United States Department of the Interior
Bureau of Land Management
Elko District Office

2014 Oil & Gas Lease Sale
Environmental Assessment

January
DOI-BLM-NV-E000-2014-0001-EA

BLM
NEVADA Elko District

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Mission Statement

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

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JUNE 2014 OIL & GAS LEASE SALE
Environmental Assessment
December 2013
(DOI-BLM-NV-E000-2014-0001-EA)

1 - INTRODUCTION

The Bureau of Land Management (BLM), is considering offering up to 73 of the 214 nominated parcels, comprising about 125,220 acres of land in northeastern Nevada within the area administered by the Elko District Office, in a state-wide competitive Oil and Gas Lease Sale to be held in June, 2014. These parcels have been nominated by industry. The Elko District encompasses about 12.4 million acres, of which approximately 7.2 million acres are public lands managed by the BLM. Maps showing the general location of the parcels and their ownership status are attached.

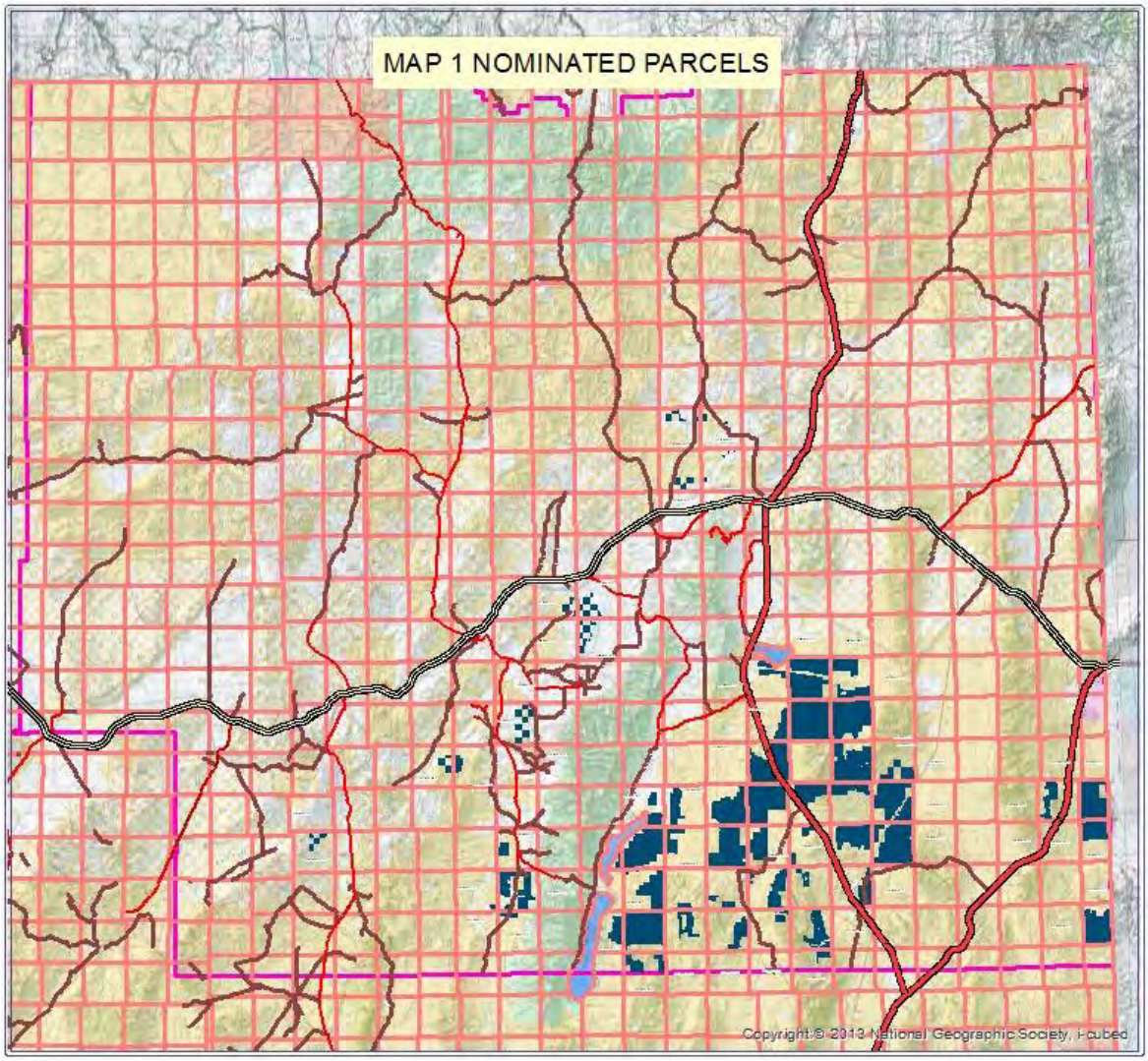
The BLM, Elko District Office, has prepared this environmental assessment (EA) to comply with the National Environmental Policy Act of 1969 (NEPA). This EA tiers to the environmental impact statements (EISs) for the 1987 Elko Resource Management Plan and the 1985 Wells Resource Management Plan (RMPs). Additional NEPA documentation is needed prior to leasing to address new circumstances or information bearing on the environmental consequences of leasing that was not considered within the broad scope analyzed in the RMP/EIS.

Background

For decades, domestic production of oil and gas in America has not kept pace with increasing consumption. Imported oil supply and prices are subject to world-wide political and social changes such as war and terrorism. These unpredictable events put the American economy and the security and welfare of the American citizens at risk in the form of disruption of energy supplies and drastically increased prices. Recognizing the increasing risk, President George W. Bush signed Executive Order 13212, on May 18, 2001, with the intent of increasing the domestic supply of energy, including oil and gas.

1.1 NEED FOR AND PURPOSE OF ACTION

The need for the leasing of public mineral estate (oil and gas leasing) is to provide for timely exploration and development of energy resources on public lands, thus reducing U.S. dependence on imported supplies. Parcels of federal mineral estate are offered for lease to encourage development of federal on shore oil and gas resources.



ELKO DISTRICT OFFICE 2014
OIL and GAS Lease Sale

N

10 5 0 10 20 30 40
Miles

Landownership

- Admin. by BLM
- Bureau of Indian Affairs
- Bureau of Reclamation
- Dept. of Defense
- US Forest Service
- US Fish & Wildlife Refuge
- Private Land
- Water
- PLSS Township
- District Boundary
- Nominated Parcels

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification

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BUREAU OF LAND MANAGEMENT
ELKO DISTRICT OFFICE

The purpose of this action is to facilitate energy development where appropriate. As public mineral estate is leased for development of oil and gas resources, BLM determines stipulations which are attached to the lease for a given parcel to avoid or minimize adverse impacts on resources such as wildlife, soils, watersheds and cultural resources. Stipulations are written to conform to approved land use plans governing BLM's management of resources in the area to be leased, and to be consistent with laws, regulations, policies, rules, and orders.

Leasing is authorized under the Mineral Leasing Act of 1920, as amended and modified by subsequent legislation, and regulations found at 43 CFR part 3100. Oil and gas leasing is recognized as an acceptable use of the public lands under the Federal Land Policy and Management Act of 1976 (FLPMA). BLM authority for leasing public mineral estate for the development of energy resources, including oil and gas, is listed in 43 CFR 3160.0-3.

1.2 LAND USE PLAN CONFORMANCE

FLPMA directs the BLM to develop and maintain comprehensive Resource Management Plans (RMPs) that govern all aspects of public land management, and that proposed leasing activities conform with approved RMPs. Leasing of lands within the Elko District for the production of energy resources is managed in accordance with direction provided in either the Wells RMP as approved June 28, 1985, or the Elko RMP, approved March 11, 1987. Since they were approved, both RMPs have been periodically evaluated and amended as necessary to address current policies and emerging issues. Parcels nominated for leasing are screened to identify areas open to leasing and applicable lease stipulations.

The 1985 Record of Decision (ROD) for the Wells RMP, page 25, provides that, "The public lands will be managed in a manner which recognizes the Nation's needs for domestic sources of minerals." As a standard operating procedure (SOP) pertinent to establishing special stipulations to attach to leases, the ROD prescribes that, "*Time-of-day and/or time-of-year restrictions will be placed on construction activities associated with leasable and saleable mineral explorations and/or development that are in the immediate vicinity or would cross crucial sage grouse, crucial deer and pronghorn antelope winter habitats, antelope kidding areas, or raptor nesting areas.*"

The 1987 Elko RMP determined whether or not areas of land are subject to mineral leasing as follows (ROD, page 4 and Map 13):

(1) Open – subject to standard leasing stipulations (82 percent of the RMP area)
(2) Limited – subject to no surface occupancy (Special Recreation Managements Areas and sage grouse strutting grounds)
(3) Limited – subject to seasonal restrictions.(crucial deer winter range, crucial antelope yearlong habitat and sage grouse brood rearing areas).
(4) Closed – (wilderness and wilderness study areas recommended for designation).

The Wells and Elko RMPs state that all Wilderness Study Areas will be managed under the Bureau's Interim Management Policy for Lands Under Wilderness Review, H-8550-1 (IMP). No new leases may be issued on lands under wilderness review according to the Interim Management Policy for Lands Under Wilderness Review (H-8550-1, Rel. 8-67, 1995, page 32).

The wilderness study areas (WSAs) in the Wells RMP planning area include the Bluebell, Goshute Peak, South Pequop and Bad Lands WSAs, (1985 Wells ROD; page 16 and Map 4). WSAs in the Elko planning area are the Rough Hills, Little Humboldt River, Cedar Ridge and Red Spring, and Owyhee Canyonlands WSAs (1987 Elko ROD; page18, Map 7 and page 37).

1.3 RELATIONSHIP TO OTHER LAWS, POLICIES AND PLANS

The proposed action, as described in the next chapter, is consistent with Federal, State and local laws, regulations, policies and plans to the maximum extent possible, including:

- Mineral Leasing Act of 1920, as amended and supplemented by subsequent legislation,
- Federal Land Policy and Management Act of 1976, which calls for managing the public lands for multiple use,
- 43 CFR part 3100, which provides regulations governing Onshore Oil and Gas Leasing,
- Executive Order 133212, which directs the Secretary of the Interior to expedite energy-related projects,
- National Historic Preservation Act (NHPA) and rules for implementing section 106 found at 36 CFR Part 800,
- Endangered Species Act (ESA) and rules for implementation of section 7 found at 50 CFR part 402,
- Clean Air Act The BLM has air resource program responsibilities through its permitting programs and Clean Air Act (CAA) requirements.
- Secretarial Order 3289 addresses current and future impacts of climate change on America's land, water, wildlife, cultural-heritage, and tribal resources.
- The Clean Water Act (CWA) of 1977 provides the statutory basis for regulating discharges of pollutants into waters of the United States and regulating water quality for surface waters.
- Land use plans for Elko and Eureka counties, and the
- Nevada statutes and plans governing management of wildlife and water resources.
- Washington Office Instruction Memorandum 2012-43, December 22, 2011, Greater Sage-Grouse Interim Management Policies and Procedures
- Washington Office Instruction Memorandum 2010-117, May 17, 2010, Oil and Gas Leasing Reform – Land Use Planning and Lease Parcel Reviews
- Washington Office Instruction Memorandum 2011-154, July 26, 2011, Requirement to Conduct and Maintain Inventory Information for Wilderness Characteristics and to Consider Lands with Wilderness Characteristics in Land Use Plans.

1.4 PARCEL SCREENING CRITERIA

An Interdisciplinary Parcel Review Team evaluated each parcel to determine potential resource effects and appropriate lease stipulations. Proposed parcels were reviewed to determine if they were located in an area that possessed sufficient size, naturalness, and outstanding opportunities for solitude or primitive and unconfined recreation to qualify as lands with wilderness characteristics. The Interdisciplinary Parcel Review Team also evaluated if a parcel should be deferred based on wildlife, cultural, or proximity to municipal water sources concerns. The parcels are deferred until more direction is provided by either completion of the Elko District Resource Management Plan or the Nevada and Northeastern California Greater Sage-Grouse Environmental Impact Statement is final and has amended the Elko District's respective Resource Management Plans. See Appendix F for specific deferral information by parcel; below briefly describes the reason for deferment.

- Some nominations are located in areas with a very high density of eligible cultural sites and potential Traditional Cultural Properties; they will be deferred until the Elko District completes a new Resource Management Plan (scheduled to begin in 2016).
- The nominated parcels in the Spruce Mountain planning area are being deferred until completion of the Elko District Resource Management Plan.
- Parcels or portions of parcels within a four mile radius of Greater Sage-Grouse leks and parcels located on lands containing Greater Sage-Grouse Preliminary Priority Habitat were deferred. The four mile radius buffer is based on the National Technical Team recommendation. If the buffer covered just a portion of a parcel and an aliquot part could be described then that remaining portion was made available for potential leasing. An exception to the deferral is if a parcel(s) was located within the Mary's River, Huntington Valley, or Star Valley potential operational areas. Since the majority of the surrounding lands were already leased and there is known interest in those areas it was felt to be reasonable to lease those parcel(s) with appropriate stipulations. If oil were to be found and production were to begin this would give BLM more control over federal minerals, royalties, and production within a geologic unit.
- One parcel was removed due to its proximity to several drinking water source water protection areas associated with the Spring Creek Community.

2 - ALTERNATIVES

2.1 NO ACTION

The No Action alternative is defined as, "Do not offer nominated parcels in the Elko District for lease in this lease sale."

2.2 PROPOSED ACTION

BLM's proposed action is to lease parcels of federal mineral estate that have been nominated and which have been determined to be suitable for leasing, subject to standard lease terms and

applicable special stipulations, in the competitive oil and gas lease sale. The tracts of federal mineral estate to be offered may lie under surface administered by the BLM, or under split estate, i.e., surface owned or administered by an individual or non-federal government agency. Lands leased would then be available for exploration and development of oil and gas resources for a 10-year period, subject to stipulations attached to the lease for each parcel.

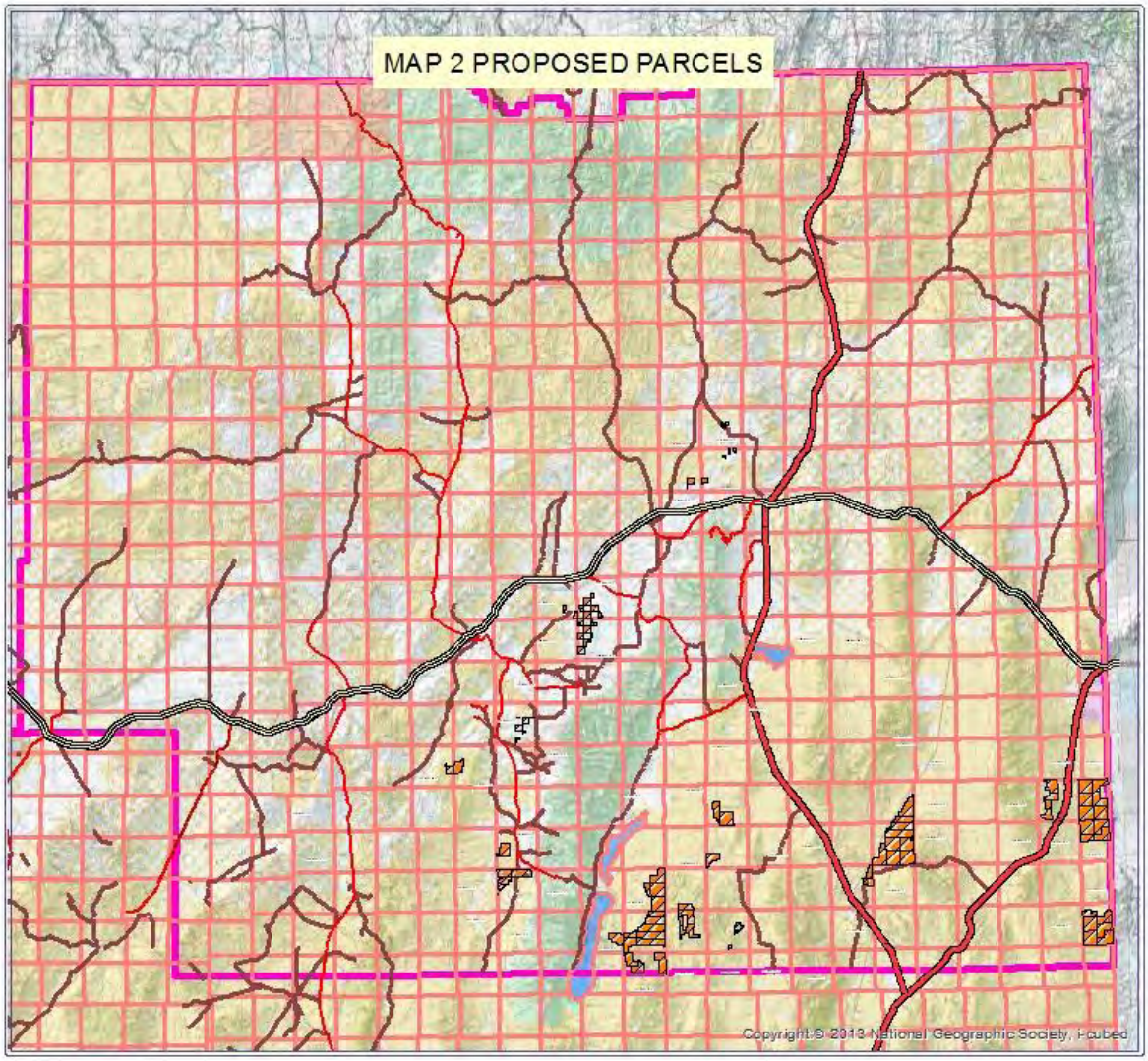
This EA analyzes the offering of leases located within the Elko District for the June 2014 lease sale. There are 73 parcels that total approximately 125,220 acres (see Map 2). Appendix A contains a complete list of the offered parcels and their legal descriptions. The Elko District Office has also proposed special stipulations to attach to each lease to protect other resources (see Table 2-1). These stipulations are described in the next section, and the standardized text for each stipulation is in Appendix B. The last column of Table 2-1 also identifies additional resource concerns, to the extent practical at the initial leasing stage. Such concerns would be more specifically addressed when and if a lessee proposes surface disturbance, through Standard Operating Procedures, Best Management Practices, and imposition of applicable laws, regulations consistent with the standard lease terms and special stipulations.

2.2.1 Resource Protection Stipulations

Once a parcel is leased, the lessee has the right to explore for and develop oil and gas resources, subject to *standard lease terms* and *special stipulations* pertaining to the conduct of operations. The conduct of operations by the lessee on all parcels would be subject to the following terms from the back of the standard lease form, which state:

"Conduct of Operations (SF-3100-11, Section 6)

> Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological and other resources, and to uses or users. Lessee shall take reasonable measures deemed necessary by the lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in leased lands, including the approval of easements or right-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.
>
> Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short-term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in destruction of such species or objects."



ELKO DISTRICT OFFICE 2014
OIL and GAS Lease Sale

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- District Boundary

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Special stipulations are developed to conform to approved resource management plans and ensure post-leasing activities comply with pertinent laws and policies. Stipulations for **cultural resources** (including Native American consultation), **raptors,** and **threatened, endangered and sensitive species** would be attached to all leases. Other stipulations that restrict surface occupancy or impose seasonal restrictions on post-leasing activities would be applied to parcels where necessary to protect resource values or uses. Certain parcels will have a Congressionally designated trails stipulation. Based on screening of the nominated parcels, Table 2-1 lists the Elko District parcels to be offered in the sale, and identifies the special stipulations that would be attached to each lease. A summary of the stipulations that can be assigned to leases to protect resources follows. The full text of each stipulation is in Appendix B.

Cultural Resources/Native American Consultation -- This stipulation is included in all leases to allow the BLM to protect cultural resources and address Native American Concerns. It advises the potential lessee that BLM will not approve any ground disturbing activities that may affect a cultural property until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or otherwise mitigated. (**WO IM 2005-003).**

Threatened, Endangered and Sensitive Species – This stipulation informs the lessee that the BLM will take whatever steps are necessary to comply with law and regulations affecting such species. Activities that could adversely affect threatened, endangered, or sensitive species habitat will not be permitted. Actions in threatened, endangered, or sensitive species habitat will be designed to benefit these species through habitat improvement. All project work will require a threatened, endangered, or sensitive species clearance before implementation. Consultation with the U.S. Fish and Wildlife Service per Section 7 of the Endangered Species Act is necessary if a threatened, endangered, or proposed threatened or endangered species, or its habitat may be impacted. Other species considered sensitive, but not under the protection of the Act, are given special management considerations through Bureau policy. If adverse impacts to these other sensitive species are identified during project planning, the project will be modified or possibly abandoned to avoid these impacts (Standard Operating Procedure, Elko ROD, p. 39; WO IM 2002-174).

