

BiState Sage Grouse

Minerals Report

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for:
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Humboldt-Toiyabe National Forest,
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Nevada BLM
Bi-State Sage Grouse Analysis Area

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Introduction to Mineral Resources

Mineral resources can be broadly broken down into discretionary and non-discretionary actions. Discretionary actions include saleable and leasable minerals, while non-discretionary actions are locatable minerals. Discretionary actions are not legally mandated and can be influenced by agency's judgment or preference, whereas, non-discretionary actions the agency is legally mandated to act as part of required duties without exercise of personal judgment or preference.

Overview of Issues Addressed (Economics)

Mineral resource actions are largely external proposals to extract or use a specific mineral resource for economic purposes that lead to meeting the needs of both local communities and the nation. Small numbers of mineral resources actions are agency proposals, usually for sand and gravel to maintain or create roads, dams, and construction sites. Most mineral resource proposals include some amount of temporary or long-term surface disturbance, including noise and visual impacts. These impacts may affect sage grouse if they are in their habitat or close enough to leks to impact breeding activity.

Affected Environment

Existing Condition

General Geology of the Project Area:

Physiography

Most of the project area lies within the western portion of the Basin and Range physiographic province and lesser amounts of the uplifted Sierra Nevada province. The Basin and Range physiographic province roughly corresponds in proximity to the Great Basin, a contiguous watershed region between the Sierra Nevada and the Rocky Mountains that has no natural outlet to the sea. Extensional forces started about 17 million years ago (Ma) which created the Great Basin. These forces have resulted in the present-day landscape of alternating mountain ranges and deep, sediment filled basins bounded by steep dipping north-south range front faults which characterize the much of the Great Basin.

Geologic Overview

The oldest rocks in the project area are Precambrian (greater than 540 Ma) schists. Paleozoic (250 to 540 Ma) rocks are present in areas, but Mesozoic (65 to 250 Ma) age rocks comprise the most extensive pre-Tertiary (greater than 65 Ma) outcrops exposed within the Great Basin portion of the project area. Mesozoic rocks in the Great Basin Province consist of Triassic (201 to 250 Ma) and Jurassic (145 to 201 Ma) metasedimentary and metavolcanic rocks and Jurassic and Cretaceous (65 to 145 Ma) granitic rocks. Over much of the project area, these Mesozoic granitic and metamorphic rocks are overlain by an extensive sequence of Cenozoic (younger than 65 Ma) volcanic and interbedded sedimentary rocks. All of these rocks have been exposed to extensive folding and faulting from multiple tectonic events that have affected the region (modified after BLM 2013). The project area is bounded on the west by Mesozoic plutonic rocks of the Sierra Nevada Batholith (CA state map) that have been partially overlain by Cenozoic volcanic rocks.

Zones of crustal weakness are important targets for precious metal exploration because they represent major conduits for the hydrothermal activity associated with ore deposit formation. The

local and regional stresses occurring in these zones are also important in providing the mechanical ground preparation required for ore deposit emplacement. As a result, the Walker Lane structural zone is associated with the occurrence of many precious metals deposits that have been discovered within the project area as evidenced by the past establishment of numerous historic mining districts.

Mineral Potential of the Project Area:

Mineral potential is described in detail in an extensive report completed for the BLM Carson City District which covers most of the eastern half of the study area. In summary the report described the mineral potential for geothermal to be high while oil & gas is low. Solid leasable mineral potential is low while saleable minerals are moderate to high depending on the commodity. Locatable minerals have an important role in the past and will continue to have some role in the future with at least moderate potential (BLM 2013). Some commodities such as gold would have a high potential. Mineral potential of the western half of the project area Forest Service lands is much the same as the eastern half due to the similar geology and the basin and range setting. Saleable sand and gravel deposits are much less common on the Forest Service lands due to the steep terrain. Although, geothermal and locatable minerals have a high potential as on the BLM administered lands (CA gold map, Geothermal potential map).

The Forest Service and BLM Minerals Programs:

On federal lands, mineral resources are governed by the General Mining Law of 1872, as amended; those portions of the FLPMA that affect the General Mining Law; Mineral Leasing Acts of 1920, as amended; the Mineral Material Acts of 1947, as amended; the Surface Resources Act of 1955 and The Mining and Minerals Policy Act of 1970. Oil & gas leasing is guided by the Energy Policy Act of 2005. Geothermal leasing is guided by the Geothermal Steam Act of 1970 (30 USC 1004), as amended; by the Energy Policy Act of 2005, and other laws, regulations, orders and policies.

The Forest Service manages oil and gas operations on National Forest System lands under 36 CFR 228 Subpart E. Mineral leasing operations are guided by Forest Service Manual 2820 and mineral prospecting, including geophysical activities is guided by Forest Service Manual 2860. Locatable minerals and surface management regulations fall under 36 CFR 228 Subpart A and Forest Service Manual 2810. Mineral materials are regulated under 36 CFR 228 Subpart C and Forest Service Manual 2850 (USFS, 2012).

Proposed actions on either Forest Service or BLM administered lands can be divided into discretionary and non-discretionary actions. Locatable exploration and mining are non-discretionary and a reasonable plan of operations must be processed and approved if the mineral estate is open to entry, whereas all other actions are discretionary and the land management agency can choose to permit as proposed, modify, or disallow the proposal.

Discretionary Actions

Mineral Materials (Saleable)

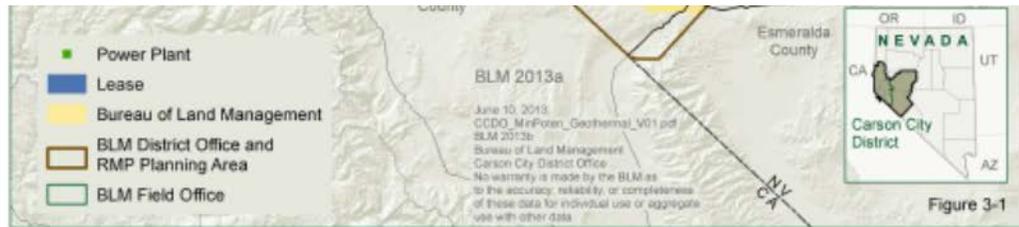
Mineral materials are common variety minerals are commonly referred to as sand and gravel, aggregates, or mineral materials, and consist of common varieties of sand, stone, gravel, cinders, clay, diatomite, pumice and pumicite as described under the Materials Act of 1947 and the

Surface Resources Act of 1955. Salable minerals on both BLM and Forest Service administered lands are made available by sale contracts or free use permits.

Most of the current mineral material products in the study area are small sand and gravel sales, free use permits and Nevada Department of Transportation (NDOT) gravel material sites (BLM 2013 b). NDOT has about 86 gravel pits for 7,300 acres in the study area of which 11 pits are in habitat for 1850 acres. The Forest Service currently has no operating saleable sites in the project area and only occasionally use mineral material sites for road maintenance purposes.

The BLM manages several operating plans for clay, cinder, perlite, and several large competitive gravel sale pits outside the study area (BLM 2013).

Leasable Minerals



Solid Minerals

Solid leasable minerals include phosphate, coal, oil shale, native asphalt, sodium, potassium, sulfur, and nitrate. There are currently no authorized leases for these commodities within the study area. However, there is one exploration application received in 2012 for potassium from alunite on Forest Service lands within the study area. The BLM and Forest Service processed portions of the application, although there has been no response from the applicant since 2012.

Applicants make requests to the BLM on both Forest Service and BLM lands to prospect for solid leasable minerals. If the prospecting area is on Forest Service lands then the BLM requests the Forest Service as a cooperating agency on the environmental analysis to recommend conditions of approval and stipulations to be attached to the lease. BLM may modify the Forest Service's recommendations or choose not to lease the land depending on the analysis.

Coal even though it is a solid leasable commodity is leased under specific guidance for coal only. If the Forest Service decides that the area is not open to leasing then the BLM is not allowed to lease the area.

