (BLM 2007, page 32). The following mitigation measure would further reduce effects to migratory birds.

Mitigation Measure

Initial ground disturbing activities would not be conducted during the migratory bird nesting season (March through July) unless necessary, and then only after inventories for migratory birds and nests were conducted by a qualified biologist acceptable to the BLM. This survey would be conducted to identify either breeding adult birds or nest sites within the specific areas to be disturbed. If active nests are present within these areas to be disturbed, NGP would coordinate with the authorized officer to develop appropriate

protection measures for these sites, which may include avoidance, construction constraints, and/or the establishment of buffers.

4.1.3 Native American Religious Concerns

Native American consultation and coordination are on-going.

As all Project activities are located at least 1,000 feet away from the springs, and the Project is short-term and temporary, it is anticipated that the Project would not affect the cultural significance of the springs. Consultation has not yet been concluded for this Project.

4.1.4 Water Quality (Surface and Ground) and Water Quantity

The project would have little potential for adversely affecting the quality of either surface waters or ground waters in the project area because all Project activities are located at least 1,000 feet away from the springs, the Project is short-term and temporary, and:

- Each slim well and full-size exploration well would be cased with steel casing cemented into the ground which is designed to prevent contamination of any ground waters by the drilling, workover and geothermal fluids and prevent the loss of any geothermal resource into other aquifers.
- In addition to steel casing, each slim well and full-size exploration well will be drilled using non-toxic drilling mud, lost circulation materials, and other mud additives to prevent the loss of drilling fluids into the rock.
- Any injection test conducted on a slim or full-size exploration well would only inject produced geothermal fluid through the cased well back into the geothermal reservoir from which it was produced, ensuring that there would be no affect on the quality of ground waters. Chemical analyses of the produced geothermal fluid would be conducted to characterize the geothermal fluids.
- Each slim well and full-size exploration well would be drilled using non-toxic drilling mud to prevent loss of drilling fluids into the rock.
- Reserve pits would be constructed at each site for the containment and temporary storage of drilling mud, drill cuttings, geothermal and workover fluids and storm water runoff from the constructed well pad.
- Storm water runoff from undisturbed areas around the constructed well pads would be directed into ditches surrounding the well pad and back onto undisturbed ground consistent with best management practices for storm water.
- To minimize erosion from storm water runoff, access roads would be constructed and maintained consistent with the best management practices for road construction applicable to temporary roads (BLM 2007, Appendix E).

The Project would have little potential to affect the quantity of either surface waters or ground waters in the area. A relatively small amount of water, averaging approximately 30,000 gallons or approximately 21 gallons per minute during drilling operations (about 0.09 acre-feet) per day for the exploration well drilling, would be obtained from shallow water wells drilled on one or more of the drill pads or trucked into Project area from the Home Station Ranch (a private source). In this water basin, 0.09 acre feet is 1.6% of the annual basin yield. Water extraction would occur on an as-needed basis during construction and drilling activities. No effects to the thermal springs from production of the temporary water well are anticipated, and monitoring to identify any effects would be conducted.

Use of groundwater for drilling would be short-term and would not be expected to affect availability of groundwater or groundwater flows. No hazardous materials would be used or produced during drilling that would have the potential to affect groundwater. Measures to protect groundwater are incorporated into drilling and well completion procedures mandated by state and federal regulations. Geothermal water generated during flow testing would be directed to the drilling reserve pit. When the reserve reaches the save freeboard limit, geothermal water would be piped offsite to one of the other inactive drill pad reserve pits, or piped to well site 81-28 and reinjected. The well bores would be cased and cemented to close off access to the surface aquifer. This would prevent geothermal water from contacting the surface aquifer.

BLM geothermal leases NVN-77483 and NVN-74881 have specific environmental protection stipulations for water resources (see Appendices A and B). The water resources lease stipulation states:

Water Resources

- The operator shall institute a hydrologic monitoring program. If a drilling program were to be undertaken, the number of aquifers encountered, their properties, their quality, and their saturated thickness would be documented. The lessee will monitor the quality, quantity, and temperature of any surface water resource within the project area.
- If adverse impacts do occur, BLM will require the lessee to take corrective action to mitigate the impact.

The water monitoring mitigation developed in the 2007 EA identified additional site specific detail based this lease stipulation would apply to this Project. With this mitigation measure in place, no additional impacts beyond those identified in the 2007 EA are expected.

