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Spencer Hot Springs Area Geothermal Leases
Lander County, Nevada

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Environmental Assessment
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List of Acronyms

The following acronyms have been used in this document.

AAQSs	Ambient Air Quality Standards
ALL	Allotment Management
AMSL	Above Mean Sea Level
BAPC	Bureau of Air Pollution Control
BLM	Bureau of Land Management
BMFO	Battle Mountain Field Office
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
dB	Decibels
dBA	A-Weighted Decibels
DNA	Documentation of NEPA Adequacy
EA	Environmental Assessment
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
GRO	Geothermal Resources Operational Orders of the Geothermal Steam Act
HMA	Herd Management Area
H_2S	Hydrogen Sulfide
IBLA	Interior Board of Land Appeals
kV	Kilovolts
Leq	Time-Averaged Noise Level in dBA
MMPA	Mining and Mineral Policy Act of 1970
MOU	Memorandum of Understanding
MW	Megawatts
NDCNR	Nevada Department of Conservation and Natural Resources
NDEP	Nevada Division of Environmental Protection
NEPA	National Environmental Policy Act
NMA	National Mustang Association
NO_2	Nitrogen Dioxide
O_3	Ozone
Pb	Lead
PL	Public Law
PM	Particulate matter
ppm	Parts per million
RMP	Resource Management Plan
RPP	Recreation or Public Purposes
SOPs	Standard Operating Procedures
SO_2	Sulfur Dioxide
TDS	Total Dissolved Solids
USC	United States Code
USCOE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
VRM	Visual Resource Management
WBT	USFS Wild Burro Territory
WHB	Wild Horse and Burro

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1 Introduction

1.1 Summary of the Proposed Action

In 2003 the Bureau of Land Management (BLM) received applications for three geothermal leases located on public lands managed by the BLM's Battle Mountain Field Office (BLM-BMFO) in the area surrounding Spencer Hot Springs, in the southeast corner of Lander County in central Nevada (Figure 1). This proposed geothermal lease area of about 4,841 acres is located approximately 15 miles southeast of the community of Austin and approximately 15 miles northeast of the community of Kingston (Figure 2). As required by the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA, and the BLM NEPA Handbook (H-1790-1), this environmental assessment (EA) evaluates the potential direct and indirect impacts on the natural and human environment that could result from the Proposed Action - the BLM-BMFO approval of these applications and issuance of the requested geothermal resource leases.

1.2 Purpose and Need for the Proposed Action

As discussed in the BLM NEPA Handbook, for externally initiated proposals such as the filing of these geothermal lease applications, the purpose and need for the Proposed Action generally reflects what the applicant intends to accomplish; the approval of the geothermal lease applications and the issuance of the geothermal resource leases.

The Geothermal Steam Act of 1970 (30 U.S. Code (USC) §1001 *et seq*., as amended) and the geothermal leasing regulations developed to implement the Geothermal Steam Act (43 CFR §3200 *et seq.*) provide the statutory authority and regulatory guidance for the issuance of geothermal resource leases by BLM. Upon receipt of completed applications for non-competitive geothermal lease applications such as these around Spencer Hot Springs and compliance with the requirements of NEPA, BLM has three options: (1) issue the leases (subject to appropriate stipulations to protect other resources); (2) issue some portion of the requested leases (also subject to appropriate stipulations to protect other resources); or (3) deny the applications and not issue any of the leases.

1.3 Discussion of Geothermal Leasing and Lease Operations

Federal geothermal leases are granted for a primary term of ten years, which under current law may be extended for up to two additional five-year periods. If the lessee produces or uses geothermal resources in commercial quantities during the primary term, the lease will continue in "additional term" for as long as geothermal resources are produced or used in commercial quantities for up to forty years beyond the end of the primary term.

When issued, federal geothermal leases convey to the lessee the "exclusive right and privilege to drill for, extract, produce, remove, utilize, sell, and dispose of geothermal steam and associated geothermal resources." However, federal geothermal leases do not grant the exclusive right to

occupy the leased public land – existing authorized uses can continue and new uses compatible with the intent of the geothermal leases can still be authorized.

Federal geothermal lessees must "*Diligently explore the leased lands for geothermal resources until there is production in commercial quantities*" applicable to the lease. To maintain each geothermal lease federal geothermal resource lessees must also pay annual rental fees to the federal government; annually spend increasing amounts to explore the lease for geothermal resources; file and maintain bonds to ensure compliance with conditions of approval; and pay royalties of up to fifteen percent of the value of any geothermal resources produced to the federal government (half of which are returned to the state from which it originated).

Geothermal leases include the right of ingress to and egress from the leased lands; the right to construct and operate on the lease; and the right to occupy as much of the land as may be necessary; all of which are subject to any lease stipulations and compliance with applicable laws and regulations, including compliance with all regulations and orders adopted under the Geothermal Steam Act.

Regulations adopted to implement the Geothermal Steam Act expressly require separate approvals from the BLM, each subject to NEPA, for each proposed geothermal lease operation beyond "casual use" activities (activities which ordinarily lead to no significant disturbance of federal lands, resources or improvements). Three types of activities are expressly described in the federal geothermal lease operations regulations: "exploration operations" (as regulated under 43 CFR 3250); "geothermal drilling operations" (as regulated under 43 CFR 3260); and the "utilization of geothermal resources" (as regulated under 43 CFR 3270).

1.4 Conformance with BLM Land Use Plans and Legal Mandates

The Proposed Action area is located in the BLM-BMFO Shoshone-Eureka Planning Area. The Proposed Action is in conformance with the Shoshone-Eureka Resource Management Plan (RMP). Part II, Section E, "Management Actions Not Expressly Addressed by the Resource Management Plan," of the RMP includes the section "Minerals Objectives and Management Decisions" brought forward unaltered from the earlier BLM "Management Framework Plan" (Record of Decision, page 29). Minerals Objectives 1, 2 and 3 lead to Management Decision #2 (Leaseable Minerals - Geothermal Steam). The three objectives are:

Objective 1: Make available and encourage development of mineral resources to meet national, regional and local needs consistent with national objectives for an adequate supply of minerals.

Objective 2: Assure that mineral exploration, development and extraction are carried out in such a way as to minimize environmental and other resource damage and to provide, where legally possible, for the rehabilitation of lands.

Objective 3: Develop detailed mineral resource data in areas where different resources conflict so that informed decisions may be made that result in optimum use of the lands.

Management Decision #2 (Leaseable Minerals – Geothermal Steam), states that: "All areas designated by the BLM as prospectively valuable for geothermal steam will be open for exploration and development unless withdrawn or restricted from mineral entry. All public lands disposed of in these areas will have the geothermal resources reserved to the federal government." The lands covered by the lease applications subject to this EA are prospectively valuable for geothermal steam (resources) and are not withdrawn or restricted from mineral entry (see Section 3.3.3.1).

The Proposed Action is in accordance with the National Energy Policy, Executive Order 13212, BLM implementation of the National Energy Policy, the Geothermal Steam Act of 1970 (30 U.S. Code (USC) §1001 et seq. as amended), and geothermal leasing regulations (43 CFR §3200). It is also the policy of the Department of the Interior, consistent with Section 2 of the Mining and Mineral Policy Act (MMPA) of 1970 and sections 102(a)(7), (8), and (12) of the Federal Land Policy and Management Act of 1976 (FLPMA), to encourage the development of mineral resources, including geothermal resources, on federal lands. Finally, the Proposed Action is consistent with the Geothermal Energy Research, Development, Demonstration Act of 1974, which promotes the development and utilization of geothermal resources.

As part of its 1997 utility restructuring legislation, the Nevada legislature established a renewable portfolio standard. Under the standard, the utilities must derive a minimum percentage of the total electricity they sell from renewable energy resources, including electricity generated from geothermal resources. In 2001, the legislature revised the minimum amounts to increase by 2 percent every 2 years, starting with a 5 percent renewable energy requirement in 2003 and achieving a 15 percent requirement by 2013 and each year thereafter. Not less than 5 percent of the renewable energy must be generated from solar renewable energy systems.

1.5 Additional Background Information

Three NEPA documents were previously prepared to support geothermal resource leasing decisions within the Shoshone-Eureka Planning Area. The first two are the "Regional Environmental Analysis on Geothermal Leasing in the Shoshone Resource Area" (27-060-5-21) and the "Regional Environmental Analysis on Geothermal Leasing in the Eureka Resource Area" (27-060-5-55). These documents are available for review at the Battle Mountain Field Office. However, because these environmental analyses did not contain any analysis of cumulative impacts or critical elements recently added to the list of those which must be analyzed in BLM NEPA documents (see Section 3.2), in 2002 the BLM-BMFO prepared a third NEPA document, the "Programmatic Environmental Assessment, Geothermal Leasing and Exploration, Shoshone-Eureka Planning Area" (NV063-EA02-16), dated September 2002 (Programmatic EA). As stated in this Programmatic EA, the Programmatic EA supplements the two earlier environmental analyses, and was "to be used as the primary environmental document for the leasing of geothermal resources and the subsequent exploration in the Shoshone-Eureka Planning Area."

However, the decisions by the BLM-BMFO approving this EA for use in issuing geothermal resource leases within the Shoshone-Eureka Planning Area (including the September 5, 2002 Finding of No Significant Impact [FONSI] and Decision Record) were appealed, and on

January 28, 2003 the Interior Board of Land Appeals (IBLA) granted the appellants a stay of the BLM decisions, thus preventing BLM from using this EA to issue geothermal leases within the Shoshone-Eureka Planning Area. This stay was to remain in effect until the IBLA issued its decision on the appeal, which was to be issued once BLM provided to the IBLA all of the relevant administrative record on the Programmatic EA, FONSI and Decision Record and the appellants provided to the IBLA sufficient evidence to support their standing to pursue the action. On August 12, 2004 the IBLA dismissed the appeal on the grounds that the appellants did not adequately demonstrate standing to pursue the appeal. Thus, this Programmatic EA, FONSI and Decision Record may now be used and cited during the NEPA review process and in geothermal resource lease application decisions, such as those in the area of Spencer Hot Springs, within the Shoshone-Eureka Planning Area.

Public scoping was conducted during July and August, 2004 for the preparation of this EA. BLM-BMFO distributed press releases and Interested Parties letters which described the proposed leasing decision and requested that written comments be submitted by August 16, 2004. BLM-BMFO also conducted a public scoping meeting in the evening of August 10, 2004 in Austin, Nevada, which was attended by 24 members of the public. Four letters were also received in response to the request for comments. The scoping comments received at the public scoping meeting and in writing can be generally summarized as follows:

- Public Use Issues
    - Loss of recreational potential if hot spring flow or current environmental setting of the hot springs is altered
    - Loss of public access to leased lands, especially the hot springs themselves
    - Impacts to recreational potential from new industrial or utility infrastructure (roads and/or power lines)
- Hydrology Issues
    - Concern for reduction in flow of springs or ground water levels in wells that support livestock, wild horses, burros and/or wildlife
    - Concern for reduction in flow from the hot springs themselves
    - Impacts from development of the geothermal resources to existing surface and ground water rights and uses
- Wild Horses, Burros and Livestock Issues
    - Physical habitat impacts within the Hickison Burro Herd Management Area
    - Physical barriers to livestock movement
- Native American Issues
    - Potential special significance of the hot springs and vicinity

2 Description of the Proposed Action and Alternatives

2.1 Proposed Action

The Proposed Action consists of BLM's approval of three noncompetitive geothermal lease applications covering a total of approximately 4,841 acres of public land (the "Proposed Action area") administered by the BLM which were submitted by Western Geothermal Partners, LLC of Reno, Nevada. The specific location of each of these lease applications is shown in Figure 3 and listed in Table 1.

Table 1: Geothermal Lease Application Serial Numbers and Legal Descriptions

Serial Number	Legal Description within Mount Diablo Baseline and Meridian
NVN-077778	Sections 1, 2, 11 and 12, Township 17 North, Range 45½ East
NVN-077779	Sections 11, 12 and 13, Township 17 North, Range 45 East
NVN-077780	Sections 14 and 24, Township 17 North, Range 45 East

The leases would grant the lessee the rights, and require the lessee to fulfill the responsibilities, briefly summarized in Section 1.3. The Proposed Action also assumes that the leases would be conditioned by the applicable and appropriate leasing stipulations presented in Appendix E of the Decision Record/FONSI for the Programmatic EA, which are reproduced in Appendix B of this Environmental Assessment, and that any operations subsequently proposed by the lessee under the geothermal lease and approved by the BLM would comply with the stipulations attached to the geothermal lease or leases; be conditioned by the application of BLM-BMFO standard mitigating measures in order to minimize adverse impacts to other resources; and comply with all applicable laws and regulations, including all regulations and Geothermal Resources Operational (GRO) Orders adopted under the Geothermal Steam Act. Appendix B of this Environmental Assessment contains the list of geothermal leasing and mitigation stipulations, and Appendix C the Standard Operating Procedures (SOPs), presented in the BLM-BMFO Programmatic EA as potentially applicable to geothermal lease operations and which, as applicable, will be assumed to be implemented as part of the Proposed Action.

2.2 Alternatives Considered But Eliminated From Detailed Analysis

NEPA requires the consideration and assessment of alternatives whenever there are unresolved conflicts involving alternative uses of available resources, although public controversy or concern about a proposed action does not necessarily mean that alternatives must be analyzed. As described in Section 1.5, a number of issues or concerns were identified during the public scoping for this EA. One alternative considered to resolve these issues or concerns was to issue leases on some portion of the requested lands but deny the applications and not issue leases on the other portions of the requested lands.

As described in Section 1.4, the Proposed Action conforms to the direction of the Shoshone-Eureka RMP, and is consistent with National Energy Policy, the Geothermal Steam Act of 1970 and the implementing geothermal leasing regulations, and the Federal Land Planning and Management Act of 1976. As noted in Section 2.1, the Proposed Action also includes the application and implementation of the leasing stipulations presented in Appendix B of this EA, and assumes that any operations subsequently proposed by the lessee under the geothermal lease and approved by the BLM would comply with all applicable laws and regulations, including all regulations and GRO Orders adopted under the Geothermal Steam Act, and be conditioned by the application of BLM-BMFO standard mitigating measures, as listed in Appendix C of this EA, in order to minimize adverse impacts to other resources.

Based upon a review of the identified issues and concerns and these stipulations, mitigation measures and regulatory requirements, no unresolved resource conflicts were identified with the Proposed Action. In addition, there was no site-specific information which would have supported excluding some of the requested lands from the leasing decision in order to respond to any of the issues or concerns. Therefore, the alternative of leasing only a portion of the requested lands was eliminated from detailed analysis and no alternatives to the Proposed Action, other than the "No Action" alternative, which is required to be analyzed under NEPA, are considered in this EA.

2.3 No Action Alternative

Under the No Action Alternative, BLM would reject the three lease applications and the three requested geothermal leases would not be issued. All other activities or uses of the lands would not be affected.

The No Action Alternative would be inconsistent with the intent of the Geothermal Steam Act, national energy policy, and Executive Order 13212, which states that agencies shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy. The No Action Alternative All other ace.n tih175de040pf.985

Floodplains: There are no floodplains within, or in the vicinity of, the Proposed Action area. No further assessment of the effects of the Proposed Action on floodplains is required.

Wild and Scenic Rivers: There are no wild or scenic rivers within, or in the vicinity of, the Proposed Action area. No further assessment of the effects of the Proposed Action on wild or scenic rivers is required.

Wilderness: There are no wilderness areas or wilderness study areas within, or in the vicinity of, the Proposed Action area. No further assessment of the effects of the Proposed Action on wilderness is required.

Forestry: There are no forested lands within the Proposed Action area. Public land administered by Toiyabe National Forest exists immediately east of the Proposed Action area, but those lands within the Toiyabe National Forest, immediately adjacent to the Proposed Action area, are not forested. No further assessment of the effects of the Proposed Action on forestry is required.

Land Use Authorizations: The Proposed Action will not have any demonstrable adverse effect on existing land use authorizations in the Proposed Action area and no further assessment of the effects of the Proposed Action on land use authorizations is required.

Playas: The Proposed Action area is located within the Big Smoky Valley basin, between the Toiyabe Range and the Toquima Range. There are no playas within the Proposed Action area, and the nearest playa in the Big Smoky Valley basin is Alkali Flat, located approximately 18 miles southwest of Spencer Hot Springs. The Proposed Action would not be expected to impact this playa, and no further assessment of the effects of the Proposed Action on playas is required.

3.3 Proposed Action

The affected environment and potential direct and indirect environmental consequences of the Proposed Action for those critical elements or other resources marked as "Yes" in the "Affected" column of Table 2 are discussed and analyzed in the sections below.

3.3.1 Air Quality

Affected Environment

The Proposed Action is located in a rural section of Nevada, many miles from any existing sources of significant air pollutant emissions. Both the federal and Nevada state governments have established ambient air quality standards (AAQSs) to protect public health and welfare. National AAQSs have been established for seven pollutants, known as "criteria" pollutants because the standards satisfy "criteria" specified in the federal Clean Air Act. These seven air pollutants are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than or equal to 10 microns in diameter (PM_{10}), particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) and lead (Pb). The State of Nevada has adopted these same standards, and has also established ambient air quality standards for hydrogen sulfide (H_2S). Air quality in the Project area has been designated as "attainment/unclassified" (which

means it either meets, or is assumed to meet, the applicable federal ambient air quality standards) for all standard ("criteria") air pollutants (USEPA 2004).

The Nevada Department of Conservation and Natural Resources (NDCNR), Division of Environmental Protection (NDEP), Bureau of Air Pollution Control (BAPC) has been delegated responsibility by both the federal Environmental Protection Agency (USEPA) and the State of Nevada to protect ambient air quality and regulate emissions of air pollutants in this area of the state. The Project area is not located in or adjacent to any Class I (most restrictive) Federal air quality area.

Although air quality in the Project area is generally assumed to be very good, periodic windstorms lift loose surface materials and elevate particulate matter (PM_{10} and $PM_{2.5}$) concentrations. Vehicles traveling on unpaved roads in the area which cross alkali soils can also generate substantial amounts of airborne particulate matter/dust.

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on air quality in the area, but could indirectly result in impacts to air quality from subsequent geothermal resource exploration and possible geothermal resource development and utilization.

Principal air pollutant emissions from geothermal exploration, development and utilization activities are from four types of sources (see Table 3).

Table 3: Principal Sources of Air Pollutants from Geothermal Operations

Type of Source	Examples
Stationary "Point" Sources	The air pollutant emissions from the combustion of diesel fuel in the drill rig engines, or the hydrogen sulfide emissions from well flow testing or [potentially] power plant operations
"Fugitive" Sources	Principally dust generated by vehicles moving on unpaved roads or by blowing wind
Mobile Combustion Sources	The "tailpipe" emissions from the construction equipment, delivery trucks, worker's vehicles, etc.
"Other" Sources	Vapor emissions from the storage of diesel fuel in storage tanks

Produced geothermal fluids may contain concentrations of noncondensable gases, principally carbon dioxide and much smaller concentrations of hydrogen sulfide (H_2S**)**, methane and other hydrocarbon gases. These noncondensable gases may be released to the atmosphere during well drilling and testing or during power plant operations if "flashed steam" technology is utilized (see Appendix A). However, the reasonable geothermal development scenario described in

Appendix A anticipates that binary power plant technology would be used for the moderate temperature geothermal resource believed to be available within the Proposed Action area, thus reducing the potential for emissions of H_2S during the utilization phase.