Raptor Nesting Sites -- This stipulation is attached to all parcels to permit establishing a buffer zone of no activity around nesting sites during nesting seasons. (Wells RMP ROD p. 25 and Elko RMP ROD p. 25)

Mule Deer Crucial Winter Range- This stipulation prevents disturbances in crucial winter range during the winter season. (Wells RMP ROD p. 10 and Elko RMP ROD p.3)

Pronghorn Antelope Crucial Winter Range- This stipulation prevents disturbances in crucial winter range during the winter season. (Wells RMP ROD p. 25 and Elko RMP ROD p.3

Pronghorn Antelope Kidding Areas – This stipulation prevents disturbance in kidding areas during the kidding season of May 1 to June 30. (Elko RMP p. 2-6)

Sage Grouse Strutting Grounds (leks) – This stipulation restricts use of the surface within 0.5 miles of known strutting grounds. (Wells RMP ROD p. 25 and Elko RMP ROD p.3)

Sage Grouse Brood Rearing Areas – This stipulation prevents disturbance within ½ mile of brood rearing areas between May 15 and August 15. (Wells RMP ROD p. 25 and Elko RMP ROD p.3)

Sage Grouse Crucial Winter Habitat – This stipulation prevents disturbance on lands identified as crucial habitat between November 1 and March 15.

I-80 Low Visibility Corridor – This stipulation limits visual impacts within 1.5 miles of either side of Interstate 80 as it crosses the Elko District with the goal of retaining the existing character of the landscape. (Wells RMP ROD p. 3 and Elko RMP ROD p. 1)

Special Recreation Management Areas (SRMA) – This stipulation restricts surface occupancy within specified parts of the SRMAs at South Fork Canyon, Wild Horse, Wilson Reservoir, South Fork Owyhee River, Zunino/Jiggs, and the proposed Salmon Falls Creek. (Wells RMP ROD p. 25 and Elko RMP ROD p. 3)

Tabor Creek Campground – This stipulation restricts surface occupancy within the Tabor Creek Campground. (Wells RMP ROD p. 25)

No Surface Occupancy-This stipulation restricts surface occupancy in defined portions of the leased parcels.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

Offering All Nominated Parcels in the June 2014 Sale

There were a total of 214 parcels nominated in the Elko District for the 2014 sale. Of these nominated parcels, 141 have been deferred and 17 parcels have been partially deferred. Reasons for their deferment include:

- Some nominations are located in areas with a very high density of eligible cultural sites and potential Traditional Cultural Properties, and they will be deferred until the Elko District Office completes a new Resource Management Plan (scheduled to begin in 2016).
- The nominated parcels in the Spruce Mountain planning area are being deferred until completion of the Elko District Office Resource Management Plan.
- Parcels or portions of parcels within a four mile radius of active sage grouse leks and parcels located on lands containing Greater Sage Grouse Preliminary Priority Habitat have been deferred unless they are within the operations area of pending oil & gas exploration plans. These deferred parcels will not be offered for sale until completion of the Nevada & Northeastern California Greater Sage Grouse EIS.
- One parcel was removed due to its proximity to several drinking water source water protection areas associated with the Spring Creek Community.

Table 2-1 June 2014. Parcels deemed suitable for oil and gas leasing with stipulations where necessary.

2014 Oil & Gas Lease Sale Elko District Stipulations

OG-010 Stip No.	OG-010-05-01	OG-010-05-02	OG-010-05-03	OG-010-05-04	OG-010-05-05	OG-010-05-06	OG-010-05-07	OG-010-05-08	OG-010-05-09	OG-010-05-10	OG-010-05-11	OG-010-05-12	OG-010-05-13	OG-010-05-14	Lease Notice	
PARCEL	T/E & Sensitive Species	Raptor Nests	Cultural Resources	Crucial Mule Deer Winter Range	Crucial Antelope Winter Range	Antelope Kidding Area	Sage Grouse Leks	Sage Grouse Brood Area	Sage Grouse Crucial Winter Habitat	VRM	Special Recreation Management Areas	Tabor Creek Camp-ground	National Historic Trails	NSO	Other	Lease Acres
NV-14-03-002	X	X	X	Partial Deferral see LLDs			X			Partial Deferral see LLDs					G,H,Q,A	680.000
NV-14-03-003	X	X	X					X	X				X		Q,A	2,324.100
NV-14-03-004	X	X	X	Partial Deferral see LLDs			X			Partial Deferral see LLDs					Q, A	1,373.450
NV-14-03-006	X	X	X		X		X	X	X				X		G,H,Q,A	1,868.870
NV-14-03-007	X	X	X		X		X	X	X				X		G,H,Q,A	1,259.020
NV-14-03-008	X	X	X	Partial Deferral see LLDs			X	X	X	Partial Deferral see LLDs			X		G,H,Q,A	1,033.240
NV-14-03-010	X	X	X	Partial Deferral see LLDs			X	X	X	Partial Deferral see LLDs			X		G,H,Q,A	469.880
NV-14-03-013	X	X	X		X		X	X	X	NSO E2W2 S.19, T29N, R56E			X	X	H,Q,A	2,031.360
NV-14-03-015	X	X	X	Partial Deferral see LLDs			X	X		Partial Deferral see LLDs					G,H,Q,A	1,520.000
NV-14-03-016	X	X	X	Partial Deferral see LLDs			X	X	X	Partial Deferral see LLDs			X		H,Q,A	520.000
NV-14-03-018	X	X	X	Partial Deferral see LLDs			X		X	Partial Deferral see LLDs			X		Q,A	1,720.000
NV-14-03-020	X	X	X				X	X	X						H,Q	1,529.510
NV-14-03-021	X	X	X				X	X	X				X		H,Q,A	2,131.340
NV-14-03-022	X	X	X				X	X	X				X		H,Q,A	2,160.000
NV-14-03-023	X	X	X				X		X				X		H,Q,A	640.000
NV-14-03-024	X	X	X												Q	2,242.230
NV-14-03-025	X	X	X										X		A	1,641.900
NV-14-03-026	X	X	X										X		Q,A	1,680.000
NV-14-03-027	X	X	X	Partial Deferral see LLDs			X		X	Partial Deferral see LLDs			X		Q,A	1,480.480
NV-14-03-029	X	X	X	Partial Deferral see LLDs			X			Partial Deferral see LLDs			X		Q,A	1,760.000
NV-14-03-030	X	X	X	Partial Deferral see LLDs			X			Partial Deferral see LLDs			X		Q,A	2,320.000
NV-14-03-031	X	X	X	Partial Deferral see LLDs			X		X	Partial Deferral see LLDs			X		A	1,113.550
NV-14-03-032	X	X	X										X		A	2,560.000
NV-14-03-033	X	X	X										X		A	2,560.000
NV-14-03-034	X	X	X										X		A	1,950.240
NV-14-03-035	X	X	X		X				X				X		Q,A	1,879.440
NV-14-03-037	X	X	X						X				X		Q,A	2,560.000
NV-14-03-038	X	X	X	Partial Deferral see LLDs			X		X	Partial Deferral see LLDs			X		Q,A	920.000
NV-14-03-039	X	X	X										X		Q,A	2,560.000
NV-14-03-051	X	X	X													1,762.560
NV-14-03-052	X	X	X													1,080.000
NV-14-03-053	X	X	X													1,480.000
NV-14-03-054	X	X	X													1,240.000
NV-14-03-060	X	X	X	Partial Deferral see LLDs			X	X	X	Partial Deferral see LLDs			X		F,H,Q,A	640.000
NV-14-03-063	X	X	X	Partial Deferral see LLDs			X	X		Partial Deferral see LLDs					Q	560.000
NV-14-03-064	X	X	X	Partial Deferral see LLDs			X	X	X	Partial Deferral see LLDs					Q	280.000
NV-14-03-073	X	X	X	Partial Deferral see LLDs			X		X	Partial Deferral see LLDs						1,582.920
NV-14-03-077	X	X	X	Partial Deferral see LLDs			X		X	Partial Deferral see LLDs					Q	1,400.000
NV-14-03-079	X	X	X		X				X						Q	2,560.000
NV-14-03-080	X	X	X				X	X	X				X		F,A	195.870
NV-14-03-081	X	X	X				X	X	X				X		A	133.320
NV-14-03-082	X	X	X				X	X	X				X		F,H,Q,A	511.900
NV-14-03-084	X	X	X				X	X	X						H,Q	388.220
NV-14-03-154	X	X	X					X							Q,C	1,039.870
NV-14-03-155	X	X	X	Partial Deferral see LLDs			X	X		Partial Deferral see LLDs					Q,C	840.000
NV-14-03-191	X	X	X					X							Q,C	2,203.710
NV-14-03-193	X	X	X					X							Q,C	2,520.000
NV-14-03-194	X	X	X												Q	2,480.000
NV-14-03-195	X	X	X					X							Q,C	2,560.000
NV-14-03-196	X	X	X					X							Q,C	2,433.070
NV-14-03-197	X	X	X					X							Q	2,560.000
NV-14-03-198	X	X	X					X							Q	2,560.000
NV-14-03-202	X	X	X												Q,C	2,400.000
NV-14-03-206	X	X	X					X							Q,C	1,720.000
NV-14-03-213	X	X	X													2,076.810
NV-14-03-214	X	X	X													1,120.000
NV-14-03-215	X	X	X													1,792.210

2014 Oil & Gas Lease Sale Elko District Stipulations

OG-010-Stip No.	OG-010-03-01	OG-010-03-02	OG-010-03-03	OG-010-03-04	OG-010-03-05	OG-010-03-06	OG-010-03-07	OG-010-03-08	OG-010-03-09	OG-010-03-10	OG-010-03-11	OG-010-03-12	OG-010-03-13	OG-010-03-14	Lease Notice	
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NV-14-03-216	X	X	X													1,120.000
NV-14-03-217	X	X	X													2,034.780
NV-14-03-218	X	X	X													2,560.000
NV-14-03-219	X	X	X													2,053.840
NV-14-03-220	X	X	X													2,193.410
NV-14-03-221	X	X	X													2,560.000
NV-14-03-222	X	X	X													2,061.080
NV-14-03-223	X	X	X													2,558.280
NV-14-03-224	X	X	X													2,197.580
NV-14-03-225	X	X	X													1,280.000
NV-14-03-226	X	X	X													1,910.210
NV-14-03-227	X	X	X													2,482.200
NV-14-03-228	X	X	X													1,920.000
NV-14-03-229	X	X	X													2,560.000
NV-14-03-230	X	X	X													2,560.000
NV-14-03-231	X	X	X													2,560.000
															Total Acres Offered	125,220.450

Notices

A	Historic roads or trails eligible for listing on the National Register of Historic Places are or may be present. Mitigation of impacts could require substantial buffers to protect the viewshed of the trail.
B	Historic Structures or remains of structures eligible for listing on the National Register of Historic Places are or may be present. Mitigation of impacts could require substantial buffers to protect viewsheds around buildings or communities.
C	Remains of historic railroads eligible for listing on the National Register of Historic Places are or may be present. Mitigation of impacts could require substantial buffers to protect the viewshed of the railroad.
D	Although all surface use authorizations would be subject to review, and mitigative measures may be required for cultural resources in any parcel, the Elko District Office advises potential lessees that these parcels are in areas with high potential for containing important cultural resources. Implementing measures to mitigate impacts to cultural resources may delay timeliness of permit approvals and restrict surface occupancy.
F	The proposed parcel intersects the 100 year floodplain. Special restrictions may apply to protect floodplain function.
G	High priority stream habitat (Elko RMP) or stream habitat (Wells RMP) exists in or near the proposed parcel. Special restrictions may apply to protect habitat.
H	A surface water resource for which water quality standards apply, is present in or near the proposed parcel. Special restrictions may apply to protect water quality.
K	Mule Deer Migration Area.
O	Mule Deer Transitional Habitat.
P	Parcels are located in the I-80 Low Visibility Corridor. The Low Visibility Corridor is a 3 mile wide (where possible) passage on which existing utility transmission or transportation facilities are located for which a future need may be accomodated if the facility is not evident in the characteristic landscape. The objective for visual resources within this area is for management actions not to be evident in the characteristic landscape.
Q	Groundwater resources have been permitted for beneficial use within or near the parcel. The BLM may place special restrictions on how the parcel may be developed depending on sensitivity of the resources present, and/or the nature of the proposed development. The groundwater connectivity between the developable resource and the existing used strata will have a bearing on these restrictions and BLM may require the lessee to collect extensive baseline data within the parcel before drilling can occur.

3 - AFFECTED ENVIRONMENT/ENVIRONMENTAL EFFECTS

General Setting

The Elko District is typical of the Great Basin, the lands generally located between the Wasatch Range of Utah and the Sierra Nevada mountains of California. The land is characterized by north-south oriented fault block mountain ranges separated by broad, flat valleys. The land is arid with precipitation generally less than 10 inches per year except for the higher elevations where precipitation is higher. The vegetation is typically sagebrush/grassland with substantial areas of juniper or pinion/juniper woodlands. Elevations range from above 13,000 feet in the Ruby Mountains to approximately 4,200 feet along the Utah border south of Wendover. The total population within the boundaries of the District is roughly 52,000 with the great majority of more than 40,000 in the Elko/Spring Creek area. Of the 12.5 million acres within the boundaries of the Elko District, approximately 7.2 million acres are public land managed by the Elko District Office.

With the exception of wilderness study areas, incorporated cities, and non-federal lands where mineral rights are not reserved to the U.S., most of the 7.2 million acres of public lands and 3.8 million acres of split estate land within the boundaries of the Elko District are open to leasing. Activities in sensitive areas are subject to surface occupancy limitations or seasonal restrictions that affect the conduct of leasing operations. The currently proposed lease sale would offer parcels scattered throughout the District subject to special stipulations where applicable.

As of 2013, over 48 million barrels of oil have been produced from oil fields within Nevada. There are geologic strata within the 7.2 million acres of public land managed by the Elko District Office which have been identified as potential sources of oil and gas. Because of the potential for oil and gas, as estimated by United States Geological Survey, public lands and mineral estate within the Elko District have been available for oil and gas leasing for decades.

See Appendix C for a projection of leasing related activities over the next 15 years. Post-leasing activities such as geophysical exploration and development of wells when added to the effects of other past, present, and reasonably foreseeable future actions have the potential to cumulatively affect resources and uses. Other activities include those related to livestock grazing, recreation, fire, urban development, and mining activities. The existing condition of lands that are leased are reflective of effects associated with past uses in combination with natural events such as wildfire and drought. The Great Basin Restoration Initiative, stream/riparian, upland restoration, and burned area rehabilitation projects are examples of ongoing actions that, when implemented, improve the condition of public lands throughout the Elko District.

3.1 CRITICAL ELEMENTS NOT AFFECTED

The following critical elements of the human environment are not present or affected by the proposed action, and are not further analyzed in this EA:

- Farm Lands (Prime or Unique)
- Environmental Justice

- Hazardous or Solid Wastes
- Wild and Scenic Rivers

3.2. EFFECTS OF THE ALTERNATIVES AND MITIGATIONS

Resources present and brought forward for analysis are discussed by the following subsections. Discussion is not listed where no impacts are expected, i.e., as for the No Action Alternative, to minimize non-essential text for this document.

The term "mitigations" used in the following sections is used to refer to resource protection measures that could be used when actual leases are developed subsequent to this lease sale.

3.2.1 Geology

Existing Conditions

Because of the potential for oil and gas, public lands and mineral estate within the Elko District have been available for oil and gas leasing for decades. There are two producing oil fields within the boundaries of the Elko District. Both are in Pine Valley but only one, the Blackburn Oil Field, is on public lands. The other, the Tomera Ranch Oil Field (Nevada Division of Minerals, 2013), is on private land, as are two abandoned oil fields. Three Bar (Nevada Division of Minerals, 2013) and North Willow (Nevada Division of Minerals, 2013) produced small amounts of oil (24,000 barrels and 51,142 barrels) in the past but neither is presently producing significant amounts of oil. The Blackburn Field (Nevada Division of Minerals, 2013), which has produced about 5,477,789 barrels, includes seven oil wells of which four, all on public land, continue to produce. The Tomera Ranch Oil Field has produced about 44,471 barrels. Production rates are declining at both fields.

Reasonably Foreseeable Development Scenario

Anytime during the 10-year term of the lease, the lessee, or operator, may submit specific plans for exploration and development to BLM for approval. These plans may be in the form of a Notice of Intent for Geophysical Exploration, or an Application for Permit to Drill (APD), Notice of Staking or Sundry Notice. BLM then reviews the submission to determine if there are any other site-specific conditions of approval that should be applied. Such conditions of approval must be consistent with the lease rights granted. In conjunction with obtaining approval to explore or develop a leased parcel, the operator may also seek a right-of-way to access the leased lands.

The following paragraphs provide a general description of possible post-leasing activities. Detailed explanations are located in Appendix D.

Geophysical exploration is used to obtain detailed geologic information. A variety of exploration methods are employed, ranging from placing electrodes in the ground, to detonating explosives to create shockwaves, to employing specially constructed off-road vehicles to produce vibrations. The most commonly used method in eastern Nevada is the vibroseis technique,

which uses large off-road vehicles with "thumpers" to generate shockwaves for two or three dimensional surveys.

Exploratory drilling (a wildcat well) begins development of a lease. An Application for Permit to Drill (APD) is filed with the BLM. A field examination is conducted and NEPA review is completed before a drilling permit is issued. An access road and a well pad are constructed for each well, if needed. Total disturbance attributed to drilling an exploration well is usually limited to five to ten acres for the pad and access road. Statistically, over 95% of exploration wells are dry.

Well Stimulation/Hydraulic Fracturing

Well Stimulation may be used to enhance oil recovery. Several methods of well stimulation could be used. Hydraulic Fracturing is one of these methods that is reasonably foreseeable for leases on this sale. Hydraulic fracturing is the process of applying high pressure to a subsurface formation via a wellbore, to the extent that the pressure induces fractures in the rock. Typically the induced fractures will be propped open with a granular "proppant" to enhance fluid connection between the well and formation. The process was developed experimentally in 1947 and has been used routinely since 1950. The Society of Petroleum Engineers (SPE) estimates that over one million hydraulic fracturing procedures have been pumped in the United States and tens of thousands of horizontal wells have been drilled and hydraulically fractured. It can greatly increase the yield of a well, and development of hydraulic fracturing methods and the drilling technology in which it is applied (in particular, long wells drilled horizontally within the targets) have enabled production of oil and gas from tight formations formerly not economically feasible.

Hydraulic Fracturing Technology

A general description of the hydraulic fracturing technology follows:

- All exploratory, testing, and production wells are multiply cased and sealed with cement between the wellbore and the formation. Well integrity is tested throughout the process.
- Drilling and hydraulic fracturing fluids can be contained in a pitless system (aboveground tanks) or a lined pit. Cuttings could be contained in roll-off boxes for hauling to disposal or surface casing interval cuttings could be spread over the site during reclamation.
- Hydraulic fracturing fluids are recovered to a large degree in "flowback" or produced water when the well is tested or produced.
- All recovered fluids are generally handled by one of four methods.
    - Underground injection
    - Captured in steel tanks and disposed of in an approved disposal facility.
    - Treatment and reuse
    - Surface disposal pits
- Drilling cuttings could be land farmed and buried on site 3 feet below root zones. Any cuttings that do not fit this waste profile will be disposed of at an approved disposal facility.

In-field drilling of additional exploration wells typically occurs when initial drilling has located oil or gas, to define the limits of the oil or gas reservoir. The process of in-field drilling is the

same as that employed for initial exploratory drilling, although new roads and pads may not be required in every instance.

Production begins only if oil or gas can be transported to a market and sold at a profit. In the Elko District, because of limited infrastructure, pumped oil is generally piped a short distance for temporary storage, then trucked to a refinery for processing. That is not likely to change because of the small quantity of resource estimated to be present in the Elko District. Production facilities may include one or more of the following: a well head; pumping equipment; a separation system; pipelines; a metering system; storage facilities; water treatment and injection facilities; cathodic protection systems; electrical distribution lines; compressor stations; communication sites; roads; salt water disposal systems; dehydration sites; and, fresh and salt water plant sites.