Mitigation Measure

Lessee shall monitor and collect the following hydrologic data from each of the two springs known as the Jersey Valley Hot Springs, which are located in the SW1/4SW1/4 of Section 28 and the SE1/4SE1/4 of Section 29, respectively:

- **Representative temperature, flow or stage, and basic thermal water chemistry- once immediately prior to the commencement of drilling and once immediately following the completion of drilling;**
- **During the drilling or flow testing of slim or full-size well 86-29 or when extracting water from any groundwater wells - Representative temperature and flow or stage from each spring - once each week until drilling, flow testing or water extracting is completed;**
- **Each year following the drilling of the first well until all wells have been abandoned - Representative temperature, flow or stage measurements, and basic thermal water chemistry - once per year.**

Collected data shall be reported to the BLM WFO project lead and hydrologist in written form within one week of receipt by the lessee.

Lessee shall document available information regarding fresh water aquifers which may be encountered during drilling, including the number encountered, their depths and saturated thickness, their quality and any other properties.

4.1.5 Wetlands and Riparian Zones

BLM geothermal leases NVN-77483 and NVN-74881 have a specific environmental protection stipulation for riparian areas.

Riparian Areas

- A No Surface Occupancy within 650 feet of any surface water bodies, riparian areas, wetlands, playas or 100-year floodplains has been established. Exceptions to this stipulation will occur on a case-by-case basis.

The Proposed Action is not expected to affect any riparian or wetland areas. It would not affect the quality, and would have little potential to affect the quantity, of any ground or surface waters within the Project area. All proposed Project activities are located at least 1,000 feet away from any known spring or pond which may support riparian or wetland habitat.

4.1.6 Geology and Minerals

The proposed access for drill pad 13-34 in section 34 has slope areas greater than 10 percent and also has several ephemeral or relict drainages.

Mitigation Measure

Ten days prior to start of dirt work for construction of the new access road to well pad 13-34, a pre-construction meeting with the dirt work contractor and the BLM/HRFO, Engineering Supervisor, or the Supervisor's representative will be required. The purpose of the meeting will be to coordinate final road placement, angle, and any necessary culvert placement.

4.1.7 Soils

The Project could disturb up to 9.75 acres. The potential for water and wind erosion on the disturbed soils in the Project area is slight to moderate. As part of the Project, disturbed areas would be re-contoured as necessary and reclaimed in accordance with applicable BLM requirements.

Soil productivity would be reduced in the 9.75 acres to be disturbed, but due to the temporary nature of this disturbance and the commitment to stockpile topsoil and use it to reclaim the disturbed lands, Project impacts on soil productivity are low.

4.1.8 Vegetation

Surface-disturbing activities from the Project would result in the loss of up to 9.75 acres of this common plant community. Disturbed areas could have an increase in cheatgrass as compared to non-disturbed areas. Implementation of the commitment to reseed disturbed areas with native see mixtures would minimize the spread of invasive, nonnative species and result in no residual impacts to vegetation.

BLM geothermal leases NVN-77483 and NVN-74881 have a specific environmental protection stipulation related to vegetation (see Appendices A and B) as follows:

Mitigation Measure

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

The following revegetation practices and seed mix were developed in the 2007 EA and would apply to this Project:

Mitigation Measures

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 using the following native seed mixture and application rate. Any variance in the mix would be coordinated with the BLM Winnemucca Field Office. The BLM recommended seed mixture is:

Species	PLS LBS./Acre	Bulk LBS./Acre	PLS/sq. ft.
Sandberg bluegrass	1.90	2.00	38
Fourwing saltbush	3.00	5.00	4
Shadscale	3.00	5.00	4
Indian Ricegrass	1.00	1.25	4
Totals	8.90	13.25	50

PLS = Pure Live Seed

4.1.9 Wildlife and Sensitive Species

The Project would result in a temporary loss of an additional 9.75 acres, for a total project disturbance of just under 20 acres of 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. Over time and subsequent to site reclamation, habitat would be

restored. This project is short-term and temporary, and there is an abundance of comparable habitat in the area.

Project-generated noise could also keep some animals away from areas directly affected by surface disturbance during the on-site project construction and drilling activities. Other adverse indirect effects could result from general human activity, which could displace individuals or reduce breeding success of species that are sensitive to human activity. The indirect effects 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 no residual impacts to wildlife resources.

The general lease stipulations (Appendix A, Appendix B, and Appendix C) require that a survey for invertebrates be conducted in areas of geothermal surface expression (typically warm or hot springs) prior to development. Because the proposed project is limited to exploration (not development) activities, and these activities do not have the potential to adversely affect the quality or quantity of either surface waters or ground waters (including cold water or geothermal springs) in the area (as discussed in Section 3.4), this invertebrate survey is not necessary at this time.