Fluid Minerals

Fluid leasable minerals include oil & gas and geothermal resources including oil shale and shale gas.

Oil and gas. The BLM has completed a leasing decision for oil & gas for the BLM lands in the study area, whereas the Forest Service lands have no leasing decision. There are no authorized oil & gas leases in the study area and there is low potential for discoveries (BLM 2013). Therefore, there is also no reasonable foreseeable development scenario for the study area.

Geothermal. Geothermal energy has been the bulk of the leasable exploration and development in the study area. Leasing decisions have been made on both the BLM lands (BLM 2008) and the Bridgeport District portion of the Forest Service lands (USFS 2012). Most of the leases have been offered competitively for electrical generation that will then be transported by power lines to municipalities in Nevada and California if ever developed. There are approximately 143,300 acres of geothermal leases within the study area. There are currently three geothermal leases inside the habitat consisting of approximately 7,614 acres. This equates to about 5% of the current leased acres are within the habitat.

There are no existing power plants in the modified study area. Although, within a short distance to the north and east of the study area there are several power plants. The state of Nevada contains 563 leases for 1,187,190 acres and 26 producing leases for geothermal electrical energy production in 2012. There are also four geothermal projects on BLM lands in the study area: Alum, Clayton Valley, Hawthorne and Silver Peak (Johnson 2012)(Geothermal maps). Important geothermal resource areas on Forest Service lands include North and South Aurora and Wilson Hot Springs.

Reasonable Foreseeable Development Scenario

Reasonable Foreseeable Development Scenarios (RFD) have been created for the BLM lands (BLM 2006, BLM 2008, BLM 2013) and for the Bridgeport District of the Forest Service lands (BLM 2008, USFS 2012, USFS 2012b).

Previous RFDs in the BLM 2008, USFS 2012, and USFS 2012b have likely overestimated the production of electricity by 2015. The Carson City District BLM Mineral Potential Report (BLM 2013) completed in 2013 is the most recent RFD and is 1.8 million acres larger than the study area. Therefore, the RFD appropriate for this study area was reduced to three 15-MW power plants. The Carson City BLM RFD is largely reiterated here for convenience. This RFD envisions that over the next 20 years, exploration drilling would occur on all geothermal leases, some of which lead to more detailed exploration drilling, and a few of which lead to the discovery of geothermal resources capable of developing three 15-MW geothermal power plants for a total of 45-megawatts. The 15-megawatt power plant is used as a typical size to estimate the amount of disturbance that could be involved for the RFD. These calculations are meant to be used as an indicator of the impacts involved, not as a cap or bound on the size of any geothermal power plant development. The discussion below looks at the potential surface disturbances from this scenario, and then the other potential environmental impacts from development of the resources.

Surface Disturbance

Exploration

During the exploration stage, surface disturbance is minimal with few adverse impacts until the decision is made to drill one or more exploration wells. An exploration drilling impact evaluation is shown in Table A-1, Geothermal Exploration Drilling Disturbance, which lists the maximum degree of anticipated surface disturbance expected during this phase.

**Table A-1
Geothermal Exploration Drilling Disturbance**

Activity	Acres of Disturbance (Acres)	Unit per Lease	Total Acres Disturbed per Lease	Total Acres Disturbed with Two Leases Explored Per Year
Exploration Roads	1 acre/mile	3 0.5-mile roads	1.5	3
Shallow Temperature Gradient or Exploration Flow Test Well (several 100 to several 1000 feet deep)	1 acre/drill site	3 drill sites	3.0	6
Total			4.5	9

If we assume that as many as three temperature gradient or exploration flow test wells would be drilled on each lease. This would disturb as much as three acres (one acre per drill site). Three new access roads, each 0.5 mile in length, would disturb an additional 1.5 acres. Therefore, the total disturbance per lease is approximately 4.5 acres (Table A-1). Exploration drilling surface impacts are transitory in that unsuccessful exploration programs are abandoned and the surface impacts are reclaimed usually within a two year period. Components from successful exploration programs can be used through the development process, frequently using the existing surface disturbances for some of the development activities. There may be numerous leases on which exploration drilling takes place; however, it is unlikely that they would not all be drilled at the same time. If we assume that over the next 20 years 40 geothermal leases are drilled, a total of 120 exploration holes would be drilled. If we assume that these holes would be drilled evenly over the entire 20 year period, 6 holes would be drilled per year. If we further assume that unsuccessful exploration holes are reclaimed within a 2-year period, then there would never be more than 12 drill pads disturbed at any one time. Table A-1 summarizes anticipated individual and cumulative impacts for the exploration drilling.

Development

The following describes the construction activities required to develop five 15-24 megawatt electrical power generating plants, associated wells, pipelines, roads, and electrical transmission lines. The number of wells includes those used for production, standby, and reinjection. Since development is likely to occur in about 5-MW increments over a period of several years, the degree of surface disturbance at any given time is less than that presented in Table A-2, Surface Disturbance from Construction of a Geothermal Power Facility. Mitigation and enhancement would have occurred in some portions of the lease before additional portions of the lease are developed.

Table A-2
Surface Disturbance from Construction of a Geothermal Power Facility

Facility or Feature	Facilities or Features/Plant	Disturbed Acres Per Feature or Facility	Disturbed Acres for Overall Power Plant Infrastructure	Total Disturbed Acres for 5 Power Plant Facilities
Power Plant	1	30	30	150
Wells	6	5	30	150
Cooling Pond	1	5	5	25
Pipelines	3	5	15	75
Access Road (spurs)	3	7	21	105
Mainline Road	1	10	10	50
Transmission Line	1	10	10	50
Total			121	605
Schedule				

The various time frames for a typical geothermal project are estimated as follows:

Exploration: 1 to 5 years

Development: 2 to 10 years

Production: 10 to 30 years (depending on construction time)

Up to 6 production or injection wells could be drilled on each lease. Each well pad would disturb approximately 5 acres, and a mainline road would disturb approximately 10 acres. Each of 3 pipelines would disturb approximately 5 acres and each of 5 access roads would disturb approximately 7 acres. A power plant would occupy approximately 30 acres, a disposal pond would disturb approximately 5 acres, and a 25-mile transmission line would disturb approximately 10 acres. Total surface disturbance for each plant for this phase of operation would total approximately 121 acres (Table A-2). Again, not all power plants would be constructed at the same time, and construction would likely be staged in 5-MW increments. Until actual geothermal exploration and development begin, it is difficult to quantify the resource potential and possible future intensified production measures necessary to develop the resources (BLM 2013).

Reasons that support choosing this RFD above

Reasonable Foreseeable Development Scenarios (RFD) have been created for the BLM lands (BLM 2006, BLM 2008, BLM 2013) and for the Bridgeport District of the Forest Service lands (BLM 2008, USFS 2012, USFS 2012b). Earlier versions of the RFD for portions of the study area have overestimated the total electrical production of the area. BLM 2008 Estimates for 2015 production for the Aurora area is 120 megawatts and 10 megawatts for the Wilson Hot Springs. Both of these areas have been drilled but with no production proposed and exploration has slowed considerably. Numerous other districts on Nevada BLM lands have 2015 estimates that are much higher than actual to date. Estimates of production were also made in the USFS 2012 and 2012b documents in the Bridgeport District and Aurora area respectively. No production is proposed for either of these areas. Since the BLM 2013 RFD is the most recent and based on updated analysis

and actual disturbances it is proposing a much reduced electrical production but yet still optimistic. The Carson City BLM District has one of the most active geothermal districts in the United States (BLM 2013). The Basin and Range setting, important fault patterns, high heat flow (heat flow map) and geologic units (NV-CA geo maps) for the study area are very similar to the remainder to the Carson City District. The BLM administered portion of the Carson City District is roughly 4.8 million acres (BLM 2013) and the study area for the bistate stage grouse is about 3 million acres. Since the recent Carson City RFD estimated that five 15 megawatt plant may be established in the next 20 years over 4.8 million acres then three 15 megawatt plants for the study area over 3 million acres would be a reasonable proportion to the Carson City RFD.