Well abandonment may be temporary or permanent. Wells are sometimes shut-in because pipelines or roads needed for production and marketing don't exist and the cost for construction is not justified by the quantity of oil discovered. These wells may later be reentered when their production can be marketed. The permanent abandonment of a well occurs when the well is determined to no longer have a potential for economic production, or when the well cannot be used for other purposes.

Reclamation. Abandonment includes removal of facilities and reclamation of surface disturbance. In the case of exploration wells which do not find economically recoverable amounts of oil, initial reclamation (recontouring), is usually completed the following year which provides for sufficient time for the reserve pit to dry out. After revegetation of the site is completed, usually within two to three years, reclamation is complete. If an exploration well finds economically recoverable quantities of oil, all disturbed surface except the small amount needed for a pump and access is reclaimed immediately.

Effects of the Proposed Alternative

Oil and gas is a nonrenewable resource. Once the oil and gas is pumped and consumed, there is no more. Standard safety drilling requirements are expected to reduce any potential for negative effects to near zero. Leasing activities, including exploration and development generates geologic information that enables geologists and engineers to expand the knowledge base for geology.

The hydraulic fracturing process uses large amounts of water (up to 900,000 gallons per well). This would be equivalent to 1% to 5% of the typical yearly water use by the community of Spring Creek, Nevada.

Fluid injection either associated with normal oil and gas development and production or associated with hydraulic fracturing has the potential to induce seismic activity. Nevada is the 3rd most tectonically active state in the union. Since the 1850s there have been 63 earthquakes with a magnitude greater than 5.5, the cutoff for a destructive earthquake. Geologic mapping and 2-D and 3-D seismic data can locate faults within the project boundary but current science may not be able to differentiate a "natural" earthquake in this tectonically active region as opposed to those induced by fluid injection. Any destructive earthquake has the potential to induce liquefaction in

saturated soils and to cause landslides. Modern buildings in Nevada are built to code and if property owners practice earthquake preparedness, damage would be kept to a minimum.

The Reasonably Foreseeable Development Scenario from Appendix C concludes that the Elko District can expect to see a total of 1,650 miles of seismic surveys, 80 exploration wells, discovery and development of two mid-size oil fields and two small oil fields. The seismic surveys are expected to result in 788 acres of disturbance of which 683 would be reclaimed at the end of the 15 years (13 of 15 years of exploration activities). The exploration wells and development and production activities would disturb 858 acres of which 677 would be reclaimed at the end of 15 years while 181 acres would still be in use for production facilities.

Cumulative Effects of the Alternatives

The cumulative effects study area (CESA) is Elko District. Fluid injection induced seismicity is a very low but real possibility that cannot accurately be quantified. There are no cumulative impacts of concern for the Proposed Action or associated future oil and gas development with respect to geologic resources.

Mitigation

No mitigation is needed for the Proposed Action, however, best management practices along with the applied stipulations would minimize the potential for adverse effects if the leased parcel is developed. Site specific mitigation will be developed during the APD stage of permitting.

3.2.2 Socio-Economics

Existing Conditions

Oil and gas and energy are national issues as well as local issues. All proposed lease parcels are located in Elko County, which has a US Census estimated population of 51,212 in 2012. Elko County relies on the exploration and development of natural resources, primarily gold, to provide the basis for employment and economic activity in the county and adjacent areas which comprise the Elko District of the BLM. Natural resource jobs, including mining, usually pay relatively well, resulting in Elko County having the second highest median household income in Nevada at just over $69,459 per year. Like gold, oil and gas are shipped out of the area for processing and use. Thus the exploitation of oil and gas resources benefits both the local and national economy.

Effects of the Proposed Alternative

Leasing, exploration, and development of oil and gas resources generate revenue to the Federal, state, and local governments. The proposed action also generates economic activity in the private sector. People and equipment are required to explore for mineral deposits. This means capital investment as well as the purchase of operational supplies such as lubricating oils and drill bits for drill rigs. Employees are required for the many disparate aspects of leasing and exploration, from those who handle permitting and land ownerships issues, to those who handle the financing and payroll, to the regulatory agency employees who regulate such activities, to the

on-the-ground employees who actually perform the exploration work, to the geologists who interpret the information received and advise on future exploration work.

Leasing activities also generate economically valuable information. Exploration generates information about the geology and mineral resources at a particular location. That information can usually be used to infer geology and mineral resources in a much wider area. The more information available, the greater the efficiency of future searches for mineral deposits of all kinds, not just oil and gas.

Oil production from federal lands results in a 12.5% production royalty payment to the federal government. Fifty percent of that amount is provided to the state government. Taxes are paid to government in a variety of forms including income and property taxes by both the oil production operators and the employees thereof. On the flip side, government may be providing additional services such as new roads, and road maintenance which results from oil development operations. The additional economic activity and employment results in a trickle down effect, supporting employment and economic activity in other sectors of the economy including housing, retail, services, and government.

A second benefit of development and production of oil and geothermal resources is increased availability and potentially lower prices for energy based on the supply/demand theory of economics. Lower prices mean increased economic activity along with the impact of diverting payments from a foreign nation to the internal US economy. Increased US energy supply also increases economic stability by decreasing the risks associated with importing energy, particularly oil and gas, from unstable source countries. Another benefit is that increased energy production helps to create the infrastructure such as roads, powerlines, service companies, housing, and the like which support the expansion of other economic activities indirectly (rather than directly) through the need of the energy industry for employees and services.

The downside of economic expansion is increased population and increased pressure on finite resources such as water, recreation, open space, and additional demands on government services.

Mitigation

The Proposed Action is for the offer of sale of leases and does not have any negative affect on Socioeconomics in Elko County. Mitigation would be determined if leased parcels are proposed for development.

3.2.3 Cultural Resources

Cultural resources are defined as those nonrenewable remains of past human activity. For example, once the objects in an archeological site are disturbed, nothing can recover the information that might have been gained through analysis of their relationships in past human history. The primary concern of cultural resource management, therefore, is to minimize the loss or degradation of culturally significant material remains.

Protection of America's cultural resources began with the passage of the 1906 Antiquities Act. Next to pass was the Historic Sites Act of 1935. These two previous Acts were incorporated into the National Historic Preservation Act (NHPA) of 1966 and its amendments. Protection of historic properties was reiterated in the Archaeological Resources Protection Act (ARPA) of 1979, and protection was broadened by the Native American Graves Protection and Repatriation Act (NAGPRA) in 1990. Although each of these acts has its own focus and orientation, collectively they require a comprehensive, multicultural, and multi-disciplined approach to managing cultural resources on public lands.

The National Historic Preservation Act (NHPA) recognizes cultural resources as five property types: districts, sites, buildings, structures, and objects. As called for in the Act, these categories are used in the National Register of Historic Places (NRHP), the preeminent reference for properties worthy of preservation in the United States. To focus attention on management requirements within these property types, the NPS *Management Policies* categorizes cultural resources as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources.

The BLM Elko District is located in the north-central Great Basin and in the north-eastern region of the state of Nevada. The Elko District contains some of the earliest known human habitation sites in the United States. Archaeological studies of this area have shown that humans (Paleoindian hunter/gatherers) began utilizing natural resources such as mega fauna (i.e., mammoths) at least 12,000 years ago. The Great Basin's climate was much different than today; having large Pleistocene lakes such as Lake Lahontan and Lake Bonneville. As the climate began changing around 9,000 years ago to a warmer/dryer environment, the mega fauna became extinct. Due to population growth and climate change these resourceful people adapted to a nomadic plant based gathering lifestyle and hunting smaller game, traveling to where the resources became seasonally available.

The Elko District also has a rich history from the historic-era. The first known Euroamericans to enter the region were fur trappers in the early 1800's. Following on the heels of these early trappers were the emigrants following the trails to Oregon and California. The Bidwell-Bartleson party passed through in 1841 and the Donner party passed through on their way to California in 1846. With the discovery of Gold at Sutter's Mill in California in 1848, miners began utilizing the trails to California to make their fortunes in the California gold fields. Mining began in the Elko District in 1859 with discovery of gold in near the present day city of Carlin. Congress granted Nevada statehood in 1864 because the region's precious metals were key to the Union's cause in the Civil War. The construction of the transcontinental railroad (which passes through the District) began in 1863 and ended in 1869. Chinese miners began arriving in the area in 1869 after the railroad had been completed.

Less than 15% of the entire Elko District has been inventoried for cultural resources as of December 2013. The District contains over 17,700 known prehistoric-era and historic-era archaeological sites. Given the vast size of the Elko District and the small amount of cultural resource inventories, most of the proposed locations for the oil and gas lease sale have not been inventoried for cultural resources. Resources known to exist in the view shed, within or near the 2014 Oil and Gas Lease Sale parcels include the California Emigrant Trail, the Hastings Cutoff

of the California Emigrant Trail, the Northern Nevada Railway Grade, and numerous prehistoric-era and historic-era sites.

Effects of the Proposed Alternative

The act of selling oil and gas leases, although not authorizing exploration, development or production prior to site specific NEPA analysis, has the potential to adversely impact cultural resources because it gives the lessee certain irrevocable rights and can foreclose the authorized officer's use of some mitigation measures. Once issued, a lease bestows upon its owner the "right to use so much of the lease lands as is necessary to explore for, drill for, mine, extract, remove and dispose of the leased resource in the leasehold" (43 CFR§ 3101.1-2) subject to specific nondiscretionary statues and lease stipulations. "Reasonable" mitigation measures may be required by the authorized officer prior to project authorization to minimize adverse impacts to other resource values. "Such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year" (43 CFR§ 3101.1-2).

Cultural resources management is authorized by a number of federal statutes including the National Historic Preservation Act (16 U.S.C. 470). Regulations (36CFR§ 60.4) promulgated under this act provide criteria for evaluating cultural properties to determine if they qualify for listing on the National Register of Historic Places due to their significance in American history, architecture, archaeology, engineering, and culture. In Nevada 15% to 20% of cultural resources found during inventory are typically found to be eligible for listing on the National Register and thus worthy of consideration beyond initial recording. A property can be eligible on the national, state/regional, or local level. The term "historic property" as defined at 36CFR§ 800.16(I) is used here to describe any cultural resource that qualifies for listing on the National Register of Historic Places.

Four National Register criteria are applied when evaluating cultural resources. Criterion A is used to evaluate a property's association with events that have made a significant contribution to the broad patterns of our history. Examples of eligible properties are the California Emigrant Trail (national level) and Fort Ruby (local level). Criterion B relates to a property's association with the lives of persons significant in our past. Examples are the home of Thomas Jefferson (national level) and a store owned by a prominent Elko businessman (local level). Criterion C applies to properties that embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master or have high artistic value. Examples include a house designed by architect Frank Lloyd Wright, a Native American game drive, and a bridge built by the Civilian Conservation Corps. Properties may be eligible under Criterion D if they are likely to yield information important to history or prehistory.

The majority of eligible cultural resources in the Elko District qualify to the National Register solely under Criterion D and adverse effects can usually be avoided either through project relocation of 200 meters or less, or through data recovery because these properties are significant due to their data potential.

However the 200 meter relocation measures allowed by the oil and gas regulations may not be sufficient to avoid adverse effects to those relatively few cultural resources that qualify for National Register under Criteria A, B and/or C. This is because such properties' significance may be in part due to their setting, feeling and association. For example an eligible segment of the California Emigrant Trail may lie in a valley where there has been little modern development and can provide the visitor a glimpse of the emigrants' experience. Placement of a production oil well or well field in the view shed may substantially affect the setting, feeling, and association of the trail. Movement of these facilities 200 meters or less often would do little to mitigate the effects.

New directives regarding National Historic Trails is outlined in the BLM Manual 6280 "Management of National Scenic and Historic Trails under Study or Recommended as Suitable for Congressional Designation (Public)" states that BLM may not permit proposed actions along National Trails which will substantially interfere with the nature and purpose of the trail. Segments of the California National Trail have contributing (eligible for the National Register) and non-contributing (ineligible for the National Register) elements. In the eligible portions, the Trail could be adversely affected through audio or visual disturbance. For further direction of requirements refer to BLM Manuel 6280, sections 5.1 through 5.5, specifically sections 5.3 A and B.

Geophysical Exploration: The potential impacts to cultural resources are shared by all the cross-country, truck-supported seismic exploration (thumper, vibrator, spark ignition and surface/subsurface explosives) and, to a lesser degree, by non-vehicle supported surface explosives. This is the crushing/breaking, displacement, and mixing of archaeological deposits, features and artifacts, and other cultural resources, by vehicle tires and tracks, or explosives. Similar impacts can be caused by the steel slabs, vibrator feet, and explosives used to create the seismic waves. The nature of the impacts can range from negligible to severe depending on the number and weight of the vehicles, the number of passes, soil types and conditions, and the nature of the cultural resources in the area of potential effect. Generally, for archaeological deposits, greater surface disturbance or soil compaction leads to greater impacts.

Cultural resources also could suffer impacts due to unauthorized artifact collection directly or indirectly associated with geophysical exploration. Potential impacts could result from illegal artifact collection by geoseismic crews who cover broad expanses of ground establishing the grids and laying out the cables necessary for data collection, and who usually know cultural resource site locations because they are required to route around sites to avoid impacts. Indirect impacts could result when seismic trails are used by artifact collectors to access locations which previously had limited access. Artifact collecting on public lands is prohibited by federal law. While difficult to quantify, artifact collection resulting from geophysical exploration could substantially impact cultural resources. "Arrowheads", bottles, and other artifacts/tools sought by collectors are also among the sources of data most critical for archaeological research and/or site interpretation. Because cultural resources are nonrenewable, artifact removal and other site damages would be an irretrievable resource loss.

Visual impacts (i.e., effects to setting, feeling, and association) to cultural properties eligible under Criteria A, B or C, caused by the intrusion of exploration vehicles, would usually be of short duration and usually not adverse. Exploration lines on-the-other-hand, could remain visible

for decades in this desert environment (as evidenced by the 1970s and 1980s seismic lines still visible in the Elko District) creating long-term visual impacts. Multiple parallel lines could be the most visually intrusive.

Other long-term impacts could occur if seismic lines are converted to use as roads. Impacts could result from continued driving over cultural resources and from deepening and widening of the roadbed within sites if use is heavy or certain conditions (powdery soil, excessive moisture) are present. Improved access could also result in damages such as long-term artifact collection in previously remote sites and more indirectly like those caused from increased off-road recreation in areas away from the seismic lines.

Certain exploration actions can be exempted from cultural resource inventory. The cultural resource Protocol Agreement between Nevada BLM and Nevada State Historic Preservation Office (SHPO) provide that the following geophysical exploration actions may be considered categorically no adverse situations and may be excluded from cultural resource inventory requirements: 1) vibroseis and conventional truck-mounted shothole drill routes and operations located on constructed roads or well-defined existing roads and trails; 2) pedestrian routes and placement sites for hand-carried geophone, cables, or similar equipment; 3) cross-country operations of seismic trucks and support vehicles on bare frozen ground or with sufficient snow depth (vehicle traffic does not reveal the ground) so as to prevent surface disturbance; 4) one time (single pass) routes of wheeled vehicles under 10,000 lbs. GVW; 5) above ground seismic blasting (Poulter method); 6) helicopter-supported activities, including shothole drilling and above ground seismic blasting (Poulter method) in most areas, that do not require helicopter staging area preparation and vehicle use off of roads and trails; and 7) exploration activities defined as casual use in 43 CFR 3150. The preceding exemptions would not apply if cultural resources might be impacted such as: the use of surface blasting is near historic structures, using crews in areas with high densities of artifacts that might be illicitly removed, or using vibroseis trucks on a historic wagon road.

Exploration Drilling: The various actions involved in oil and gas exploration drilling could adversely impact cultural resources physically and visually. Impact types would be similar for all drilling methods but the degree of impact could differ since some methods cause more earth disturbance than others. If drill pad or mud pit construction are not needed and scarification is not used to rehabilitate the pad then physical impacts would usually be crushing/breaking, displacement and mixing of archaeological deposits, features and artifacts, and other cultural resources. Pad construction impacts could be more severe as constructed pads are usually larger than informal pads and substantial earth disturbance is usually required, potentially obliterating any cultural resources. Drilling fluid runoff could impact cultural resources away from drill pads by covering them with sediment or eroding cultural deposits.

Exploration pad construction and drilling activities could affect the setting, feeling, and association of cultural properties eligible to the National Register under Criteria A, B or C as discussed above under “Effects”. If the pad and associated facilities are abandoned and rehabilitated shortly after construction, these effects could be temporary and therefore not adverse if successfully rehabilitated. If the project goes to production visual impacts could be long-term as discussed below.

Improved access and an increased human presence could result in illicit artifact collection and general deterioration of cultural resources. This type of damage would typically be concentrated around the drill site and access routes, and might be expected to be more likely to occur, or result in greater damages when extended drilling times are involved.

Road Construction and Use: Road construction, like the other actions involving substantial earth disturbance, can damage or destroy any cultural resources within the road corridor. A narrow road created by a single pass of the blade would be likely to do less damage, than a crowned and ditched road built to support heavy traffic. Cultural resources outside the construction corridor could be impacted by construction induced erosion.

Road construction and use could affect the setting, feeling, and association of historic properties eligible to the National Register under Criteria A, B or C as discussed above in "Effects." The type of road, duration of use, nature of the historic properties, and visibility of the road from these properties would have to be considered in determining effects and developing mitigation measures. If the roads were to be abandoned and rehabilitated soon after construction, effects could be determined to be temporary and therefore not adverse, assuming the rehabilitated routes did not create a substantial long-term visual effect. If new roads were not closed and rehabilitated, visual impacts could be long-term from both the intrusion of the road itself and from traffic using it.

Creation of new or improved access into areas which previously were difficult to reach could have substantial and long lasting adverse effects if cultural resources were present. A number of studies (Williams 1978, Lyneis et al. 1980; Nickens et al. 1981) have shown that that increased access leads to both intentional and incidental deterioration of nearby cultural resources. Nickens et al. (1981) found that most archaeological sites within 100 meters of improved roads exhibited evidence of vandalism and/or illegal collection. Sites at considerably greater distances also suffered damage but with less frequency as distance increased (Desjean and Wilson 1990; Ison et al. 1981; Nickens et al. 1981). With the advent of widespread ATV use in the last decade, we might anticipate that the spread of damage beyond new access roads may now be even greater especially since the Elko District Office RMPs allows off-road use in most areas.

Development: Development of individual oil wells and oil fields would have the same types of impacts as exploratory drilling if cultural resources are present but potentially at a much greater scale simply because of the increased surface disturbance, additional facilities, longer period of use, and less opportunity to effectively redesign/relocate the fields to avoid impacts. The types of potential impacts depend on many factors including the location of the oil fields, the nature of the subsurface oil/gas reservoirs, the number and type of cultural resources present, and the geography.

Physical impacts from the clearing, leveling, cutting and filling for the drill pads, tank batteries, internal pipelines, and other facilities could damage or destroy cultural resources located within the construction zones. As a rule, moving an oil field so as to avoid historic resources would not be feasible, but relocating and rerouting facilities within a field to avoid direct physical impacts is possible. However, such actions may be insufficient to avoid the effects of incidental and intentional human actions (e.g., running equipment through sites, artifact collecting, etc.) or unanticipated secondary effects of the development such as erosion or oil spills.

The earth disturbance, facilities, operations activities (such as flaring), and traffic required by oil and gas development and operations could substantially impact the setting, feeling, and association of any nearby historic properties eligible to the National Register under Criteria A, B and C by introducing visual and noise elements that are out of character with the particular resource such as the California Trail. Intrusions could range from minor, if the historic property is some distance from the development or is screened by the topography, to overwhelming if a small resource such as a historic cabin were to be surrounded by a well field and associated facilities.

Power Lines: Power line installation and maintenance would cause earth disturbing activities at the pole locations, along access routes, and at staging areas. All of these could have adverse effects to cultural resources. The amount of disturbance depends on the size of the line. Single pole lines might only require cross country travel and drilling of pole holes without preparing a pad. The greatest damage could be from long-term use of the access route for line inspection and maintenance, and as an access route by the public.

Due to their height and visibility power lines could affect the setting, feeling, and association of historic properties eligible to the National Register under Criteria A, B and C.

Pipelines**:** Pipelines could be installed on the surface or buried. Both methods could have adverse effects to cultural resources by obliterating surface and shallow buried manifestations of archaeological and historic sites. Buried pipelines also have the potential to affect deeply buried archaeological deposits.