To protect those bats which use the mine adits located in Sections 27 and 34 in T27N, R40E (on the east side of lease NVN-77483), lease NVN-77483 applies a “no surface occupancy” restriction to lands within 0.25 mile of these mine adits. No activities proposed by the project would occur within 0.25 mile of these adits.

The Proposed Action is unlikely to effect the pallid bat or Townsend’s big eared bat due to the short-term, temporary nature of the project; the absence of any drilling materials or produced waters on-site which could harm the bats; and the distance from the areas of surface disturbance to the maternity colony and hibernaculum. Lights used for drilling at night may attract and concentrate moths and other insects on which the Townsend’s big eared bat, and potentially the pallid bat, may feed, which could be a short-term beneficial effect.

Mitigation Measure Lease Stipulation

Bat Protection

- **To protect the Pallid bat (Antrozous pallidus) and Townsend’s big-eared bat (Corynorhinus townsendii) using mine adits in sections. 27 and 35, T27N, R40E, a 0.25-mile No Surface Occupancy has been instituted.**

Given the marginal sage grouse habitat and absence of leks in the vicinity of the project area, the project will not likely have effects on this species. Project construction would result in the direct loss of an additional 9.75 acres of potential special status bird habitat. This project is temporary and short-term and any special status birds would likely adjust and relocate to abundant similar habitat in the project vicinity.

4.1.10 Paleontological Resources

Of the two proposed sites and associated access roads, approximately 200 feet of the access road for proposed site 13-34 is located within an area mapped as “Qtoa”, an unnamed Miocene to Pliocene sedimentary rock unit approximately 15 to 4 million years old.

Construction activities on the unnamed Miocene to Pliocene sedimentary rock; (mapped as Qtoa and Ts) would create new surface disturbance and could result in the disturbance or destruction of potentially significant fossils.

BLM geothermal lease NVN-74883 has a specific environmental protection stipulation for paleontological resources (see Appendix C) as follows:

Paleontological Resources

- **Where significant paleontological resources are identified, mitigating measures such as data recovery, restrictions on development, and deletion of some areas from development may be required on a case by case basis.**

The following mitigation measure for exploration drilling and access is recommended to minimize the potential loss of significant fossils.

Mitigation Measure

Surface-disturbing activities on either of the two unnamed Miocene to Pliocene sedimentary units (Qtoa and Ts) will require pre-disturbance surveys to determine the appropriate subsequent course of action, which could include monitoring by a qualified paleontological monitor during surface-disturbing activities, avoidance of identified significant fossil localities, or no further action.

A completed pre-disturbance survey report must be submitted to the BLM, HRFO ten days prior to any surface disturbance on either of the two unnamed Miocene to Pliocene sedimentary units (Qtoa and Ts).

4.2 The No Action Alternative

None of the previously described environmental consequences associated with the proposed activity would occur.

Geothermal resources are considered a mineral resource by the state and federal governments. The No Action Alternative would have an adverse effect on the continued data gathering and resource analysis that could lead to development and monitoring of geothermal resources in the Jersey Valley area. 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.

Most resources would not be affected by the No Action Alternative. Since short term benefits would accrue to the local economy as a result of the proposed action, the economic impacts of the No Action Alternative can be viewed at the economic benefits that would be foregone.
The previously approved geothermal operations would not be affected by the selection of the No Project 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 is the Jersey Valley Hydrographic Area (Number 132) of the Central Hydrographic Region (Number 10), as designated by the Division of Water Resources of the Nevada Department of Conservation and Natural Resources (NDCNR-DWR) (see Figure 3: Cumulative Effects Study Area Map).

5.2 Past and Present Actions

Past and present activities consist principally of dispersed recreation, livestock grazing, and mineral exploration and development activities (including geothermal resource exploration and locatable minerals exploration).

All surface disturbances related to the Geologix mineral exploration activities described in the previous EA has been reclaimed (BLM 2007, page 40 and BLM 2008b).

In May, 2007, geothermal exploration drilling began. Five exploration well sites and necessary access have been constructed. Exploration drilling is currently ongoing.

5.3 Reasonable Foreseeable Future Actions

For this analysis it is assumed that the "foreseeable future" is the anticipated four-year period for implementation of the Proposed Action plus a subsequent three-year period for reclamation. It is assumed that recreational, locatable minerals exploration and livestock grazing activities associated with the CESA 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.