Non-discretionary actions:

Locatable

Locatable mineral commodities produced in the project area include gold, silver, copper, iron, tungsten, silica, lead, and zinc (BLM 2012 b). Nevada is a major producer of precious metals and is currently ranked as the third or fourth largest gold producing region in the world in terms of its annual production. In 2010 Nevada produced 5.3 million ounces of gold by far out-producing any other state, and it also produced 7.3 million ounces of silver and over 127 million pounds of copper (Johnson 2012). Past exploration and production of the following commodities have also occurred in or near the study area: antimony, arsenic, beryllium, graphite, magnesium, manganese, mercury, molybdenum, nickel, cobalt, thorium, rare earth elements, titanium, uranium, vanadium, barite, borates, limestone, diatomite, fluorspar, gypsum, kyanite/aluminous refractories, perlite, pyrophyllite, and turquoise (BLM 2013).

Three BLM active plans of operation fall within the project area of the Carson City District related to precious metals exploration. The project names are Candelaria (600 acres), Buckskin Mine (18 acres) and Bovie Lew (10 acres). One copper plan of operations is also partly in the planning area called the MacArthur Pit (43 acres) (BLM 2013).

The Candelaria mine historically produced 68 million ounces of silver and has been reclaimed since 1998. Silver Standard is actively exploring this site (SilverStandard, 2014). At the Buckskin Mine 199,000 metric tons were shipped for processing in 2008 (Infomine, 2014). The Bovie Lew Mine was a historic placer mine (findthedata.org, 2014).

The Battle Mountain District also has three mines within the study area including the Mineral Ridge Mine, Silver Peak Lithium Mine and Basalt Diatomite Mine. The Mineral Ridge Gold Mine is currently an open-pit heap leach facility located in the southern portion of the study area and would produce 30,000 ounces of gold /year for the next three years (Scorpio Gold 2014). In 2011 the Mineral Ridge Mine had 46 employees and produced 13,951 ounces of gold and 7907 ounces of silver (NBMG 2012).

The Silver Peak Lithium Mine on BLM and private lands produces up to 6,000 tons per year of lithium carbonate equivalent from brines (NDEP 2012). About one third of the project falls within the study area. Silver Peak lies near a dry lake bed that is rich in lithium and other minerals and is currently the only operating source of lithium in the United States. The mine is being expanded to double the capacity of its lithium carbonate production. The project is funded in part by a \$28.4 million grant from the U.S. Department of Energy to expand and upgrade the production of lithium materials for advanced transportation batteries (Wikipedia 2014).

One diatomite mine is in the study area called the Basalt Mine and operated by Grefco Minerals Inc., (Visher and Conyer 2012).

Twenty-five plans of operation are active on the USFS in Nevada (USFS, 2012) and five in California. The Borealis Mine located on Forest Service administered lands restarted gold production in 2012 from reworking previous heap leach ore. Gold production in the first quarter of 2013 was approximately 3300 ounces (Gryphon 2013). The Esmeralda Mine is a historic gold producer from underground and open pits. Currently only the mill is processing ores from other parts of the State and no mining is taking place on site. The Pine Grove project is an advanced stage gold resource largely on private land. The company plans to place the future mine facilities, heap leach and waste rock on Forest Service administered lands (personal communication Bridgeport District Geologist). Pine Grove has a measured and indicated resource of 203,900 ounces of gold (Lincoln Gold webpage). The Forest Service is processing a proposal to drill condemnation holes, monitor wells, and soil tests at this site. The Lucky Boy Silica mine is producing silica from a unique clean quartz site for Hardie Board used to make house siding and backer board. The mine is currently on private land and abuts Forest Service administered land.

The Forest Service is also actively processing a plan of operations for the specialty clay mine within habitat that could be used as a fertilizer additive, cattle feed supplement and other uses.

Active mining claims in the project area numbered about 17,000. Each claim is a maximum of about 20 acres. So the maximum area held under active locatable mining claims is approximately 340,000 acres or 530 square miles.

Data searches completed and data presented:

	Data source/search method	Alpine, CA	Mono, CA	Carson City, NV	Douglas, NV	Esmeralda, NV	Lyon, NV	Mineral, NV	total
Persons in the mining sector	Jim Winfrey	0	35		35	15	45	6	
Persons employed at Major Mines in the project area	Visher, M. and Coyner, A., 2012, Major Mines of Nevada 2011					Silver Peak Lithium and Basalt Mine Diatomite 78		Borealis gold mine 37	

Wabuska Geothermal power plant employees	Manta website						4		
Active mining claims in the project area									17000
Active mining claims estimated in the habitat	LR2000								6800
Active plans of operation in the project area									30
Number of mining districts in the entire county	LR2000	8	9	5	10	36	18	41	
O&G leases in the entire county	LR2000	0	0	0	0	23/44980 acres	0	5/10660	
Geothermal leases in the entire county	LR2000	0	11		0	68	23	34	
Geothermal leases in habitat	LR2000	0	0	0	0	0	1/1892	3/6260	
Geothermal lease parcels in the non-	Nicholas Connelly					90433	10149	35125	135707

habitat acres total									
Geotherm al lease parcels in habitat acres	Nicholas Connelly						2550	5064	7614
NDOT Mineral Material sites in non- habitat acres	Nicholas Connelly/ NDOT		5	40	743	1508	1664	1502	5462
NDOT Mineral Material sites in habitat acres	Nicholas Connelly/ NDOT				624	100	120	1010	1855
communit y pits in CC district project area	Mineral potential report for CCD				1	0	3		
Mineral Material pits in entire county not likely to include NDOT sites	LR2000	1	17		8	8	20	14	

Desired Condition

Environmental Consequences

Methodology

The Proposed Action limitations and mitigations impacts on exploration, development and mining or geothermal energy production will be analyzed by comparing the number of minerals projects, mining claims, leases and so forth to the number of those within the study area. This will help to indicate the intensity of the impact. The types of impacts the proposed action will have on the minerals program will also be examined by explaining the usual types of limitations and mitigations that may be applied. This discussion will help identify the context and magnitude.

Incomplete and Unavailable Information

There is generally adequate information available on geothermal drilling projects, active mines and other minerals projects that may impact this analysis. There is no or poor information on how much gravel is removed annually from the gravel pits.

Spatial and Temporal Context for Effects Analysis

The effects analysis and cumulative impacts are discussed for the area within the study boundary. The no action alternative will describe the current condition of the minerals activities which include current exploration, development, and mining or geothermal energy production in the study area. The proposed action will be analyzed by evaluating the implementing objectives, guidelines, and standards on the minerals projects and potential future impacts on the minerals program.

Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions:

Vein silver and gold deposits were the most important discoveries in the 1850s to the early 1900s as they accounted for almost all the precious metal production. In the early 1970s, when the price of gold was allowed to react to market demand the price fluctuated significantly and investors began to encourage expansion of gold exploration and mining again in Nevada. Since the early 1900s the emphasis of exploration shifted to finding and developing large, low-grade deposits, which became economical using cyanide heap leach methods for gold and silver recovery. Exploitation of these large low grade precious metal deposits peaked in the study area in the mid-1990s (BLM 2013 b).

In the study area, nonmetallic minerals activity began in the early 1860s with the exploitation of salt deposits from playa lakes at various locations in Churchill and Mineral counties (BLM 2013 b). Sand and gravel pits have been in existence for some time as there are abundant deposits near particular elevations largely on BLM administered lands associated with ancient lake deposits. No past actions are known that limit the availability of mineral resources.

Present Actions:

Nonmetallic (industrial) salable minerals produced in the study area and surrounding area include salt, borates, gypsum, fluorite, clay, zeolite, limestone, and diatomite (BLM 2013 b). Most of the saleable products are from numerous small pits excavating sand and gravel for road maintenance and construction. There are no leases for oil & gas activity or solid leasable minerals in the study area.