The prescriptive general stipulations to reduce the potential for adverse effects from geothermal leasing and exploration in the BLM Shoshone-Eureka Planning Area are provided as Appendix B to this EA, and include the following stipulations specific to air quality.

> ***The operator will implement at the direction of the Assistant Field Manager testing of emissions for H_2S and other noxious / deadly gases where there is indication that these gases may occur.***

Particulate matter/fugitive dust will be released as a result of site construction activities, vehicle travel on unpaved roads, and wind blowing across unprotected disturbed surfaces that could result from geothermal exploration and utilization activities.

The BLM-BMFO Standard Operating Procedures provided as Appendix C to this EA specifically address this aspect of air quality, as follows.

> ***1. The BLM requires roads, drill pads, and other disturbed surfaces to be watered for dust suppression as directed by the Assistant Field Manager.***

In addition, the lessee must comply with the requirements of GRO Order No. 4, which directs that lease operations shall not exceed applicable Federal or state ambient air quality standards, and that required permits shall be obtained by the lessee. Permits are typically required for any utilization activity which has the potential to emit substantial quantities of air pollutants. In addition, BAPC regulations require that no person may construct or use unpaved or untreated areas without first putting into effect an ongoing program using the best practical methods to prevent particulate matter from becoming airborne, including, but not limited to, paving, chemical stabilization, watering, phased construction and re-vegetation.

Based on the application and implementation of these measures which are part of the Proposed Action, the indirect impacts of the Proposed Action on air quality should be minimal.

3.3.2 Water Resources (Hydrology, Water Quality and Quantity)

Affected Environment

The Proposed Action area is located in the northeastern corner of the northern Big Smoky Valley, officially designated by the State Engineers Office of the Nevada Division of Water Resources as “Big Smoky Valley, Northern Part (Hydrographic Area 137B)” (Figure 4). The north-northeast trending basin extends about 70 miles from its southern boundary near Round Mountain in Nye County to its northern end near Austin, and encompasses more than 1,300 square miles (Handman and Kilroy 1997). The water resources of this hydrographic area are relatively undeveloped, with most of the water supply, and most of the water consumption, occurring on the western side of the valley where streams and springs flow from the Toiyabe

Range. Estimated water consumption for the entire hydrographic area in 1985 was 6,600 acre-feet, with all but a very small amount being consumed for agricultural crop irrigation, mining and livestock watering (very little is used for domestic purposes) (Handman and Kilroy 1997). However, during the same year certificated, permitted or applied for water rights within the hydrographic area totaled in excess of 170,000 acre-feet.

Because the permitted ground water rights in Hydrographic Area 137B approach or exceed the estimated average annual recharge of the area, and the water resources are either being depleted or require additional administration, the Nevada State Engineer, Division of Water Resources, Department of Conservation and Natural Resources, has designated Hydrographic Area 137B an "administered ground water basin." Designating a hydrographic area as an "administered ground water basin" provides the State Engineer with additional authority in the administration of the water resources within that ground water basin.

The quality of the ground waters in Hydrographic Area 137B is reported to be generally in the acceptable range for irrigation, livestock watering and domestic use, although the quality of thermal ground waters is typically poorer, as the higher water temperatures more readily dissolve minerals from the host rock (Handman and Kilroy 1997).

Surface water flows through the Proposed Action area and vicinity in intermittent and/or ephemeral stream channels which originate in the low mountains to the east and north (Figure 5). Because the elevation of the upland bedrock area to the east of the Proposed Action area is lower than the elevation of the rest of the upland areas within the hydrographic area, the Proposed Action area and vicinity is estimated to produce and infiltrate into the ground substantially less precipitation and runoff per acre than the rest of the hydrographic area (Handman and Kilroy 1997). Also, principally because of their intermittent nature, there are no known flow measurements or water quality analysis of these streams in or around the Proposed Action area and vicinity.

Few ground water wells, and only the springs of the Spencer Hot Springs complex, are known in the Proposed Action area or vicinity (Figure 5). Ground water elevations within the Proposed Action area and general vicinity have been reported by the U.S. Geological Survey (USGS) as relatively flat (and relatively stable over time) over a large area, varying little over the period of record. Reported ground water elevations include:

- About 5600 feet above mean sea level (AMSL) two miles south of Spencer Hot Springs (at well W02 on Figure 5);
- About 5615 feet AMSL two to three miles northeast of Spencer Hot Springs (at wells W10 ["Conquest Well" or "Burro Well"], W11 ["Pete's Well" or "Joe's Well"] and W12 on Figure 5); and
- About 5620 to 5630 feet AMSL both four to five miles north (at wells W17 and W21 on Figure 5) and four to five miles northwest (at wells W15 and W18 on Figure 5) of Spencer Hot Springs.

Water quality samples taken at two wells (wells W15 and W18 on) drilled by the USGS in the early 1980's for a water resource investigation of the northern Big Smoky Valley (Handman and Kilroy 1997) documented good quality water with specific conductance averaging about 430 microsiemens per centimeter [or about 280 parts per million (ppm) total dissolved solids (TDS)] (USGS 2004).

In contrast, water samples taken from several sources at Spencer Hot Springs document appreciably poorer (although still relatively good) quality water, with an average specific conductance of about 1,140 microsiemens per centimeter [or about 740 parts per million (ppm) total dissolved solids (TDS)]. Also, these water sources at Spencer Hot Springs are flowing from surface elevations of up to 5,740 feet AMSL, from 110 to as much as 140 feet higher than the water levels measured in the surrounding surface aquifer. There is substantial geologic and historic evidence (including the presence of a substantial travertine terrace deposited by hot waters flowing to the surface over a long period of time and maps of these flowing springs from early in the twentieth century) that natural spring flow occurred from several different vents in the Spencer Hot Springs area. However, most of the current flow appears to be issuing from old open wells, which may have been drilled in the 1940's to supply water for the operation of the nearby mines to the east.

This chemical and elevation information suggests that the source of the waters which flow from the Spencer Hot Springs springs/wells is a separate aquifer containing water of substantially different chemistry than the water in the surrounding surface aquifer. It has been postulated that the water discharging at Spencer Hot Springs may originate as precipitation in Monitor Valley, located to the east of Big Smoky Valley (Figure 2), which flows through, and is heated by, the intervening rocks of the Toquima Range (NBMG 2004). Because the elevation (pressure) of the aquifer source for the Spencer Hot Springs thermal waters is so much higher than the elevation of the water in the surrounding surface aquifer (from which all of the other wells are produced), it is also likely that the thermal aquifer interacts little, if at all, with the surface fresh water aquifer.

Information for water rights from springs and other underground water sources (wells) in the Proposed Action area and vicinity are listed in Appendix E. Many of these water rights listed in Appendix E have been cancelled, withdrawn, abrogated or denied, such that there are less than one dozen current water right certificate, permit or application holders within an area of approximately 135 square miles surrounding the Proposed Action area (Figure 5). Two water rights certificates, dating from 1952, have been issued to private owners, and in 1994 the BLM was issued a reserved water right, all for waters from the Spencer Hot Springs area springs and wells. A water right certificate for a stock watering application dating back to 1946 was granted for a spring located about one mile southeast of Spencer Hot Springs. All other recorded water rights are located more than three miles from the closest point of the Proposed Action area.

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on water resources in the area, but could indirectly result in impacts to water resources from subsequent geothermal resource exploration and possible geothermal resource development and utilization.

The principal public and agency concern expressed during the scoping process for this EA was the potential for any geothermal development and utilization to reduce the flow of water from the thermal springs or lower the ground water levels in non-thermal wells – indirect impacts of the leasing decision to springs and wells that support use by livestock, wild horses, burros and/or wildlife; recreational and spiritual uses; and water rights for agriculture and domestic uses.

Because of their chemical and elevation differences, the thermal waters flowing from the springs likely derive from a separate aquifer which is isolated from the shallow aquifer from which the fresh water wells produce. Thus, it is unlikely that development and utilization of the geothermal resources would draw down the water table that supports the existing and proposed shallow water wells.

By their very nature, geothermal fluid production and injection operations change the distribution of pressures in the developed geothermal reservoir. If the source of the thermal waters which flow from the Spencer Hot Springs is developed for a geothermal utilization project, it is possible that geothermal production and injection operations for that utilization project could alter the pressure in the thermal reservoir sufficiently to cause the flow of the Spencer Hot Springs to diminish or even cease. It is also possible that a separate, isolated aquifer may exist below the Proposed Action area which could be developed for a utilization project without altering the flow of the Spencer Hot Springs. Although insufficient information is currently available to know the exact nature of the geothermal reservoir(s) below Spencer Hot Springs, geothermal reservoir management techniques (such as altering geothermal production and inject well pressures, locations and depths) do exist and can be used to change the pressure distribution in a geothermal reservoir to modify or reverse adverse pressure changes detected by reservoir monitoring.

The prescriptive general stipulations to reduce the potential for adverse effects from geothermal leasing and exploration in the BLM Shoshone-Eureka Planning Area are provided as Appendix B to this EA, and include the following stipulations specific to water resources.

> ***All applicants for exploration permits will be required to submit a surface water inventory to the Assistant Field Manager before authorization may be granted. The inventory will include a map of appropriate scale (such as 1:24,000) indicating the location of all surface water on public land within ½ mile radius from the surface-disturbing activity.***
>
> ***At the commencement of surface disturbing activities for the drilling of exploration wells, the BLM will require that the drilling company monitor the water temperature and outflow of water from local springs and existing wells as directed by the Assistant Field Manager. If the temperature and / or outflow of the water from the spring or well were impacted to a degree determined by the Assistant Field Manager to be more than negligible, the BLM will require the operator to take corrective actions. Failure of the operator to take the corrective measures as directed will result in BLM terminating the operation.***

exploration activities are short-term and temporary, and should have no long-term effects on most species.

During geothermal utilization stage operations, additional roads, wells, and surface facilities are expected to be constructed. An additional 35 acres of existing habitat could be lost to geothermal development. Surface pipelines will be constructed to deliver geothermal fluid from and to wells which may be located as much as one mile from the power plant site. Fences may be constructed around the immediate power plant and well sites. The construction of these surface pipelines and fences could also prevent access to lands for foraging that were not directly disturbed by the construction of the geothermal facilities. These access limitations can typically be avoided by appropriate project planning, design and construction. However, the long-term operational disturbance from noise and other human activity may deter some species from using parts of the Proposed Action area during the life of the geothermal development.

Of specific concern, pronghorn antelope are known to occupy the Proposed Action area and vicinity year-round. Pronghorn have been observed foraging in the area near Spencer Hot Springs. Implementation of the following measure would minimize the potential for adverse effects from the construction of geothermal pipelines and fences on wildlife:

WLF-2: Fences and surface pipelines needed for geothermal operations shall be designed, located and constructed in a manner that will not prevent pronghorn antelope and other wildlife access to foraging habitat in undisturbed portions of the lease.

Based on the application and implementation of these measures, the indirect impacts of the Proposed Action on wildlife should be minimal.

3.3.5.5 Migratory Birds

Affected Environment

A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle. A variety of migratory birds exists across the Shoshone-Eureka Planning Area, including the Proposed Action area. The Migratory Bird Treaty Act (MBTA) (16 USC 703-712) protects bird species naturally occurring in the United States and makes it illegal for people to "take" migratory birds, their eggs, feathers or nests. Different accounts identify as many as 838 of 1,043 species of birds as being covered by the Act, with only about 175 bird species in the U.S. not protected by the MBTA or the Endangered Species Act (ESA) (Faanes *et al*, 1992).

Migratory water and shore birds depend upon the seasonal water that accumulates on playas due to impermeable clay layers. There are no playas within the Proposed Action area, but some migratory birds may forage, nest, or otherwise seasonally use habitat in the Proposed Action area. Migratory birds may also periodically utilize the small areas of surface water available at the Spencer Hot Springs group of springs and flowing wells.

The bald eagle (*Haliaeetus leucocephalus*) is believed to be a seasonal migrant through the Proposed Action area.

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on migratory birds in the Proposed Action area, but could indirectly result in impacts to migratory birds from subsequent geothermal resource exploration and possible geothermal resource development and utilization.

Migratory birds, including the bald eagle, may seasonally forage or otherwise use portions of the Proposed Action area. Geothermal exploration activities could remove about 11 acres of habitat and result in temporary and short-term disturbance that could deter migratory birds. Geothermal utilization stage operations could result in about 35 additional acres of habitat loss and longer-term disturbance and human activity.

The general stipulations to reduce the potential for adverse effects from geothermal leasing and exploration in the BLM Shoshone-Eureka Planning Area, as presented in the Programmatic EA, have been made part of the Proposed Action, and include the following stipulation specific to migratory birds:

> ***The BLM will limit the amount of ground clearing or other disturbance (such as the creation of cross-country access to drill sites) that an operator may do during the migratory bird nesting season. Areas to be disturbed shall be surveyed by personnel approved and supervised by BLM to determine the existence and location of any nests. If any nests are located, the nest will be avoided by ¼ mile. If the nest area cannot be avoided, BLM will develop site-specific mitigation.***

No additional measures to prevent indirect adverse effects on migratory birds from the issuance of the geothermal leases appear to be required.

3.3.6 Wild Horses and Burros

Affected Environment

With passage of the Wild Free-Roaming Horse and Burro Act of 1971 (Public Law 92-195), Congress found that "Wild free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West." The Act states that wild free-roaming horses are to be considered in the area where presently found as an integral part of the natural system of the public lands. The Secretary was ordered to "manage wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands." The procedures and policies implemented to accomplish this mandate have evolved over the years (BLM-BMFO, 2004).

Objectives of the Wild Free-Roaming Horse and Burro Act of 1971 (PL 92-195) are to preserve and protect wild horses and burros on public lands. Regulations adopted pursuant to the Act (43 CFR 4700 *et seq.*) state that Herd Management Areas (HMAs) shall be established for the maintenance of wild horse and burro herds. In delineating each HMA, the authorized officer

must consider the appropriate management level for the herd, the habitat requirements of the animals, and the relationships with other uses of the public and adjacent private lands. Management activities affecting wild horses and burros, including the establishment of HMAs, are to be in accordance with approved land use plans.

The objectives also include management of wild horses and burros as an integral part of the natural system of the public lands under the principle of multiple-use; protection of wild horses and burros from unauthorized capture, branding, harassment or death; and humane care and treatment of wild horses and burros.

Wild horses and burros are to be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat. Wild free-roaming horses and burros shall be managed in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands. Management activities affecting wild horses and burros are to be undertaken with the goal of maintaining free-roaming behavior.

The Proposed Action area is located within the boundaries of the BLM-BMFO Hickison Burro Herd Management Area (HMA). The Hickison HMA also includes the USFS Wild Burro Territory (WBT) located on the adjacent Toiyabe National Forest-administered lands to the east of the Proposed Action area. The BLM portion is approximately 70,000 acres in size, one of the smaller HMAs administered by the BLM-BMFO. Through a 1983 Memorandum of Understanding (MOU) with the USFS, the Toiyabe National Forest was designated as the lead agency for the combined HMA/WBT. The original acreages showed the USFS with more land area than BLM. However, current maps indicate the BLM administers more land area in the Hickison HMA/WBT.

The U.S. Highway 50 fence is a barrier that effectively prevents movement of the herd north-south across the highway. Currently, there are approximately 56 burros and 62 wild horses inhabiting the HMA. The horses inhabit the portion north of U.S Highway 50, and the burros (and one horse) inhabit the approximately 52,000-acre portion of the HMA south of U.S. Highway 50, which encompasses the Proposed Action area. This small burro population is the only one administered by the BLM-BMFO.

The habitat of the HMA is droughty, with sparse vegetation and few surface water resources (see Section 3.3.2). The burros currently have available to them three principal sources of water: “Joe’s Well,” “Burro Well,” and Spencer Hot Springs (see Figure 5). All three of these water sources are located within the same general area in relatively close proximity to each other; however, only Spencer Hot Springs is located within the Proposed Action area. “Burro Well” is located about 2 miles northeast of Spencer Hot Springs, and “Joe’s Well” is located about 4 miles northeast of the hot springs (about ¼-mile and 2 miles from the nearest proposed geothermal lease boundary, respectively). These later two water sources are located outside of BLM-administered lands, within the Toiyabe National Forest. The National Mustang Association (NMA), an organization that was established in 1965 for the purpose of preserving and perpetuating the survival of the wild and free roaming "mustang," has worked with BLM-BMFO in recent years to install a solar array and pump at each of these two wells to provide reliable water for the burros (and other wildlife) away from Spencer Hot Springs where human-burro

conflicts could occur with recreational users of the springs. The burros use the water from the hot springs throughout the year, and may be more dependent on the hot springs water during the winter when other water sources are frozen. Census flights undertaken in 1998 and 2002 and recorded sightings of the burros indicate that the majority of burro use occurs near these three existing water sources. A third solar-pumped well ("Pete Summit Well") is planned for development by the BLM-BMFO about 2 miles southeast of Spencer Hot Springs, in the same hydrographic basin.

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on wild horses and burros, but could indirectly result in impacts to wild horses and burros from subsequent geothermal resource exploration and possible geothermal resource development and utilization.

Geothermal exploration operations are temporary and short-term and would not be expected to have the ability to substantively affect the hot spring flow or ground water levels in the Proposed Action area or vicinity. Geothermal utilization stage activities, however, occur over the longer term and could have the potential to adversely affect the thermal water resources over a broader area. Adverse impacts could include a reduction or cessation of the spring flow at Spencer Hot Springs.

As discussed in Section 3.3.2 of this EA, the potential for any adverse effects on spring flow is low because of the adoption into the Proposed Action of stipulations designed to prevent, or correct, any reduction in the flow of the springs. Further, as also discussed in Section 3.3.2 of this EA, because the thermal waters flowing from the springs derive from an aquifer which is isolated from the shallow aquifer from which the water wells produce, there is very little potential for development and utilization of the geothermal resources to draw down the water table that supports the existing and proposed shallow water wells in the general area pumped to supply water for burros.

In addition, the general stipulations to reduce the potential for adverse effects from geothermal leasing and exploration in the BLM Shoshone-Eureka Planning Area from the Programmatic EA, reproduced as Appendix B to this EA, include the following stipulations specific to wild horses and burros.

> ***If operations cause a water source to become unavailable to wild horses* [or burros], *the Authorized Officer may require a new well to be drilled, or another water development to be constructed in the general area to provide adequate water for the wild horses* [or burros]. *If the lease area is within a HMA, the Assistant Field Manager may require additional stipulations for the protection of wild horses and burros, including seasonal restrictions or no surface occupancy.***

To further minimize the potential for adverse effects on wild horses and burros by the unavailability of water from an existing water source affected by geothermal activities and before a new well or another water development can be constructed in the general area, the following measure is provided:

WHB-1: If operations cause a water source to become unavailable to wild horses and burros, the Authorized Officer will require the lessee to haul or otherwise provide water for wild horses and burros until a new well is drilled or another water development source is constructed in the general area to provide adequate water for wild horses and burros.