Additionally, Ormat has proposed the Jersey Valley and Buffalo Valley Geothermal Development Projects, which would include the construction and operation of geothermal well fields and geothermal resource utilization facilities. The producing limits of the geothermal field(s) would be determined by developmental drilling. Surface disturbance to construct additional roads and drill pads would occur. Drilling of production wells would be initiated. Other facilities include a power plant, an electric transmission line; geothermal fluid pipelines; geothermal fluid ponds; and warehouse and maintenance facilities. Because they are generally sequential, little overlap of the impacts is expected from the proposed exploration project and the geothermal development activities.

5.4 Cumulative Impacts for the Proposed Action

5.4.1 Migratory Birds

The amount of surface disturbance which may be created within the CESA by road construction, mineral and geothermal exploration operations and the forecast geothermal development project would be a very small portion of the CESA. Mitigation measure(s) requiring inventories for migratory bird nests and limiting ground disturbing activities if conducted during the migratory bird nesting season, could help reduce the potential adverse effects if also implemented for the other actions.

5.4.2 Water Quality (Surface and Ground) and Water Quantity

Development of the geothermal resources would entail the drilling and completion of additional geothermal wells very similar to the currently proposed Project. The geothermal development production phase, during which the geothermal fluid would be produced and injected, may also begin during the "foreseeable future." Monitoring and collection of hydrologic data from each of the two springs known as the Jersey Valley Hot Springs would have to continue to be monitored during and through any development stage. Storm water runoff from mineral exploration and geothermal development activities could create additional erosion and sedimentation.

5.4.3 Soils

Additional impacts to soils could be expected to occur from additional mineral exploration, geothermal development and other cumulative activities. Additional roads could be constructed and mineral exploration holes drilled. These activities could disturb the soils in the affected areas, which would be "lost" until reclaimed following completion of the Projects. Mitigation measure(s) requiring the salvaging of topsoil could help reduce the potential adverse effects if implemented for the other actions.

5.4.4 Vegetation

Additional impacts to vegetation could also be expected to occur from additional mineral exploration, geothermal development and other cumulative activities. Each of these activities could disturb and/or remove vegetation in the affected areas. Mitigation measure(s) requiring timely reclamation and re-seeding of disturbed areas, as proposed by the Project, could reduce adverse impacts to vegetation.

5.4.5 Wildlife

Additional wildlife habitat could be disturbed by the additional mineral exploration, forecast geothermal development, and other cumulative activities through the creation of roads and mineral exploration holes. Wildlife habitat directly disturbed by these activities would be "lost" until reclaimed. General human activity and generated noise could also keep some animals away from habitat not directly affected by surface disturbance. The amount of this direct and indirect surface disturbance expected from the cumulative projects is a small portion of the cumulative impact assessment area. There is abundant comparable wildlife habitat in the vicinity and region, and wildlife is normally able to move away from small areas of direct disturbance and into adjacent suitable habitat. Reclamation of directly disturbed areas, as proposed by the project, could re-establish habitat for wildlife.

5.4.6 Sensitive Species

In most cases, mineral exploration would not be allowed in areas where these activities could have a negative impact on special status species. Mitigation measure(s) for avoidance and to survey for special status species could help reduce the potential for adverse effects if also implemented for the other actions.

5.4.7 Paleontological Resources

The two sedimentary units within the proposed Project area determined to have the potential to produce significant fossils are only present at the southern edge of the geothermal lease unit agreement area. The amount of surface disturbance which may be created in the CESA by road construction, mineral and geothermal exploration and the forecast geothermal development project would be only a few acres or less. The potential for the disturbance or destruction of potentially significant fossils would increase. However, the geothermal leases and mitigation measure(s) developed in this and the previous EA require that where any significant paleontological resources that are identified, data recovery, restrictions on development, and deletion of some areas may be required.

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; threatened and endangered species; migratory birds; Native American consultation, candidate and special status species; wastes (hazardous or solid); water quality (surface and ground); wetlands and riparian zones; geology and minerals; soils; vegetation; wildlife; range resources; economic values; recreation; visual; water quantity; paleontology; and lands and realty from implementation of the No Action Alternative.

5.6 Irreversible and Irretrievable Commitment of Resources

No irreversible and irretrievable commitment of resources is expected.

Figure 3: Cumulative Effects Study Area Map

6 MITIGATION AND MONITORING

As described in Chapters 2 and 4, there are lease specific environmental protection stipulations from BLM geothermal leases NVN-77483 (Pershing County portion), NVN-74881 and NVN-74883, that would apply to this Project. Additionally, the previously developed mitigation measures in the 2007 EA (NV-020-07-EA-01) and the mitigation measures developed in this document would apply to the current Project proposal.