There are various exploration notices and plans of operation for locatable minerals in the study area. Several small operating mines include the Basalt (diatomite) Mine, Silver Peak Lithium Mine on BLM lands and the Borealis Gold Mine, and Esmeralda Mine on Forest Service lands.

Active geothermal projects include the Aurora and Wilson Hot Springs on Forest Service lands and the Silver Peak, Alum and Clayton Valley projects on BLM lands. The Humboldt-Toiyabe National Forest Geothermal Leasing EIS was completed in 2012 and the Forest Service is processing some leasing requests for the BLM to consider leasing.

Reasonably Foreseeable Future Actions:

The Nevada Division of Environmental Protection (NDEP) has decided in June 2013 to grant surface disturbance for a reclamation permit consisting of 362.7 acres of private land and 4.9 acres of public land for the Pumpkin Hollow copper project near Yerington, Nevada (NDEP 2013).

Also, the Senate Committee on Energy and Natural Resources passed the Lyon County Economic Development and Conservation Act (S. 159 or "Land Bill") on June 18, 2013. This bill was introduced on January 28, 2013, and would in summary:

The Bill directs the Secretary of the Interior to convey to the city of Yerington, Nevada, identified federal land in Lyon and Mineral Counties. Designates identified federal land in Nevada managed by the Forest Service, to be known as the Wovoka Wilderness, as wilderness and as a component of the National Wilderness Preservation System and would withdraw the mineral estate from certain surrounding National Forest System Lands (Heller and Reid, 2013).

The Land Bill would convey approximately 10,400 acres of land to the City of Yerington, placing the entire Pumpkin Hollow project under local and Nevada State oversight. Combined with Nevada Copper's 1,500 acres of private land, the bill would provide approximately 11,900 acres total for mine development; power, water and road infrastructure that in turn would provide the City with lands for ancillary commercial and industrial development (Bonifacio 2013).

Preliminary feasibility studies of both open pit and underground mining for Pumpkin Hollow have been prepared and indicate a current mineable measured and indicated reserve of 27.6 million tons grading 1.49% Cu with significant amounts of gold and silver (Bryan and others, 2012).

The Forest Service is processing a plan of operations at the Pine Grove project that would serve as monitor wells, condemnation holes, and soil test holes in preparation for submitting a mine plan to the NDEP and Forest Service. The pits would be hosted on private land while much of the heap leach facilities and waste rock repositories would likely be placed on Forest Service administered lands. The gold ore has a measured and indicated resource of 203,900 ounces (Lincoln gold webpage, 2014).

Alternative 1 – No Action

Direct Effects

There are no direct effects to mineral activities under the no action alternative. Management of mineral resources would continue under the current Forest Plan and BLM RMPs.

Indirect Effects

Under the No Action alternative, mineral activities would proceed much as they are currently. The BLM would continue to use the Instruction Memorandum NV-2013-009 for Bi-State Sage Grouse for Minerals Activities (BLM 2012 c) until a plan amendment can be completed. The Forest Service would put more attention on the environmental analysis of sage grouse for each proposed action since the USFWS has made a decision on the proposed listing of the bird and its critical habitat in the near future. The Forest Service would not have the goals, objectives, guidelines, and standards to direct the future environmental analysis.

There are numerous BMPs and environmental protection measures that are in every mineral authorization to protect sage grouse and their habitat such as noxious weed mitigation, revegetation requirements, recontouring, seasonal restrictions and others.

Discretionary Actions

Fluid Minerals - Geothermal

Discretionary actions on BLM land for proposed actions and past authorized actions operators would be asked to minimize or eliminate impacts to BSSG or the PPH (Preliminary Priority Habitat). If analysis indicates more than a minor impact to BSSG then the BLM determines, in coordination with the respective state wildlife agency, that the action and mitigation measures would cumulatively maintain or enhance Bi-State DPS PPH habitat, the proposed action authorization decision must be forwarded to the Bi-State DPS technical Working Team for their review. If this group is unable to agree on the appropriate mitigation for the proposed authorization, then the proposed decision must be forwarded to the EOC, when appropriate, for its review. If the EOC is unable to agree on the appropriate mitigation for the proposed authorization, the EOC will coordinate with and brief the BLM State Director for a final decision in absence of consensus. This process will go on until a Land Use Plan (LUP) amendment is completed (BLM 2012 c).

In addition to considering opportunities for onsite mitigation, the BLM will, to the extent possible, cooperate with project proponents to develop and consider implementing appropriate offsite mitigation that the BLM, coordinating with the respective state wildlife agency, determines would avoid or minimize habitat and population-level effects (BLM 2012 c).

For geothermal proposals within the Bridgeport District of the Forest Service would use the direction in the Humboldt-Toiyabe Geothermal Leasing EIS and Decision (USFS 2012) or the

Aurora Geothermal EA Supplement and Decision (USFS 2012 b) depending on location to guide leasing stipulations, conditions of approval (COAs), and final analysis.

Fluid Minerals – Oil & Gas

The BLM's authority for approving oil and gas exploration is listed in 43 CFR 3151. The BLM's approval of oil & gas activities is subject to conditions to prevent undue or unnecessary degradation of public lands and must be consistent with the corresponding RMP and the District-wide EA for oil & gas leasing. The Forest Service has not completed an oil & gas leasing decision for any part of the study area. If a leasing decision was completed by the Forest Service then the BLM could offer areas open to leasing in a competitive bid. Currently there are no authorized oil & gas leases in the study area (LR2000).

Solid Leasable Minerals

Coal is treated as a leasable mineral whether it is on Public Domain or acquired lands, and all coal leases are sold by competitive, sealed bid. Royalties must be paid on all producing leases. The regulations governing coal management are found in the 43 CFR 3400.

The leasable solid minerals other than coal are generally minerals that are found in bedded deposits, which means that they lie in seams or beds which have lateral extent. The main types of leasable minerals are: chlorides, sulfates, carbonates, borates, silicates, and nitrates of potassium (potash) or sodium and related products; sulfur; phosphate and its associated and related minerals; asphalt; and gilsonite. These minerals are leasable on both Public Domain and acquired lands. If deposits are known to exist and to be economically workable, leases are sold competitively. If deposits are not known, a prospecting permit can be obtained on a first-come, first-served basis, which allows the permittee to explore for the mineral. If the mineral is then found in commercial quantities, a preference right lease can be issued to the permittee. Royalties must be paid on all producing leases. The regulations governing these minerals are found in the 43 CFR 3500 regulations (BLM website).

Leasable minerals located on Forest Service lands are managed by the BLM. The Forest Service is a cooperating agency on the environmental analysis and gives the BLM surface protective measures they would like incorporated into the lease. However, the BLM is not obligated to incorporate those measures.

In 2012 the BLM received a request to prospect for Alunite to potentially produce potassium that was located in the Bridgeport District of the Forest Service. After initial processing of the application the BLM has had no contact from the applicant. No other leasable mineral applications have been received by the BLM in recent years.

Mineral Materials (Saleable)

Currently there are about 90 small sand and gravel pits largely on BLM lands in the project area that are used mostly for road maintenance. About eleven of those pits are within Bi-State sage grouse habitat. Most of these pits are NDOT pits managed under ROWs granted to the Federal Highway Administration.

Nondiscretionary Actions (Locatable Minerals)

The BLM would continue to request that current holders of Notices and Plans of Operation modify their operations to avoid or minimize adverse effects on Bi-State DPS and its habitat. Operators must be informed in the request that compliance is not mandatory. New notices and plans of operation would be required to include measures to avoid or minimize adverse effects to Bi-State DPS populations and its habitat. The BLM would continue to ensure that new notices and plans of operation comply with the requirements in 43 CFR 3809 to prevent unnecessary or undue degradation (BLM 2012 c).

Cumulative Effects

The Pumpkin Hollow copper deposit discussed in reasonably foreseeable future actions is not in Bi-State sage grouse habitat and is about 10 to 15 miles from the nearest habitat and not likely to have any direct or indirect impact on BSSG. The Economic Development and Conservation Act (S. 159) could be passed at some future date and made law which in its current form would designate a wilderness area and certain other lands withdrawn from mineral entry which would benefit the BSSG by not allowing most minerals activities in the area of the wilderness and withdrawal.