Geothermal exploration activities, including drill site and access road construction and well drilling and testing, will introduce new intermittent sources of traffic, noise, surface disturbance and human activity to the Proposed Action area. Approximately 11 acres of forage may be lost as a result of direct surface disturbance during exploration activities. Geothermal exploration activities may also deter wild horses and burros from using the areas adjacent to the exploration activities. However, these exploration activities are short-term and temporary, and should have no long-term effects on wild horses and burros.

During geothermal utilization stage operations, additional roads, wells, and surface facilities are expected to be constructed. An additional 35 acres of existing habitat could be lost to geothermal development. Surface pipelines will be constructed to deliver geothermal fluid from and to wells which may be located as much as one mile from the power plant site. Fences may be constructed around the immediate power plant and well sites. The construction of these surface pipelines and fences could also prevent access to lands for foraging that were not directly disturbed by the construction of the geothermal facilities. These access limitations can typically be avoided by appropriate project planning, design and construction. However, it is not known how tolerant wild horses and burros will be of the long-term operational disturbance resulting from geothermal development and utilization activities. Implementation of the following measure would minimize the potential for restricting wild horse and burro access to forage by geothermal development facilities:

WHB-2: Fences and surface pipelines needed for geothermal operations shall be designed, located and constructed in a manner that will not prevent wild horses and burros access to undisturbed portions of the lease for foraging.

In addition, the following BLM-BMFO Standard Operating Procedure provided in Appendix C to this EA specifically addresses wild horses and burros, as follows.

6. Cattle guards, fences, and other range improvement facilities would be constructed as required by the Authorized Officer to mitigate impacts to livestock grazing and wild horses and burros.

Based on the application and implementation of these measures, the indirect impacts of the Proposed Action on wild horses and burros should be minimal.

3.3.7 Invasive Nonnative Species

Affected Environment

The Federal Noxious Weed Act of 1975 (7 USC 2801 *et seq*.), as amended by Sec. 15, Management of Undesirable Plants on Federal Lands, 1990, and the Carson-Foley Act of 1968 (PL 90-583), established a federal program to control the introduction and spread of foreign noxious weeds into the United States.

Invasive nonnative species invade heavily used or disturbed areas where vegetation has been removed (e.g., burned areas, cleared sites, off-road surface disturbance, etc.). These areas are prone to invasion by such species unless rehabilitation efforts are successful. Invasive weeds are spread by wind transport; heavy equipment (e.g., construction equipment, drill rigs, etc.); vehicles; livestock; wildlife; and contaminated seed, hay, or mulch. When invasive weeds occur along waterways or in washes, they can also be spread by water.

Some of the invasive nonnative species that exist in the flatland greasewood and shadscale type vegetation communities within the Proposed Action area include halogeton (*Halogeton glomeratus*), Russian thistle (*Salsola iberica*), and cheatgrass (*Bromus tectorum*). Other invasive plants and noxious weeds that are known to inhabit the surrounding vicinity include Musk thistle (*Carduus nutans*), Scotch thistle (*Onopordum acanthium*), Russian knapweed (*Acroptilon repens*), Hoary cress (*Cardaria draba*), and Salt cedar (*Tamarix ramosissima*).

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on the spread of invasive nonnative species, but could indirectly result in impacts due to the introduction or spread of invasive nonnative species from subsequent geothermal resource exploration and possible geothermal resource development and utilization activities.

Seeds of invasive nonnative species may be carried onto public lands by vehicles during geothermal exploration or utilization stage activities and become established. These weeds may spread to areas adjacent to disturbed areas. Invasive nonnative species may crowd out more desirable native vegetation, destroying livestock grazing lands and wildlife habitat. Areas disturbed by geothermal exploration and development activities may be prone to invasion and establishment of invasive nonnative species. Surface disturbance of about 11 acres during geothermal exploration and about 35 additional acres through geothermal utilization may facilitate the introduction of invasive nonnative species to the Proposed Action area.

The general stipulations to reduce the potential for adverse effects from geothermal leasing and exploration in the BLM Shoshone-Eureka Planning Area presented in the Programmatic EA include the following stipulation specific to invasive nonnative species:

> ***Areas to be involved in surface disturbing activities will be inventoried for the presence of invasive, nonnative species and treated if present. The exterior of all vehicles and heavy equipment shall be cleaned by water before entering public lands to do work. To minimize the possibility for contamination, a designated wash area will be designated by the BLM and shall be established and monitored by the operator in high use areas.***

The boots of operators and other person working in the areas shall be cleaned of seed before coming onto BLM lands. The BLM will develop and the operator shall implement a weed treatment program from the time operation commences until the site is abandoned. Seed and mulch used to reclaim disturbed areas shall be free of invasive nonnative species. Operators and workers shall avoid driving through or parking in areas where invasive nonnative species occur. When sites are abandoned, they will be inventoried for the presence of invasive nonnative species and treated if present.

See also the discussion on revegetation in Section 3.3.5.2. Based on the application and implementation of this measure, which is a part of the Proposed Action, the indirect impacts of the Proposed Action on the spread of noxious weeds should be minimal.

3.3.8 Allotment Management

Affected Environment

Livestock grazing (cattle, horses, and sheep) is a primary use of BLM lands in the Shoshone-Eureka Planning Area. Use levels are administered through the issuance of leases and permits. The Proposed Action area is split between two allotments by Pete's Summit Road, which is the boundary between the Simpson Park Allotment to the north and Kingston Allotment to the south. Approximately 81 percent of the Proposed Action area is located within the Simpson Park Allotment and the remaining 19 percent in the Kingston Allotment. Five permittees utilize the Simpson Park Allotment. All 5 permittees are authorized to utilize this portion the Simpson Park Allotment; however, historic use of this portion of the Simpson Park Allotment has been by Young Brothers and Howard Wolf. Two permittees utilize the Kingston Allotment, and both of the Kingston Allotment permittees utilize the area of the Proposed Action. The only livestock currently using the area of the Proposed Action are cattle.

The range vegetation within the Proposed Action area is within Shadscale (*Atriplex confertifolia*)-dominated sites. The primary grass to be disturbed, other than possibly riparian associated grasses associated with the runoff from the springs, would be Indian ricegrass (*Achnatherum hymenoides*) and bottlebrush squirreltail (*Elymus elymoides*). Shadscale, Indian ricegrass, and bottlebrush squirreltail are utilized by livestock during the spring, fall, and winter months. During the fall and winter months, shadscale defoliates, resulting in livestock licking up the leaves that have fallen to the ground. Once dessicated, Bottlebrush squirreltail is primarily utilized after the inflorescences have broken or blown off the plant in late summer, fall, and winter. An estimated 16 acres are required per animal unit month (AUM) for the Simpson Park Allotment and about 29 acres per AUM on the Kingston Allotment. Based on these estimates, the Proposed Action area supports approximately 245 AUMs in the Simpson Park Allotment, and about 32 AUMs in Kingston Allotment, for a total of about 277 AUMs of range overall.

Livestock water in the runoff from Spencer Hot Springs, and depend heavily upon springs and other surface water. Spencer Hot Springs provides the only permanent watering area for this portion of the Simpson Park Allotment. Currently, the portion of the Kingston Allotment that is within the Proposed Action area does not have any surface water developments. However,

Spencer Hot Springs is utilized as a watering area during the overlapping season of use for both the Kingston and Simpson Park Allotments.

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on allotment management, but could indirectly result in impacts on allotment management from subsequent geothermal resource exploration and possible geothermal resource development and utilization.

Geothermal exploration operations are temporary and short-term and would not be expected to have the ability to substantively affect the hot spring flow or ground water levels in the Proposed Action area or vicinity. Geothermal utilization stage activities, however, occur over the longer term and could have the potential to adversely affect the thermal water resources over a broader area. Adverse impacts could include a reduction or cessation of the spring flow at Spencer Hot Springs.

As discussed in Section 3.3.2 of this EA, the potential for any adverse effects on spring flow is low because of the adoption into the Proposed Action of stipulations designed to prevent, or correct, any reduction in the flow of the springs. Further, as also discussed in Section 3.3.2 of this EA, because the thermal waters flowing from the springs derive from an aquifer which is isolated from the shallow aquifer from which the water wells produce, there is very little potential for development and utilization of the geothermal resources to draw down the water table that supports the existing and proposed shallow water wells in the general area pumped to supply water for burros and wildlife but which also provide water for livestock.

In addition, the general stipulations to reduce the potential for adverse effects from geothermal leasing and exploration in the BLM Shoshone-Eureka Planning Area from the Programmatic EA, reproduced as Appendix B to this EA, include the following stipulations specific to allotment management.

> ***If operations cause a water source to become unavailable to livestock, the Authorized Officer will require a new well to be drilled, or another water development to be constructed in the general area to provide adequate water for livestock. If the lease area is within an allotment, the Assistant Field Manager may require additional measures, including seasonal restrictions or no surface occupancy.***

To further minimize the potential for adverse effects on livestock by the unavailability of water from an existing water source affected by geothermal activities and before a new well or another water development can be constructed in the general area, the following measure is provided:

ALL-1: If operations cause a water source to become unavailable to livestock, the Authorized Officer will require the lessee to haul or otherwise provide water for livestock until a new well is drilled or another water development source is constructed in the general area to provide adequate water for livestock.

A projected total of about 46 acres of surface could be disturbed within the Proposed Action area during geothermal exploration and utilization. Each of the allotments could be affected by geothermal activities to varying degrees, but assuming the estimated 46 acres of surface disturbance would occur in the higher range-value Simpson Park Allotment, then approximately 3 AUMs could be lost as an indirect result of the issuance of the geothermal leases. The construction of surface pipelines and fences could also prevent access to lands for grazing that were not directly disturbed by the construction of the geothermal facilities. These access limitations can typically be avoided by appropriate project planning, design and construction. Implementation of the following measure would minimize the potential for restricting livestock access to forage by geothermal development facilities:

ALL-2: Fences and surface pipeline needed for geothermal operations must be constructed in a manner that will not prevent livestock access to undisturbed portions of the lease for grazing.

In addition, the BLM-BMFO Standard Operating Procedures provided as Appendix C to this EA specifically address livestock grazing, as follows.

6. Cattle guards, fences, and other range improvement facilities would be constructed as required by the Authorized Officer to mitigate impacts to livestock grazing and wild horses and burros.

Based on the application and implementation of these measures, the indirect impacts of the Proposed Action on livestock should be minimal.

3.3.9 Visual Resources

Affected Environment

The overall objective of visual resource management is to manage public lands in a manner that will protect the quality of the visual (scenic) values in accordance with Section 102(a)(8) of the Federal Land Policy and Management Act of 1976 (FLPMA). The BLM Visual Resource Management (VRM) system is a methodical approach to inventory and managing the scenic resources of the public lands.

The entire Proposed Action area is currently managed under the BLM VRM objectives for a Class IV Management Area. In this VRM class, BLM management objectives allow for major modifications of the character of the landscape, specifically:

> Class IV Management Objectives: *To provide for management activities that require major modification of the existing character of the landscape. The level of change to characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic landscape elements* (BLM Manual Section H-8410-1, Visual Resource Inventory).

There is limited existing development within the Proposed Action area, but evidence of human intrusion is visually apparent. A 230-kV electrical transmission line follows a northeast to southwest alignment through the western edge of the Proposed Action area (BLM, 1980) (see Figure 3). The transmission line is visually evident from almost everywhere in the Proposed Action area. Unpaved dirt roads are also visually evident in the Proposed Action area and vicinity, and fugitive dust plumes from vehicle travel on the unpaved roads are readily visible. Remnants of former mining activities are also apparent within and just outside of the eastern edge of the Proposed Action area. The Proposed Action area would be considered to be in the middleground-background distance zone with respect to views from U.S. Highway 50 and State Route 376.

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on visual resources, but could indirectly result in impacts to visual resources from subsequent geothermal resource exploration and possible geothermal resource development and utilization.

The general stipulations to reduce the potential for adverse effects from geothermal leasing and exploration in the BLM Shoshone-Eureka Planning Area, as reproduced from the Decision Record in Appendix B to this EA, contain no stipulations specific to visual resources. However, the BLM-BMFO Standard Operating Procedures provided as Appendix C to this EA specifically address visual resources, as follows.

> ***8. A visual contrast rating worksheet is prepared by the BLM for each drill site and proposed road construction. Ridges and skylines are avoided.***

During geothermal exploration activities, vehicle travel to and through the Proposed Action area would be visible, particularly with respect to dust from vehicles traveling on unpaved roads. Up to six, 0.1-acre temperature gradient hole pads; three, 0.5-acre temperature observation hole pads; three, 1.5-acre well sites; and up to three miles of new access road could be constructed, disturbing a combined total of about 11 acres of currently undisturbed land that would be visible from elevated locations. During drilling activities the mast of the drill rig may extend to 170 feet above ground level, and would be visible for long distances across the alluvial flats of the Proposed Action area and vicinity. Drilling continues 24-hours per day, 7-days per week, and lights on the drill rig required for safety would increase the visibility of the geothermal exploration operations during the night. Water vapor (“steam”) plumes from the wells may also be visible during well clean out and flow testing operations. However, geothermal well drilling and testing activities are relatively short-term and temporary and, after site reclamation, would have no long-term adverse effect on the visual resources in the Proposed Action area and vicinity.

During the geothermal utilization stage, the reasonable geothermal development scenario anticipates the construction of a geothermal power plant or direct use facility, additional roads, additional wells, and ancillary facilities somewhere within the Proposed Action area which would disturb an additional 35 acres of previously undisturbed land. Constructed facilities could be as tall as 40 feet. Construction of a short (2-mile long) transmission line from the power plant

to the nearest point on the existing transmission line that could transfer the generated electricity to the power grid is also assumed. Given the sparse vegetation and relatively flat terrain in most of the Proposed Action area, the power plant or direct use facilities would be visible for long distances from elevated locations.

There are no residences located in the vicinity of the Proposed Action area to view the constructed facilities. The potentially sensitive receptors which may be located nearest to the utilization facilities would likely be recreational users of the *ad hoc* bathing facilities located at Spencer Hot Springs, followed by travelers on U.S. Highway 50 (although these could be no closer than about three miles away). The visual impact of a geothermal power plant or direct utilization facility, as viewed from the Spencer Hot Springs or U.S. Highway 50, would largely depend on the distance of the viewer from the facilities and the backdrop against which the facilities would be viewed. A substantial visual impact on recreational users of the hot springs could occur if the power plant or direct use facility was constructed close or immediately adjacent to the hot springs, with diminishing adverse effects the further from the springs the facilities were located. However, because of the flat terrain and relatively small size of the Proposed Action area, it is unlikely that a geothermal power plant or direct use facility could be located anywhere within the Proposed Action area that would completely eliminate adverse visual effects on recreational users of the hot springs. However, none of these potential indirect visual impacts resulting from the issuance of the geothermal leases would conflict with the current BLM visual management objectives for the Proposed Action area and vicinity.

3.3.10 Recreation

Affected Environment

The Proposed Action area and vicinity are currently utilized for dispersed recreational activities (i.e., sightseeing, camping, rock hounding, hunting, etc.). The nearest developed recreation sites, both located on Forest Service-administered lands, are Toquima Cave (located approximately 12 miles southeast of the Proposed Action area) and Hickison Petroglyph Recreation Site (located approximately 11 miles northeast of the Proposed Action area).

Spencer Hot Springs is located approximately 7 miles southeast of the junction of U.S. Highway 50 and State Route 376, with access via the unpaved "Pete's Summit Road" (see Figure 2). BLM does not officially recognize Spencer Hot Springs, located within the southeast corner of the Proposed Action area, as a recreation site and discourages recreational use of the hot springs themselves. However, both local and visiting hot springs recreational enthusiasts are known to be drawn to the area to bathe in the hot springs pools and use the limited *ad hoc* facilities that have been constructed at the hot springs (Personal Communication – Jim Kielhack, Community of Kingston; July 20, 2004).

Local members of the public are currently working with Lander County in an attempt to seek the issuance of a "Recreation or Public Purposes" (RPP) lease from BLM-BMFO for the hot springs area (Personal Communication – Ray William, Discover Central Nevada; July 20, 2004). The potential cumulative effects which could result from the issuance of the proposed geothermal leases and the issuance of an RPP lease at Spencer Hot Springs are evaluated in Section 3.5.

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on recreation, but could indirectly result in impacts to recreation from subsequent geothermal resource exploration and possible geothermal resource development and utilization.

During geothermal exploration operations, various activities could occur that may adversely affect recreational users of the Proposed Action area. These geothermal lease exploration activities would include access road construction or improvement, drill site construction, and drilling operations at selected temperature gradient hole, observation well, and deep well sites within the Proposed Action area. Up to 11 acres of surface disturbance would occur. Adverse impacts from dust generated by vehicles traveling on unpaved roads, drill site construction, visibility of exploration equipment and activities, and noise could diminish the quality of the experience of the recreational users of the Proposed Action area. However, the adverse effects of these geothermal exploration operations would be short-term and temporary.

If geothermal exploration activities discovered promising geothermal resources, then geothermal utilization stage activities could occur. Additional access roads, well sites and power plant or direct-use facilities could be constructed, creating an estimated additional 35 acres of new surface disturbance. Well drilling activities lasting several weeks or months per well would include the use of larger drilling rigs with masts heights of up to 170 feet above the land surface that would be visible for long distances. Development facilities up to 40 feet in height could be constructed; and operational noises, traffic and visual intrusions would be generated continuously 24 hours per day, 7 days per week, over the 30-year or longer life of the geothermal development. The location of the utilization facilities could be almost anywhere within the Proposed Action area. Similar to geothermal exploration, adverse impacts from traffic-generated dust, utilization facility visibility, and operational noise could adversely affect recreational users in the area.

The potential impacts from dust or particulate matter (PM_{10} and $PM_{2.5}$) generated from vehicle travel on unpaved roads and construction is discussed in Section 3.3.1. Similarly, the potential impacts of geothermal exploration and development on visual resources is discussed in Section 3.3.9.

Noise is most often measured in decibels (dB), units that measure the apparent loudness of sound. Because the human ear is more sensitive to some sound frequencies than others, sound measured by a noise meter is typically adjusted so that it approximates what would be heard by the human ear. Units of noise measurement recorded by such an adjusted noise meter are termed "A-weighted decibels" (dBA). Because noise levels in the environment fluctuate with time, a time-averaged noise level in dBA (Leq) is often used to characterize the noise environment at a given location.[3]

[3] Time-varying sound levels are often described in terms of an equivalent constant decibel level. Equivalent sound levels (Leq) are used to develop single-value descriptions of average sound exposure over various periods of time. Such average sound exposure values often include additional weighting factors for annoyance-potential attributable to time of day or other considerations. The Leq data used for these average sound exposure descriptors are generally based on A-weighted sound-level measurements.