Applicable Lease Stipulations:

Bat Protection

- To protect the Pallid bat (Antrozous pallidus) and Townsend's big-eared bat (Corynorhinus townsendii) using mine adits in the vicinity, all drill sites would be sited at least 0.25-mile from openings occupied by these bats.

Migratory Birds

- Surface disturbing activities during the migratory bird nesting season (March to July) may be restricted in order to avoid potential violation of the Migratory Bird Act.

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.

Water Resources

- The operator shall institute a hydrologic monitoring program. The lessee will monitor the quality, quantity, and temperature of any surface water resource within the project area.
- All operators would be required to submit a surface water inventory to the BLM.

Hazardous Materials

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

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).

Paleontological Resources

- Where significant paleontological resources are identified, mitigating measures such as data recovery, restrictions on development, and deletion of some areas from development may be required on a case by case basis.

Mitigation measures developed in the 2007 EA:

- 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 Field 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 Winnemucca Field Office (WFO) 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.

- A minimum of 12 inches of topsoil would be salvaged during construction, and stockpiled for use during subsequent reclamation of the disturbed areas.

- Lessee shall monitor and collect the following hydrologic data from each of the two springs known as the Jersey Valley Hot Springs, which are located in the SW1/4SW1/4 of Section 28 and the SE1/4SE1/4 of Section 29, respectively:

  - Representative temperature, flow or stage, and basic thermal water chemistry- once immediately prior to the commencement of drilling and once immediately following the completion of drilling;
  - During the drilling or flow testing of slim or fill-size well 86-29 or when extracting water from any groundwater wells - Representative temperature and flow or stage from each spring - once each week until drilling, flow testing or water extracting is completed;
  - Each year following the drilling of the first well until all wells have been abandoned - Representative temperature, flow or stage measurements, and basic thermal water chemistry - once per year.

  Collected data shall be reported to the BLM WFO project lead and hydrologist in written form within one week of receipt by the lessee.

  Lessee shall document available information regarding fresh water aquifers which may be encountered during drilling, including the number encountered, their depths and saturated thickness, their quality and any other properties.

- If the wells are successfully completed, all surface equipment and facilities shall be painted a color that blends with the natural surroundings. The authorized officer shall be contacted and BLM Winnemucca Office staff consulted prior to the selection of the color.

- 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, Ormat would contact the WFO 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 using the following native seed mixture and application rate. Any variance in the mix would be coordinated with the BLM Winnemucca Field Office. The BLM recommended seed mixture is:

Species	PLS LBS./Acre	Bulk LBS./Acre	PLS/sq. ft.
Sandberg bluegrass	1.90	2.00	38
Fourwing saltbush	3.00	5.00	4
Shadscale	3.00	5.00	4
Indian Ricegrass	1.00	1.25	4
Totals	8.90	13.25	50

PLS = Pure Live Seed

The following mitigation and monitoring measures were developed through the analysis conducted in this Environmental Assessment.

- Initial ground disturbing activities would not be conducted during the migratory bird nesting season (March through July) unless necessary, and then only after inventories for migratory birds and nests were conducted by a qualified biologist acceptable to the BLM. This survey would be conducted to identify either breeding adult birds or nest sites within the specific areas to be disturbed. If active nests are present within these areas to be disturbed, NGP would coordinate with the authorized officer to develop appropriate protection measures for these sites, which may include avoidance, construction constraints, and/or the establishment of buffers.

- Ten days prior to start of dirt work for construction of the new access road to well pad 13-34, a pre-construction meeting with the dirt work contractor and the BLM/HRFO, Engineering Supervisor, or the Supervisor's representative will be required. The purpose of the meeting will be to coordinate final road placement, angle, and any necessary culvert placement.

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

- Surface-disturbing activities on either of the two unnamed Miocene to Pliocene sedimentary units (Qtoa and Ts) will require pre-disturbance surveys to determine the appropriate subsequent course of action, which could include monitoring by a qualified paleontological monitor during surface-disturbing activities, avoidance of identified significant fossil localities, or no further action.

  A completed pre-disturbance survey report must be submitted to the BLM, HRFO ten days prior to any surface disturbance on either of the two unnamed Miocene to Pliocene sedimentary units (Qtoa and Ts).

7 COORDINATION AND CONSULTATION

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Appendix A: Special Geothermal Lease Stipulations, Lease NVN-77483

Appendix B: Special Geothermal Lease Stipulations, Lease NVN-74881

Appendix C: Special Geothermal Lease Stipulations, Lease NVN-74883