Surface pipelines could have long-term visual effects for some historic properties, while visual effects from buried pipelines might be of shorter duration if the line and access road are rehabilitated and revegetated.

Rehabilitation/Abandonment: Rehabilitation and abandonment of trails, roads, pads, and other facilities associated with oil and gas exploration and development could affect cultural resources, but usually not to the degree of the earlier project phases. Positive effects could be lessening or removal of project induced visual intrusions into settings of historic properties. Adverse impacts could result if new ground containing historic properties would be disturbed during leveling, recontouring, ripping, or other types of rehabilitation. As a rule, special protective measures established in the proposed action for construction would suffice for the rehabilitation/abandonment phase. However, because rehabilitation/abandonment may occur months or years after the original action, avoidance measures could be forgotten or overlooked.

Most cultural properties tend to degrade over time due to natural forces but many tend to remain intact for thousands of years. Modern human activity tends to exacerbate the damage and as a consequence cultural resources are disappearing at an ever increasing rate. Many of the impacts of fluid mineral exploration and development described above would be mitigated through implementing protective measures as part of standard operating procedures. Similar measures implemented for other types of federal undertakings would also limit cultural resource impacts. Nonetheless, as described above, not all damages attributable to these actions are well understood or can be controlled. Taken together with other uses of the public lands, fluid mineral exploration would contribute to an overall decline in cultural resources.

Cumulative Effects

The 2014 Oil & Gas Lease Sale does not authorize any ground disturbance and therefore has no direct effect to cultural resources. As directed by law, cultural resources inventories are conducted for any actions involving federal lands, and adverse effects to historic properties avoided or mitigated as appropriate. Avoidance through project redesign is the preferred method of mitigation; however, when avoidance is not feasible, data recovery or other forms of mitigation are implemented prior to ground-disturbing activities. Unavoidable adverse effects to historic properties would be addressed through mitigation in accordance with the appropriate processes and developed in consultation with the Nevada SHPO. In addition, any previously unknown NRHP-eligible sites potentially discovered during project activities would be mitigated in accordance with the NRHP and BLM rules and regulations in consultation with the Nevada SHPO. Therefore, and proposed projects arising from the 2014 Oil & Gas Lease Sale is not expected to cumulatively contribute to direct effects to historic properties. However, if data recovery is necessary to mitigate unavoidable adverse effects to historic properties, the process would recover a substantial amount of data but ultimately the site would be destroyed by the undertaking preventing future opportunities for scientific research, preservation, or public appreciation. Over time, this represents a cumulative loss.

Mitigation

Most adverse effects to cultural resources would be mitigated through project redesign, relocation, or in some cases of historic properties eligible for their research potential (Criteria D), through data recovery. Direct physical impacts would usually be avoided by project reroutes and redesign. Buffers would be established between historic properties and proposed projects to mitigate potential direct and indirect impacts.

While avoidance measures and buffers may lessen the degree of incidental and intentional impacts to historic properties, other measures would also be required if warranted.

Such mitigation measures may include, but are not limited to:

- the proponent to ensure their actions or the actions of their employees, contractors or anyone else associated with the project do not intentionally or inadvertently adversely impact historic properties.
- Should unanticipated or unauthorized impacts occur, the proponent would be responsible for taking steps to eliminate the action causing the impact, and for the cost of repairing/stabilizing damaged properties and/or undertaking appropriate data recovery.
- If historic properties susceptible to impacts attributable to the project are located near or within long-term facilities such as oil fields, or associated access roads, photographic documentation, and establishment of base maps followed with periodic monitoring by an archaeologist funded by the proponent would be required to ensure that these historic properties are not deteriorating.
- the proponent and their employees in site protection, including but not limited to
- employee education to reporting of unauthorized artifact collecting.

3.2.4 Paleontological Resources

Regulatory Framework:

The Paleontological Resources Preservation Act (PRPA) became law in 2009 with the passage of Public Law 111-011. The PRPA includes specific provisions addressing management of these resources by the Bureau of Land Management (BLM), National Park Service (NPS), Bureau of Reclamation (BOR), U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS). The PRPA confirmed the authority for many policies these agencies already had in place for the management of paleontological resources including issuing permits for collecting paleontological resources, curation of paleontological resources, and confidentiality of locality data. The PRPA only applies to federal lands and does not affect private lands. It provides authority for the protection of paleontological resources on federal lands including criminal and civil penalties for fossil theft and vandalism. Consistent with policy before the passage of the act, the PRPA also includes provisions allowing for casual or hobby collecting of common invertebrate and plant fossils without a permit on federal lands managed by the BLM, the BOR, or the USFS, under certain conditions. The PRPA directed federal agencies to begin developing regulations, establishing public awareness and education programs, and inventorying and monitoring federal lands.

The BLM also manages paleontological resources (fossils) on federal lands under the following additional statutes and regulations (BLM 2010):

- Federal Land Policy and Management Act of 1976 (P.L. 94-579);
- National Environmental Policy Act of 1969 (P.L. 91-190); and
- Various sections of BLM's regulations found in Title 43 Code of Federal Regulations (CFR) that address the collection of invertebrate fossils and, by administrative extension, fossil plants.

In addition to the statutes and regulations previously listed, fossils on public lands are managed through the use of internal BLM guidance and manuals. Included among these are the BLM Manual 8270 and the BLM Handbook H-8270-1 (BLM 2010). Various internal instructional memoranda have been issued to provide guidance to the BLM in implementing management and protection to fossil resources.

Effects of the Proposed Alternative

Potential Fossil Yield Classification**:**
The BLM has adopted the Potential Fossil Yield Classification (PFYC) system to identify and classify fossil resources on federal lands (BLM 2007). Paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources.

The PFYC system is a way of classifying geologic units based on the relative abundance of vertebrate fossils or scientifically significant fossils (plants and invertebrates) and their sensitivity to adverse impacts. A higher class number indicates higher potential for presence. The PFYC is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class. Instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions. The BLM intends for the PFYC System to be used as a guideline as opposed to rigorous definitions. Descriptions of the potential fossil yield classes are summarized in Table 8.

Paleontological resources are the fossilized remains of invertebrate and vertebrate animals and multi-cellular plants, including imprints. Paleontological resources constitute a fragile and non-renewable scientific record of the history of life on earth. Once damaged, or improperly collected, their scientific and educational value may be greatly reduced or lost forever.

The paleontological resources in the Elko District occur in sediments and tuffaceous sediments throughout the Tertiary (66 million years to 1.6 million) and are likely to be found in the Quaternary sediments (1.6 million years to 10,000).

Fossil fish are known to occur with plant fossils in the Oligocene aged (23 to 36 million years) Elko formation in tan colored silty shale (Palmer, 1984). Oligocene sediments would rate 3 in the PFYC system because vertebrate fossils are known to exist but there is very little scientific data.

Vertebrates including varieties of extinct camel, antelope, and ancestors of the horse have been found in the tuffaceous siltstone, sandstone, and limestone in the Carlin Formation (Hockett 2013), Humboldt Formation, or in similar Miocene (5 million to 23 million years) aged materials throughout the district. The depositional environment likely helped preserve the bone material of dead animals as well as the high amount of silica contained in the volcanic ash. According to Hockett (2010), the volcanic tuffs are the highly fossiliferous rocks in the Carlin formation, but the tuffs are not the predominant rock-type in the formation. The proposed type-section southwest of Carlin, Nevada described by Regnier (1960) indicates a high degree of variability of deposits within the formation. Miocene sediments would rate 3 in the PFYC system because vertebrate fossils are known to exist but there is very little scientific data.

Potential Fossil Yield Classification

Class	Description	Basis	Comments
1	Igneous and metamorphic (tuffs are excluded from this category) geologic units or units representing heavily disturbed preservation environments that are not likely to contain recognizable fossil remains.	• Fossils of any kind known not to occur except in the rarest of circumstances • Igneous or metamorphic origin • Landslides and glacial deposits	The land manager's concern for paleontological resources on Class 1 acres is negligible. Ground disturbing activities would not require mitigation except in rare circumstances.

Class	Description	Basis	Comments
2	Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant invertebrate fossils.	• Vertebrate fossils known to occur very rarely or not at all • Age greater than Devonian • Age younger than 10,000 years before present • Deep marine origin • Aeolian origin • Diagenetic alteration	The land manager's concern for paleontological resources on Class 2 acres is low. Ground disturbing activities are not likely to require mitigation.
3	Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Also, sedimentary units of unknown fossil potential.	• Units with sporadic known occurrences of vertebrate fossils • Vertebrate fossils and significant invertebrate fossils known to occur inconsistently; predictability known to be low • Poorly studied and/or poorly documented; potential yield cannot be assigned without ground reconnaissance	The land manager's concern for paleontological resources on Class 3 acres may extend across the entire range of management. Ground disturbing activities would require sufficient mitigation to determine whether significant paleontological resources occur in the area of a Proposed Action. Mitigation beyond initial findings would range from no further mitigation necessary to full and continuous monitoring of significant localities during the action.
4	Class 4 geologic units are Class 5 units (see below) that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation.	• Significant soil/vegetative cover; outcrop is not likely to be impacted • Areas of any exposed outcrop are smaller than 2 contiguous acres • Outcrop forms cliffs of sufficient height and slope that most is out of reach by normal means • Other characteristics that lower the vulnerability of both known and unidentified fossil localities	The land manager's concern for paleontological resources on Class 4 acres is toward management and away from unregulated access. Proposed ground disturbing activities would require assessment to determine whether significant paleontological resources occur in the area of a proposed action and whether the action would impact the paleontological resources. Mitigation beyond initial findings would range from no further mitigation necessary to full and continuous monitoring of significant localities during the action.
5	Highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils and/or scientifically significant invertebrate fossils, and that are at risk of natural degradation and/or human-caused adverse impacts.	• Vertebrate fossils and/or scientifically significant invertebrate fossils are known and documented to occur consistently, predictably, and/or abundantly • Unit is exposed; little or no soil/vegetative cover • Outcrop areas are extensive; discontinuous areas are larger than 2 contiguous acres • Outcrop erodes readily; may form badlands • Easy access to extensive outcrop in remote areas • Other characteristics that increase the sensitivity of both known and unidentified fossil localities	The land manager's highest concern for paleontological resources should focus on Class 5 acres. Mitigation of ground disturbing activities would be required and may be intense. Areas of special interest and concern should be designated and intensely managed.

Sources: BLM 2008, 2007.

A mastodon was found in Pliocene (2 million years) sand in Spring Creek, Nevada. As reported by Hockett, the mastodon found in Spring Creek is important for several reasons. This specimen is the first well-documented occurrence of an American Mastodon in Nevada and the Great Basin of North America. The Great Basin covers much of Nevada, and parts of Utah, Idaho, Oregon, and California. In Nevada, *Miomastodon* remains have been reported at Stewart Valley in Esmeralda County and Thousand Creek in Humboldt County, but no American Mastodons have been previously recorded in Nevada or the Great Basin. While many 10,000 to 20,000 year-old mastodons have been found (especially in the midwestern and eastern United States), American Mastodons that date millions of years ago are relatively rare anywhere in North America. If the dating of the Spring Creek mastodon is correct, then this specimen is one of only a dozen or so American Mastodons that date to this time period. (Hockett, 1997) Pliocene sediments would rate 3 in the PFYC system because vertebrate fossils are known to exist but there is very little scientific data.

All vertebrate fossils are considered significant and can occur in Devonian- aged or younger sedimentary rocks. On the Elko District vertebrate fossils have been found in most ages of

Tertiary and Quaternary sediments. Invertebrate fossils occur in sedimentary rocks of all ages in the Elko District but there are no localities designated as being of significant scientific value.

The 2014 Oil and Gas Lease Sale does not authorize ground disturbing actions and therefore will have no effect on these fragile resources. However, future exploration, drilling, and production could cause adverse effects to paleontological resources but any effects would likely be minimal.

Cumulative Impacts

The 2014 Oil and Gas Lease Sale does not authorize ground disturbing actions and therefore will have no direct or cumulative effect on these fragile resources. However, future exploration, drilling, and production could cause adverse effects to paleontological resources. Cumulative impacts to fossils are possible at the exploration and development stage of oil and gas development but would likely be minimal.

Mitigation

Most paleontological resources degrade over time due to natural forces but many survive for millions of years. Modern human activity tends to exacerbate the damage and as a consequence paleontological resources are disappearing at an increasing rate. A project specific paleontological inventory should be conducted in any future project associated with this lease sale if sedimentary rocks with the potential to contain vertebrate fossils are present. If paleontological resources are identified within the parcel, a qualified Paleontologist could mitigate the adverse effects through creating a buffer zone for avoidance or the resource could be excavated and removed from the project area. Further guidance regarding BLM's policy on paleontological resource management; refer to BLM Manual 8270 entitled "*Paleontological Resource Management."*

Most of the impacts of fluid mineral exploration and development would be mitigated through implementing protective measures as part of standard operating procedures. Protective measures could include avoidance by creating buffer zones or excavation by a qualified Paleontologist. Given that most of these activities do not penetrate deep into the substrate where many of these fossils occur, the cumulative impact of post-leasing activities should be minimal.

3.2.5 Soils

Existing Conditions

The soils in the proposed parcels vary in depth, texture, erosion potential, and other characteristics based on several soil forming factors. A wide range of landforms are present within the proposed parcels. Soils on valley floors are frequently deep, poorly drained and alkaline with a high salt content. Soils on piedmonts are moderately deep and overlie a silica cemented hardpan. Mountain soils are often shallow and form over bedrock. Oil and gas exploration and development is most likely to occur on piedmonts or valley bottoms. Detailed soil information for the proposed parcels is available in the following published soil surveys: Elko County Central Part (767); Elko County Northeast Part (765); Elko County Southeast Part (766).

Soil quality in and near the proposed lease parcels is affected by a variety of natural and anthropogenic factors. A detailed assessment of soil condition has not been completed for this analysis, but it can be assumed that conditions vary from parcel to parcel depending on differing land uses and natural influences. As with many other areas in the Elko District, the proposed parcels are mostly undeveloped, but there may be areas of dispersed or heavy impacts to soils associated with different land uses such as livestock grazing, vehicle use, wildland fire, and any activity which disturbs the ground surface. Soil quality is also affected by natural conditions and occurrences which affect soil quality such as wildland fire, climatic variability, weather events, climate change, and variability in soil forming factors. Natural and anthropogenic activities affect soil quality by altering soil quality characteristics such as aggregate stability, compaction, and infiltration. impacts to these characteristics alters soil productivity which can affect numerous other natural resources in the ecosystem. (USDA 2001).

Effects of the Proposed Alternative

The act of offering, selling, and issuing federal oil and gas lease does not create direct impacts to soil quality. Impacts to soils, both direct and indirect, would occur when the lease is developed in the future. The potential impacts would be analyzed in detail on a site-specific basis prior to oil and gas development.

If oil and gas development were to occur in the proposed area(s) for leasing, most of the impacts to soil quality would be a result of the ground disturbing activities such as well pad construction, roads to access the well pad, and road spurs off of main well pad access roads. These facilities would create new areas of localized heavy impacts to soils quality. Additional impacts to soils may occur as a result of water diversion associated with the large amounts of water required for some drilling and hydraulic fracturing operations. If water is depleted by these operations, areas of hydric soils may be negatively affected. BLM would ensure that best management practices would be used to reduce negative effects. Impacts to soils would not likely result in enough disturbance to influence function and productivity of soils at a large scale. Historically, oil and gas development has been very limited in the Elko District, and development could increase by several orders of magnitude before having the potential to impacts soils at a large scale.

Cumulative Effects of the Alternatives

The cumulative effects study area (CESA) is a two mile buffer of the area encompassed by the parcels available for lease. This area was chosen because of the potential for direct impacts to soils from disturbance associated with oil and gas development, along with the potential for impacts to hydric soils outside of the lease parcels if large water diversions are proposed. As described above for the Affected Environment, levels of soil disturbance in the CESA are low and the current levels of natural and anthropogenic influences have not resulted in substantive cumulative effects. Reasonably foreseeable future actions that could occur under the No Action Alternative such as livestock grazing and permitted land disturbance could incrementally increase these impacts, but cumulative impacts of concern are not expected under this alternative.

The Proposed Action would not result in any direct incremental increase in cumulative impacts to soil resources, but subsequent development could increase impacts as described above in the Proposed Action section. The increase in impacts associated with oil and gas development would

be very small when compared to the cumulative impacts described for the No Action Alternative. As a result, there are no cumulative impacts of concern for the Proposed Action or associated future oil and gas development with respect to soil resources.

3.2.6 Water Resources (Surface/Ground)

Existing Conditions:

Hydrology

The proposed lease parcels are within five watersheds classified by the United States Geological Service (USGS) as sub-basins and designated by eight digit hydrologic unit codes (HUC) (Seaber, et al. 1987).These include the South Fork Humboldt, Upper Humboldt, Long Ruby Valleys, Spring-Steptoe Valleys, and Southern Great Salt Lake Desert Sub-Basins The Nevada Division of Water Resources (NDWR) has its own delineation of watershed boundaries called hydrographic areas which differ from that of the USGS (NDCNR 1999). These watersheds are characterized by internal surface drainage and ground water flows. The South Fork Humboldt Sub-Basin flows into the Upper Humboldt Sub-Basin, which flows into the Lower Humboldt Sub-Basin. The other three sub-basins are internally drained meaning that there is no surface water outlet.

The climate of the affected area is semi-arid and surface water is limited. Precipitation within the affected sub-basins ranges between 4 and 40 inches per year and averages 12 inches per year. Precipitation is greater on the higher elevations and most precipitation falls as snow during the winter months. About 10% of precipitation reaches streams or infiltrates into groundwater and the rest is consumed by vegetation or evaporates (NDEP 2012). A portion of precipitation that falls in winter months becomes concentrated in streams primarily in springtime as snow melts. The majority of streams are ephemeral and flow only in response to this snowmelt and heavy rainfall events.

According to the National Hydrologic Dataset there are about 1,900 miles of perennial streams and over 20,000 miles of ephemeral/intermittent streams in the sub-basins where lease parcels are proposed within the Elko District boundary. There is less than one mile of perennial streams and about 500 miles of ephemeral/intermittent streams within proposed parcels. There are an additional 160 miles of perennial stream within two miles of the proposed parcels.

Beneath the surface, groundwater is abundant and interacts with surface water. Surface water gradually infiltrates into the ground and replenishes aquifers in most of the affected watershed area, but there are some areas where groundwater replenishes surface flow (Plume, 2013). Water budgets which quantify the various inputs and outputs to groundwater resources have been studied and published by USGS and NDWR (NDWR, 2013). Availability of groundwater is subject to a variety of natural influences including climatic variability and climate change. Groundwater flow in affected sub-basins generally flows in the same direction as surface water however there is some flow between basins (Heilweil, 2011).

A small portion of precipitation that falls within affected sub-basins infiltrates into the ground and resurfaces as springs. Some spring flow also comes from other sub-basins. According to

BLM data there are about 1000 springs on BLM administered land within the affected sub-basins and about 50 springs in and within two miles of proposed lease parcels. These springs exhibit the full range of water chemistry and other water quality characteristics as determined by their flow paths through local, intermediate, or regional aquifers (Sada, et al. 2001). Springs on BLM lands have flows that reach as much as 7000 gallons per minute however most are small and discharge less than 0.5 gallons per minute.

Streams, springs, and reservoirs and provide water for a variety of beneficial use in the affected sub-basins including irrigation, riparian vegetation, mining, municipal, domestic, livestock, recreation, and wildlife. A large portion of available water is used for irrigation and is diverted directly from streams. Another large portion of water is consumed directly from surface and shallow groundwater by riparian vegetation. The riparian vegetation adjacent to streams, springs, and other waterbodies relies on the dependable water that these sources provide. Livestock and wildlife drink directly from springs and streams that exist on both BLM and private land.

Groundwater is also used for a variety of beneficial uses within the sub-basins. Municipalities and domestic water users divert water primarily from groundwater wells on private land however there are a few diversions from springs on BLM and private land. Mining operations divert water for mining and milling as well as dewatering on private and BLM land. NDWR data indicate there are about 1000 groundwater wells within the affected basins. About 10 of these wells are within the proposed lease sale parcels and there are about 55 wells within two miles of the parcels. The largest use of water resources in the sub-basins is irrigation, followed by municipal and other uses. Water wells within and near lease parcels are mostly stock watering wells but there are a few domestic drinking water wells.