The typical noise level of a conversation is about 60 dBA at 3 feet from the speaker. Background sound levels in representative rural areas range from about 40-45 dBA. Baseline sound levels have not been measured in the Proposed Action area, but sound/noise levels are presumed to be typical of representative rural areas.

GRO Order No. 4, General Environmental Protection Requirements, requires geothermal lessees to comply with federal occupational noise exposure levels or state standards for the protection of personnel, whichever are the more restrictive. Further, GRO Order No. 4 requires that the federal geothermal lessee shall "not exceed a noise level of 65 dBA for all geothermal-related activity including, but not limited to, exploration, development, or production operations, as measured at the lease boundary line or 0.8 km (one-half mile) from the source, whichever is greater."

The loudest typical source of continuous noise from a binary geothermal power plant is from the turbine generator unit(s). There are many variations in turbine-generator construction and noise shielding opportunities, but an unshielded turbine generator capable of producing 20 MW of electrical energy could be expected to produce noise levels of about 75 dBA at 100 feet from the source.[4] Conservatively assuming a 6 dB attenuation of sound with every doubling of distance, then the operating noise level from a 20 MW binary power plant could reach background sound levels (about 45 dBA) within about 3,200 feet (0.6 miles) of the source. At that distance noise levels from an operating geothermal power plant would not typically be discernable above background sound levels. Noise shielding and different generation technologies may reduce the sound level at the source, decreasing the resulting noise levels at the receptor(s). The following measure would substantially mitigate the potential adverse effects of noise from geothermal development on recreational users of the Spencer Hot Springs area that could occur as an indirect result of the issuance of the geothermal leases:

REC-1: Normal operational noise levels generated by geothermal utilization facilities should not exceed a 24-hour time-weighted average of 45 dBA when measured from a representative location at Spencer Hot Springs.

3.3.11 Socioeconomics

Affected Environment

There are no developed facilities and no residents in the Proposed Action area. A kind of *ad hoc* recreational development exists at Spencer Hot Springs that is not formally recognized nor authorized by the BLM. Hot springs recreational enthusiasts are reported to travel from long distances to visit Spencer Hot Springs and bathe in the springs (see Section 3.3.10). There are no official counts of these visitors, but they are reported to make purchases in the area and are viewed as important contributors to the local economy.

Environmental Consequences

The issuance of geothermal leases would result in small increases in revenue to the U.S. Treasury for lease rentals. If development and utilization should occur, additional revenue would

[4] Based on actual measurements of an operating, air-cooled (typically louder than water-cooled), 20 MW binary geothermal power plant operating near Mammoth Lakes, California (Unpublished report EDAW, Inc., 2002).

be generated for the U.S. Treasury in the form of royalties. One-half of this income is returned to the State of origin. No specific lease or royalty income is paid to Lander County or the local communities, but *ad valorem* taxes are typically generated for the host County as a result of the construction of the land improvements/geothermal utilization project.

Substantial secondary purchases of goods and services from the community by workers would likely occur during exploration, construction and operation. In addition, temporary and long-term, moderate to well-paying jobs would be created should geothermal exploration and utilization project construction and operation occur. If a 20 MW binary power plant is developed, 10-12 or more long-term skilled jobs may be generated. The number of job opportunities that could result from a direct-use project would be largely determined by the kind of project developed, but a larger number of less-skilled job opportunities would be likely. These economic benefits may be partially offset by a reduction in local purchases by hot springs recreational users if geothermal activities reduce their numbers.

No significant demands on local community services should result during the temporary and short-term geothermal exploration activities, but a small increased demand for community services in the form of police and fire protection, schools and related services could result if long-term geothermal development should occur.

3.3.12 Wastes

3.3.12.1 Solid Wastes

Affected Environment

There is no existing development within the Proposed Action area, and only small quantities of trash, which are collected in barrels and removed for off-site disposal on an *ad hoc* basis, are currently being generated by the recreational users in the Proposed Action area. The community nearest to the Proposed Action area is Kingston (see Figure 2). That community currently operates a solid waste transfer station and has their solid waste transported to a landfill operating near the community of Austin. However, the Austin landfill is scheduled to close in the near future and both communities will be operating solid waste transfer stations. Solid wastes from the region will then be transported to an existing landfill near Battle Mountain (Personal Communication – Briese Bernley, SRK, August 29, 2004).

Environmental Consequences

The issuance of geothermal leases will not have a direct impact on the generation of solid wastes, but could indirectly result in solid wastes being generated from subsequent geothermal resource exploration and possible geothermal resource development and utilization activities.

Small quantities of solid wastes are generated during all phases of geothermal exploration and development. During exploration operations solid wastes, in the form of paper products and some garbage, are typically collected and accumulated in a roll-off bin brought to the site by a waste contractor. These wastes are then removed to an offsite disposal facility at the end of drilling operations. Drilling mud is circulated into the hole during drilling to lift cuttings to the

surface and cool the drill bit. That portion of the drilling mud which cannot be re-circulated, and the rock cuttings, are discharged into, and temporarily stored, in an earthen sump on the drill site. The sump contents are typically allowed to dry, then are sampled and analyzed at the end of operations. These wastes, which are typically inert, are usually buried in the sump on the site if testing demonstrates that they are non-hazardous. Similarly, sanitary wastes are contained in portable toilets that are maintained during on-site activities and removed from the site at the end of operations by a waste contractor.

Geothermal development operations also generate small quantities of solid wastes that typically are temporarily stored on site in roll-off bins and periodically removed offsite by a waste contractor. However, permanent sanitary facilities, in the form of toilet and septic systems, are typically installed at utilization sites.

The relatively small volume of solid wastes generated during geothermal exploration or utilization would not be expected to result in a substantive increase to the existing solid waste generated by the local communities.

3.3.12.2 Hazardous Wastes

Affected Environment

This section briefly describes the regulations pertaining to hazardous materials and the setting in the region of influence for the Proposed Action. For the purpose of analyzing environmental impacts from the Proposed Action, hazardous materials on geothermal leases, adjacent to geothermal leases, or associated with geothermal leases are addressed in this section and are described below.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides a federal fund to clean up uncontrolled or abandoned hazardous waste sites and certain other releases of pollutants and contaminants into the environment. Section 120(h) of CERCLA requires that property contaminated by the federal government be restored before being conveyed outside the federal government (USEPA 2002).

The Resource Conservation and Recovery Act (RCRA) gave EPA the authority to regulate hazardous waste from when it was created to its disposal, including the generation, transportation, treatment, storage, and disposal of hazardous waste. Drilling fluids, produced water, and other wastes associated with the exploration, development, or production of crude oil, natural gas, or geothermal energy are exempt from RCRA Subtitle C (USEPA 1993).

Environmental Consequences

The Proposed Action area is undeveloped and no hazardous materials are suspected to be present within or adjacent to the Proposed Action area. There is no evidence to indicate that any hazardous material was stored or disposed of or released within or adjacent to the Proposed Action area. As such, the issuance of the geothermal leases will not result in any direct hazardous waste-related impacts. However, the issuance of geothermal leases could indirectly result in

hazardous waste-related impacts from subsequent geothermal resource exploration and possible geothermal resource development and utilization activities.

During geothermal exploration activities hazardous substances that may be used on site could include bulk quantities of diesel fuel and lesser amounts of oils and other lubricants. No hazardous drilling mud additives are typically used during the drilling of geothermal monitoring or test holes or exploration wells.

During geothermal development operations larger quantities of bulk fuels and the working fluids used by binary power plants would typically be stored in above-ground storage tanks and used on-site. Drum-size and smaller quantities of oils, lubricants, paints, treatment chemicals and cleaning supplies are also typically used and stored on-site. Waste oil is routinely generated from equipment maintenance operations. In some geothermal development projects, scale can build up within pipelines and other equipment that is in direct contact with the geothermal fluid. Depending on the chemical characteristics of the scale, small quantities of hazardous waste may be generated during periodic cleanouts or replacements of pipelines and other equipment.

Compared to power plant development projects, direct-use geothermal projects would typically use and store smaller quantities of hazardous materials on-site, and would typically require less frequent geothermal-related maintenance activities that could result in the generation of petroleum hydrocarbon or hazardous wastes.

For all geothermal operations, unintended leaks and small spills or releases of petroleum hydrocarbons or other materials stored on geothermal operations sites could occur. Significant spills are rare and almost all spills or releases are restricted to the immediate area of the source of the spill. Subsequent approvals of geothermal exploration and development operations typically require on-site containment in areas where petroleum hydrocarbons and hazardous materials are stored.

As discussed above, geothermal exploration and development activities typically use small to moderate quantities of hazardous materials that are stored on-site. Spills or accidental releases of these substances could be an indirect effect of the issuance of the proposed geothermal leases. However, any geothermal exploration or development projects that may be proposed under the leases will be required to meet applicable petroleum hydrocarbon and hazardous substance handling laws and regulations.

3.4 No Action Alternative

Under the No Action Alternative, the geothermal leases would not be issued and no direct or indirect impacts to any of the critical elements or other resources identified in Table 2 would occur within the Proposed Action area or vicinity. However, potentially adverse indirect impacts could occur in other locations if alternative sources of electrical energy or heat for industrial or commercial processes were developed instead of the geothermal resources which may be found at in the Proposed Action area. Geothermal energy is one of cleanest energy forms available – for example, geothermal power plants generate far fewer air pollutants than either natural

gas-fired or coal-fired power plants. Denial of these leases could indirectly result in energy developments with greater air pollutant impacts in some other location.

3.5 Cumulative Impacts

Analysis of cumulative impacts is required by the CEQ regulations implementing NEPA. These regulations, at 40 CFR1508.7, state:

> *Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

3.5.1 Existing, Proposed, and Reasonably Foreseeable Actions

There are two principal ongoing federal agency management activities occurring in the Proposed Action area and vicinity. These include activities associated with the wild horse and burro herd management and livestock allotment management programs. BLM internal evaluations used to assess livestock management practices, grazing systems, and wild horse and burro populations indicate that these programs are meeting BMFO management and allotment specific objectives. However, each of these management activities has the potential to adversely affect other resources in the area, including soils, vegetation, wildlife, invasive nonnative species, and water resources. Each of these management programs also has the potential to conflict with other uses of resources in the area, such as recreational use of the hot springs. The effects of the Proposed Action on the ongoing allotment and herd management program activities are discussed in Sections 3.3.6 and 3.3.8, respectively.

One new potential action is being proposed in the vicinity of the Proposed Action area – that being the leasing of an area around Spencer Hot Springs to Lander County for public recreational-use through a USDI, BLM "Recreation or Public Purposes" Lease (RPP Lease). Precedent for the issuance of such an RPP Lease exists, as Esmeralda County was recently issued such a lease for an approximately 20-acre area around a hot water well and pool in Fish Lake Valley. The Spencer Hot Springs recreational-use project is in the early stages of planning and a private entity, *Central Nevada Outdoors*, has requested funding from Lander County to initiate a feasibility study for the lease acquisition (Personal Communication – Ray Williams, Jr., Greater Austin Chamber of Commerce; July 23, 2004). No project description has been released for the proposed recreational-use lease, but it is assumed for this cumulative assessment that the lease would be for an approximately 40-acre area encompassing the Spencer Hot Springs pools and hot springs that includes the existing *ad hoc* facilities currently being used by the public.

There is also the potential that additional non-competitive applications could be submitted for geothermal leases on public lands administered by either the BLM or USFS in the vicinity of the Proposed Action area. At this time there is insufficient information available about the potential for, or potential location of, any additional geothermal lease applications to include this "project" in the cumulative impact assessment. However, to the extent that applications are submitted for

lands with substantially the same environmental setting as the Proposed Action area, then this EA could be used in part to analyze the potential effects of this subsequent leasing decision.

3.5.2 Direct Cumulative Impacts of the Proposed Action

There are no known cumulative impacts that will occur as a direct result of the issuance of the proposed geothermal leases. However, it is reasonable to assume that the issuance of the geothermal leases could result in indirect cumulative impacts from subsequent geothermal exploration and development operations in the lease area (see Section 3.5.3).

3.5.3 Cumulative Impacts Based on Potential Development Scenarios

3.5.3.1 Cumulative Effects During Geothermal Exploration

Geothermal exploration operations have the potential to result in about 11 acres of surface disturbance and the associated loss of vegetation in the area of disturbance. Eleven acres would be equivalent to approximately 0.8 AUM of forage that could be available for the wildlife, livestock and wild horses and burros that compete for forage vegetation in the area. The recreational-use of the Spencer Hot Springs area and construction of additional recreational facilities at the hot springs which could occur if the RPP Lease were issued could result in some indeterminate additional loss of vegetation and forage. If the hot springs recreational facilities are fenced, then about 40 acres of vegetation (about 2.8 AUM) would be made unavailable for forage. Additional pressure on the regeneration of the native vegetation in the area would occur and the potential for invasive nonnative species would increase in the affected areas.

Large quantities of geothermal fluid are not produced during exploration activities and no impact on existing water resources would be expected from geothermal exploration activities. No effect on the surface flow of the hot springs or solar-pumped wells in the area would occur. Increased recreational-use of Spencer Hot Springs could diminish the availability of the surface water to wildlife, livestock and wild horses and burros. If the hot springs recreational facilities developed under an RPP Lease are fenced, the surface water could become unavailable as a watering source which would adversely impact the wildlife and wild horses and burros dependent on the water, and another source of water would likely be needed for livestock grazing in the area.

The combined physical presence and disturbance associated with geothermal exploration operations and increased recreational-use of the hot springs under the RPP Lease could deter wildlife and wild horses and burros from using the area around Spencer Hot Springs. This could put added pressure on adjacent areas and could limit the populations of affected species.

Geothermal exploration activities are short-term and temporary. If subsequent geothermal utilization stage activities do not occur, then exploration holes and wells would be abandoned in conformance with BLM requirements, site reclamation of disturbed surfaces would be required, and no further cumulative effects associated with geothermal exploration would occur.

3.5.3.2 Cumulative Effects During Geothermal Utilization

Geothermal utilization stage operations have the potential to result in about 35 additional acres of surface disturbance. Typically the areas affected during geothermal exploration operations continue to be used during development operations, such that a total of about 46 acres could continue to be dedicated to geothermal activities during geothermal utilization. Forty-six acres is equivalent to about 3.3 AUM of forage in the Simpson Park Allotment area and, when combined with the about 2.8 AUM of forage that could be made unavailable as a result of increased recreational-use and fencing of the hot springs under an RPP Lease, then a cumulative 6.1 AUM of forage could be lost to wildlife, livestock and wild horses and burros. As described for geothermal exploration operations, additional pressure on the regeneration of the native vegetation in the area would occur and the potential for invasive nonnative species could increase in the affected areas.

Large quantities of geothermal fluid could be produced and injected during geothermal utilization activities. However, the cumulative impact on existing water resources from geothermal utilization activities would not differ from those described for the Proposed Action, as no substantive additional sources of water consumption or water quality impact would occur from the existing, proposed or reasonably foreseeable actions in the Proposed Action area. No cumulative effect on the surface flow of Spencer Hot Springs or the solar-pumped wells in the area would occur. Increased recreational-use of Spencer Hot Springs under the RPP Lease could diminish the availability of the surface water to wildlife, livestock and wild horses and burros. If the hot springs recreational facilities are fenced under the RPP Lease, the surface water could become unavailable as a watering source, which would adversely impact the wildlife and wild horses and burros dependent on the water, and require that another source of water be developed for livestock grazing in the area. However, these impacts on water resources would be independent of the geothermal utilization anticipated by the reasonable geothermal development scenario.

The combined physical presence and disturbance associated with long-term geothermal utilization operations and increased recreational-use of the hot springs under the RPP Lease could deter wildlife and wild horses and burros from using the area. In particular, the construction of surface pipelines and fences around the vicinity of the hot springs, well sites and power plant site or direct-use site could limit access to parts of the geothermal lease area. This would put added pressure on adjacent areas and could limit the populations of affected species. However, the BLM-BMFO Standard Operating Procedures provided as Appendix C to this EA specifically address livestock grazing and wild horses and burros, as follows:

6. ***Cattle guards, fences, and other range improvement facilities would be constructed as required by the Authorized Officer to mitigate impacts to livestock grazing and wild horses and burros.***

A comparable constraint could also be applied to a RPP Lease of the Spencer Hot Springs area. Similarly, the following measure to minimize the potential for restricting wildlife, livestock, and wild horse and burro access to forage from geothermal development facilities could also be applied to the RPP Lease:

Fences and surface pipeline needed for geothermal operations must be constructed in a manner that will not prevent wildlife, livestock, or wild horses and burros access to undisturbed portions of the lease for grazing.

These measures would minimize the potential cumulative adverse effects from the physical presence and disturbance of the existing, proposed, and reasonably foreseeable actions on wildlife, livestock, and wild horses and burros.

Geothermal utilization developments are typically projected to last about 30 years. At the end of operations, the facilities would be dismantled, wells would be abandoned in conformance with BLM requirements, and site reclamation of disturbed surfaces would be required. No further cumulative effects associated with geothermal utilization would occur. The recreational-use activities at Spencer Hot Springs would be expected to continue under the RPP Lease after the geothermal utilization activities have concluded.