There are no effects from the No Action Alternative on the management of mineral resources there would be cumulative effects for the no action alternative.

Alternative B – Proposed Action

Standards and guidelines in the proposed action would include site-specific analysis of proposed and existing activities in the amendment area. Specific standards and guidelines affecting recreation and lands special uses include the following:

Design Features and Mitigation Measures

Additional design features and mitigation measures would be determined through site specific NEPA analysis.

Alternative B and C Common Goals and Objectives

Goal 1: bi-state DPS habitat and movement corridors are managed to bring vegetation communities to their ecological site potential and to maintain or increase the species.

Objective 1a: By 2024, 200,000 acres of degraded habitat (i.e., areas with conifer encroachment, invasive annual grasses, and/or altered fire regimes) have been improved through changes in management or restoration activities to meet habitat objectives.

Objective 1b: By 2024, bi-state DPS populations will be at or above current levels.

Goal 2: bi-state DPS and habitats will benefit from standards and guidelines adopted to eliminate or reduce negative impacts and increase positive impacts from discretionary and nondiscretionary actions.

Objective 2a: By 2020, bi-state DPS productivity, survival, or use of seasonal habitats will be at least at the same level as they are in 2014.

Objective 2b: By 2019, water developments (tanks and troughs) will be designed or retrofitted to decrease the risks of drowning or disease or as breeding sites for vectors such as mosquitos.

Objective 2c: Saleable mineral pits determined to be no longer in use shall be reclaimed by the

operator to meet sage grouse conservation objectives within 5 years of such determination.

Goal 3: In habitat, fuels treatments are used as a management tool when the benefits to bi-state DPS clearly outweigh the risks; otherwise fire is suppressed in bi-state DPS habitat after life and property.

Objective 3a: By 2024, proactive fire prevention treatments will have been implemented in or adjacent to 30% of the identified habitat.

Objective 3b: By 2019, risk of unwanted fire in habitat shall be 20% lower compared to conditions in 2014.

Goal 4a: Areas at risk of conversion to a degraded, disturbed, or invaded state are declining in size and distribution.

Objective 1a: By 2024, 200,000 acres of degraded habitat (i.e., areas with conifer encroachment, invasive annual grasses, and/or altered fire regimes) have been improved through changes in management or restoration activities to meet habitat objectives.

Goal 4b: Reduction of fuel loads has reduced the risk of high severity fires in bi-state DPS habitat.

Objective 4b: Over the next 10 years areas with annual invasive grass dominance are reduced across 20,000 acres of habitat.

Goal 4c: Bi-state DPS habitat has moderate to high resilience to disturbance and resistance to invasive annual grasses.

Objective 4b: Over the next 10 years areas with annual invasive grass dominance are reduced across 20,000 acres of habitat.

Goal 5: Over the next 25 years, areas with are increasing through the implementation of integrated restoration strategies. □

Objective 1a: By 2024, 200,000 acres of degraded habitat (i.e., areas with conifer encroachment, invasive annual grasses, and/or altered fire regimes) have been improved through changes in management or restoration activities to meet habitat objectives.

Objective 4b: Over the next 10 years areas with annual invasive grass dominance are reduced across 20,000 acres of habitat.

Objective 5a: Over the next 10 years manage or restore habitat so that land cover provides adequate sagebrush habitat to meet sage grouse needs to maintain or increase current populations.

Below are the standards that apply just to minerals projects:

Alternative A – No Action	Alternative B	Alternative C
<p>Minerals General Starts Here</p> <p>Application of standards and guidelines to mineral resource management is subject to valid existing rights and in some cases technical feasibility.</p>		
No existing direction.	<p>B-Min-S-01: For new and existing leases in habitat, limit offsite noise to less than 10 decibels (dbA) above ambient measures from 2 hours before until 2 hours after at sunrise at the perimeter of a lek during active lek season.</p>	Same as B-Min-S-01.
No existing direction.	<p>B-Min-S-02: In habitat, limit offsite noise to less than 10 decibels (dbA) above ambient measures from 2 hours before until 2 hours after at sunrise at the perimeter of a lek during active lek season.</p>	Same as B-Min-S-02.
No existing direction.	<p>B-Min-S-03: Apply timing restrictions in all bi-state DPS habitat areas to avoid construction, drilling, completion, and reclamation activities, including those of exploratory wildcat wells within seasonal habitat periods.</p>	Same as B-Min-S-03.
No existing direction.	<p>B-Min-G-01: Concentrate disturbance/facilities to reduce spatial impact to habitat. The intent of the guideline is to minimize disturbance footprint wherever possible.</p>	Same as B-Min-G-01.

No existing direction.	B-Min-G-02: In connective area, maintain vegetation characteristics suitable to bi-state DPS to the extent technically feasible. The intent of the guideline is to minimize disturbance footprint wherever possible.	C-Min-S-01: In connective area, maintain vegetation characteristics suitable to bi-state DPS to the extent technically feasible.
No existing direction.	B-Min-G-03: Control fugitive dust on roads and pads. The intent of this guideline is to reduce dust where it can adversely impact habitat.	C-Min-S-02: Control fugitive dust on roads and pads.
No existing direction.	B-Min-S-04: Require a full reclamation bond specific to the site. Insure bonds are sufficient for costs relative to reclamation that would result in full restoration in habitat.	Same as B-Min-S-04.
No existing direction.	B-Min-G-04: Use areas with prior disturbance to site infrastructure. The intent of the guideline is to minimize disturbance foot print wherever possible.	C-Min-S-03: Use areas with prior disturbance to site infrastructure.
No existing direction.	B-Min-S-06: Camps for workers shall be located outside habitat.	Same as B-Min-S-06.
Fluid Minerals Starts Here No leasing decision has been analyzed for Forest Service lands. BLM has made a leasing decision.	B-Min-G-05: Limit disturbances to an average of one site per 640 acres on average, with no more than 3% total anthropogenic surface disturbances. The intent of the guideline is to minimize disturbance foot print wherever possible.	C-Min-S-04: For fluid minerals do not consent to leasing unless only under No Surface Occupancy stipulations without exceptions, modifications or stipulations.

<p>For geothermal BLM has a 2008 EIS making leasing decisions on most lands. This lease contains lands which have been identified as bi-state DPS brood rearing areas subject to seasonal protection from disturbance. Seasonal restrictions from disturbance in bi-state DPS brood rearing areas apply within 0.5 miles or other appropriate distance based on site-specific conditions from May 15 to August 15, inclusive. This restriction does not apply to operating facilities. Also, the interim IMs that address sage grouse prior to the planning decision are also applicable.</p>	<p>B-Min-S-07: Require seasonal restriction November 1 to March 1 on geophysical exploration within winter habitats.</p>	<p>Same as B-Min-S-07.</p>
<p>No existing direction.</p>	<p>B-Min-G-06: Allow geophysical exploration to obtain exploratory information for areas outside of and adjacent to habitat to provide continued opportunities outside that would not disturb bi-state DPS habitat.</p>	<p>Same as B-Min-G-06.</p>
<p>No existing direction.</p>	<p>B-Min-S-08: Require reclamation for geophysical exploration operations to meet bi-state DPS desired conditions.</p>	<p>Same as B-Min-S-08.</p>
<p>No existing direction.</p>	<p>B-Min-S-09: Apply the least invasive seismic exploratory method in habitat.</p>	<p>Same as C-MIN-S-04.</p>
<p>The BLM has completed a leasing decision for oil and gas for the BLM lands in the study area; however, there are no authorized oil and gas leases in the study area and there is no oil and gas leasing decision on the Forest Service lands.</p>	<p>B-Min-G-07: Incorporate mitigation to offset all proposed surface disturbance that would result in loss of habitat. Mitigate first within the same population area where the disturbance is realized, and if not possible, within an adjacent habitat. The intent of this guideline is to move toward desired habitat conditions when restoring habitat or mitigating disturbance.</p>	<p>Same as C-MIN-S-04.</p>