Water diversion and use in Nevada is regulated and permitted by the Nevada Division of Water Resources (NDWR), and information regarding presence and availability of water is provided by the U.S. Geological Survey (USGS). These agencies report that many of the hydrographic areas in Elko County- including those in this lease sale - are fully appropriated or over-appropriated. This means that that more water is being diverted and used than is being replenished by natural sources such as rainfall and snowmelt (Heilweil, 2011).

Water Quality

Quality of water within the affected sub-basins is the result of a wide variety of natural and anthropogenic characteristics, occurrences and activities. Geology, topography, climate, vegetative cover, wildfire and land use are all factors in determining the chemical, physical, and biological properties of these natural waters. Some surface waters may have naturally high levels of various dissolved solids, nutrients, or high temperature naturally while others express these attributes as a result of a combination of natural conditions and anthropogenic influence (Hem 1970).

Land use has been documented to have a considerable direct and indirect impact on water quality. Some land uses such as mining, and sewage treatment facilities discharge contaminated water directly into waterbodies and are known as point-sources. Most sources of anthropogenic water quality degradation in the affected sub-basins however, are the result of inputs throughout the watershed and are known as non-point sources. Livestock grazing is the most common and

widespread land use on BLM lands in the affected sub-basins and likely is the greatest of the anthropogenic impacts on water quality from these lands. Wildlife use causes similar but less intense impact to water quality.

Water quality standards as contained in the Nevada Administrative Code (NAC) 445A define water quality goals for waterbodies in the State of Nevada. These standards are based on the beneficial uses for these waterbodies and contain both narrative and numeric criteria. Narrative standards contained in NAC 445A.121 apply to all surface waters of the state including streams and springs and require waters to be "free from" various pollutants. Numeric standards also found in NAC 445A designate specific criteria so that water is suitable to use for irrigation, domestic, stock water, or any other beneficial use (NDEP 2012).

There are 1256 miles of perennial and intermittent streams within the affected sub-basins for which the Nevada Division of Environmental Protection (NDEP) has identified beneficial uses and numeric water quality standards. Six-hundred-thirty-six (636) miles of these streams have been identified as having water quality that does not fully support their beneficial uses. These are included in Nevada's 303(d) list of impaired waters. There is a one mile reach of one stream within the proposed lease sale parcels, and about 35 miles of stream within two miles of these parcels that do not meet water quality criteria established by NDEP. Inclusion of streams on this list are most commonly due to parameters being exceeded to support aquatic life such as the temperature and total phosphorus criteria (NDEP 2012). The NDEP report did not identify any waters in exceedence of narrative standards.

NDEP has stated that some numeric water quality standards set for Nevada streams may not be appropriate, or even achievable. Although water quality standards are a good starting point, it is not known whether beneficial uses are truly supported until a total maximum daily load (TMDL) is developed for a waterbody. A TMDL is an assessment of the amount of pollutant a water body can receive and not violate water quality standards. Total phosphorus and temperature exceedences do not necessarily mean that beneficial uses are not being supported since elevated values may not necessarily be causing the associated undesirable conditions such as algal growth or low dissolved oxygen (NDEP 2009). The TMDL prepared for Hanks Creek and Dixie Creek in Elko district illustrates how better standards can be applied for streams on BLM administered land by choosing criteria that are achievable and appropriate for existing beneficial uses (Pahl 2010) Resource Area RMP's for The Elko District specify that streams must be managed in a way that prevents deterioration of habitat. This includes preventing decline of water quality. The Elko RMP identifies 22 streams that are classified as high priority stream habitat, and the Wells RMP simply identifies all stream habitat.

Effects of the Proposed Alternative

As previously stated, the sale of parcels and issuance of oil and gas leases is strictly an administrative action. The act of offering, selling, and issuing federal oil and gas leases does not produce impacts to water quality and surface water. On-the-ground impacts would not occur until a lessee applies for and receives approval to drill on the lease. The BLM cannot determine at the leasing stage whether or not a proposed parcel will actually be sold, or if it is sold and issued, whether or not the lease would be explored or developed. Consequently, the BLM cannot determine exactly where a well or wells may be drilled or what technology may be used to drill and produce wells, so the impacts listed below are generic, rather than site-specific.

Direct and Indirect Effects, Surface Water:
Subsequent development of a lease may result in long-and short term alterations to the hydrologic regime depending upon the intensity of development. Clearing, grading, and soil stockpiling activities associated with exploration and development actions could alter short term overland flow and natural groundwater recharge patterns resulting in *de minimis* risk[1]. Potential impacts include surface soil compaction caused by construction equipment and vehicles, which would likely reduce the soil's ability to absorb water, increasing the volume and rate of surface runoff. New oil and gas roads and pads, pipelines, and powerlines, could cut slopes and alter channel and floodplain characteristics at drainage crossings. The combination of increased surface disturbance, surface runoff, decreased infiltration and changes in drainage features could result in increased peak flows in *de minimis*. The success or failure of integrated measures, BMPs, and appropriate mitigation measures designed to manage storm water and reduce erosion during construction and operation of oil and gas facilities will determine much of the impact with regard to surface waters, including road construction.

Runoff associated with storm events could increase sediment/salt loads in surface waters down gradient of the disturbed areas. Sediment may be deposited and stored in minor drainages where it could be readily moved downstream (within closed basins) during heavy storms. Sediment from future development activity may be carried into contained basins and sloughs where water quality classifications could be exceeded. The land-locked nature of most lease parcels and distance of other parcels to potentially impacted surface waters would restrict effect on the amount of sediment and salt contributed by lease exploration and development activities. Surface erosion would be greatest during the construction and would be controlled through integrated measures, BMPs, and appropriate mitigation measures. The magnitude of the impacts to surface water resources from future development activities depends on the proximity of disturbances to drainage channels, slope aspect and gradient, degree and area of soil disturbance, soil character, duration of construction activities, and the timely implementation and success/failure of mitigation measures. Natural factors which attenuate the transport of sediment and salts into susceptible water bodies include water available for overland flow; the texture of the eroded material; the amount and kind of ground cover; the slope shape, gradient, and length; and surface roughness. Impacts would likely be greatest shortly after the start of construction activities and would likely decrease in time due to stabilization, reclamation, and revegetation efforts. Minor long-term direct and indirect impacts to the watershed and hydrology could continue for the life of surface disturbance from water discharge from roads, road ditches, and well pads, but would decrease once all well pads and road surfacing material has been removed and reclamation of well pads, access roads, pipelines, and powerlines has taken place (Appendix C). Short-term direct and indirect impacts to the watershed and hydrology from access roads that are not surfaced with impervious materials would occur and would likely decrease in time due to reclamation efforts. Limiting factors include absence of hydraulic connectivity, the small area affected and implementation of integrated measures, BMPs, and appropriate mitigation measures.

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[1] *de minimis* risk. In risk assessment, it refers to a level of risk that is too small to be concerned with. Some refer to this as a "virtually safe" level. National Library of Medicine Toxicology Glossary - http://sis.nlm.nih.gov/enviro/iupacglossary/glossaryr.html

Although there is potential for oil and gas development to contribute sediment loads to aquatic systems, there is no reasonable likelihood that siting adjustments, State and federally-imposed sedimentation and storm-control measures, and reclamation strategies would fail to provide adequate means to effectively prevent substantive off-site transport and delivery of sediments or fluids that may impair downstream riparian or aquatic conditions in the closed basins.

Direct and Indirect Effects, Groundwater: Hydraulic Fracturing (HF) is designed to change the producing formations' physical properties by increasing the flow of water and gas around the well bore. Hydraulic fracturing may also introduce chemical additives into the producing formations. Chemical additives used in completion activities for the well will be introduced into the producing formations, but should mostly be pumped back out before production. Production zones generally do not contain freshwater.

HF is designed to change the producing formations' physical properties by increasing the flow of water, gas, and/or oil around the well bore. This change in physical properties may open up new fractures or enhance existing fractures that could result in freshwater aquifers being contaminated with natural gas, condensate and/or chemicals used in drilling, completion and hydraulic fracturing. Impacts to groundwater resources could occur due to failure of well integrity, failed cement, surface spills, and/or the loss of drilling, completion and hydraulic fracturing fluids into groundwater. Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. Concentrations of these additives also vary considerably and are not always known since different mixtures can be used for different purposes in gas development and even in the same well bore.

Loss of drilling fluids may occur at any time in the drilling process due to changes in porosity or other properties of the rock being drilled through for both the surface casing and the production hole. When this occurs, drilling fluids may be introduced into the surrounding formations which could include freshwater aquifers, if it occurs when drilling the surface casing. Some or all of the produced water from these leases is likely to be injected in wells for disposal. Petroleum products and other chemicals could result in groundwater contamination through a variety of operational sources including but not limited to pipeline and well casing failure, well (gas and water) construction, and spills. Similarly, improper construction and management of reserve and evaporation pits could degrade ground water quality through leakage and leaching. The potential for negative impacts to groundwater caused from hydraulic fracturing, are currently being investigated by the Environmental Protection Agency. Authorization of the proposed projects would require full compliance with local, state, and federal directives and stipulations that relate to surface and groundwater protection.

If contamination of freshwater aquifers from oil and gas development occurs, changes in groundwater quality could impact springs and residential wells if these springs and residential wells are sourced from the same aquifers that have been affected. Direct impacts to surface water would likely be greatest shortly after the start of construction activities and would likely decrease in time due to natural stabilization, and reclamation efforts. Impacts to groundwater would be less evident and occur on a longer time scale. Construction activities would occur over a relatively short period (commonly less than a month); however, natural stabilization of the soil can sometimes takes years to establish to the degree that will adequately prevent accelerated

erosion caused by compaction and removal of vegetation. Spills or produced fluids (e.g., saltwater, oil, fracking chemicals, and/or condensate in the event of a breech, overflow, or spill from storage tanks) could result in contamination of the soil onsite, or offsite, and may potentially impact surface and groundwater resources in the long term (BLM 2013).

Currently, water use to drill one well ranges between 1 and 6 million gallons. In fracturing a well, companies have estimated that generally they use a ratio of 0.5 percent hydraulic chemical fluid mix to 1.5 million gallons of water. That translates to a minimum of 5,000 gallons of chemicals into one well for every 1.5 million gallons of water used to fracture a well (Paschke 2011).

Not all wells resulting from an APD will employ fracturing and water consumption will be temporary. Oil and gas wells are cased and cemented at a depth below all usable water zones; consequently impacts to water quality at springs and residential wells are not expected. However, faulty cementing or well casing could result in methane migration to upper zones. Should hydrocarbon or associated chemicals for oil and gas development in excess of EPA/WDEQ standards for minimum concentration levels migrate into culinary water supply wells, springs, or systems, it could result in these water sources becoming non-potable.

Source Water Protection Areas
No source water protection areas will be affected by the proposed action as there are none within the lease parcels. One parcel was removed due to its proximity to several drinking water source water protection areas associated with the Spring Creek Community.

Cumulative Effects of the Alternatives

The cumulative effects study area (CESA) is the five sub-basins in which the proposed parcels are located This area was chosen because effects associated with the development of parcels within the proposed lease sale would not likely extend beyond these basins. As described above in the Affected Environment section, water resources are over-appropriated in these basins, and many of the surface waters are listed as impaired on Nevada's 303(d) list. Based on these facts it could be inferred that water resources have already sustained substantive cumulative effects. These impacts would continue to occur under the No Action Alternative.

The Proposed Action would not result in any direct incremental increase in cumulative impacts to water resources, but subsequent development would likely increase impacts as described above in the Proposed Action section. Specifically, development would likely result in additional water diversion, and surface water quality could be affected by development. The incremental increase in these impacts is small when compared to the level of impacts that already exist in the sub-basins as described above in the Affected Environment section. These cumulative impacts would continue to occur under the Proposed Action.

Mitigations

Protection of water resources would be accomplished through implementation of best management practices along with specific restrictions that may be applied to individual parcels. Parcels with sensitive water resources have been identified (Table 2-1) and stipulations are attached to mitigate any known environmental or resource conflicts that may occur on a given

lease parcel For example, lessees may be required to locate facilities a certain distance from streams or off of the 100 year floodplain. These restrictions will be implemented on an individual parcel basis and will serve as a condition of approval for exploration and development.

3.2.7 Air Quality

Existing Conditions

The U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for criteria pollutants, including carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). Exposure to air pollutant concentrations greater than the NAAQS has been shown to have a detrimental impact on human health and the environment. The EPA has delegated regulation of air quality under the federal Clean Air Act to the State of Nevada. In addition to the criteria pollutants, regulations also exist to control the release of hazardous air pollutants (HAPs). HAPs are chemicals that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. EPA currently lists 188 identified compounds as hazardous air pollutants, some of which can be emitted from oil and gas development operations, such as benzene, toluene, and formaldehyde. Ambient air quality standards for HAPs do not exist; rather these emissions are regulated by the source type, or specific industrial sector responsible for the emissions.

Ambient air quality in the affected environment (i.e. compliance with the NAAQS) is demonstrated by monitoring for ground level (i.e. receptor height) atmospheric air pollutant concentrations. In general, the ambient air measurements show that existing air quality in the region is good. For more information on pollutant monitoring values, including the other criteria pollutants not shown below, please visit the EPA's Air Data website at www.epa.gov/airdata.

Effects of the Proposed Alternative

While the act of leasing the parcels would produce no substantial air quality effects, potential future development of the lease could lead to increases in area and regional emissions. Since it is unknown if the parcels would be developed, or the extent of the development, it is not possible to reasonably quantify potential air quality effects through dispersion modeling or another applicable method at this time. Further, the timing, construction and production equipment specifications and configurations, and specific locations of activities are also unforeseeable at this time. Additional air effects will be addressed in a subsequent analysis when lessees file an APD. All proposed activities including, but not limited to, exploratory drilling activities would be subject to applicable local, State, and Federal air quality laws and regulations.

The Bureau of Land Management National Operations Center (BLM NOC) retained the Kleinfelder Team (which consisted of staff from Kleinfelder, Inc. and ENVIRON International Corporation) to prepare an emissions inventory estimate of criteria pollutants, greenhouse gases (GHG), and key hazardous air pollutants (HAPs) for a representative oil and gas well in the western United States (US). The emissions inventory was designed to be used by BLM staff, such as NEPA planners, air resource specialists, and natural resource specialists, to evaluate

emissions from small, which for purposes of this inventory is approximately five wells or less, oil and gas projects.

Defining a "representative" oil and gas well for the entire western US was extremely challenging as there are numerous variables, even within a single basin and sub basin that can materially affect the emissions. Such variables include oil and gas composition, difficulty drilling the geologic formation, oil and gas production rate, equipment at the well site, emission controls, produced water that may be associated with oil and gas production, among many others. Accordingly, to develop such an inventory, five different well types (three natural gas wells and two oil wells) representative of five different major oil and gas basins in the western US were evaluated. In order to develop the emission inventories, information that is not proprietary, not draft, and not pre-decisional was reviewed for the five selected basins plus other oil and gas developments in the western US. The characteristics of the five basins selected are similar to a large portion of the oil and gas produced in the western United States. The table, below, is taken from this March 2013 report: Erbes, Air Emissions Inventory Estimates for a Representative Oil and Gas Well in the Western United States. The Reasonably Foreseeable Development Scenario developed for this lease EA is a maximum of 80 wells drilled within the parcels in the Elko District. The number of holes that could be drilled in any given area is unknown but potential emissions would be multiplied appropriately.

Well Type	**Gas**	**Gas**	**Gas**	**Oil**	**Oil**
Pollutant	Uinta/Piceance (tpy)	Upper Green River (tpy)	San Juan (tpy)	Williston (tpy)	Denver (tpy)
NOx	15.6	14.6	5.6	15.6	6.3
CO	3.8	3.9	3.1	8.0	3.4
VOC	3.4	5.2	5.3	17.6	6.7
SO_2	0.0004	0.0004	0.001	0.001	0.001
PM_{10}	6.9	6.7	6.8	6.9	6.6
$PM_{2.5}$	0.8	0.8	0.5	0.8	0.5
CO_2	2,552.1	2,552.1	651.0	3156.4	1,049
CH_4	12.2	14.1	6.1	16.6	1.8
N_2O	0.05	0.05	0.04	0.6	0.04
GWP	2,825	3,194	791	3,682	1,099
Benzene	1.4	1.5	1.4	1.5	1.4
Toluene	1.0	1.2	1.0	1.0	1.0
Ethybenzene	0.00003	0.01	0.0008	0.0008	0.0006
Xylene	0.6	0.7	0.6	0.6	0.6
n-Hexane	7.5	7.5	7.5	7.9	7.5
Total HAPs	10.4	10.9	10.5	11.0	10.5

Note: Sums may not precisely total due to round off differences. A value of 0.00 indicates that pollutant is not emitted or emitted in *de minimis* amounts. If there is a non-zero value, at least one significant figure is reported. Greenhouse gas emissions are in terms of short tons CO_2, CH_4, and N_2O. Global Warming Potential (GWP) is in terms of short tons of CO_2 equivalent (CO_2e), using a GWP of 1 for CO_2, 21 for CH_4, and 310 for N_2O.
(Erbes, 2013)

Any subsequent activity authorized after APD approval could include soil disturbances resulting from the construction of well pads, access roads, pipelines, power lines, and drilling. Any disturbance is expected to cause increases in fugitive dust and potentially inhalable particulate matter (specifically PM_{10} and $PM_{2.5}$) in the project area and immediate vicinity. Particulate matter, mainly dust, may become airborne when drill rigs and other vehicles travel on dirt roads to drilling locations. Air quality may also be affected by exhaust emissions from engines used for drilling, transportation, gas processing, compression for transport in pipelines, and other uses. These sources will contribute to potential short and long term increases in the following criteria pollutants: carbon monoxide, ozone (a secondary pollutant, formed photochemically by combining VOC and NOX emissions), nitrogen dioxide, and sulfur dioxide. Non-criteria pollutants (for which no national standards have been set) such as carbon dioxide, methane, nitrous oxide, air toxics (e.g., benzene), and total suspended particulates (TSP) could also be emitted. Certain pollutants may be significant when evaluating AQRV for effects on visibility and atmospheric deposition. Significance will depend greatly on the proximity to sensitive receptors, area meteorology, and the background levels of AQRV at any sensitive receptor. Dust control measures, such as applying a layer of gravel over the travel surfaces, watering travel surfaces, and reducing speed along the roadways can be very effective in mitigating dust issues.

During exploration and development, 'natural gas' may at times be flared and/or vented from conventional, coal bed methane, and shale wells. The gas is likely to contain volatile organic compounds that could also be emitted from reserve pits, produced water disposal facilities, and/or tanks located at the site. The development stage may likely include the installation of pipelines for transportation of raw product. New centralized collection, distribution and/or gas processing facilities may also be necessary. The decision to offer the identified parcels for lease would not result in any direct emissions of air pollutants. However, any future exploration or development of these leases will result in emissions of criteria, HAP and GHG pollutants. The additional emissions could result in an incremental increase in overall emissions of pollutants, in the region depending on any contemporaneous activities occurring at the same time when potential exploration and development occurring on the lease would happen.

Mitigations

The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. In accordance with a recent BLM Memorandum of Understanding (MOU) regarding air quality analysis and mitigation; BLM will coordinate with the Environmental Protection Agency (EPA) early in the APD process to determine how best to model and mitigate for impacts to air quality. Measures may also be required as COAs on permits by either the BLM or the applicable state air quality regulatory agency. The BLM also manages venting and flaring of gas from federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

Some of the following measures could be imposed at the development stage:

- flaring or incinerating hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;

- emission control equipment of a minimum 95 percent efficiency on dehydration units, pneumatic pumps, produced water tanks;
- vapor recovery systems where petroleum liquids are stored;
- tier II or greater, natural gas or electric drill rig engines;
- secondary controls on drill rig engines;
- no-bleed pneumatic controllers (most effective and cost effective technologies available for reducing VOCs);
- gas or electric turbines rather than internal combustions engines for compressors;
- NO_x emission controls for all new and replaced internal combustion oil and gas field engines;
- water dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;
- interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.
- co-located wells and production facilities to reduce new surface disturbance;
- directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- gas-fired or electrified pump jack engines;
- velocity tubing strings;
- cleaner technologies on completion activities (i.e. green completions), and other ancillary sources;
- centralized tank batteries and multi-phase gathering systems to reduce truck traffic;
- forward looking infrared (FLIR) technology to detect fugitive emissions; and
- air monitoring for NO_x and ozone.