4 Consultation and Coordination

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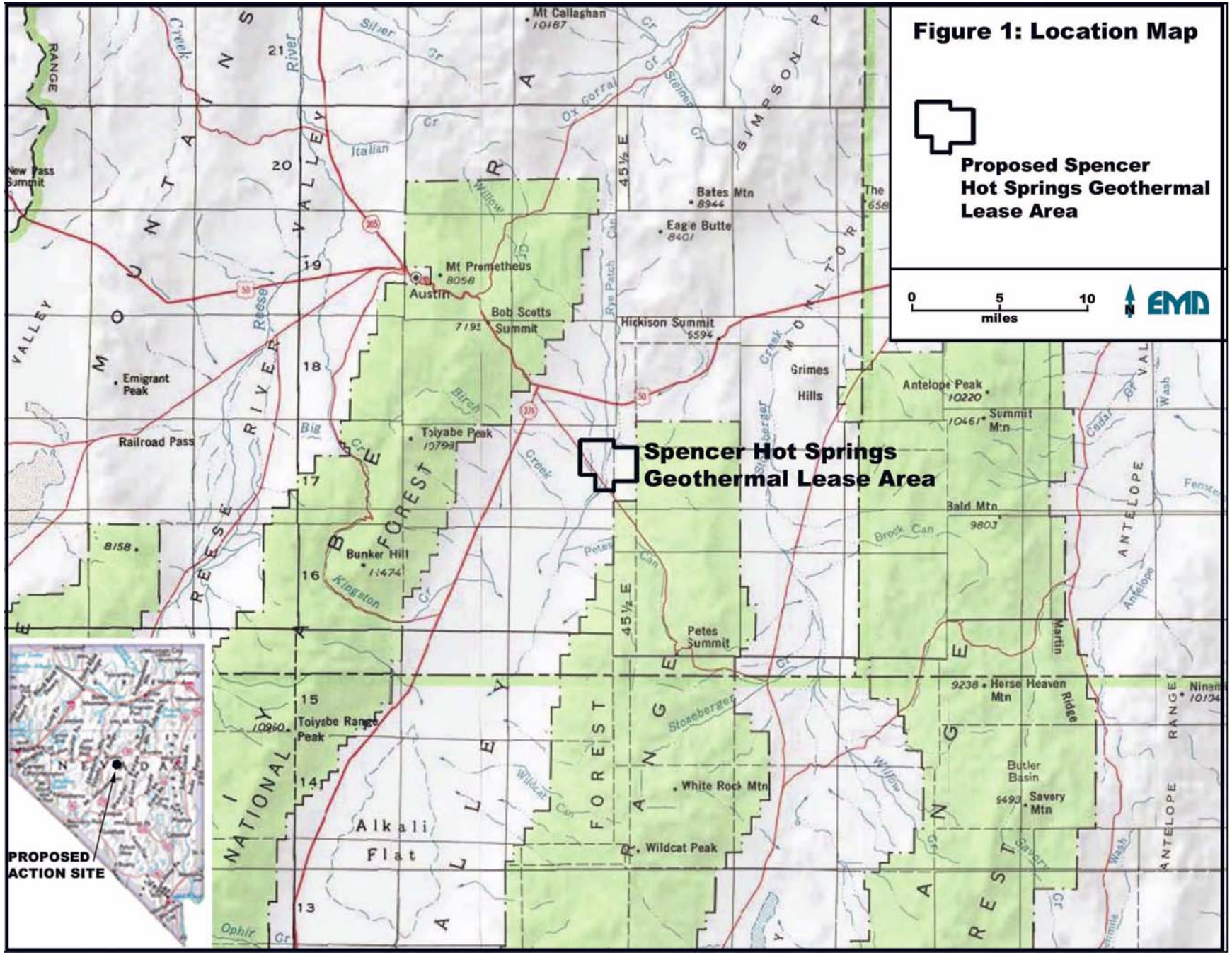

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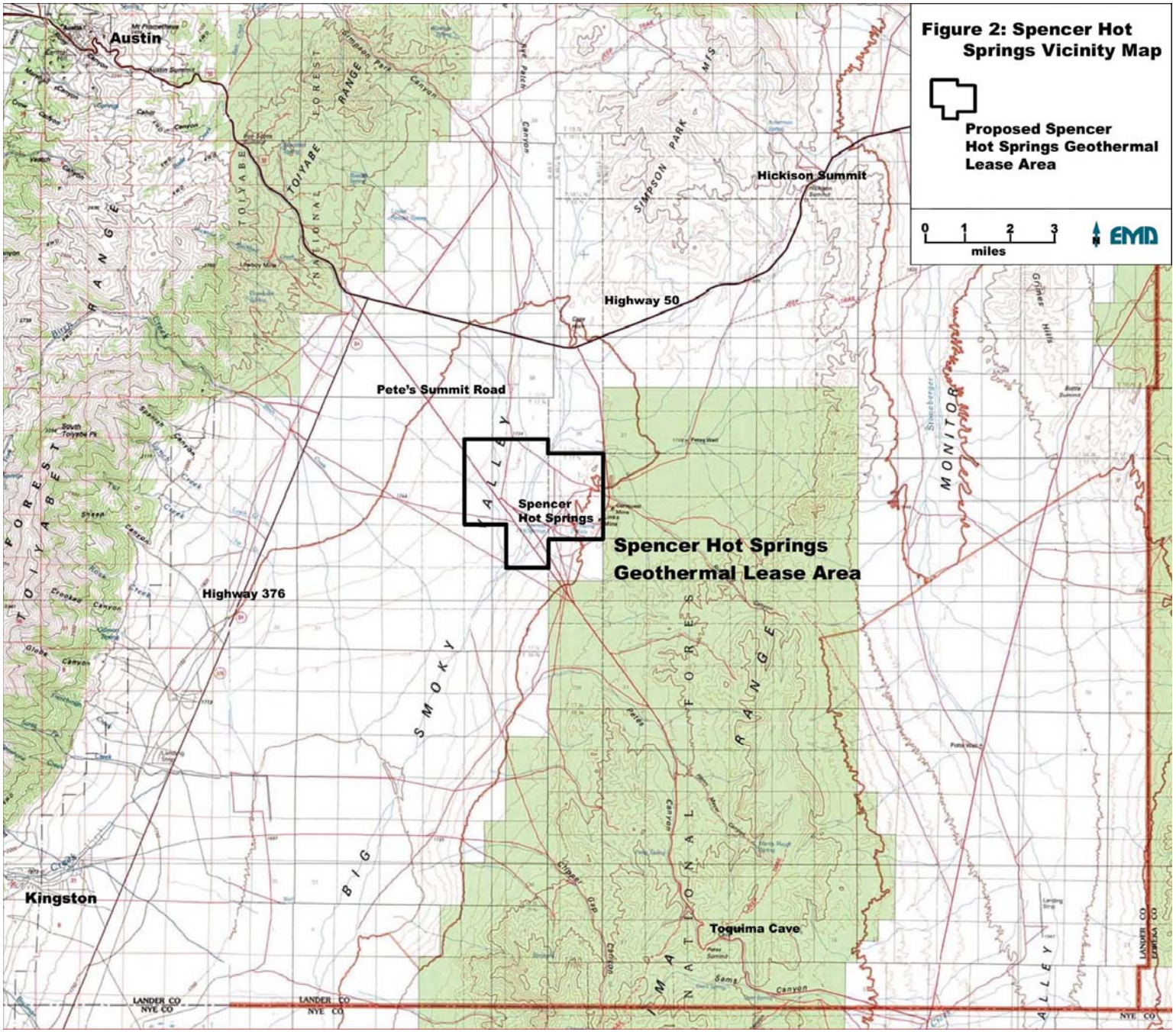

Figure 2: Proposed Spencer Hot Springs Geothermal Lease Area Vicinity Map

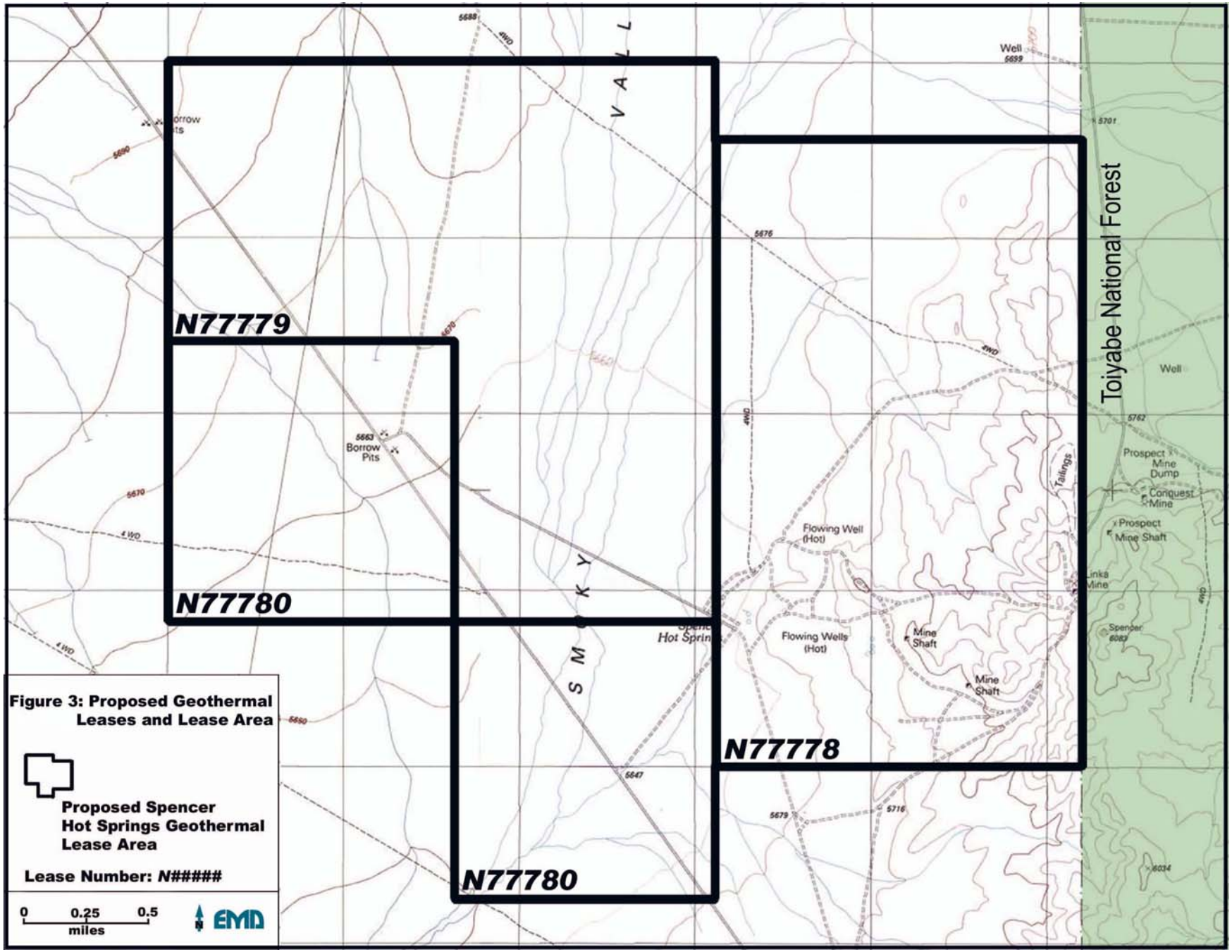

Figure 3: Proposed Spencer Hot Springs Area Geothermal Lease Map

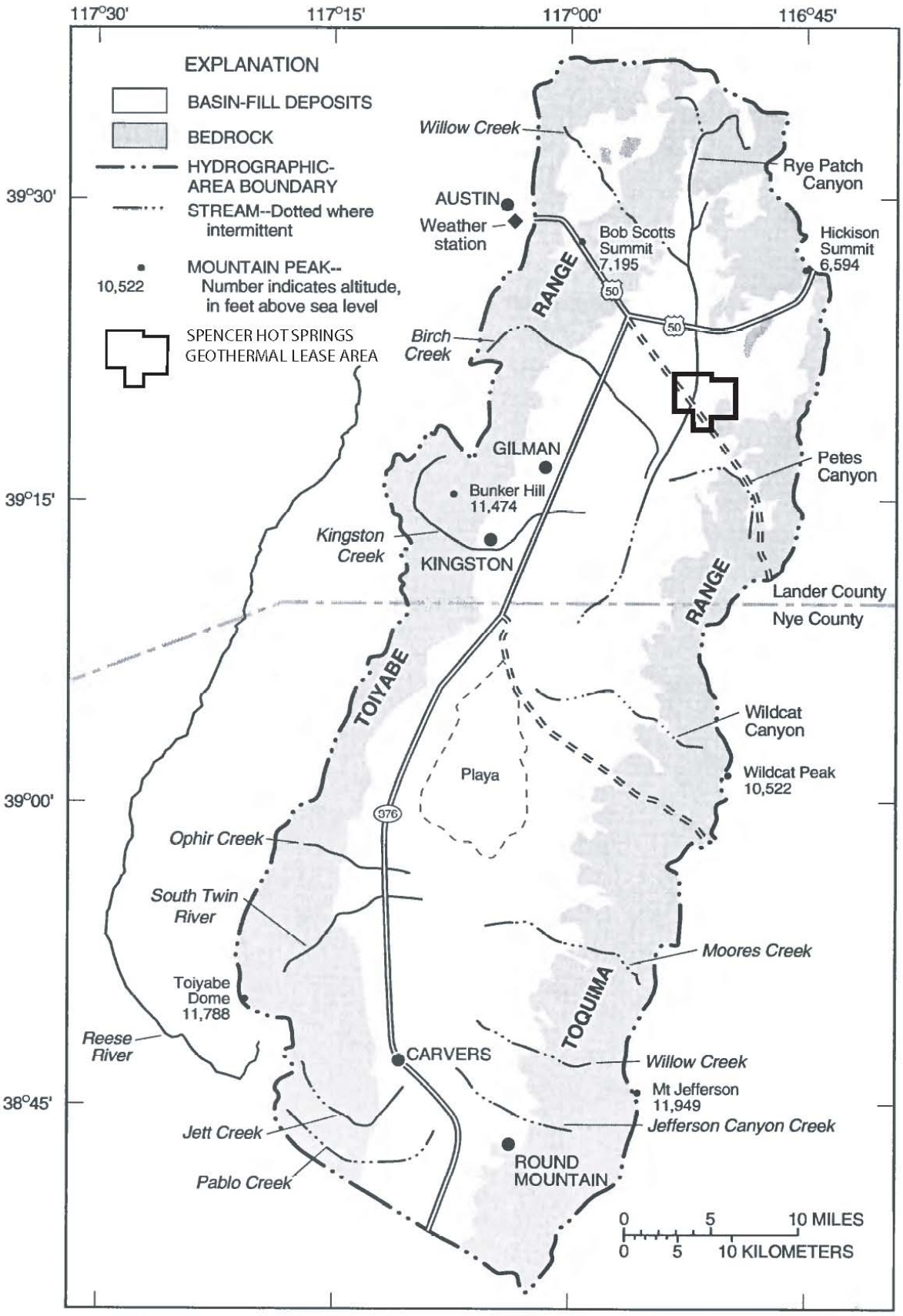

Figure 4: Big Smoky Valley, Northern Part Hydrographic Area (#137B)

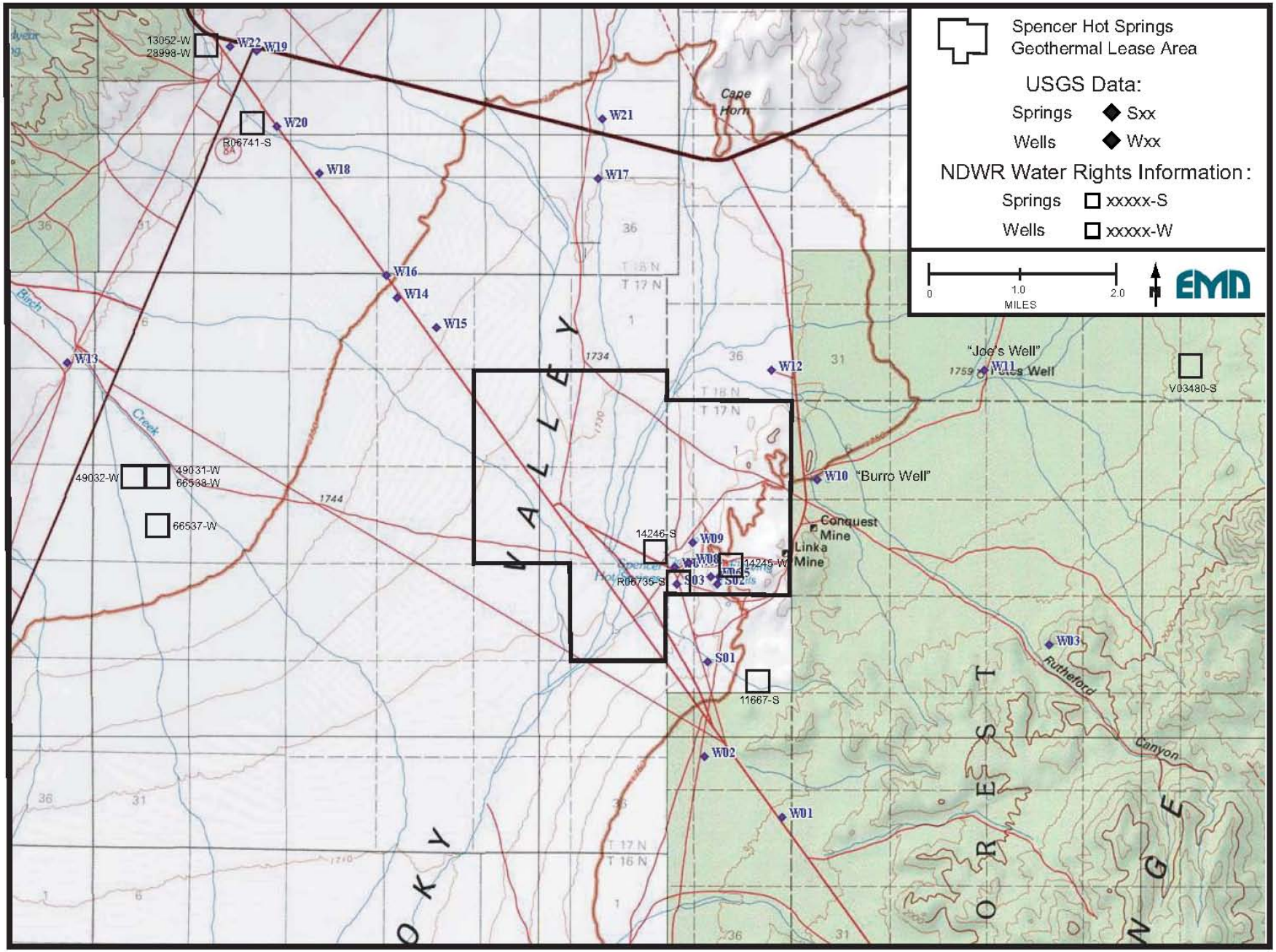

Figure 5: Selected Springs, Ground Water Wells and Water Rights in the Vicinity of Spencer Hot Springs

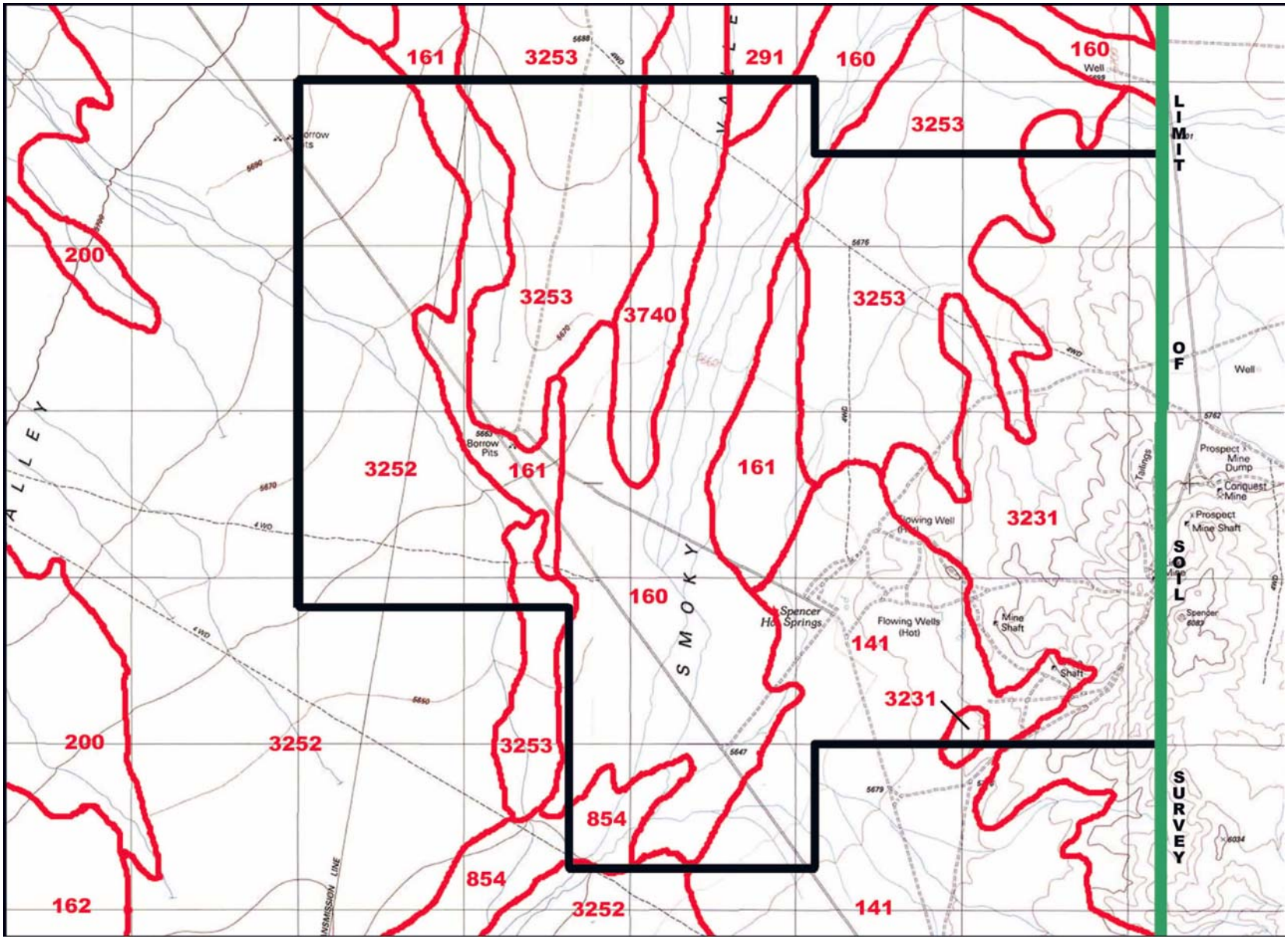

Figure 6: Soil Associations within and near the Spencer Hot Springs Area

Appendices

A. Reasonable Geothermal Development Scenario

B. Standard Operating Procedures

C. Geothermal Lease Stipulations

D. Site Reclamation Seed Mixes

E. Nevada Division of Water Resources Water Rights Reports

APPENDIX A – Reasonable Geothermal Development Scenario

The proposed action involves only the issuance of geothermal resource leases by the BLM. Since issuing geothermal leases does not allow the lessee to conduct activities beyond casual use, there are no direct impacts from the leasing decision. However, because each lease requires the lessee to "diligently explore the leased lands for geothermal resources until there is production in commercial quantities," it is reasonable to assume that the issuance of a geothermal resource lease could eventually result in the exploration, drilling, production and use of geothermal resources from these lands. Thus, because leasing is likely to lead to other activities which could have environmental impacts, issuing geothermal leases could have indirect impacts on the environment.