No existing direction.	B-Min-G-08: If the lease is entirely within the habitat, any development should be placed in an area that would be the least harmful to bi-state DPS, primarily through limiting ground disturbance, to minimize the disturbance footprint in habitat.	Same as B-Min-G-08.
No existing direction.	B-Min-G-09: All commercial pipelines should be buried where possible, to reduce perch opportunities for avian predators and to reduce need for linear maintenance corridors. Surface vegetation standards and guidelines would apply.	C-Min-S-5: All commercial pipelines shall be buried where possible.
No existing direction.	No proposed direction.	C-Min-S-06: Upon expiration or termination of existing leases, do not consent to leasing if inquired by the BLM.
No existing direction.	B-Min-S-10: Require reclamation of disturbed areas to meet desired conditions for habitat when facilities are no longer needed or leases are relinquished.	Same as alternative B.
No existing direction.	B-Min-G-10: Use closed-loop systems for drilling operations, with no reserve pits when technically feasible. The intent is to reduce disturbance footprint in habitat and avoid creation of poisonous water source.	C-Min-S-07: Use closed-loop systems for drilling operations, with no reserve pits when technically feasible.
No existing direction.	B-Min-G-11: Use noise shields when drilling during the lek, nesting, brood-rearing, and wintering seasons. With the intent to reduce disturbance from noise in proximity to leks, nesting, and brood-rearing habitats.	C-Min-S-08: Use noise shields when drilling during the lek, nesting, brood-rearing, and wintering seasons.

No existing direction.	B-Min-S-11: Do not authorize construction of new high-power (120 kV) transmission towers unless there are no other corridor options.	C-Min-S-09: Do not authorize new high-power (120 kV) transmission line corridors, transmission line ROWs, transmission line construction, or transmission line facility construction in habitat outside existing corridors.
No existing direction.	B-Min-S-12: Transmission towers (120 kV) must be constructed with anti-perching devices to discourage use by raptors.	Not applicable as a result of C-Min-S-09.
No existing direction.	B-Min-S-13: Do not authorize new fences unless necessary for safety or environmental protection reasons. If fences are necessary, require a safe design for bi-state DPS (e.g., marking).	Same as B-Min-S-13.
No existing direction.	B-Min-S-14: Require removal of transmission lines and roads that are no longer needed.	Same as B-Min-S-14.
No existing direction.	B-Min-G-12: Incorporate noise reduction design elements for new compressor stations. With the intent to reduce disturbance from noise in proximity to leks, nesting and broad rearing habitats.	C-Min-S-10: Do not authorize new compressor stations inside habitats.
Solid Leasable Minerals starts here No existing direction.	No proposed direction.	C-Min-S-011: Do not consent to solid mineral lease in habitat.
Mineral materials can be disposed and must follow the BLM IM interim management direction.	B-Min-G-13: Request that the BLM not authorize new mine facilities on the surface unless there is no technically feasible alternative, and it has demonstrated no net loss of habitat, to minimize the disturbance footprint in habitat.	C-Min-S-12: Request that the BLM not issue permits for solid leasable mineral prospecting or mining in habitat.

	B-Min-G-14: If new mine facilities must be placed in habitat, then co-locate facilities in existing disturbed areas and authorize them to the minimum size necessary to reduce the disturbance footprint in habitat.	Same as B-Min-G-14.
No existing direction.	B-Min-S-15: Do not authorize new pits or prospecting permits in bi-state DPS habitat.	C-Min-S-13: Do not allow new sale of mineral materials in habitat.
	B-Min-S-16: Authorize mineral material use and expansion of existing pits only with no unmitigated net loss of habitat.	C-Min-S-14: Prohibit expansion of existing mineral material sites.
Mineral Materials starts here No existing direction.	B-Min-S-17: Permits for existing mineral material sites shall require an approved pit development operating plan that minimizes impacts to bi-state DPS and other resources.	C-Min-S-15: Do not allow new sale of mineral materials in bi-state DPS habitat.
No existing direction.	B-Min-S-18 Any contract or permit for mineral material operations, except for disposals from community sites and common-use areas, shall include requirements for reclamation of the site to meet bi-state DPS habitat objectives.	Same as C-MIN-S-15.
No existing direction.	B-Min-S-19 Ensure no net unmitigated loss at existing mineral material sites in habitat.	C-Min-S-17: Prohibit expansion of existing mineral material sites.
No existing direction.	B-Min-S-20: Where the Federal government owns the surface, and the mineral estate is in non-Federal ownership, require an approved pit development plan.	Same as B-Min-S-20.

<p>Locatable Minerals starts here</p> <p>Outside of wilderness, wilderness study areas, and withdrawn areas, the mineral estate is locatable. On BLM lands with unpatented mining claims, projects can be proposed. On Forest Service land no unpatented claims are necessary as long as the land is open to entry. BLM minerals are handled under 43 CFR 3809 and Forest Service minerals under 36 CFR 228 subpart A.</p>	<p>B-Min-S-21: Mitigate long-term negative impacts in habitat from discretionary or nondiscretionary activities to the extent practicable.</p>	<p>C-Min-S-18: Petition the BLM to withdraw locatable minerals.</p>
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Alternative B

Direct / Indirect Effects

All Minerals:

B-Min-G-02: In connective area, maintain vegetation characteristics suitable to bi-state DPS to the extent technically feasible. The intent of the guideline is to minimize disturbance footprint wherever possible.

Connective area is not likely sage brush and other suitable habitat or it would have been defined as habitat not connective habitat. Therefore, to make a proposal in connective habitat that currently has non-sage grouse type vegetation to create sage-grouse suitable vegetation may not be possible given the location and soil characteristics. It only goes to reason that this standard would be to the extent feasible.

B-Min-S-04: Require a full reclamation bond specific to the site. Insure bonds are sufficient for costs relative to reclamation that would result in full restoration in habitat.

This is already a requirement for implementation of most projects. However it is not meant to imply that reclamation would be required beyond current guidance and laws both federal and state. For example, approved mine pits would not need to be filled in and pit walls would not have to be revegetated. The approved reclamation plan for each project would have to be fully implemented and completed.

B-Min-S-02: In habitat, limit offsite noise to less than 10 decibels (dbA) above ambient measures from 2 hours before until 2 hours after at sunrise at the perimeter of a lek during active lek season.

Exploration activities can easily be limited with seasonal restrictions to avoid noise during this time of year. However, mining could be impacted by this standard. Detailed environmental

analysis of mining proposals would have to show how they can meet this standard prior to implementation.

Discretionary Actions:

The impacts of implementing the Alternative B on the discretionary minerals actions would likely include timing limitations, such as seasonal use restrictions on operations or surface disturbing activities, daily timing limitations, processing placement alternative analysis, mitigating some proposed actions due to the impact on habitat, meeting specific revegetation establishment conditions and diversity, and off-site mitigation to offset the surface disturbance of habitat. Other mitigation measures might include underground placement of pipelines and power lines inside habitat, color or height requirements for certain structures, and so on. These requirements would have a certain negative financial impact on the proponent, but will vary greatly depending on the specific project.

Fluid Minerals – Geothermal and Oil & Gas

Guidelines and standards for fluid mineral actions encompass the general list for all projects as well as the Minerals General and Fluid Minerals above.

Geothermal leasing decisions have been made for all the study area except the Carson City Ranger District of the Forest Service. Oil & gas leasing decisions have been made for most of the BLM lands only. Current leases have stipulations and conditions of approval assigned to the lease by the BLM. The standards and guidelines will impact future NEPA as projects are proposed on the lease but will not change the existing lease stipulations and conditions of approval. However, future leases will be assigned stipulations and conditions of approval that are consistent with the guidelines and standards. Fluid mineral infrastructure are approved on the lease through the operating plan, but off the lease the powerlines, pipelines, road use and so forth are approved under special use permits on Forest Service lands and ROWs on BLM land. Impacts due to needing special use permits and ROWs can be found in the land use section elsewhere in the EIS.