More specific to reducing GHG emissions, the table below describes in detail commonly used technologies to reduce methane emissions from natural gas, coal bed natural gas, and oil production operations. Table 3.2.7-2. Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program, displays common methane emission technologies reported under the Program and associated emission reduction, cost, maintenance and payback data.

In the context of the oil sector, additional design features to reduce GHG emissions may include methane reinjection and CO_2 injection. Furthermore, the EPA is expected to promulgate new federal air quality regulations that would require GHG emission reductions from many oil and gas sources.

Table 3.2.7-2. Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program [1]

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($)	Annual Operating and Maintenance Cost ($)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Wells					
Reduced emission (green) completion	7,000 [2]	$1K – $10K	>$1,000	1 – 3 yr	$3
Plunger lift systems	630	$2.6K – $10K	NR	2 – 14 mo	$7

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($)	Annual Operating and Maintenance Cost ($)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Gas well smart automation system	1,000	$1.2K	$0.1K – $1K	1 – 3 yr	$3
Gas well foaming	2,520	>$10K	$0.1K – $1K	3 – 10 yr	NR
Tanks					
Vapor recovery units on crude oil tanks	4,900 – 96,000	$35K – $104K	$7K – $17K	3 – 19 mo	$7
Consolidate crude oil production and water storage tanks	4,200	>$10K	<$0.1K	1 – 3 yr	NR
Glycol Dehydrators					
Flash tank separators	237 – 10,643	$5K – $9.8K	Negligible	4 – 51 mo	$7
Reducing glycol circulation rate	394 – 39,420	Negligible	Negligible	Immediate	$7
Zero-emission dehydrators	31,400	>$10K	>$1K	0 – 1 yr	NR
Pneumatic Devices and Controls					
Replace high-bleed devices with low-bleed devices					
End-of-life replacement	50 – 200	$0.2K – $0.3K	Negligible	3 – 8 mo	$7
Early replacement	260	$1.9K	Negligible	13 mo	$7
Retrofit	230	$0.7K	Negligible	6 mo	$7
Maintenance	45 – 260	Negl. to $0.5K	Negligible	0 – 4 mo	$7
Convert to instrument air	20,000 (per facility)	$60K	Negligible	6 mo	$7
Convert to mechanical control systems	500	<$1K	<$0.1K	0 – 1 yr	NR
Valves					

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($)	Annual Operating and Maintenance Cost ($)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Test and repair pressure safety valves	170	NR	$0.1K – $1K	3 – 10 yr	NR
Inspect and repair compressor station blowdown valves	2,000	<$1K	$0.1K – $1K	0 – 1 yr	NR
Compressors					
Install electric compressors	40 – 16,000	>$10K	>$1K	>10 yr	NR
Replace centrifugal compressor wet seals with dry seals	45,120	$324K	Negligible	10 mo	$7
Flare Installation	2,000	>$10K	>$1K	None	NR

Source: Multiple EPA Natural Gas STAR Program documents.

[1] Unless otherwise noted, emission reductions are given on a per-device basis (e.g., per well, per dehydrator, per valve, etc.). [2] Emission reduction is per completion, rather than per year.

K = 1,000 mo = months Mcf = thousand cubic feet of methane NR = not reported yr = year

3.2.8 Climate Change

Existing Conditions

There is broad scientific consensus that humans are changing the chemical composition of our atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gasses (GHGs) such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapor, and several industrial gases in our atmosphere. An increase in GHG emissions is said to result in an increase in the earth's average surface temperature, primarily by trapping and decreasing the amount of heat energy radiated by the earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected, in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, precipitation rates, etc., which is commonly referred to as climate change. The Intergovernmental Panel on Climate Change (IPCC) has predicted that the average global temperature rise between 1990 and 2100 could be as great as 5.8°C (10.4°F), which could have massive deleterious impacts on the natural and human environments. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to

increase measurably, from approximately 280 ppm in 1750 to 396 ppm in 2012 (as of June). The rate of change has also been increasing as more industrialization and population growth is occurring around the globe. This fact is demonstrated by data from the Mauna Loa CO_2 monitor in Hawaii that documents atmospheric concentrations of CO_2 going back to 1960, at which point the average annual CO_2 concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO_2 concentration or build up, since pre-industrial times has occurred within the last 50 years.

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

Effects of the Proposed Alternative

Climate Change Analysis Assumptions
No GHG emissions will result from the proposed action, which is administrative in nature; however, the BLM recognizes that GHG emissions are a potential indirect effect of fluid mineral exploration and/or development subsequent to leasing. As a result, the analysis is limited to a qualitative description of pollutants associated with oil and gas development and production and describes how the proposed action potentially contributes to climate change through the release of GHGs. Although the EPA recently revised GHG emission factors used to estimate emissions from oil and gas development and production, it would be a highly speculative exercise to quantify estimates of GHG emissions at the leasing stage. Any potential effects would occur if and/or when the leases were developed. While it is not possible to accurately quantify potential GHG emissions in the affected areas as a result of making the proposed parcels available for leasing, some general assumptions can be made: offering the proposed parcels may contribute to drilling new wells. Subsequent development of any leases issued would contribute a small incremental increase in overall GHG emissions. When compared to statewide, national, or global emissions, the amount released as a result of potential production from the proposed lease parcels would not have a measurable effect on global climate.

Climate Change Impacts
Secretarial Order 3289 was issued in 2009 which directs each bureau to: "consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, and/or when making major decisions affecting DOI resources."

The primary sources of greenhouse gases associated with oil and gas exploration and production are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). In addition, nitrous oxide and VOCs are indirect air pollutants that contribute to ozone production and aid in prolonging the life of methane in the atmosphere. With respect to climate change, climate plays a significant role in the production of ozone. Sunlight and high temperatures are a major catalyst in reactions between VOCs and NOx in the production of ozone. With an increase in overall temperature, we can expect to have more hot days and less precipitation that will lead to a higher production of ozone.

GHGs are produced and emitted by various sources during phases of oil and gas exploration, well development, production, and site abandonment. The American Petroleum Institute (API) categorizes sources of emissions from all oil and gas operations into the following classifications:

Direct Emissions

- Combustion Sources – includes stationary devices (boilers, heaters, internal combustion engines, flares, burners) and mobile devices (barges, railcars, and trucks for material transport; vehicles for personnel transport; forklifts, construction equipment, etc.).
- Process Emissions and Vented Sources - includes process emissions from glycol dehydrators, stacks, vents, ducts; maintenance/turnaround; and non-routine activities such as pressure relief valves, emergency shut-down devices, etc.
- Fugitive Sources- includes fugitive emissions from valves, flanges, pumps, connectors, etc.; and other non-point sources from wastewater treatment.

Indirect Emissions

Emissions associated with company operations, such as off-site generation of electricity, hot water or steam, and compression for on-site power, heat and cooling. Direct and indirect GHG emissions may occur from various sources during each phase of exploration and development. During exploration and development, emissions are generated from well pad and access road construction, rigging up/down, drilling, well completion, and testing phases. GHG emissions for these phases are mainly CO_2 emissions from fuel in internal combustion engines of diesel trucks, equipment, and rigs.

There are currently no established thresholds of significance for GHG, but the EPA has used a reporting threshold of direct GHG emissions of 25,000 tons per year of carbon dioxide equivalent (74 FR 56260, October 30, 2009).

For this analysis, the RFD predicts that up to 80 wells will be drilled as a result of the proposed action, however, the offered parcels are scattered across the district and we cannot predict how many holes will actually be drilled in any location. More accurate analysis will be completed at the exploration and development phase, after leasing is complete.

In addition to the mandatory GHG reporting requirement and regulatory requirements to reduce GHGs, the BLM encourages federal oil and gas lessees and/or operators to implement "Best Management Practices (BMPs)" that reduce GHG emissions. As identified in the EPA Inventory of US Greenhouse Gas Emissions and Sinks, the BLM holds regulatory jurisdiction over portions of natural gas and petroleum systems. Exercise of this regulatory jurisdiction has led to development of BMPs designed to reduce emissions from field production and operations. Analysis and approval of future development would include applicable BMPs as Conditions of Approval (COAs) in order to reduce or mitigate GHG emissions. Additional measures developed at the project development stage would be incorporated as COAs in the approved APD, which is binding on the operator.

Mitigations

Such mitigation measures may include, but are not limited to:

- Flare hydrocarbon and gases at high temperatures in order to reduce emissions of incomplete combustion through the use of multi-chamber combustors;
- "Green" (flareless) completions;
- Minimizing waste during drilling and completion operations (such as requiring capture of gas when economically feasible during hydraulic fracturing operations)
- Water dirt roads during periods of (high) use in order to reduce fugitive dust emissions;
- Require that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored;
- Installation of liquids gathering facilities or centralized production facilities to reduce the total number of sources and minimize truck traffic;
- Use of natural gas fired or electric drill rig engines;
- The use of selective catalytic reducers on diesel-fired drilling engines; and,
- Re-vegetate areas of the drilling pad(s) not required for production to reduce the amount of dust from the pad(s).

Measures to reduce GHG emissions include the EPA's Natural Gas STAR program and additional BMPs that are located on the BLM Washington Office webpage (http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html). The EPA US Inventory data show that industry's implementation of BMPs proposed by the EPA's Natural Gas STAR energy program has reduced emissions from oil and gas exploration and development.

3.2.9 Vegetation

Existing Conditions

Detailed descriptions of the vegetative communities in the Elko District including meadow, big sagebrush, low sagebrush, mountain brush, pinyon-juniper woodland, broadleaf trees, shadscale, greasewood, and winterfat communities can be found in the Elko and Wells RMP EISs and the EA for the 2004 Fire Management Amendment to the RMPs and will not be repeated here. Due to the extensive acreage that has burned in recent years, the spread of cheatgrass and other annual weeds has increased in the Elko District, at the expense of native vegetation, particularly sagebrush habitat. Currently the Elko District is actively participating in restoration and rehabilitation efforts in the burned areas, as well as in Great Basin Restoration Initiative and aquatic and terrestrial wildlife habitat improvement projects to enhance present communities to meet rangeland health standards.

Effects of the Proposed Alternative

The initial action of oil and gas leasing does not affect vegetation resources. However, surface disturbing activities for exploration and production will affect vegetation resources. Activities such as well pad construction, fence construction, development of roads, pipeline construction, facility construction and power line construction will lead to the removal of vegetation and run the risk of being invaded or dominated by cheatgrass and other invasive annual weeds. As projected by the Reasonably Foreseeable Development scenario, a total of 1,360 acres are anticipated to be disturbed throughout the Elko District during the exploration and development

of oil and gas resources over the next fifteen years of which approximately 744 acres will be reclaimed. This will result in a net loss of 616 acres of vegetation during the fifteen year projection. Eventually all the acreage will be reclaimed and vegetation will be reestablished. In the long term, within three to five years, seeding is used in the reclamation process to provide a more desirable plant community of native forbs and grasses. Often, an abandoned well location is seeded and fenced as an exclosure to protect the vegetation as it is being established. The protective fence is normally temporary and will be removed once reclamation is completed. A more detailed analysis of impacts to vegetation resources would be completed in a site specific EA before surface disturbing activities are authorized. The amount of disturbance, reduced by reclamation efforts, should not affect the vegetation composition, and quality of vegetation of the plant communities in which most development occurs. Therefore, the cumulative impacts to vegetation resources related to leasing activities are not considered substantive. Impacts to vegetation as a result of future actions would be analyzed on a case by case basis as exploration and development permits are proposed.

Mitigation

All seed used for reclamation on public lands will meet standards existing at the time of the proposed application. (See also section on invasive, non-native species, 3.2.18. This standard is expected to evolve as more is learned about invasive weeds.) Best management practices along with specific restrictions would be implemented to minimize negative effects to vegetation communities.

3.2.10 Livestock Grazing

Existing Conditions

Of the 7.2 million acres of public lands administered by the Elko District BLM, there are 195 livestock grazing authorizations used among 239 grazing allotments. Elko District carries 824,058 Animal Unit Months (AUMs); of which, 692,229 of these AUMs are currently active, 126,549 are historically suspended, and 5,280 have been temporarily suspended. Authorized types of livestock include cattle, sheep and horses. While several different plant communities exist throughout the district with varying amounts of forage, as an average it takes approximately 9 acres to equal one AUM. Grazing use is periodically evaluated and changes in grazing management are made to meet and rangeland health standards and allotment-specific multiple use objectives.

Effects of the Proposed Alternative

The initial action of oil and gas leasing does not affect livestock grazing. Impacts to livestock grazing could occur as a result of the subsequent actions (e.g., exploration, development, production, or abandonment) once a parcel is leased. The impact would be loss of vegetation thus, loss of forage for active areas disturbed by operations. The disturbance would be confined to small areas, usually for a temporary period of time until the vegetation is reestablished (two to five years). The vegetation would soon recover and be available for consumption by livestock and wildlife.

Short term, generally referring to a two to three year span, disturbance to livestock grazing could occur during exploration and development phases. This may include livestock avoiding certain areas due to traffic, drilling, and construction of facilities such as power lines and pipelines. This disturbance will be limited to the short term and would not cause a major impact to livestock distribution. Because of the usually dispersed nature of activity, reclamation of disturbed sites, and varying degrees of damage to vegetation, reduction in licensed use has not been required. High concentrations of surface disturbance on one or a few grazing allotments could lead to reductions in livestock grazing on those affected allotments, if the issue is identified in the allotment evaluation process.

Mitigations

Best management practices along with specific restrictions would be implemented to minimize negative impacts to grazing resources.

3.2.11 Forest Resources

Existing Condition:

Forest resources exist on some of the lands proposed for leasing within the District. The forest resource species are pinyon, juniper, aspen, and mahogany. Most oil and gas exploration occurs in valley floors, usually away from forested areas. The Wells Resource Areas has more forested areas, but also is believed to have less potential for oil and gas exploration and development activity.

Effects of the Proposed Alternative

The initial action of oil and gas leasing does not affect forest resources. Impacts to forest resources could occur as a result of the exploration, development, production or abandonment of oil and gas activities could include removal of trees for the construction of roads and facilities, loss of woodland products such as firewood or pine nuts, loss of wildlife habitat such as nesting and perch sites, and changes in risk of wildfire in the area.

Mitigation

Measures to reduce impacts of leasing activities on forest resources could include avoiding the removal of trees, except when necessary by rerouting or relocating road routes and facilities, or by limbing trees. Trees requiring removal should be disposed of by the operator. Where blading is required, stumps will be removed or buried in an area designated by the Authorized Officer. Where blading is not required, stump height should not exceed 12 inches. All slash less than four inches in diameter should be chipped, scattered outside the cleared area, or stockpiled for use during reclamation as directed by the Authorized Officer. All material four inches in diameter and greater will be removed from federal land unless otherwise directed. A wood permit from BLM for the wood removed (for the appraised value) could be required prior to any clearing. Best management practices along with specific restrictions would be implemented to minimize negative impacts to forest resources.

3.2.12 Wilderness Study Areas

Existing Conditions

The Elko District contains 10 Wilderness Study Areas (WSAs) covering 303,572 acres. These include the Badlands, Bluebell, Cedar Ridge, Goshute Peak, Little Humboldt River, Owyhee Canyon, Red Spring, Rough Hills, South Fork Owyhee River and South Pequop WSAs. Land management prescriptions are applied according to BLM Manual 6330, Management of BLM Wilderness Study Areas. No new leases may be issued on lands under wilderness review.

The Wilderness Act of 1964 described for wilderness management the following passage from Section 2(c) of the Act:

> "A wilderness ...is an area where the earth and community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions..."

Section 603(a) of FLPMA directed the Secretary of Interior to inventory and study remaining roadless areas of 5000 acres or more to determine which areas possess wilderness characteristics, as described in the Act of 1964. The Secretary was further directed to report to the President his recommendation as to the suitability or non-suitability of each area for preservation as wilderness. In 1991, the Nevada BLM completed a Wilderness Study Report which contained recommendations for wilderness or non-wilderness designation for each of the WSAs. Congress has the final determination on whether a WSA will be designated as Wilderness or released from study and back to multiple-use.

Effects of the Proposed Alternative

No effects, due to the fact that WSA are excluded from leasing. Land management prescriptions for WSAs are applied according to BLM Manual 6330, Management of BLM Wilderness Study Areas. The Nevada BLM memorandum dated September 24, 2004 (IM No. NV-2004-093) also establishes that "*we will offer and issue fluid mineral leases to within one quarter mile of a Wilderness or WSA boundary. Any quarter-quarter sections intersected by and including a portion of a Wilderness or WSA boundary will be excluded from the parcel nominated."*

Cumulative Effects of the Proposed Action

There would be no cumulative effects to the Wilderness Study Areas as there is no ground disturbance associated with this action. The potential future actions of exploration, development, and decommission associated specifically from the sale of oil and gas parcels would also not impact Wilderness Study Areas. The stipulations outlined in the EA limit the sale of parcels that come within .25 miles of any WSA in the Elko District.

3.2.13 Lands with Wilderness Characteristics (LWC)

Existing Conditions

On June 1, 2011, the Secretary of the Department of the Interior issued a memorandum to the BLM Director that in part affirms BLM's obligations relating to wilderness characteristics under Sections 201 and 202 of the Federal Land Management Policy Act. The BLM released Manuals 6310 and 6320 in March 2012, which provide direction on how to conduct and maintain wilderness characteristics inventories and provides guidance on how to consider whether to update a wilderness characteristics inventory.

The primary function of an inventory is to determine the presence or absence of wilderness characteristics. An area having wilderness characteristics is defined by:

- Size - at least 5,000 acres of contiguous, roadless federal land,
- Naturalness
- Outstanding opportunities for solitude or primitive and unconfined types of recreation.
- The area may also contain supplemental values (ecological, geological, or other features of scientific, educational, scenic, or historical values).

The Nevada BLM completed the original wilderness review in 1979, and issued an initial wilderness inventory decision in 1980. At that time, the inventory found wilderness character present in several units. Those were designated as Wilderness Study Areas in 1980.

The Elko District Office BLM began updating the lands with wilderness characteristics (LWC) inventory in 2011 on a project driven basis. The 82 parcels up for lease intersect 26 LWC inventory areas. Of those 26 inventory areas 2 have been previously analyzed under other projects. In the Wells Field Office NV-EK-03-457 was studied and found to lack sufficient solitude and opportunities for outstanding primitive or unconfined recreation. In the Tuscarora Field Office NV-EK-02-817 inventory found the area lacks sufficient qualities to support wilderness characteristics. The remaining units have yet to be studied in depth, but based on the results of the 1979 initial wilderness inventory and the 1980 intensive wilderness inventory the potential exists for some unstudied areas to contain wilderness attributes.

Effects of the Proposed Alternative

The effects of the proposed action would not result in any direct impacts as the action would not result in any ground disturbing activities. The proposed action could result in several indirect activities that may cause serious impacts to wilderness character within each inventory area. Exploration, development, and decommission could all impact the naturalness of a LWC unit as well as opportunities to experience solitude and participate in primitive or unconfined types of recreation. Oil and Gas activities could also reduce the size of a study area through the development of access roads and other supporting actions leading to the area not meeting the size requirement outline in BLM Manual 6310 Conducting Wilderness Characteristics Inventory on BLM Lands.

Table 3.2.13 LWC Unit List

LWC Unit Number	*Acres*	*Last Inventoried*	*Wilderness Character*	*Potential of LWC Since Last Survey*
NV-EK-03-120	23,427	1980 Intensive	No	High
NV-EK-03-124	8,845	1980 Intensive	No	Low
NV-EK-03-139	18,557	1980 Intensive	No	Moderate
NV-EK-03-169	19,104	1979 Initial	No	Low
NV-EK-03-223	6,652	1979 Initial	No	Low
NV-EK-03-264	6,744	1980 Intensive	No	Low
NV-EK-03-272	7,036	1979 Initial	No	Moderate
NV-EK-03-274	139,536	1980 Intensive	No	Moderate
NV-EK-03-276	14,425	1980 Intensive	No	Moderate
NV-EK-03-279	60,471	1980 Intensive	No	High
NV-EK-03-284	21,106	1979 Initial	No	Low
NV-EK-03-285	33,524	1979 Initial	No	Low
NV-EK-03-292	6,733	1980 Intensive	No	Moderate
NV-EK-03-300	31,006	1979 Initial	No	Low
NV-EK-03-301	9,229	1980 Intensive	No	Moderate
NV-EK-03-303	9,515	1980 Intensive	No	Moderate
NV-EK-03-308	68,159	1979 Initial	No	Low
NV-EK-03-322	8,096	1979 Initial	No	Moderate
NV-EK-03-332	13,417	1980 Intensive	No	Moderate
NV-EK-03-457	16,159	2011 Inventory	No	No
NV-EK-02-563	11,181	1979 Initial	No	high
NV-EK-02-816	13,154	1979 Initial	No	Moderate
NV-EK-02-817	9,585	2012	No	No
NV-EK-02-818	10,026	1979 Initial	No	Moderate

If exploration activities are conducted on the lease parcels, the unsuccessful exploration wells are plugged and abandoned and they would be reclaimed immediately after drilling or construction. Therefore, in the long term, it is possible that the potential disturbances would be reclaimed allowing the area to return to a natural state; and opportunities for solitude or a primitive and unconfined type of recreation would return. Impacts to size may also be reclaimed after exploration, but depending on the extent of wells and associated facilities (roads, gravel pits, etc.) impacts may remain that could continue to eliminate LWCs based on size.