In order to assess these potential indirect environmental impacts that may result from issuance of these geothermal leases, a reasonable development scenario has been developed. This reasonable development scenario for the geothermal resource which may exist on the lands involves four sequential phases, which conform to the regulations adopted under the Geothermal Steam Act which require separate, subsequent approvals from the for each geothermal lease operation: exploration (Phase 1); drilling (Phase 2); utilization (Phase 3); and closure and abandonment (Phase 4). The success or failure of each phase affects the implementation of subsequent phases and, therefore, the subsequent environmental impacts.

Specifically for the purposes of the assessment of environmental impacts, these phases have been grouped into two stages: the exploration stage, consisting of the exploration phase and that portion of the drilling phase which occurs before the development phase, because these activities are generally short-term and temporary; and the development stage, consisting of the utilization and closure and abandonment phases and that portion of the drilling phase which occurs during the utilization phase, because these activities are generally long term and/or permanent.

The general assumptions outlined in the following description of the four phases serve to establish reasonable development possibilities for analyzing now future environmental impacts that may result from the issuing of these leases for geothermal resources. It should be noted that the reasonable development scenario permits only a general evaluation of the types of impacts that may occur, and cannot precisely predict the exact nature, magnitude and extent of these impacts because of the inability to precisely predict the nature, timing and location or any future development. Further, only a small percentage of the federal geothermal leases which are issued are actually explored, drilled and their geothermal resources utilized.

Geothermal resource operations would typically begin with "casual use" type activities. "Casual use" activities are specifically not defined as geothermal exploration operations, since they ordinarily lead to no significant disturbance of federal lands, resources or improvements. "Casual use" activities may include geophysical surveys (which collect passive seismic, magnetic, gravity and electrical information); geological surveys (which might include geologic mapping); and geochemical surveys (including collecting water samples, soil gas samples, rock chemistry, etc.), all of which are designed to generally characterize the area being explored and identify potential target areas for the next phase of exploration. Most often these surveys are conducted

by geologists driving on existing roads or walking across areas without existing roads. As a result, conducting "casual use" activities does not require any authorization or permit from BLM.

Phase One: Geothermal Exploration Operations

Geothermal exploration operations are any activity relating to the search for evidence of geothermal resources which require physical presence on the land and which may cause damage to those lands, which distinguishes them from the "casual use" activities described above. Geothermal exploration operations may be conducted on any federal lands available for geothermal leasing, whether leased or not, and may be conducted by any party, whether or not they are the federal geothermal lessee of the land, once authorized by the BLM under the federal regulations at 43 CFR 3250. Geothermal exploration operations include geophysical operations which may require the construction of roads, pads, shallow seismic holes, or off-highway vehicle travel; the drilling of small-diameter, generally shallow (200- to 2,500-foot) temperature gradient holes (to collect geologic data and measure the temperature gradient as a function of depth within the rock); the drilling of slightly larger diameter (though still small), typically deeper (1,000- to 4,000-foot) observation holes (designed to obtain deeper geologic information, and possibly sample of geothermal fluid, from the geothermal reservoir); and any drill pads or access roads which may need to be constructed to enable the geothermal exploration operations.

The geothermal exploration operations phase of the reasonable development scenario for the Spencer Hot Springs Area leases assumes the drilling of six temperature gradient holes from six 0.1-acre pads, the drilling of three observation holes from three 0.5-acre pads, and the construction of two miles of 10-foot wide access road, for a total surface disturbance of less than 4 acres. Drilling would be conducted using a diesel-powered, truck-mounted drill rig from a level pad. Drill cuttings and non-hazardous, non-toxic waste drilling mud would be discharged to a small pit dug on the pad. Small quantities of water (less than 0.5 acre-feet per hole) would be required to mix the drilling mud, control dust, etc., but no geothermal fluids would be produced and discharged to the surface. Both the temperature gradient and observation holes are typically constructed with steel casing cemented into the hole to keep the hole from collapsing and prevent the intermingling of any encountered ground waters between aquifers.

The exploration phase of the reasonable development scenario could take from one to five years or more to complete.

Phase Two: Geothermal Drilling Operations

Should the federal geothermal lessee determine that the geothermal exploration operations phase was "successful," the next phase would be to conduct geothermal drilling operations. "Geothermal drilling operations" include the drilling of geothermal resource wells and conducting related activities for the purpose of performing flow tests, producing geothermal fluids, or injecting fluids into a geothermal reservoir, and include any subsequent well operations. Because federal geothermal leases convey to the lessee the "exclusive right and privilege to drill for, extract, produce, remove, utilize, sell, and dispose of geothermal steam and associated geothermal resources," only the federal geothermal lessee, or the lessee's designated operator, may conduct geothermal drilling operations on a geothermal lease, and only once the

specific geothermal drilling operations are authorized by the BLM under the federal regulations at 43 CFR 3260.

Typically, a federal geothermal lessee would propose, obtain approvals, and conduct multiple geothermal well drilling programs for the same geothermal lease area. The first would be to drill exploration wells to confirm the nature, location and extent of the geothermal resources which may be indicated by the geothermal exploration operations. If geothermal resources in sufficient quantity and quality are confirmed through these exploratory geothermal well drilling and testing programs, additional geothermal resource development and injection wells would eventually be drilled to support a geothermal utilization project (see following).

Geothermal resource wells are typically larger-diameter wells specifically sized and designed to allow flow-testing (and, if successful, production or injection) of the geothermal resource from the geothermal reservoir. They may be as shallow as 500 feet and as deep as 10,000 feet, as they must be targeted to the presumed depth of the geothermal reservoir. They are constructed with multiple layers of steel casing cemented into the hole to keep the hole from collapsing, prevent the intermingling of any encountered ground waters between any aquifers, and allow the geothermal fluids to be produced safely to the surface (or allow produced geothermal fluids to be injected safely into the geothermal reservoir).

The geothermal drilling operations phase of the reasonable development scenario for the Spencer Hot Springs Area leases assumes the drilling of three geothermal wells from three 1.5-acre pads and the construction of one mile of 20-foot wide access road during the geothermal resource exploration/confirmation stage, for a total surface disturbance of approximately 7 acres. (Surface disturbance associated with the drilling of geothermal wells during the development stage are provided in the discussion of geothermal resource utilization operations, below.) Drilling would be conducted using a large, diesel-powered drill rig, requiring as many as 20 tractor trailer loads to mobilize to the drill site. The mast of the drill rig would rise as much as 170-feet above the level pad. Drilling would be conducted 24-hours per day, 7 days per week by a crew of four and likely that many other support/management workers. Drill cuttings and non-hazardous, non-toxic waste drilling mud would be discharged to a moderate size reserve pit dug on the pad. As much as 2 acre-feet of water per well would be required to mix the drilling mud, control dust, etc. Geothermal fluids produced to the surface would likely be discharged into a storage basin constructed on the drill pad during short-term (less than one day) flow tests, but would have to be pumped through temporary pipelines laid along the side of the access roads to one or more other geothermal well(s) and injected during any longer term (longer than one day to several weeks) reservoir flow tests.

The geothermal resource confirmation stage of the geothermal well drilling phase of the reasonable development scenario could take from an additional one to five years or more to complete, although the drilling of each well would likely require no more than 30 days.

Phase Three: Geothermal Resource Utilization Operations

Should the federal geothermal lessee determine that the geothermal resource confirmation stage of the geothermal drilling operations phase was “successful,” the next phase would be to develop

the geothermal well field and construct and operate the geothermal resource utilization facility. The "utilization of geothermal resources" includes the construction and operation of electrical generation and/or direct use facilities utilizing geothermal resources and related utilization facility and well field operations, as may be authorized by the BLM under the federal regulations at 43 CFR 3270. (The geothermal drilling operations conducted on a geothermal lease by the geothermal lessee, or the lessee's designated operator, to drill and complete geothermal resource development and injection wells to support a geothermal utilization project are authorized by the BLM under the federal regulations at 43 CFR 3260.)

The type of geothermal resource utilization facility which may be proposed, constructed and operated on the federal geothermal lease depends primarily on the size and temperature of the confirmed geothermal reservoir. (Other factors influencing the decision on the type of utilization facility include market demand, the availability of and proximity to other required resources, and potential profitability.) Geothermal resources can be classified as low temperature, moderate temperature or high temperature. The highest temperature geothermal resources are generally used only for generating electrical energy, while the low temperature geothermal resources are typically used exclusively in direct heat applications (that is, the heat is used directly, and not converted to electrical energy). Moderate temperature geothermal resources have been used in both types of utilization facilities.

Two different types of geothermal resource utilization facilities have been used to generate electrical energy from geothermal resources. Flash steam power plants use geothermal steam, which is "flashed" from the superheated geothermal fluid produced from the production wells by reducing the pressure in a "flash" tank, to power the turbine/generator units to produce electricity. The remaining geothermal fluid not flashed to steam is injected into the geothermal reservoir to be reheated and produced again. Because these types of power plants produce clean water (when the flashed steam is condensed after exiting the turbine), they are typically cooled by circulating this condensed steam in a wet cooling tower. Because the amount of steam produced is proportional to the temperature of the geothermal fluid, these types of utilization facilities are typically constructed to utilize only high temperature geothermal resources (those with temperatures generally in excess of 350°F).

Binary-cycle power plants are more typically constructed to convert the moderate temperature geothermal fluids to electrical energy. Geothermal fluid is typically pumped up the production wells from the geothermal reservoir and flowed through heat exchangers to heat another more volatile fluid, known as the "working" or "binary" fluid. This "working" fluid is vaporized in the heat exchanger and the vapor used to turn the turbine/generator units. None of the geothermal fluid is flashed to steam but is entirely injected into the geothermal reservoir to be reheated and produced again. The working fluid vapor is typically condensed back into a liquid in large air-cooled condensers, and then returned to the heat exchangers in a closed-loop system.

Projects which use the heat in the geothermal fluid directly, without converting it to electrical energy, are known as "direct-use" projects. They typically use the heat in the lower temperature geothermal fluids for such things as heating buildings, industrial processes, greenhouses and aquaculture (growing fish), or may be used to dry agricultural products or support recreational

uses (such as resorts or spas). Direct-use projects typically use less geothermal fluid than power generation projects, and as a result may or may not inject the geothermal fluid into the ground after the heat is used.

Public information currently available indicates that the geothermal reservoir feeding Spencer Hot Springs is most likely either a moderate or low temperature geothermal resource. Therefore, the geothermal resource utilization operations phase of the reasonable development scenario for the Spencer Hot Springs Area leases will assume that either a binary power plant or direct utilization facility would be constructed and operated. The geothermal resource development stage of the geothermal drilling operations phase of the reasonable development scenario assumes the drilling of six additional geothermal wells from six 1.5-acre pads and the construction of two more miles of 20-foot wide access road over the assumed 30-year life of the utilization project, for a total surface disturbance of approximately 14 acres.

As many as four miles of 8- to 24-inch diameter pipelines, covered with 2 inches of insulation, would be constructed about one foot off the ground on supports adjacent to the access roads to bring the geothermal fluid from the production wells to the utilization facility and from the utilization facility to the injection wells. Additional surface disturbance from the pipelines would be about 5 acres, assuming an additional 10 feet of surface disturbance.

To produce 20 MW of electrical energy for sale, a binary power plant would need from 3 to 4 million pounds per hour (6,000 to 8,000 gallons per minute) of 300°F geothermal fluid, which would be injected back into the geothermal reservoir at about 180°F. The quantity and temperature of the geothermal resource required for a direct-use project would be less.

No new access roads would likely be necessary to access the utilization facility because of the roads already assumed constructed for the well field exploration and development. It is assumed that a typical 20 MW binary power plant would disturb 10 acres, and that a large direct utilization project (such as a greenhouse or aquaculture [fish growing] facility) would also disturb 10 acres. (Although such a direct utilization project could conceivably occupy more area than the binary power plant, it would likely also require less geothermal resource, which would reduce the area required for the field development.) Both an electric power plant and a direct utilization project would require the construction of an electric transmission (or distribution) line to export produced power (or provide power for operations). Assuming a two-mile, 20-foot-wide connection to the existing transmission line within the lease block and a one-acre switch yard, the total new surface disturbance for all utilization facility activities would be about 16 acres.

The geothermal resource development and utilization construction stage of the reasonable development scenario would likely take one year to complete, and is assumed to operate for 10 to 30 years or more.

Phase Four: Closure and Abandonment

Federal regulations and operational orders specifically require proper closure of facilities, abandonment of wells and reclamation of disturbed lands. Federal regulations also require lease, drilling and utilization bonds to ensure compliance with conditions of approval and proper

closure of facilities, abandonment of wells and reclamation of disturbed lands. These closure and abandonment requirements would be implemented during each of the other phases as conducted activities become no longer necessary. Disturbed lands are reclaimed when no longer required for ongoing operations. Temperature gradient holes, observation holes and geothermal wells are abandoned when no longer useful by plugging the bore with clean drilling mud and cement, removing all surface equipment and structures, and capping and covering the top of the casing below the ground surface. Utilization facilities, transmission lines and pipelines would be dismantled and removed, and all disturbed lands, including access roads not permitted to remain in service, would be re-graded to approximate original contours and reclaimed by replanting/reseeding with native vegetation.

The following table summarizes by phase, stage and activity the new surface disturbance (in acres) which may be anticipated should the Spencer Hot Springs Area geothermal leases be issued.

PHASE/ACTIVITY	ROADS	DRILL PADS	PIPELINES	UTILIZATION FACILITY	TRANSMISSION LINES	TOTALS
EXPLORATION	3	1	0	0	0	4
DRILLING	2	5	0	0	0	7
EXPLORATION STAGE TOTAL	**5**	**6**	**0**	**0**	**0**	**11**
UTILIZATION	5	9	5	10	6	35
CLOSURE	0	0	0	0	0	0
UTILIZATION STAGE TOTAL	**5**	**9**	**5**	**10**	**6**	**35**
LEASE AREA TOTALS	**10**	**15**	**5**	**10**	**6**	**46**

APPENDIX B – Geothermal Lease Stipulations

The following leasing stipulations are generally applicable, as appropriate, to the Proposed Action, and have been reproduced from Appendix E to the Decision Record/Findings of No Significant Impact (DR/FONSI) prepared for the Programmatic Environmental Assessment, Geothermal Leasing and Exploration, Shoshone-Eureka Planning Area, EA# NV63-EA02-16 (BLM-BMFO, 2002b).

When issuing a lease or approving a permit, the BLM may include stipulations from the following list to mitigate potential site-specific impacts. Which stipulations are included in any given authorization will depend upon findings from the Documentation of NEPA Adequacy (DNA) and input from resource specialists. For example, measures to protect wild horses and burros will be included only when those animals are known to be present on the land under consideration for lease or exploration.