Existing and future fluid mineral leases could potentially be affected by implementation of standards and guidelines. Future project specific analysis could require modification of operating plans to meet seasonal and buffer restrictions for example. New leases, APD's, utilization plans and so forth could still be authorized, but would be subject to standardized stipulations relating to the standards and guidelines.

In some cases, if new proposed activities were determined to have an adverse effect on sage grouse and they could not be sufficiently mitigated, operating plans would have to be modified. In some cases, the lease holder may find the mitigations too costly and may withdraw their application and drop their lease. Restrictions on facility placement, limited access, increased administrative costs, and installation of facilities in less-than-optimum sites could all result if projects were proposed in habitat.

B-Min-G-05: Limit disturbances to an average of one site per 640 acres, with no more than 3% total anthropogenic surface disturbances. The intent of the guideline is to minimize disturbance footprint wherever possible.

One site per 640 acres would work fine for oil & gas drilling and development but not for geothermal since it needs numerous drill holes to define the resource and then carefully placed and spaced drill holes to both lift the geothermal water from the reservoir and place it back in the geothermal cell.

Oil & gas drilling and well production has some flexibility since they can use directional drilling to drill up to five miles laterally from the collar location and drill numerous holes of differing directions from one platform (Wikipedia 2014). However, geothermal drilling is not nearly as versatile due largely to the cost/benefit of directional drilling and the structural geologic setting that is important to be located within. Geothermal power production must have multiple drill holes precisely located so they can draw hot geothermal water from a specified region, and after using some of the heat, reinject the water in a different area of the circulating hydrothermal subsurface cell.

Opportunities for economic growth may be impacted by proponents not proceeding with acquiring leases and operating plans because of mitigations placed on these leases and subsequent operating plans. The amount of impact would depend on the type and expense of the mitigation. If significant oil & gas bearing horizons were suspected in the study area, impacts to future oil & gas exploration and production would be minor since they would likely choose to drill from outside the habitat or locally inside the habitat. Some geologic units would likely be inaccessible for oil & gas production since the cost and technology would not allow the area to be reached from outside the habitat. However, geothermal development would be impacted much more significantly. The structural geological setting that must be present, along with the right geothermal conditions cannot be moved out of the habitat and the drilling and production facility can only be modified to a certain degree to attempt to meet the standards and guidelines. A project proposed in these areas may be subject to additional requirements, such as resource surveys and reports, construction and reclamation engineering, long-term monitoring, special design features, special siting requirements, timing limitations, and rerouting. Such requirements could restrict project location or they could delay project implementation.

Access could also be affected through implementation of this alternative. The use of existing roads and construction of new roads would not be prohibited through the proposed action; however, future site-specific NEPA could modify or change access to FS or BLM lands if the proposed roads did not fall under the types allowed in the guideline. It is likely that most geothermal companies would develop outside the habitat due to the limitations created by the standards and guidelines.

B-Min-G-09: All commercial pipelines should be buried where possible to reduce perch opportunities for avian predators and to reduce need for linear maintenance corridors. Surface vegetation standards and guidelines would apply. Reasons why burying pipelines is not possible in some situations in geothermal:

- Scaling from the geothermal brine occurs in pipelines which requires ongoing operations and maintenance (in addition to usual maintenance and repairs of any detected leaks, etc.);
- Sliding pipe supports and expansion loops are required for geothermal pipelines due to thermal expansion from the hot temperatures of the brine flowing through the pipeline, which is not technically feasible underground;

- Burying pipelines results in much higher impact on habitat and surface disturbance. Typically pipelines are constructed 2 – 3 ft aboveground with structural supports located about every 30 feet, and adjacent to existing roads.

B-Min-G-10: Use closed-loop systems for drilling operations, with no reserve pits when technically feasible. The intent is to reduce disturbance footprint in habitat and avoid creation of poisonous water source.

Closed-loop drilling operations with no reserve pits is technically feasible for oil & gas drilling and geothermal exploration operations such as core hole drilling, but not feasible for full-size geothermal wells (which typically include flow-testing into a sump) due to the hot steam which cannot be contained in a closed system like oil & gas drilling.

B-Min-G-11: Use noise shields when drilling during the lek, nesting, brood-rearing, and wintering seasons, with the intent to reduce disturbance from noise in proximity to leks and nesting and brood rearing habitats.

Noise shields around drill rigs and drill platforms are relatively common for oil & gas drilling but uncommon for geothermal drilling. Many of the initial drill holes to explore and define a geothermal resource use small drill rigs and minimal roads and pads. Noise shields would not be possible to transport and set up on exploration roads and pads. If this becomes a requirement then the roads would have to be scaled up and drill pads greatly expanded in size to incorporate noise shields.

B-Min-S-01: For new and existing leases in habitat, limit offsite noise to less than 10 decibels (dbA) above ambient measures from 2 hours before until 2 hours after at sunrise at the perimeter of a lek during active lek season.

During exploration this would be easy to meet by placing seasonal restrictions. However, during production the project proposal would have to meet the standard and depending on location could impact the ability to produce.

Solid Leasable Minerals

Solid leasable minerals under this alternative have standards that recommend that mining should not be located in habitat. However, the underground mining and exploration below the habitat could be proposed and potentially approved. Since solid leasable minerals rarely are found in economic quantities within the study area, impacts are expected to be minor.

Mineral Materials (Saleable)

Existing mineral material pits would be allowed to be developed but would have numerous requirements added to new sales due to the guidelines and standards. Site specific NEPA on new permits could add seasonal timing limitations, offset mitigation, hours of operation and other requirements. Crushing and screening operations may be impacted by the height of infrastructure requirement and may not be allowed at some sites.

Proposals to expand existing pits in habitat will be carefully evaluated, especially if the purpose and need for the commodity can be met elsewhere outside the habitat. For example, a gravel sale

out of a current pit inside the habitat may be denied if gravel can be readily attained from a pit within reasonable distance that occurs in a pit outside the habitat.

Mineral materials such as sand and gravel will likely continue to have the same demand as present or increase slightly due to increased home development. However, there appear to be enough existing gravel pits or exploration potential outside of habitat to meet the need but would have an increase in cost to haul the material the additional distance.

Nondiscretionary Actions (Locatable Minerals)

There are approximately 17,000 active mining claims in the study area. Nondiscretionary actions from locatable exploration or mining proposals would have potentially the same impacts as discretionary mineral actions except that a reasonable plan of operations cannot be denied, but would have practicable mitigation measures to minimize or eliminate the impacts on sage grouse and the habitat. Some mining proposals might also have some portions of the proposed surface disturbance that cannot be revegetated, such as pit high-walls. Off-site mitigation can be requested for these actions but the operator is not obligated to comply.

The future of various commodities prices is expected to rise and fall similar to the past and thus the exploration and development of these commodities will do the same. Since the study area has many different types of mineral potential. The area will likely see continued exploration for more than one commodity.

Since this Alternative B does not withdraw any federal lands from mineral entry, mining claims will likely continue to be located but may have a somewhat reduced impact to sage grouse due to the increased time to process a plan of operation and increased cost to produce a product. An increased time to process a plan of operations has a definable negative impact on minerals actions because the ability to raise capital to explore or develop is based on a historically fluctuating commodity price, no matter what the commodity. The longer it takes to approve a plan of operations the more financial impact to the operator and the less likely that they will be able to implement their project. This is evident from the historic plan of operations processed on the Humboldt-Toiyabe National Forest. The forest service is legally mandated to process locatable plans of operation in a timely manner.

The cash costs as well as the capital costs to explore, develop, mine, and produce mineral products will likely go up by some unknown amount and will vary depending on the location and mitigation applied to an individual project. These increased costs will negatively impact the number of jobs available in the minerals sector.

Cumulative Effects

There are no cumulative effects from past or present minerals actions. There are no present or future actions that when combined with the proposed amendment would incrementally alter how mineral resources are managed in the amendment area.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Discuss how well or whether each alternative complies with relevant laws, regulations, policies or the Forest Plan.