For any producing wells, the impacts would be long term (20 years) or much longer. At that point, the impacts to LWC would be considered permanent.

Cumulative Effects

There are no cumulative impacts expected to result directly from the proposed action since the proposed action does not include any surface disturbance. However, it does authorize the right to future exploration and production activities. At that time when leased parcels are proposed for exploration and development, then potential impacts would be discussed in a site-specific NEPA document as required through mineral lease regulations.

Mitigation

The inventory areas that have not been studied will be reviewed by BLM specialists to see if certain units qualify. For units containing wilderness characteristics all parcels in that area will be deferred until a land use plan revision determines how these units will be managed as outlined by BLM Manual 6320 Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process.

3.2.14 Recreation

Existing Conditions

The Elko District has 7.2 million acres of public land open to recreational pursuits. It is estimated that in 2013, there were 1.1 million visitors to public lands in the Elko District. There are six designated Special Recreation Management Areas (SRMAs), three of those are developed campgrounds, two are boating areas and one is a natural area. Over 380 miles of designated California National Scenic and Historic Trail are in the Elko District. There are scenic byways, wildlife viewing areas, historic mining districts, many fishable lakes, reservoirs and streams, recreation trails and various other opportunities for dispersed recreation. Popular dispersed recreation activities include hunting, riding off highway vehicles (OHVs), photography, wildlife viewing, fishing, sightseeing, boating, mountain biking, camping, and hiking.

Vehicles are limited to designated routes in all the SRMAs and Wilderness Study Areas. The Salt Lake ACEC is closed to motorized traffic annually from March 1 through August 31(1985 Wells RMP). The Spruce Mountain Planning Area (NDOW Hunt Unit 105) is restricted motorized and mechanized travel to existing routes and trails until a travel management plan is completed that would define the travel network (Federal Register E6-5992).The rest of the District is open for vehicle use according to the Elko and Wells Resource Management Plans. Users are strongly encouraged to practice accepted outdoor ethics such as Leave No Trace and Tread Lightly whenever they recreate on public lands to preserve recreational resources for future generations of outdoor enthusiasts.

The Elko District Office administers approximately 6 competitive events on the District each year and permits over 30 commercial outfitter and guides. The events are vehicle races, motorcycle races and mountain bike races. Commercial outfitter and guides offer various hunting services and guided recreation opportunities on public lands.

Effects of the Proposed Alternative

The initial action of oil and gas leasing does not affect recreation. Impacts to recreation would occur as a result of the subsequent actions (e.g. exploration, development, production and abandonment) once a parcel is leased. No leasing is proposed in or near any designated recreation areas.

Dispersed recreation would be impacted by the presence of people, structures and equipment in an area not previously occupied. Some recreationists may cease using areas for recreation because of oil and gas development. Vehicles and noise could scare off animals that

recreationists are hunting or detract from the feeling of solitude in the vicinity of a new development.

Impacts to recreation may also be the displacement of competitive motorized racing groups if parcels south of West Wendover, NV are developed. This area has been the most popular racing area in the District for almost 20 years. Several racing groups from around the region with participants that attend these events from all over the country could become displaced from pre-approved race routes if exploration and pad development occur within these areas. The specific impacts of each development would be further outlined in site particular NEPA documents if or when exploration takes place in the area.

Leased parcels that are developed around the designated California National Scenic and Historic Trail could also impact recreation visitors. Groups looking for vicarious experiences while traveling the trail would be influenced by the developments in and around the trail. These impacts would be mitigated in part through the stipulations listed in Appendix B. Particular impacts to trail visitors would have to be outlined in future site specific NEPA documents as parcels are developed because to do so now would be speculation.

During many phases of oil and gas development, new routes may be created as a result of fence construction, powerline construction and pipeline construction. In general, new routes lead to greater access for recreationists. Fences or development could also restrict public access by blocking off areas originally accessible the general public.

Public safety is a concern with any development and the general public would need to be prevented from accessing areas of development. With development such as well pad construction and facility construction, traffic increases in the area causing another public safety concern.

During reclamation, not all new routes will be rehabilitated; some will remain as public access routes. Over the long term, recreation access is increased.

Cumulative Effects

The incremental effects of the proposed action combine with the past, present, and reasonably foreseeable future actions may have an impact on recreational resources. The entire nature of those impacts as to the severity and duration cannot be fully discussed in this document, but will be analyzed if or when an APD is submitted to the Elko District. At that time a site specific NEPA document will analyze those effects in detail, and quantify and qualify the compound effects to recreational resources as part of the permitting process.

Mitigation

The Stipulations in Appendix B prevent impacts to high use, developed recreation areas. The Special Recreation Management Areas stipulation prevents surface occupancy within .5 mile of the high water line where reservoirs are present and restrictions to existing access within the remainder of the recreation area. The Tabor Creek Campground SOP also prevents surface occupancy within this high use area. Using best management practices will lessen the impacts to

dispersed recreationists, but further discussion on potential impacts to dispersed recreationists would take place in future NEPA documents as the parcels are developed.

3.2.15 Visual Resource Management

Existing Conditions

As part of the Visual Resource Management (VRM) program, the BLM has prepared and maintains an inventory of visual values on public lands within the Elko District, called the Visual Resource Inventory (VRI). The inventory is intended to identify the visual values of areas within the field office and assign them to an inventory class based on three factors: the scenic quality of an area; the sensitivity of the public to certain changes on the landscape; and a delineation of distance zones to indicate relative visibility of the landscape from primary travel routes and observation points.

The Elko District is part of the Basin and Range landscape type. Elevations range from 4,400 ft. in the valleys to 11,000 ft. in the mountains. Much of the district could be classified as a panoramic landscape with horizontal lines forming the horizon and vertical lines forming the mountains. Many of the basins are sagebrush vegetation type with grasses and other small shrubs intermixed. Colors in the valleys are light greens and browns. As elevation increases up-slope, vegetation type changes to pinion-juniper type. Colors change to darker greens and browns. The panoramic view causes the vegetation form to be very smooth and the landform to be rough. There are various rock outcrops and variations in the soil colors.

Manmade features in the Elko District range from highways and powerlines to fences, roads, and range developments. There are many man-made features; some more dominant than others depending on your exact location.

Visual resources are identified through the Visual Resource Management (VRM) inventory. This inventory consists of a scenic quality evaluation, sensitivity level analysis, and delineation of distance zones. Based on these factors, BLM-administered lands are placed into four visual resource inventory classes: VRM Classes I, II, III, and IV. Classes I and II are the most valued, Class III represents a moderate value and Class IV is of the least value. VRM classes serve two purposes: (1) as an inventory tool that portrays the relative value of visual resources in the area, and (2) as a management tool that provides an objective for managing visual resources. (See Table 3.2.1.5).

In addition to the above Classes, in the Elko and Wells Resource Management Plans, a Low Visibility Corridor was established along Interstate 80. Visual impacts are to be minimized within 1.5 miles on either side of the highway. Within this three-mile wide Low Visibility Corridor, the objective is for management actions not to be evident in the characteristic landscape. Management objectives for Class II VRM areas will be used as a guideline when evaluating projects within the Low Visibility Corridor. The Table 2-1(above) identifies those leases proposed to be offered at March 2014 sale where the I-80 Low Visibility Corridor stipulation would need to be attached.

Elko District BLM contains sections of the California National Scenic and Historic Trail. The Trail main segments cross the District from the northeast corner near the boarders of Idaho and Utah heading southwest towards the East Humboldt Range. Then the Trail follows the same general direction along the Humboldt River through Elko and Carlin Canyon. The main Trail continues along the Humboldt northwest after Emigrant Pass and leaves the District around Sterritt Peak and the Battle Mountain Area. The Hastings Cutoff sections enter the District at the base of Pilot Peak and continue west until the East Humboldt and Ruby Mountain Range complex. The Hastings Cutoff then routes around the southern end of the Ruby Mountains until rejoining the main section of the trail west of Elko through South Fork Canyon. According to BLM Manual 6280 visual resources around Trail segments need to be managed as a Class I or Class II resource.

Table 3.2.15 VRM Classification Objectives

VRM CLASS	Visual Resource Objective	Change Allowed (Relative Level)	Relationship to the Casual Observer
Class I	Preserve the existing character of the landscape. Manage for natural ecological changes.	Very Low	Activities should not be visible and must not attract attention.
Class II	Retain the existing character of the landscape.	Low	Activities may be visible, but should not attract attention.
Class III	Partially retain the existing character of the landscape.	Moderate	Activities may attract attention, but should not dominate the view.
Class IV	Provide for management activities, which require major modification of the existing character of the landscape.	High	Activities may attract attention, may dominate the view, but are still mitigated

Effects of the Proposed Alternative

Currently when a lease is offered an analysis is done to determine which VRM Class the development falls under using the established inventory as a guideline. If a visual contrast rating is completed and the area falls under a higher VRM Class, management has the authority to apply higher Class objectives to the area.

The development of leased lands for Oil and Gas resources would create strong contrasts between the project features and the existing landscape. All the dominant elements of the visual landscape (form, line color, and texture) would be affected.

Building roads would superimpose visual lines that would appear in sharp contrast with horizontally aligned hills and the continuous, uninterrupted vegetation in the area. Removal of vegetation due to road and drill pad construction would expose bare soil much lighter in color and smoother in texture than the surrounding vegetation. This would superimpose visible lines and openings in vegetation that is otherwise uniform and which covers all the landscape. Those contrasts would be visible to anyone in the area. However surface disturbances would be less visible as they moved away from the viewer. Roads would be highly visible as the observer looked along them but less visible when the observer looked across them.

Permanent structures such as steel storage tanks would cause substantial contrast to form, line, texture and potentially to color as well. Essentially, there are very few structures present in the Oil and Gas Lease area and the proposed structures would be square or rectangular or cylindrical in form, they would have a vertical alignment, and they would be smooth in texture. This would be in sharp contrast with the low, gently rolling hills and valleys of the characteristic landscape. In open country they would be visible at great distances. The visibility of the structures would be enhanced if they were painted an inappropriate color. Roads, especially as the viewer looks along them would create lines that would usually be the opposite of the natural horizontal lines in the landscape.

The length of time required for re-vegetation is fairly long. Grasses can be re-established in a season or two but it takes several years to re-establish sagebrush, the dominant vegetative species in the area.

Even though the issuance of leases would cause impacts to all the elements of the visual landscape (form, line, color, and texture), it still would conform to the Class III and IV Visual Resource Management.

Under the assumption that a number of wells would be drilled and that they would be successful, substantial changes in the visual landscape could result over the next 2-5 years.

Cumulative Effects

The reasonably foreseeable future actions would have an impact on visual resources. A number of ongoing and future activities combined could result in direct and indirect impacts to visual resources, particularly to VRM Class II areas. VRM Class III and IV areas would have site-specific design features incorporated and future activities would avoid VRM Class I areas. The stipulations required through the RMP or those determined to be needed on a site-specific basis will help to minimize impacts from these activities.

Mitigations

In spite of the fact that most of the parcels are in VRM Class IV, reasonable attempts should be made to lessen visual impacts. Design mitigation techniques are applied to screen projects from view. Strategies include color selection, layout of earthwork, vegetative manipulation, placement of structures, materials selection and reclamation or rehabilitation. Design techniques and VRM requirements are provided by various publications describing Best Management Practices including those for Visual Resource Management for Fluid Minerals.

The SOP for the I-80 Low Visibility Corridor would limit visual impacts within 1.5 miles of either side of I-80 using Class II standards.

Visual effects on the California National Scenic and Historic Trail would be limited by the stipulations outlined in Appendix B.

3.2.16 Native American Concerns

Existing Conditions

Federal law and agency guidance require the BLM to consult with Native American tribal governments concerning the identification of cultural values, religious beliefs, and traditional practices of the Native American peoples that may be affected by actions on BLM-administered lands. This consultation includes the identification of places (i.e., physical locations) of traditional cultural importance to the affected Native American tribes. Places that may be of Native American traditional cultural importance include, but are not limited to:

- Locations associated with the traditional beliefs concerning tribal origins, cultural history, or the nature of the world.
- Locations where religious practitioners go, either in the past or the present, to perform ceremonial activities based on traditional cultural rules or practice; Ancestral habitation sites; Trails; Burial sites; and Places from which plants, animals, minerals, and waters believed to possess healing powers or used for other subsistence purposes, may be taken.
- Some of these locations may be considered sacred to particular Native American individuals or tribes.
- In 1992, the National Historic Preservation Act (NHPA) was amended to explicitly allow that "properties of traditional religious and cultural importance to an Indian tribe may be determined to be eligible for inclusion on the National Register of Historic Places." If a resource has been identified as having importance in traditional cultural practices and the continuing cultural identity of a community, it may be considered a "traditional cultural property" (TCP). To qualify for nomination to the National Register of Historic Places (NRHP), a TCP must:
    - Be more than 50 years old;
    - Be a place with definable boundaries;
    - Retain integrity; and
    - Meet certain eligibility criteria as outlined for cultural resources in the NHPA (Section 3.2.3 cultural Resources).

In addition to NRHP eligibility, some places of cultural and religious importance also must be evaluated to determine if they should be considered under other federal laws, regulations, directives, or policies. These include, but are not limited to, the Native American Graves Protection and Repatriation Act of 1990, American Indian Religious Freedom Act of 1978, Archaeological Resources Protection Act (ARPA) of 1979, and Executive Order (EO) 13007 (Sacred Sites) of 1996.

The effects of federal undertakings on properties of religious or cultural significance to contemporary Native Americans are given consideration under the provisions of EO 13007, American Indian Religious Freedom Act, and recent amendments to the NHPA. As amended, the NHPA now integrates Indian tribes into the Section 106 compliance process and also strives to make the NHPA and National Environmental Policy Act procedurally compatible. Furthermore, under Native American Graves Protection and Repatriation Act, culturally affiliated Indian tribes and the BLM jointly may develop procedures to be taken when Native American human remains are discovered on federal land.

Tribal Consultation: The BLM, Elko District, Tuscarora Field Office has consulted and shared information with the groups listed in the table below. Consultation and communication with these tribal/band governments have included letters, phone calls, and visits with the individual Tribal/Band Councils. Consultation will continue throughout the life of the project.
Tribal ethnographic resources are associated with the cultural practices, beliefs, and traditional history of a community. In general, ethnographic resources include places in oral histories or traditional places, such as particular rock formations, the geothermal water sources, or a rock cairn; large areas, such as landscapes and viewscapes; sacred sites and places used for religious practices; social or traditional gathering areas, such as racing grounds; natural resources, such as plant materials or clay deposits used for arts, crafts, or ceremonies; and places and natural resources traditionally used for non-ceremonial uses, such as trails or camping locations.

Summary of Native American Consultation (Consultation is On-Going).

Name of Tribe or Band	Date of Contact	Type of Contact	Comments/Notes
Te-Moak Tribe of Western Shoshone	11-19-2013	Council meeting	Information sharing at Councils request. Comments provided, areas of concern removed.
Battle Mountain Band	01-10-2014	Letter from BLM	Invitation to open government-to-government consultation
Elko Band	11-27-2013	Council meeting	Information sharing at Councils request. No Comments or concerns provided.
South Fork Band	11-18-2013	Council meeting	Information sharing at Councils request. No Comments or concerns provided. Requested copy of draft EA for review and comment.
Wells Band	11-18-2013	Council meeting	Information sharing at Councils request. No Comments or concerns provided.
Shoshone Paiute Tribes of the Duck Valley Indian Reservation	01-10-2014	Letter from BLM	Invitation to open government-to-government consultation
Confederate Tribes of the Goshute Indian Reservation	01-10-2014	Letter from BLM	Invitation to open government-to-government consultation

Name of Tribe or Band	Date of Contact	Type of Contact	Comments/Notes
Duckwater Shoshone Tribe	01-10-2014	Letter from BLM	Invitation to open government-to-government consultation
Yomba Shoshone Tribe	01-10-2014	Letter from BLM	Invitation to open government-to-government consultation
Ely Shoshone Tribe	01-10-2014	Letter from BLM	Invitation to open government-to-government consultation

The NEPA process does not require a separate analysis of impacts to religion, spirituality, or sacredness. As a result, references to such beliefs or practices convey only the terminology used by participants involved in the ethnographic studies and tribal consultation. This terminology does not reflect any BLM evaluation, conclusion, or determination that something is or is not religious, sacred, or spiritual in nature, but conveys only the information that has been gathered through tribal consultation and coordination and current and historic ethnographic study.

Effects of the Proposed Alternative

Implicitly the act of selling oil, gas, and geothermal leases indirectly creates the potential to adversely impact Native American sites of spiritual/cultural/traditional nature. If a lease is sold, the lessee retains irrevocable rights and can foreclose the authorized officer's use of some mitigation measures. For example, according to 43 CFR § 3101.1-2, once a lease is issued to its owner, that owner has the "right to use so much of the lease lands as is necessary to explore for, drill for, mine, extract, remove and dispose of the leased resource in the leasehold" subject to specific nondiscretionary statues and lease stipulations.

The types of resource uses by traditional activities and current religious practices often cannot be easily or effectively mitigated for. The direct and indirect activities associated with imaging, exploration, development, and mineral extraction are often terminally disruptive to traditional and religious practices.

Mitigation

Both oil and gas leasing/development and geothermal leasing/development are recognized and acceptable uses of lands administered by the BLM under the Federal Land Policy and Management Act of 1976 (FLPMA). However, in accordance with the National Historic Preservation Act (P.L. 89-665), the National Environmental Policy Act (P.L. 91-190), the Federal Land Policy and Management Act (P. L.94-579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (P.L. 101-601) and Executive Order 13007, the BLM must also provide affected tribes an opportunity to comment and consult on proposed actions. BLM must attempt to limit, reduce, or possibly eliminate any negative impacts to Native American traditional/cultural/spiritual sites, activities, and resources.

Due to the existence of additional Standard Operating Procedures (SOPs) and stipulations and limitations (law, regulations, directives), BLM has determined that parcels requested to be deferred or withdrawn, by the Te-Moak Tribe, will remain in the March 2014 Oil and Gas lease sale (see SOP No. 1, 2, and WO IM 2005-003). Information for areas of concern to the various tribes and bands have been gleaned from thirty years of confidential ethnographic studies and reports. These areas of concern have been added to the information proved by the Te-Moak Tribe.

As stated above, if, as a result of leasing, a ground disturbing plan to explore or develop is submitted to BLM, all applicable laws, regulations, directives, SOPs, and stipulations and limitations will apply.

BLM reserves the right to deny or alter proposed activities associated with any surface occupancy that results from Oil, Gas, and Geothermal leasing. Consequently, the BLM must take steps to identify locations having traditional/cultural or religious values to Native Americans and insure that its actions do not unduly or unnecessarily burden the pursuit of traditional religion or traditional values.

In the past, Elko BLM has deferred certain lease parcels that were also part of the tribe's draft land acquisition package to be sent to the Nevada Congressional Delegation.

3.2.17 Wild Horses

Existing Conditions

There are 8 wild horse herd management areas (HMA) managed by the Elko District Office. They are the Owyhee, Rock Creek, Little Humboldt, Diamond Hills North, Maverick-Medicine, Antelope Valley, Goshute, and Spruce-Pequop HMAs. These eight HMAs total approximately 1.8 million acres and have an appropriate management level (AML) of 1,338 wild horses. Wild horses inhabit these HMAs year round.

Parcels 017-018, 024-035, 037-039, 051-054, 063-066, 073 and 079 are partially or completely within the Maverick-Medicine HMA, parcels 213-215 are within the Goshute HMA and parcels 154-156, 191, 193-198, 202, 206 and 216-221 include lands that fall within the Antelope Valley HMA.