Resource	***Stipulation***
Air Quality	*The operator will implement at the direction of the Assistant Field Manager testing of emissions for H_2S and other noxious / deadly gases where there is indication that these gases may occur.*
Cultural-Historical Resources	*Cultural resources shall be avoided and mitigation measures shall be developed on a case-by-case basis as required by regulations, lease terms and attached stipulations developed during site specific NEPA analysis.*
Native American Religious Concerns	*As surface disturbing activities occur, the BLM will require the operator to monitor the water temperature and outflow or water from local hot springs and existing wells as directed by the Assistant Field Manager. If the temperature and outflow from the spring or well were impacted to a degree determined by the Assistant Field Manager to be more than negligible, the BLM shall require the operator to take corrective actions. Failure of the operator to take the corrective measures as directed will result in BLM terminating the operation.*
Special Status Species	*The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The special status species list is reviewed and / or updated annually and as species are added, new stipulations may add further restrictions. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to*

Resource	***Stipulation***
	the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation. Exploratory endeavors on the public lands will require a Special Status Species review, and may, at the direction of the Assistant Field Manager, require a field survey for the presence of Special Status Species. Potential impacts to Special Status Species will be analyzed on a case-by-case basis. Mitigation measures shall be developed on an individual project basis depending upon the results of the survey. *Springs within ½ mile of exploration activities shall be inventoried by BLM approved and supervised personnel for the presence of invertebrates. If a rare genus, such as Pyrgulopsis, is found, identification to species and monitoring of effects of the proposed action shall be required and site-specific mitigation may be developed by the BLM.* *Sage grouse:* *BLM will require operations to avoid active leks (strutting grounds) by 2 miles during strutting season (see Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, October 2000).* *Approximate dates: March 1 - May 15* *Operations shall avoid nesting and brood rearing habitat (especially riparian habitat where broods concentrate beginning usually in June) by ½ mile during the time such areas are in use.* *Approximate dates:* *April 1 - August 15* *BLM will require operations to avoid sage grouse wintering habitat by ½ mile, while occupied. Most known wintering grounds in the Shoshone-Eureka Resource Area occur at high elevations and are not likely to be affected. Avoidance dates will vary with severity of the winter.* *BLM will limit the disturbance to and fragmentation of all known*

Resource	***Stipulation***
	sage grouse habitat. *Ferruginous hawks:* *Operations shall avoid active nests by ½ mile. Approximate dates: March 15 - July 1*
Hydrology and Water Quality and Quantity	*All applicants for exploration permits will be required to submit a surface water inventory to the Assistant Field Manager before authorization may be granted. The inventory will include a map of appropriate scale (such as 1:24,000) indicating the location of all surface water on public land within ½ mile radius from the surface-disturbing activity.* *At the commencement of surface disturbing activities for the drilling of exploration wells, the BLM will require that the drilling company monitor the water temperature and outflow of water from local springs and existing wells as directed by the Assistant Field Manager. If the temperature and / or outflow of the water from the spring or well were impacted to a degree determined by the Assistant Field Manager to be more than negligible, the BLM will require the operator to take corrective actions. Failure of the operator to take the corrective measures as directed will result in BLM terminating the operation.* *Results will be reported to Federal and State agencies on the status of these hydrologic systems during drilling.* *Impacts include, but are not limited to, the following:* *Change in water temperature* *Change in discharge rate* *Substantial decrease in water table level* *Surface subsidence* *In the event of impacts to surface or subsurface waters, determined by* *the Assistant Field Manager to be more than negligible, or if a violation of Federal or State water quality standards occurs, the Assistant Field Manager will assess the situation, and may require the* *operator to amend, relocate or discontinue operations. If operations* *are terminated, the BLM will develop and the operator shall implement remediation measures.*

Resource	***Stipulation***
	Additional stipulations may include: *No use of the surface water;* *Limitations on the type of equipment that may be used; and* *Restrictions of activities during certain times of the year (seasonal restrictions).*
Wetlands / Riparian Zones	*BLM will direct the operator to avoid surface waters, wetlands and riparian areas. No exploration activities will occur within 100 feet of surface waters, wetlands or riparian areas.* *Vegetation shall not be disturbed within 300 feet of waters designated by the Authorized Officer, except at approved stream crossing.* *Where surface waters, wetlands and riparian areas cannot be avoided (100 feet for non-surface disturbing exploration activities and 300 feet for surface disturbing exploration activities), mitigation will be developed on a case-by-case basis.* *Additional stipulations may include:* *No use of the surface water;* *Limitations on the type of equipment that may be used; and* *Restrictions of activities during certain times of the year (seasonal restrictions).* *The BLM will require that the drilling company monitor the temperature and outflow of water from local hot springs. If the temperature and / or outflow of water from a spring were impacted to a degree determined by the Assistant Field Manager to be more than negligible, the BLM will require the operator to take corrective action. Failure of the operator to take the corrective measures as directed will result in BLM terminating the operation.*
Invasive Nonnative Species	*Areas to be involved in surface disturbing activities will be inventoried for the presence of invasive, nonnative species and treated if present. The exterior of all vehicles and heavy equipment shall be cleaned by water before entering public lands to do work. To minimize the possibility for contamination, a designated wash area will be designated by the BLM and shall be established and monitored by the operator in high use areas. The boots of operators and other person working in the areas shall be cleaned of seed before coming onto BLM lands. The BLM will develop and the operator shall implement a weed treatment program from the time operation commences until the site is*

Resource	***Stipulation***
	abandoned. Seed and mulch used to reclaim disturbed areas shall be free of invasive nonnative species. Operators and workers shall avoid driving through or parking in areas where invasive nonnative species occur. When sites are abandoned, they will be inventoried for the presence of invasive nonnative species and treated if present.
Land Use Authorizations	*BLM will require proposals to avoid existing rights-of-way where possible. Proposed leases shall not overlap existing land use authorizations if they would adversely affect the valid existing authorization.*
Allotment Management	*If operations cause a water source to become unavailable to livestock, the Authorized Officer will require a new well to be drilled, or another water development to be constructed in the general area to provide adequate water for livestock. If the lease area is within an allotment, the Assistant Field Manager may require additional measures, including seasonal restrictions or no surface occupancy.*
Recreation	*None identified.*
Soils	*None identified.*
Vegetation	*Disturbed areas will be reseeded with native or introduced plant species, depending on the site conditions. Disturbed areas will be reseeded with pure live seed (certified weed free) with the mixes in Appendix F. Native vegetation will be used wherever possible. However, to compete with invasive nonnative species, introduced species, as suggested in the seed list in Appendix F, will be used.*
Visual Resources	*None identified.*
Migratory Birds	*The BLM will limit the amount of ground clearing or other disturbance (such as the creation of cross-country access to drill sites) that an operator may do during the migratory bird nesting season. Areas to be disturbed shall be surveyed by personnel approved and supervised by BLM to determine the existence and location of any nests. If any nests are located, the nest will be avoided by ¼ mile. If the nest area cannot be avoided, BLM will develop site-specific mitigation.*
Wildlife	*If operations cause a water source to become unavailable to wildlife, the Authorized Officer will require a new well to be drilled, or another water development to be constructed in the general area to provide adequate water for wildlife. If the lease area is within a wildlife management area, the Assistant Field Manager may require additional measures, including seasonal restrictions or no surface occupancy.*

Resource	***Stipulation***
Wild Horses and Burros	*If operations cause a water source to become unavailable to wild horses, the Authorized Officer may require a new well to be drilled, or another water development to be constructed in the general area to provide adequate water for the wild horses. If the lease area is within a HMA, the Assistant Field Manager may require additional stipulations for the protection of wild horses and burros, including seasonal restrictions or no surface occupancy.*
All Resources	*Operators shall adhere to all Standard Operating Procedures as outlined in this EA, unless specifically waived by the Assistant Field Manager* [Note – see the referenced Standard Operating Procedures provided as Appendix C to this Spencer Hot Springs Geothermal Leasing EA].
Playa	*Because playas are important recreational places apt to have cultural sites nearby and provide critical habitat for some migratory waterbirds and shorebirds, including Special Status Species such as the Snowy Plover, mitigation measures will be developed on a case-by-case basis. Mitigation may include, but is not limited to, no surface occupancy and seasonal restrictions.*

APPENDIX C – Standard Operating Procedures

Potentially applicable Standard Operating Procedures were identified in the Programmatic Environmental Assessment, Geothermal Leasing and Exploration, Shoshone-Eureka Planning Area, EA# NV63-EA02-16 (BLM-BMFO, 2002a), as reproduced below.

The following is a list of Standard Operating Procedures that have been developed via forms, laws, regulations, and BLM policy:

1. *The BLM requires roads, drill pads, and other disturbed surfaces to be watered for dust suppression as directed by the Assistant Field Manager.*

2. *The operator must obtain permits as required by Federal, State, and Local laws and regulations. The BLM will not permit any operation that would violate Federal, State, or County water quality regulations. All operations would be required to comply with all State and Federal regulations concerning wetlands and riparian areas.*

3. *Areas disturbed are to be scarified and revegetated as soon as feasible.*

4. *All traffic associated with exploration is required to follow routes that avoid cultural resources. Operators identify and flag anticipated routes and detours on the route.*

5. *A cultural inventory may be required. The decision to require a cultural inventory is made by the Assistant Field Manager for Nonrenewable Resources.*

The inventory would be one of the following types:

a. ***Class I:*** *A review of existing historic documentation and BLM office records. This type of inventory is generally used when the proposed project is located in an area of complete disturbance, or where the area has been previously inventoried using methods consistent with existing standards*

b. ***Class II:*** *A review of existing historic documentation and BLM office records, and some fieldwork. This type of inventory is generally used when only a portion of the project area has been disturbed, or portions of the project area have been previously inventoried using methods consistent with existing standards. It may also include a determination of significance for cultural properties located within the project area, and a determination of effect.*

c. ***Class III:*** *A complete inventory that includes a review of existing historic documentation and BLM office records, and a complete inventory of the project area. It includes an evaluation of significance for cultural properties located within the project area and a determination of effect. This type of inventory is used in areas where there have been no previous*

inventories, in areas where there has been a change in ground visibility, or in areas that were inventoried using methods not acceptable by existing standards.

6. *Cattle guards, fences, and other range improvement facilities would be constructed as required by the Authorized Officer to mitigate impacts to livestock grazing and wild horses and burros.*

7. *All topsoils, except playas, are salvaged, stockpiled, labeled, and used for reclamation activities, including revegetation. Surface disturbance is planned and constructed so as to avoid the most easily eroded soils.*

8. *A visual contrast rating worksheet is prepared by the BLM for each drill site and proposed road construction. Ridges and skylines are avoided.*

APPENDIX D – Site Reclamation Seed Mixes

The following BLM recommended seed mixes are potentially applicable to revegetation and site reclamation activities in the proposed Spencer Hot Springs Geothermal Lease area.

Salt Desert Shrub Community [1]

Rev 12-3-02

Shrubs (Use four of the following shrubs at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Fourwing saltbush[2] (*Atriplex canescens*)	2	
Shadescale[2] (*Atriplex confertifolia*)	2	
Winterfat (*Ceratoides lanata*)	2	
Forage kochia (*Kochia prostrata*)	2	
Nevada Mormon tea (*Ephedra nevadensis*)	1	
Spiny hopsage (*Grayia spinosa*)	1/2	
Douglas rabbitbrush (*Chrysothamnus viscidiflorus*)	2	

Forbs (Use two of the following forbs at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Scarlet globemallow (*Sphaeralcea coccinea*)	0.50	
Palmer penstemon (*Penstemon palmeri*)	0.25	
Lewis flax (*Lewis flax*)	0.75	

Grasses (Use four of the following grasses at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Crested wheatgrass (*Agropyron cristatum*)	1.0	
Indian ricegrass (*Oryzopsis hymenoides*)	1.0	
Great Basin wildrye (*Elymus cinereus*)	1.0	
Bottlebrush squirreltail (*Sitanion hystrix*)	1.0	
Inland saltgrass (*Distichlis spicata stricta*)	0.5	
Alkali sacaton (*Sporobolus airoides*)	0.1	
Russian wildrye (*Elymus junceus*)	1.0	

[1] Please indicate which species you selected in the last column and submit a copy of this form to the BLM with your notification of completed reclamation.
[2] Highly successful

Wyoming Sagebrush Community[1]

Rev 12-3-02

Shrubs (Use four of the following shrubs at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Wyoming big sagebrush (Artemisia tridentata wyomingensis)	0.10	
Fourwing saltbush (Atriplex canescens)[2]	2.00	
Spiny hopsage (Grayia spinosa)	1/2	
Forage kochia (*Kochia prostrata*)	2	
Nevada Mormon tea (*Ephedra nevadensis*)	1	

Forbs (Use three of the following forbs at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Scarlet globemallow (*Sphaeralcea coccinea*)	0.50	
Palmer penstemon (*Penstemon palmeri*)	0.50	
Lewis flax (*Lewis flax*)	1.00	
Sweetvetch (Hedysarum boreale)	2.00	

Grasses (Use three of the following grasses at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Crested wheatgrass (*Agropyron cristatum*)	2.0	
Indian ricegrass (*Oryzopsis hymenoides*)	2.0	
Great Basin wildrye (*Elymus cinereus*)	2.0	
Bottlebrush squirreltail (*Sitanion hystrix*)	2.0	

[1] Please indicate which species you selected in the last column and submit a copy of this form to the BLM with your notification of completed reclamation.

[2] Highly successful

Mountain Brush Community[1]

Rev 12-3-02

Shrubs (Use three of the following shrubs at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Snowberry (Symphoricarpos)	1	
Serviceberry (Amelanchier)	2	
Antelope bitterbrush (Purshia tridentata)	1	
Curl-leaf Mountain Mahoghany (Cercocarpus ledifolius)	1	
Currant (Ribes)	1	

Forbs (Use four of the following forbs at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Yarrow (Achillea)	0.10	
Palmer penstemon (*Penstemon palmeri*)	0.25	
Lewis flax (*Lewis flax*)	1.00	
Arrowleaf balsamroot	2.00	
Common sainfoin	6.00	
Cinquefoil	0.10	
Small burnet (Sanguisorba minor)	4.00	

Grasses (Use three of the following grasses at the rates identified.)

Species common and scientific names	pounds/acre *(Pure Live Seed)*	Species selected
Idaho fescue (Festuca idahoensis)	1.0	
Indian ricegrass (*Oryzopsis hymenoides*)	1.0	
Orchardgrass (Dactylis glomerata)	0.5	
Great Basin wildrye (*Elymus cinereus*)	1.0	
Bluebunch wheatgrass (Agropyron spicatum)	1.0	
Nevada bluegrass (Poa nevadensis)	0.5	
Mountain brome (Bromus carinatus)	2.0	

[1] Please indicate which species you selected in the last column and submit a copy of this form to the BLM with your notification of completed reclamation.

Trees (from transplant)

As recommended on individual basis:

Jeffrey pine (Pinus jeffreyi)
Limber pine (Pinus flexilis)
Ponderosa pine (Pinus ponderosa)

CODE DEFINITIONS
FOR PERMIT DATABASE

APPLICATION STATUS		COUNTY		USE		SOURCE	
ABR	ABROGATED	AL	ALPINE	COM	COMMERCIAL	EFF	EFFLUENT
APP	APPLICATION	CC	CARSON CITY	CON	CONSTRUCTION	GEO	GEOTHERMAL
CAN	CANCELLED	CH	CHURCHILL	DEC	AS DECREED	LAK	LAKE
CER	CERTIFICATE	CL	CLARK	DOM	DOMESTIC	OGW	OTHER GROUND WATER
CUR	CURTAILED	DO	DOUGLAS	DWR	DEWATERING	OSW	OTHER SURFACE WATER
DEC	DECREED	EL	ELKO	ENV	ENVIRONMENTAL	RES	RESERVOIR
DEN	DENIED	ES	ESMERALDA	IND	INDUSTRIAL	SPR	SPRING
EXP	EXPIRED	EU	EUREKA	IRC	IRRIGATION (CAREY ACT)	STO	STORAGE
FOR	FORFEITED	HU	HUMBOLDT	IRD	IRRIGATION (D L E)	STR	STREAM
PER	PERMIT	LA	LANDER	IRR	IRRIGATION	UG	UNDERGROUND
RFA	READY FOR ACTION	LI	LINCOLN	MM	MINING AND MILLING		
RFP	READY FOR ACTION (PROTESTED)	LY	LYON	MUN	MUNICIPAL		
RLP	RELINQUISH A PORTION	MI	MINERAL	OTH	OTHER		
REL	RELINQUISHED	NY	NYE	PWR	POWER		
RES	RESERVED	PE	PERSHING	QM	QUASI-MUNICIPAL		
RVP	REVOCABLE PERMIT	ST	STOREY	REC	RECREATION		
RVK	REVOKED	WA	WASHOE	STK	STOCKWATERING		
SUP	SUPERCEDED	WP	WHITE PINE	STO	STORAGE		
SUS	SUSPENDED			WLD	WILDLIFE		
VST	VESTED RIGHT						
WDR	WITHDRAWN						

NEVADA DIVISION OF WATER RESOURCES
WATER RIGHTS DATABASE

SPECIAL HYDROGRAPHIC ABSTRACT

Run Date: 8/20/2004

Selection Criteria : pod_twn in ('17N') and pod_rng in ('44E') order by basin,m.app

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
137B	4478			6/26/1917	ABR	STR	SE	SE	04	17N	44E	0.00	IRR		50.00	0.00		LA	LABORDE, ST. JOHN
		CHANGE BY:	5894		CER	STR													
	4479		4110	6/26/1917	CER	STR	NW	NW	01	17N	44E	1.03	IRR		103.32	412.00	AFA	LA	LANDER COUNTY DEVELOPMENT CORP.
	5894	4478	3950	12/6/1919	CER	STR	SE	SE	04	17N	44E	0.25	IRR		24.55	98.20	AFA	LA	LANDER COUNTY DEVELOPMENT CORP.
	13062		3438	9/27/1949	CER	STR	SW	SE	27	17N	44E	0.00	IRR		236.15	0.00		LA	YOUNG, J. CHESTER
	13732			5/22/1951	WDR	STR	NE	NE	05	17N	44E	1.00	MM		0.00	0.00		LA	MARSAM ENTERPRISES, INC.
	19255		6388	10/6/1960	CER	STR	NW	NE	09	17N	44E	0.09	IRR		18.82	42.75	AFA	LA	WORK, TELFORD
	20048			8/25/1961	CAN	STR	NE	NE	17	17N	44E	0.00	IRR		0.00	0.00		LA	WORK, TELFORD
	31046			1/31/1977	CAN	STR	NE	NE	17	17N	44E	0.00	IRR		0.00	0.00		LA	WORK, TELFORD
	42144			8/22/1980	DEN	UG	NE	NE	26	17N	44E	5.40	IRD		320.00	1,280.00	AFA	LA	CRIPE, SYVILLA O.
	42145			8/22/1980	DEN	UG	NW	NW	26	17N	44E	5.40	IRD		320.00	1,280.00	AFA	LA	CRIPE, JOHN E.
	47288			10/3/1983	DEN	UG	NE	NE	02	17N	44E	5.40	IRD		320.00	1,280.00	AFA	LA	YOUNG, J. LAVAR
		CHANGE BY:	49676		DEN	UG													
	49676	47288		2/3/1986	DEN	UG	NE	NE	02	17N	44E	5.40	IRD		320.00	1,280.00	AFA	LA	YOUNG, J. LAVAR
	57718			5/29/1992	CAN	UG	SE	SE	36	17N	44E	'64.00	MUN		0.00	0.00		LA	ECO-VISION, INC.
	V02413			2/8/1956	VST	STR	SE	SW	21	17N	44E	2.63	IRR		131.49	525.96	AFA	LA	YOUNG BROS., A NV PARTNERSHIP
		CHANGE BY:	68329T		EXP	STR													
	V02414			2/8/1956	VST	STR	SW	SE	27	17N	44E	0.00	IRR		131.49	0.00		LA	YOUNG BROS., A NV PARTNERSHIP
		CHANGE BY:	68329T		EXP	STR													
	V03541			11/3/1980	VST	SPR	SW	NW	16	17N	44E	1.00	IRR		3.26	13.06	AFA	LA	WORK, TELFORD
	V03653			2/6/1981	VST	STR	NW	NE	09	17N	44E	1.00	IRR		17.75	0.00		LA	WORK, TELFORD
173B	13063		3439	9/27/1949	CER	STR	SE	SW	21	17N	44E	2.36	IRR		236.15	944.60	AFA	LA	YOUNG, J. CHESTER

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NEVADA DIVISION OF WATER RESOURCES
WATER RIGHTS DATABASE

SPECIAL HYDROGRAPHIC ABSTRACT

Run Date: 7/28/2004

Selection Criteria : pcd_twn in ('17N') and pcd_rng in ('45E') order by basin.m.app