Other Relevant Mandatory Disclosures

If applicable to your resource, this might include relationship of short-term uses and long-term productivity or irretrievable/irreversible effects in an EIS, significance factors in an EA.

Summary of Effects

While these standards and guidelines with only have minor impacts on oil & gas exploration and production they would have a much greater impact on geothermal exploration and production. Consequently most geothermal exploration would likely take place outside of habitat. Solid leasable minerals would not be expected to be permitted in habitat but existing gravel pits would continue some level of seasonal production most likely. Locatable minerals would have impacts from site specific NEPA and likely seasonal restrictions and other mitigations.

Alternative C

Standards and guidelines in in Alternative C would include additional restrictions on proposed and existing activities in the amendment area. Specific standards and guidelines affecting minerals include the following:

Direct / Indirect Effects

All minerals:

C-Min-S-01: In connective area, maintain vegetation characteristics suitable to bi-state DPS to the extent technically feasible. Connective area is not likely sage brush and other suitable habitat or it would have been defined as habitat not connective habitat. Therefore, to make a proposal in connective habitat that currently has non-sage grouse type vegetation to create sage-grouse suitable vegetation may not be possible given the location and soil characteristics. It only goes to reason that this standard would be to the extent feasible.

It is not possible to bury all powerlines if the terrain and soil/rock do not allow it, especially if there are intermittent runs of solid rock for example. Transitioning from buried to overhead many times to stretch a few miles would not be feasible. Also to cross a section corner of Forest Service land would also not be feasible to go underground for 2 feet or so. The guideline should remain flexible by keeping in the “where feasible”.

Fluid Minerals – Geothermal and Oil & Gas

This alternative would only allow new leases granted if consent is given to have a no surface occupancy (NSO) stipulation. No surface occupancy for this alternative means that the lease holder can only perform casual use activities as defined by the BLM and some types of geophysical surveys that are minimally disturbing of the surface. Use of low grade roads is also limited and no new roads would be created. Also, no drilling or infrastructure could be placed in habitat.

The other guidelines and standards would apply to existing leases recognizing valid existing rights. Impacts to oil & gas exploration and production would be much more costly to accomplish all drilling from outside the habitat verses Alternative B. However, some limited geophysical exploration and casual use activities would provide some means to use the habitat areas to help identify targets and deposits outside the habitat with no real impact to the habitat. Since there is only low potential for oil & gas deposits in the study area, the impacts on oil & gas exploration and production are expected to be very minor.

Geothermal exploration and production would however be considerably impacted. NSO coupled with no ROW grants and no transmission lines in habitat would make it difficult to explore and produce electrical power and transmit it to the grid. Although, there would be some potential to put transmission lines outside of habitat and would likely be additional length of transmission lines to get the power to the grid which would cost more.

C-Min-S-5: All commercial pipelines shall be buried where possible. Reasons why burying pipelines is not possible in some situations in geothermal:

- Scaling from the geothermal brine occurs in pipelines which requires ongoing operations and maintenance (in addition to usual maintenance and repairs of any detected leaks, etc.);
- Sliding pipe supports and expansion loops are required for geothermal pipelines due to thermal expansion from the hot temperatures of the brine flowing through the pipeline, which is not technically feasible underground;
- Burying pipelines results in much higher impact on habitat and surface disturbance. Typically pipelines are constructed 2 – 3 ft aboveground with structural supports located about every 30 feet, and adjacent to existing roads.

C-Min-S-07: Use closed-loop systems for drilling operations, with no reserve pits when technically feasible.

Closed-loop drilling operations with no reserve pits is technically feasible for oil & gas drilling and geothermal exploration operations such as core hole drilling, but not feasible for full-size geothermal wells (which typically include flow-testing into a sump) due to the hot steam which cannot be contained in a closed system like oil & gas drilling.

B-Min-G-11: Use noise shields when drilling during the lek, nesting, brood-rearing, and wintering seasons, with the intent to reduce disturbance from noise in proximity to leks and nesting and brood rearing habitats.

Noise shields around drill rigs and drill platforms are relatively common for oil & gas drilling but uncommon for geothermal drilling. Many of the initial drill holes to explore and define a geothermal resource use small drill rigs and minimal roads and pads. Noise shields would not be possible to transport and set up on exploration roads and pads. If this becomes a requirement then the roads would have to be scaled up and drill pads greatly expanded in size to incorporate noise shields.

Solid Leasable Minerals

Solid leasable minerals would not be allowed to be prospected with a permit or mined from the surface in habitat. This alternative it appears as a standard verses a guideline in alternative B. The Forest Service is a cooperating agency for solid leasable minerals and the BLM is not required to fulfill the Forest Service request but would commonly comply with the petition. Nothing in these guidelines or standards would preclude exploration, development, and mining outside habitat or underneath the habitat as long as the infrastructure was outside of habitat. Since the potential for solid leasable minerals is low and past production was very minor in the study area, the impact on solid mineral exploration and mining is expected to be minor.

Mineral Materials (Saleable)

This alternative would not allow new sales or expansion of existing pits. Current sales contracts would be allowed to be completed but without the potential for renewal. Mineral materials needed for road maintenance and development would have to come from pits outside the habitat. Community pits and free use pits are somewhat uncommon on both BLM and Forest Service lands within the study area. The Forest Service and BLM also use these pits to maintain their system of roads. If the community pit was located within the habitat, another source outside habitat would have to be used or a new one prospected and developed. Road maintenance in these areas is mostly accomplished by the state or county and their costs to maintain these roads would increase according to the haul distance.

Nondiscretionary Actions (Locatable Minerals)

Under this alternative the Forest Service would petition the BLM to withdraw the locatable mineral rights subject to valid existing claims from the habitat area. The BLM would prepare appropriate documents to request withdrawal of the habitat area on Forest Service and BLM lands to be submitted to the Washington Office for approval. Once the withdrawal was completed no new claims would be valid. The impacts to locatable mineral exploration and mining would be considerable. Valid existing rights followed by Surface Use Determinations and/or Validity exams would be performed on all new proposals for exploration and mining on existing mining claims. The amount of time for the Forest Service to complete those determinations or exams would be significant and likely take years to complete.

There are five active mining operations and many old mining districts in the study area. The potential to find additional mineable ore is most common near new or old existing mines or mining districts. The current mining operations would not likely be impacted by the withdrawal of the mineral rights, but the expansion potential and exploration potential would be substantially impacted and curtailed.

Exploration drilling is currently common in the study area with over 30 exploration projects.

Cumulative Effects

The Forest Service has one proposal for testing the surface for a potential heap leach and waste rock repository of a potential gold mine on private land at the Pine Grove deposit. Depending on the timing of withdrawal and valid existing rights of this project, it could be impacted by this alternative by not allowing the facilities to be placed on Forest Service land within habitat. This proposal is on the edge of the habitat and site specific surveys would be needed to determine the habitat boundary.

Summary of Effects

Many of the operating mines, existing gravel pits, and exploration projects would continue operating for a while but new proposals in habitat would be significantly curtailed on both discretionary and nondiscretionary project proposals.

Changes between the initial report and this report

A RFD was added for geothermal electrical production. The Discretionary minerals discussion for the alternatives were broken down into Fluid Minerals, Solid Leasable Minerals and Mineral Materials (Saleable). Alternative B was significantly modified and alternative C was added. The area of analysis was reduced in size. Additional references were consulted and used to better analyze the impacts. Mason Pass (4.4 acres), Ann Mason (14 acres), and the MacArthur Pit (43

acres) precious metal plan of operations on BLM lands fell outside of the new study area boundary. Additional information was added on the Candelaria Mine, Buckskin Mine, Bovie Lew, Silver Peak Lithium Mine, Mineral Ridge Mine and Esmeralda Mine. The discussion about the Basalt diatomite mine was moved from the mineral materials section to the locatable section since diatomite is locatable.

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