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
37B	14246		3935	4/21/1952	CER	SPR	SE	SE	13	17N	45E	0.03	DOM		0.00	7.00	MO	LA	SHUCK, F.D.
	31668			5/12/1977	CAN	UG	SW	NE	12	17N	45E	5.40	IRC		320.00	0.00		LA	CARR, GARY, WRIGHT, CHARLES W.
	31669			5/12/1977	CAN	UG	SW	NE	08	17N	45E	5.40	IRC		320.00	0.00		LA	CHIAROVALLE, ANTHONY, CHIAROVALLE, JANIBETH
	31670			5/12/1977	CAN	UG	SW	NE	04	17N	45E	5.40	IRC		320.00	0.00		LA	JONES, DANNY R., JONES, JOAN
	31672			5/12/1977	CAN	UG	SW	NE	09	17N	45E	5.40	IRC		320.00	0.00		LA	FREAR, DONALD, FREAR, VIRGINIA
	31673			5/12/1977	CAN	UG	SW	NE	11	17N	45E	5.40	IRC		320.00	0.00		LA	DERFORD, JOHN VAN, HURLEY, WALTER
	31675			5/12/1977	CAN	UG	SW	NE	03	17N	45E	5.40	IRC		320.00	0.00		LA	WRIGHT, JESSIE E., WRIGHT, ROGER H.
	31676			5/12/1977	CAN	UG	SW	NE	10	17N	45E	5.40	IRC		320.00	0.00		LA	PARKER, HUGH, PARKER, MARY
	31677			5/12/1977	CAN	UG	SW	NE	02	17N	45E	5.40	IRC		320.00	0.00		LA	HOE, MARTIN, WRIGHT, HORACE
	31678			5/12/1977	CAN	UG	SW	NE	01	17N	45E	5.40	IRC		320.00	0.00		LA	SHEDLOVE, WILLIAM, SHEDLOVE, ZENA
	49031	46754		5/6/1985	ABR	UG	NW	NE	18	17N	45E	0.00	IRD		320.00	0.00	AFA	LA	YOUNG, RALPH
		CHANGE BY:	66538		PER	UG													
	49032	46753		5/6/1985	ABR	UG	NW	NW	18	17N	45E	0.00	IRD		320.00	0.00	AFA	LA	YOUNG, RALPH
		CHANGE BY:	66537		PER	UG													
	66537	49032		6/30/2000	PER	UG	NW	SE	18	17N	45E	5.40	IRR		0.00	960.00	AFA	LA	YOUNG, RALPH
	66538	49031		6/30/2000	PER	UG	NW	NE	18	17N	45E	5.40	IRR		0.00	960.00	AFA	LA	YOUNG, PATRICIA
	V03192			7/24/1979	WDR	SPR	SE	SE	12	17N	45E	0.00	STK		0.00	0.00		LA	BLM

- - End of Report - -

NEVADA DIVISION OF WATER RESOURCES
WATER RIGHTS DATABASE

SPECIAL HYDROGRAPHIC ABSTRACT

Run Date: 7/28/2004

Selection Criteria : pod_swn in ('17N') and pod_rng in ('45EH') order by basin,m.app

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
37B	11667		3275	8/17/1946	CER	SPR	SW	SE	13	17N	45EH	0.05	STK		0.00	10.95	MG	LA	PARSONS, CHARLES W.,PARSONS, MARY F.,STRESHLEY, LEROY A.,STRESHLEY, MARIE
	14245		3934	4/21/1952	CER	UG	NW	SW	12	17N	45EH	0.25	MM		0.00	180.99	MG	LA	WEILER, SAMUEL
	15793			9/9/1954	WDR	UG	NE	NE	24	17N	45EH	1.00	MM		0.00	0.00		LA	ESSON, JENNIE M.
	R06735			6/28/1994	RES	SPR	NW	SW	11	17N	45EH	0.01	OTH		0.00	2.19	MG	LA	BLM

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NEVADA DIVISION OF WATER RESOURCES
WATER RIGHTS DATABASE

SPECIAL HYDROGRAPHIC ABSTRACT

Run Date: 7/28/2004

Selection Criteria : pod_twn in ('17N') and pod_rng in ('46E') order by basin,m.app

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
37B	8388			11/13/1927	CAN	SPR				17N	46E	0.15	STK		0.00	0.00		NY	SCHMIDTLEIN GEORGE W.
	15635			5/12/1954	CAN	UG	SW	NW	18	17N	46E	0.50	MM		0.00	0.00		LA	URANIUM MINES OF AMERICA, INC.
	45910			7/12/1982	WDR	UG	NE	NE	06	17N	46E	0.05	STK		0.00	3.65	MG	LA	WOLF RANCH

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NEVADA DIVISION OF WATER RESOURCES
WATER RIGHTS DATABASE

SPECIAL HYDROGRAPHIC ABSTRACT

Run Date: 8/20/2004

Selection Criteria : pod_twn in ('18N') and pod_rng in ('44E') order by basin,m.app

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
056	15501			2/15/1954	DEN	STR		LT06	06	18N	44E	1.00	MM		0.00	0.00		LA	URANIUM MINES OF NEVADA CO.
	16958			6/8/1956	WDR	SPR	SE	SW	06	18N	44E	0.00	MM		0.00	0.00		LA	APEX URANIUM
	16959			6/8/1956	WDR	SPR	SW	SW	06	18N	44E	0.00	MM		0.00	0.00		LA	APEX URANIUM
	V03469			8/22/1980	VST	SPR	SW	NE	06	18N	44E	0.02	STK		0.00	0.00		LA	USFS
	V03470			8/22/1980	VST	SPR	NE	SW	06	18N	44E	0.02	STK		0.00	0.00		LA	USFS
	V03471			8/22/1980	VST	SPR	SW	SW	06	18N	44E	0.02	STK		0.00	2.65	MGS	LA	USFS
	V03479			8/22/1980	VST	SPR	SW	SW	04	18N	44E	0.02	STK		0.00	0.00		LA	USFS
137B	3185			11/27/1914	CAN	STR	SE	NW	34	18N	44E	1.00	PWR		0.00	0.00		LA	CAHILL, JOHN H. MRS.
	3418			6/4/1915	CAN	SPR	SE	SE	23	18N	44E	0.01	MM		0.00	2.35	MG	NY	OLSON, JOHN B.
	5701			9/2/1919	CAN	STR	SE	NE	26	18N	44E	1.00	MM		0.00	0.00		LA	NEVADA BIRCH CREEK MINING CO.
	6056			4/14/1920	WDR	STR	NE	NW	29	18N	44E	0.90	IRR		80.00	0.00		LA	ARENA, LINO P.
	6057		3788	4/14/1920	CER	STR	NE	SE	20	18N	44E	0.08	IRR		7.50	22.72	AFA	LA	BUREAU OPERATING CO.
	9254			5/3/1930	CAN	STR	SW	SE	35	18N	44E	2.00	MM		0.00	0.00		LA	GRIMES, FLOYD K.,TANDY, D.H.
	20042		5401	8/17/1961	CER	STR	SW	SE	13	18N	44E	2.70	IRR		56.30	225.20	AFA	LA	STRESHLEY, LEROY A.
	21311		6413	5/29/1963	CER	SPR	SE	NE	03	18N	44E	0.01	DOM		0.00	1.00	MG	LA	USFS
	40667			2/25/1980	CAN	SPR	NW	SE	23	18N	44E	0.01	STK		0.00	1.46	MG	LA	7-K RANCHING CORP.
	41045			4/9/1980	CAN	SPR	SE	SW	22	18N	44E	0.01	STK		0.00	0.00		EU	7-K RANCHING CORP.
	61430			7/28/1995	PER	UG	NW	NE	02	18N	44E	0.10	QM		0.00	0.20	MGS	LA	USFS
	V03265			10/3/1979	VST	SPR	NE	NW	02	18N	44E	0.03	STK		0.00	0.00		LA	USFS
	V03266			10/3/1979	VST	SPR	SW	SW	01	18N	44E	0.02	STK		0.00	0.00		LA	USFS
	V03267			10/3/1979	VST	SPR	NW	NE	01	18N	44E	0.02	STK		0.00	1.77	MGS	LA	USFS
	V03268			10/3/1979	VST	SPR	SW	SW	02	18N	44E	0.02	STK		0.00	0.00		LA	USFS
	V03270			10/3/1979	VST	SPR	NE	SE	23	18N	44E	0.02	STK		0.00	0.00		LA	USFS
	V03271			10/3/1979	VST	SPR	SW	SW	14	18N	44E	0.02	STK		0.00	3.07	MGS	LA	USFS
	V03477			8/22/1980	VST	SPR	SE	NE	09	18N	44E	0.02	STK		0.00	2.65	MGS	LA	USFS
	V03478			8/22/1980	VST	SPR	SE	SE	08	18N	44E	0.02	STK		0.00	1.15	MGS	LA	USFS
	V04098			7/18/1983	VST	SPR	SW	SE	02	18N	44E	0.02	STK		0.00	0.00		LA	USFS
	V06005			9/17/1993	VST	STR	SE	SW	35	18N	44E	0.10	STK		0.00	0.02	MG	NY	USFS

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NEVADA DIVISION OF WATER RESOURCES
WATER RIGHTS DATABASE

SPECIAL HYDROGRAPHIC ABSTRACT

Run Date: 8/20/2004

Selection Criteria : pod_twn in ('18N') and pod_rng in ('45E') order by basin,m.app

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
056	21953			4/14/1964	CAN	UG		N2	26	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	RICHARDS, LEE A.
137B	11572			5/6/1946	DEN	UG	SW	NW	25	18N	45E	0.10	STK		0.00	0.00		LA	GIVENS, EDITH, MRS.,PETERSEN, W.L.,STRESHLEY, MARIE, MRS.
	11613			6/14/1946	CAN	STR	SW	SE	18	18N	45E	10.00	IRR		160.00	0.00		LA	PETERSEN, W.L.
	11712			10/29/1946	WDR	STR	NW	SW	25	18N	45E	1.60	IRR		160.00	0.00		LA	PETERSEN, W.L.
	12912			5/10/1949	WDR	UG	SW	SE	25	18N	45E	5.00	IRR		320.00	0.00		LA	HUBBERT, EDGAR T.
	12967			6/17/1949	CAN	UG	SW	SW	25	18N	45E	3.00	IRR		300.00	0.00		LA	HARDFORD, BOYD
	13052		3899	9/23/1949	CER	UG	NW	SW	20	18N	45E	0.00	DOM		0.00	0.46	MG	LA	KALTENBACH, ANDREW P.,KALTENBACH, GLORIA M.
	18253			8/17/1959	WDR	UG	NW	SW	20	18N	45E	1.00	IRR		0.00	0.00		LA	ANDERSON, CARL
	26260		8395	8/16/1971	CER	SPR	SW	SE	18	18N	45E	0.01	STK		0.00	1.34	MG	LA	BUREAU OPERATING COMPANY
	28998		9735	12/5/1974	CER	UG	NW	SW	20	18N	45E	0.50	QM		0.00	6.95	MG	LA	KALTENBACH, ANDREW P.
	31662			5/12/1977	CAN	UG	NW	SE	23	18N	45E	5.40	IRC		320.00	0.00		LA	KIELHACK, JAMES M.,KIELHACK, RENOTHA K.
	31663			5/12/1977	CAN	UG	NW	SE	22	18N	45E	5.40	IRC		320.00	0.00		LA	BERTOLINO, CHARLES,BERTOLINO, CHRISTOL
	31664			5/12/1977	CAN	UG	SW	NE	34	18N	45E	5.40	IRC		320.00	0.00		LA	KIELHACK, JAMES M. JR.,KIELHACK, M. D.
	31665			5/12/1977	CAN	UG	NW	SE	26	18N	45E	5.40	IRC		320.00	0.00		LA	DREW, CYNTHIA,DREW, LEE
	31666			5/12/1977	CAN	UG	SW	NE	36	18N	45E	5.40	IRC		320.00	0.00		LA	CIRAC, DON,CIRAC, PAUL
	31667			5/12/1977	CAN	UG	SW	NE	33	18N	45E	5.40	IRC		320.00	0.00		LA	CHARBONNEAU, FLORINE,CHARBONNEAU, MEL
	31671			5/12/1977	CAN	UG	NW	SE	27	18N	45E	5.40	IRC		320.00	0.00		LA	POPE, C.L.,POPE, PATSY
	31674			5/12/1977	CAN	UG	SW	NE	35	18N	45E	5.40	IRC		320.00	0.00		LA	CHARBONNEAU, LORRI L.,CHARBONNEAU, ROBERT B.
	32739			7/7/1977	CAN	UG		NE	32	18N	45E	4.90	IRC		320.00	0.00		LA	POTTS, DONALD B.,POTTS, JEANNE
	32802			7/14/1977	CAN	UG	NE	NW	32	18N	45E	5.40	IRR		320.00	0.00		LA	POTTS, DONALD,POTTS, JEANNE
	37108			3/20/1979	WDR	UG	NW	NW	34	18N	45E	5.40	IRR		320.00	0.00		LA	REESE, OSCAR N.
	37109			3/20/1979	WDR	UG	NW	NW	34	18N	45E	5.40	IRR		320.00	0.00		LA	REESE, CHARLOTTE L.
	39055			9/13/1979	WDR	UG	NW	NW	34	18N	45E	5.40	IRR		320.00	1,280.00	AFA	LA	REESE, OSCAR
	39056			9/13/1979	WDR	UG	NW	NE	34	18N	45E	5.40	IRR		320.00	1,280.00	AFA	LA	REESE, CHARLOTTE L.
	40650			2/25/1980	CAN	SPR	SW	SE	09	18N	45E	0.01	STK		0.00	1.46	MG	LA	7K RANCHING CORP.
	41474			6/6/1980	CAN	UG	NW	NW	34	18N	45E	5.40	IRD		320.00	0.00	*	LA	REESE, OSCAR
	41475			6/6/1980	CAN	UG	NW	NE	34	18N	45E	5.40	IRD		320.00	0.00	*	LA	REESE, CHARLOTTE L.
	41841			7/21/1980	CAN	UG	SE	SW	23	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	PECK, CHARLOTTE
	41842			7/21/1980	CAN	UG	SE	NW	23	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	PECK, RUSSELL
	41843			7/21/1980	CAN	UG	NE	NW	35	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	PECK, STEPHEN
	41844			7/21/1980	DEN	UG	SE	SW	13	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	PECK, EMMA
	41845			7/21/1980	CAN	UG	SE	NE	33	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	BUTTERFIELD, CAROL
	41846			7/21/1980	CAN	UG	SE	NW	33	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	CRIPE, JOHN E.
	41847			7/21/1980	CAN	UG	NE	SW	35	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	CRIPE, DANIEL EARL
	41848			7/21/1980	CAN	UG	NE	NW	21	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	CRIPE, GEORGE R.
	41849			7/21/1980	CAN	UG	SW	SW	21	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	CRIPE, ELIANE ANDREE

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
137B	41850			7/21/1980	DEN	UG	NE	NW	27	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	CRIPE, DOUGLAS GEORGE
	41851			7/21/1980	DEN	UG	SW	SW	15	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	LEACH, JACK P.
	41852			7/21/1980	DEN	UG	NW	NW	15	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	LEACH, CORNELIA
	41853			7/21/1980	DEN	UG	NE	SW	12	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	BRADLEY, L. DOROTHEA
	41854			7/21/1980	DEN	UG	NE	NW	12	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	BRADLEY, HARRY J.
	41855			7/21/1980	DEN	UG	NE	NE	31	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	VANDERVORT, FRANK
	41856			7/21/1980	DEN	UG	SW	SW	31	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	VANDERVORT, PAT
	41953			7/30/1980	DEN	UG	SE	SW	27	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	TARO, ANTONIO S.
	42429			9/12/1980	WDR	UG	NW	NE	34	18N	45E	5.40	IRR		320.00	0.00		LA	REESE, CHARLOTTE L.
	42430			9/12/1980	WDR	UG	NW	NW	34	18N	45E	5.40	IRR		320.00	0.00		LA	REESE, CHARLOTTE L.
	42980			12/19/1980	DEN	UG	SW	NE	25	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	BRADLEY, CAROL M.
	45344			2/22/1982	CAN	UG	SW	NW	20	18N	45E	0.25	QM		0.00	5.47	MG	LA	FRONTIER TAVERN AND TRUCK STOP,KALTENBACH, ANDREW
	46753			3/21/1983	ABR	UG	NW	NW	34	18N	45E	0.00	IRD		320.00	0.00	AFA	LA	REESE, OSCAR N.
		CHANGE BY:	49032		ABR	UG													
	46754			3/21/1983	ABR	UG	NW	NE	34	18N	45E	0.00	IRD		320.00	0.00	AFA	LA	REESE, CHARLOTTE L.
		CHANGE BY:	49031		ABR	UG													
	47289			10/3/1983	DEN	UG	NW	SW	32	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	YOUNG, JANET D.
		CHANGE BY:	49677		DEN	UG													
	49677	47289		2/3/1986	DEN	UG	NW	SW	32	18N	45E	5.40	IRD		320.00	1,280.00	AFA	LA	YOUNG, JANET D.
	R06741			6/20/1994	RES	SPR	SW	NE	29	18N	45E	0.01	OTH		0.00	2.19	MG	LA	BLM
	R06742			6/20/1994	RES	SPR	SW	SW	09	18N	45E	0.01	OTH		0.00	2.19	MG	LA	BLM
	V03269			10/3/1979	VST	SPR	SW	SW	05	18N	45E	0.02	STK		0.00	0.00		LA	USFS
139	1871		88	11/10/1910	CER	SPR		NE	25	18N	45E	0.03	IRR		2.00	8.00	AFS	LA	DAMELE, PETER

- - End of Report - -

NEVADA DIVISION OF WATER RESOURCES
WATER RIGHTS DATABASE

SPECIAL HYDROGRAPHIC ABSTRACT

Run Date: 7/28/2004

Selection Criteria : pod_twn in ('18N') and pod_rng in ('45EH') order by basin,m_app

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
37B	11571		3234	5/6/1946	CER	UG	SE	SE	01	18N	45EH	0.05	STK		0.00	10.95	MG	LA	PARSONS, CHARLES W.,PARSONS, MARY F.

--End of Report--

NEVADA DIVISION OF WATER RESOURCES
WATER RIGHTS DATABASE

SPECIAL HYDROGRAPHIC ABSTRACT

Run Date: 8/20/2004

Selection Criteria : pod_twn in ('18N') and pod_rng in ('46E') order by basin,m.app

BASIN	APP	CHANGE OF APP	CERT	DATE	STAT	SRC	POINT OF DIVERSION QQ	QTR	SEC	TWN	RNG	DIV RATE (CFS)	TYPE OF USE	SUP	IRRIGATED ACRES	ANNUAL DUTY	UNIT	CO	OWNER OF RECORD
137B	V03480			8/22/1980	VST	SPR	NW	SW	35	18N	46E	0.02	STK		0.00	1.11	MGS	LA	USFS

- - End of Report - -