Effects of the Proposed Alternative

There are no direct impacts to wild horses associated with leasing, however wild horses can be found within the HMAs and future exploration could affect wild horses within those HMAs. Increased human and motorized activity could disrupt and displace wild horses. The wild horses inhabiting the area of the exploration could leave the area and move away from the noise and activity. During any long term or permanent activity it is probable that wild horses over time would become accustomed to the activity and resume normal activities at a reasonable distance. Construction of new fences as part of development production facilities could disrupt movement of free roaming wild horses and animals could be injured by colliding with any new fences.

Mitigations

Construction of fencing within a HMA would be evaluated during review of any development proposal to determine if flagging or other measures would be necessary to increase visibility to wild horses. Best management practices along with specific restrictions would be implemented to minimize negative impacts to wild horses.

3.2.18 Invasive, Nonnative Species

Existing Conditions

Invasive, nonnative species occur in some areas which have the potential for oil and gas exploration or development. Invasive, nonnative species, including Nevada designated noxious weed species are aggressive, typically nonnative, ecologically damaging, undesirable plants, which severely threaten biodiversity, habitat quality and ecosystems. Because of their aggressive nature, invasive, nonnative weed species may eventually spread into established plant communities. Wildland fires in the northern Great Basin have helped to cause an increase of invasive weed species. Wildland fires provide a fertile environment, usually without competition from native species, for weed species to become established. Vehicles are a primary vector in the spread of invasive weed species. Seeds and plant propagules can become lodged in tires and undercarriages and deposited in relatively weed free areas. Increased traffic from users of public lands may cause an increase of noxious and/or invasive plant species.

The State of Nevada has three categories of noxious and invasive weed species:

Category A includes noxious weeds, which are:

- Not found or limited in distribution throughout the state;
- Actively excluded from the state and actively eradicated wherever found; and
- Controlled by state for all infestations.

Category B includes noxious weed species, which are:

- Established in scattered populations in some counties of the state;
- Actively excluded where possible; and
- Controlled by the state in areas where populations are not well established or previously unknown to occur.

Category C includes noxious weeds, which are:

- Currently established and generally widespread in many counties of the state; and
- Controlled and abated at the discretion of the state quarantine officer (Nevada Department of Agriculture 2006).

A number of the parcels proposed for the March 2014 sale contain Nevada designated noxious weed species. Species found within the parcels include Scotch thistle (*Onopordum acanthium*), spotted knapweed (*Centaurea maculosa*), hoary cress (*Cardaria draba*), Russian knapweed (*Acroptilon repens*), perennial pepperweed (*Lepidium latifolium*), Bull thistle(*Cirsium vulgare*), and Canada thistle (*Cirsium arvense*).

Parcel #	Noxious Weeds Species Present
NV-14-03-002	Scotch thistle, hoary cress
NV-14-03-003	Scotch thistle, Canada thistle
NV-14-03-004	Scotch thistle, hoary cress
NV-14-03-006	Scotch thistle, Canada thistle
NV-14-03-007	Scotch thistle
NV-14-03-008	Scotch thistle
NV-14-03-010	Scotch thistle
NV-14-03-013	Scotch thistle
NV-14-03-015	Scotch thistle
NV-14-03-016	Hoary cress
NV-14-03-018	Need Inventory
NV-14-03-020	Hoary Cress
NV-14-03-021	Hoary Cress
NV-14-03-022	Hoary Cress
NV-14-03-023	Hoary Cress
NV-14-03-024	Need site specific inventory
NV-14-03-025	Need site specific inventory
NV-14-03-026	Need site specific inventory
NV-14-03-027	Need site specific inventory
NV-14-03-029	Need site specific inventory
NV-14-03-030	Need site specific inventory
NV-14-03-031	Need site specific inventory
NV-14-03-032	Need site specific inventory
NV-14-03-033	Need site specific inventory
NV-14-03-034	Need site specific inventory
NV-14-03-035	Need site specific inventory
NV-14-03-037	Need site specific inventory
NV-14-03-038	Need site specific inventory
NV-14-03-051	Need site specific inventory
NV-14-03-052	Need site specific inventory
NV-14-03-053	Need site specific inventory
NV-14-03-054	Need site specific inventory
NV-14-03-060	Hoary Cress, Canada thistle
NV-14-03-063	Need site specific inventory
NV-14-03-064	Need site specific inventory
NV-14-03-073	Need site specific inventory
NV-14-03-077	Hoary Cress
NV-14-03-079	Hoary Cress
NV-14-03-080	Hoary Cress
NV-14-03-081	Hoary Cress
NV-14-03-082	Hoary Cress
NV-14-03-084	Need site specific inventory
NV-14-03-154	Need site specific inventory
NV-14-03-155	Need site specific inventory

Parcel #	Noxious Weeds Species Present
NV-14-03-191	Need site specific inventory
NV-14-03-193	Need site specific inventory
NV-14-03-194	Need site specific inventory
NV-14-03-195	Need site specific inventory
NV-14-03-196	Need site specific inventory
NV-14-03-197	Need site specific inventory
NV-14-03-198	Need site specific inventory
NV-14-03-202	Need site specific inventory
NV-14-03-206	Need site specific inventory
NV-14-03-213	Bull Thistle
NV-14-03-214	Bull thistle
NV-14-03-215	Canada thistle, Salt Cedar
NV-14-03-216	Need site specific inventory
NV-14-03-217	Need site specific inventory
NV-14-03-218	Need site specific inventory
NV-14-03-219	Need site specific inventory
NV-14-03-220	Need site specific inventory
NV-14-03-221	Need site specific inventory
NV-14-03-222	Need site specific inventory
NV-14-03-223	Need site specific inventory
NV-14-03-224	Need site specific inventory
NV-14-03-225	Dyers Woad
NV-14-03-226	Need site specific inventory
NV-14-03-227	Bull Thistle
NV-14-03-228	Need site specific inventory
NV-14-03-229	Bull Thistle
NV-14-03-230	Need site specific inventory
NV-14-03-231	Canada Thistle

Effects of the Proposed Alternative

The act of offering, selling, issuing federal oil and gas leases does not produce invasive/non-invasive species impacts. Subsequent development produces impacts in the form of ground disturbance. The construction of an access road and well pad may unintentionally contribute to the establishment and spread of noxious weeds. Noxious weed seed could be carried to and from the project areas by numerous methods, including construction equipment, the drilling rig and transport vehicles. The main mechanism for seed dispersion on the road and well pad is by equipment and vehicles that were previously used and or driven across or through noxious weed infested areas. The potential for the dissemination of invasive and noxious weed seed may be elevated by the use of construction equipment typically contracted out to companies that may be from other areas.

Each APD would result in additional disturbance throughout the future project areas creating opportunity for noxious and invasive weeds to spread. Proposed mitigation measures, including noxious and invasive weed control, would be developed upon environmental analysis of site-

specific APD. Cheatgrass and other weedy annuals are common along roadsides and disturbed areas. These and the other species of noxious weeds are spread by vehicle traffic, livestock, and wind, water, recreational vehicles, and wildlife. There would also be potential for new weeds to be transported onto the site on equipment used for construction activities. Any disturbance of soil or removal of vegetation would create opportunity for weeds to establish or spread into the surrounding plant community. In disturbed areas, bare soils and the lack of competition from an established perennial plant community would allow weed species opportunity to grow and produce seed. However, successful reclamation using a seed mix adapted to the site in conjunction with integrated weed management would create an opportunity to improve vegetative communities and reduce the amount of weed species in the project area.

Cumulative Impacts from Past, Present and Reasonably Foreseeable Future Actions

Future development within the proposed lease sale parcels would result in additional vegetation loss and surface disturbance. Past and present oil and gas activities in the area have already created disturbance, and oil and gas development is anticipated to continue throughout the area. Successful reclamation would reduce the risk to healthy plant communities and provide an opportunity to improve degraded vegetative communities within the project area.

Mitigations

The Following principles of integrated pest management, including herbicide application, shall be employed to control and minimize noxious and invasive weeds:

- Prior to any ground disturbing activities, further analysis addressing the potential effects related to noxious, non-native species would be considered.
- Clean equipment of all mud, dirt and plant parts before moving into relatively weed-free areas.
- Include weed prevention and treatment in all plans for surface disturbance and reclamation.
- Ensure all disturbed soil is revegetated as soon as possible to establish competition against invasive weeds.
- Incorporate weed prevention into road layout, design and alternative evaluation (where road construction is required).
- Incorporate weed prevention into road layout, design and alternative evaluation (where road construction is required).

Use of current standards for seed used to reclaim public lands would be helpful in reducing the spread of invasive, non-native species. Best management practices along with specific restrictions would be implemented to minimize negative impacts.

3.2.19 Wetlands/Riparian Zones

Existing Conditions

Riparian areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Typical riparian areas are lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers, streams, and shores of lakes and reservoirs

with stable water levels. Excluded are such sites as ephemeral streams or washes that do not exhibit vegetation dependent on free water in the soil. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and which, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, swamps, lakeshores, sloughs, bogs, wet meadows, estuaries, and some riparian areas.

Riparian and wetland areas adjacent to surface waters are the most productive and important ecosystems in the planning area. Although these areas represent a small portion of the affected sub-basins, riparian, habitats play an important role in restoring and maintaining the chemical, physical, and biological integrity of water resources (Fitch and Ambrose 2003). Healthy Riparian and wetland areas have the potential for multi-canopy vegetation layers with trees, shrubs, grasses, forbs, sedges, and rushes, and are valuable habitat for a wide variety of wildlife species. Healthy systems also filter and purify water, reduce sediment loads, enhance soil stability, provide micro-climatic moderation, and contribute to groundwater recharge and base flow (Pritchard et al. 1998).

The BLM and U.S. Fish and Wildlife Service (FWS) have recorded and mapped data regarding the extent and condition of riparian/wetland areas. According to the FWS there are about 200,000 acres of wetlands within the affected sub-basin which represents about 4% of the land area.. Those riparian acres are mapped using remote sensing techniques and do not include the small riparian areas surrounding many of the smaller springs and streams within the sub-basins. The proportion of riparian area on BLM administered land is much smaller because BLM land is mostly located in the uplands As mentioned previously, BLM has inventoried around 1000 springs on BLM land within the sub-basins, and many others are present on private land.

Although detailed information on the condition and trend of riparian areas is not available for the affected basins as a whole, some data are available for the riparian areas associated with springs and streams on public land. One of the ways BLM assesses the condition of riparian areas associated with streams (lotic) and springs (lentic) is by using the Proper Functioning Condition (PFC) Assessment outlined in Pritchard et al. 1998. This technique is used by the BLM to determine whether or not riparian areas are meeting rangeland health standards. Riparian areas are considered to be in PFC when adequate vegetation, landform, or debris is present to dissipate energy, improve water quality, reduce erosion, filter sediment, aid floodplain development capture and store water, and provide for greater biodiversity. Riparian areas that are functioning at risk lack one or more soil, water, or vegetation attribute, making them susceptible to degradation. Nonfunctional riparian areas are clearly not exhibiting the attributes necessary for a functioning system. Although this protocol is not directly related to oil and gas development, the impacts associated with the Proposed Action, and other land uses such as livestock grazing could combine to create impacts which would be observed through PFC assessment.

Results of lotic and lentic PFC assessments indicate that although some improvement has been accomplished in the past 15 years, many acres of riparian area are rated as being in poor condition. A BLM summary of lotic PFC assessments for the Elko District indicated that 60% of stream miles assessed between 2000 and 2012 were rated in proper functioning condition or Functional at risk with upward trend. Results in the affected sub-basins and streams in and near the proposed parcels are similar. BLM's lentic assessment database indicates that of the 29

assessments completed in and near (within two miles) the proposed lease parcels, eight were rated as functional at risk with downward trend, one was rated as functional at risk with upward trend, three were rated as functional at risk with no apparent trend, seven were rated as non-functional and 10 were rated as being in proper functioning condition.

Effects of the Proposed Alternative

As previously stated, the sale of parcels and issuance of oil and gas leases is strictly an administrative action. The act of offering, selling, and issuing federal oil and gas leases does not produce impacts to riparian/wetland resources. Subsequent development of a lease may result in long-and short term alterations to surface hydrology and groundwater resources which may indirectly impact riparian/wetland resources depending upon the intensity of development. Because potential impacts to riparian/wetland resources are so strongly connected to impacts to surface and groundwater quality and quantity, the reader is encouraged to refer to the Water Resources section of this document for full analysis.

Impacts to riparian/wetland resources may include varying degrees of habitat loss depending on the sensitivity of the riparian system and the proximity of the exploration and/or construction activities. Impacts could include increased sediment loads due to ground clearing, loss of vegetative communities, as well as accelerated erosion due to road construction. Sedimentation can increase turbidity levels, reducing available light and riparian plant production. Any degree of habitat loss to a riparian system opens the area to invasion by upland and/or weed species. Exploration or construction impacts that have the potential for riparian habitat removal or degradation in combination with other actions in the area will have to be evaluated at the time the permit application is submitted.

Normal oil/ gas plant operations should have minimal effect on any nearby riparian areas once facility construction is completed. Exceptions to this are incidences where spills, emissions or plant personnel activity cause degradation to water quality or riparian communities or where large quantities of water are diverted to support the operation. Discharge of treated waters can have variable effects on the riparian community, depending on the water quality. Increased moisture in drainages can accelerate riparian plant establishment, changing the existing vegetative composition. Temperatures of discharge waters are usually high and algae and/or moss production can increase as a result of such water entering any standing water bodies. Additional monitoring measures may need to be employed where potential for impacts to riparian areas through facility operations are high.

Upland reclamation of the drilling site has the potential to increase sedimentation loads to any nearby drainage during the initial phases. It is unlikely, though, that any viable riparian area will be disturbed for oil/ gas drilling purposes. Reclamation of facilities should only result in transient effects on riparian areas. Monitoring or remediation measures to reduce possible impacts to riparian areas should be established at the time of the APD submittal.

Cumulative Effects

The cumulative effects study area (CESA) is the area within and near the proposed lease parcels. This area was chosen because effects associated with the development of parcels within the proposed lease sale would not likely extend beyond this area. As described above in the Affected

Environment section, there is a considerable portion of riparian/wetland resources in the CESA that are non-functional or functional at risk and as such it could be inferred that riparian/wetland resources have already sustained substantive cumulative effects. These impacts would continue to occur under the No Action Alternative.

The Proposed Action would not result in any direct incremental increase in cumulative impacts to riparian/wetland resources, but subsequent development could increase impacts as described above in the Proposed Action section. Specifically, development would likely result in additional water diversion, and surface water quality could be affected by development, resulting in potential impacts to riparian/wetland resources. The incremental increase in these impacts is small when compared to the level of impacts that already exist in the sub-basins as described above in the Affected Environment section. These cumulative impacts would continue to occur under the Proposed Action.

Mitigations

Executive Order 11990, May 24, 1977, directs federal agencies to take appropriate actions to avoid, to the extent possible, long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct support of new construction in wetlands wherever there is a practicable alternative.

Exploratory drilling and road building would be restricted to 15% slopes or less in canyons of perennial streams. The important beneficial impact would be to prevent deterioration of riparian habitat due to sedimentation. The effect of such a restriction on oil and gas/geothermal development would mean that high elevation drilling would be done near ridge tops and on benches, well away from streams that were also on slopes 15% or less (Elko RMP, ROD).

Impacts to an open body of water, such as a canal, ditch, slough, pond, creek, lake, or stream and riparian areas would be avoided by a buffer zone of 400 ft. This buffer may be greater as determined by the Elko BLM Field Office, in order to sufficiently protect riparian areas against adverse impacts such as increased sedimentation, impacts to water quality and quantity and loss of riparian vegetation.

3.2.20 Wildlife and Fisheries

Existing Conditions

These lease parcels are expected to provide habitat for a large number of wildlife species. Many species of birds, mammals, reptiles, amphibians, fish and invertebrates may find any one of the proposed lease areas suitable habitat. A few parcels proposed for leasing fall in areas of special importance to one or more wildlife species, such as crucial winter range for mule deer. These areas may have special stipulations concerning drilling activities, which will have to be followed by anyone proposing to develop specific sites (Table 3.2.22a).

Big Game

The lease parcels are within areas utilized by mule deer, pronghorn antelope, and elk. All species may be observed in any given location during some part of the year. Some habitat areas are

crucial to the persistence of a herd or population through stressful seasons and or drought conditions. These areas have been delineated using observations of habitat use combined with the best knowledge of available forage types, water, and thermal cover. Information on parcels with known big game crucial habitat is provided in Table 3.2.22a.

Raptors
Most lands in the Elko District may have raptor nesting sites and foraging areas including sites occupied by eagles. Nesting habitats vary between species and vary with available features. Rock ledges, high cliffs, tree tops, bare ground, and burrows are all examples of where raptor nests may be found within the lease parcels. Prey may include small mammals, other avian species, reptiles, amphibians, and carrion. Information on raptors is gathered during winter surveys as well as spring nesting surveys. Raptors may be resident or migratory. Migrating raptors may travel as far as South America to winter or may stay as residents. Information on parcels with known raptor occurrences is provided in Table 3.2.22b.

Fisheries
No known fisheries occur within the lease parcels.

Migratory Birds
Migratory birds are discussed in the Migratory Bird section (3.2.21).

Special Status Species

Special status species, sensitive species, threatened and endangered species, proposed species, and candidate species are discussed in the section on Special Status Species (3.2.22).

Effects of the Proposed Alternative

There would be no direct effects from issuing new oil and gas leases, leasing does not directly authorize oil and gas exploration, development, production, or any other ground disturbing activities. Indirect effects may occur during the exploration, development, and or production of the minerals within the lease parcels. These effects would be analyzed at the time that these activities are proposed. Possible effects are discussed in a general manner below.

Oil and gas exploration, development, and production activities have the potential to affect wildlife in the following ways:

- Temporary disturbance, displacement, or mortality of wildlife could result from exploration and development. Impacts include habitat loss of the area surrounding the construction site due to fencing, noise and high activity levels.
- Long-term habitat loss and habitat fragmentation could result from exploration or development. Risk of permanent loss of habitat due to unsuccessfully reclaimed sites is high. Reclamation, especially in low elevation and low precipitation sites, is difficult even with the best techniques and equipment; the potential for failure is high.
- Degradation to habitat and quality forage due to the possible establishment and spread of noxious weeds from exploration and development.
- The potential of groundwater contamination from spills or evaporation pond runoff and/or overflow could change the water chemistry at springs, altering aquatic habitat.

This could possibly alter survivorship and reproduction of aquatic species; however it is believed the contamination of groundwater is highly unlikely to occur.

- Changes in water quantity and quality could alter the survivorship and reproduction of aquatic species; however it is believed that the amount of water necessary for drilling would not affect neighboring springs.

Direct impacts from exploration, development, and production activities would be analyzed under a separate site-specific NEPA analysis at the time that these activities are proposed.

Big Game
Mule deer, elk, and antelope crucial habitats exist in the lease sale areas. Impacts include temporary individual or population displacement from preferred habitat to marginal habitat, potential for animal mortality, decreased fitness, or behavioral changes in the vicinity of the exploration site. Permanent habitat loss due to mechanical changes to the environment or weed invasion may occur. In addition, oil and gas development at various stages could disrupt big game movement corridors. Impacts of groundwater removal could affect spring and stream discharge changing water availability and habitat viability, and alter habitat use patterns.

Raptors
Raptors may be particularly affected during nesting season since it is generally the time of highest physiological stress. Disturbance, even a one-time occurrence, may cause species with low tolerance to disturbance (ferruginous hawk, Swainson's hawk and the short-eared owl) to abandon their nests.

Golden eagles have been documented throughout the district and compliance with the Bald and Golden Eagle Act requires surveys and protection measures for eagle nests and foraging areas. Coordination between the USFWS, project proponents and BLM would be necessary before any surface disturbing activities would be authorized on lease parcels within these habitats.

Cumulative Effects

The incremental effects of the proposed action combined with the past, present, and reasonably foreseeable future actions may have an impact on these resources. The entire nature of those impacts as to the severity and duration cannot be fully discussed in this document, but will be analyzed if or when an APD is submitted to the Elko District. At that time a site specific NEPA document will analyze those effects in detail, and quantify and qualify the compound effects to fish and wildlife resources as part of the permitting process.

Mitigations

Big Game
Seasonal restrictions from disturbance in crucial mule deer and pronghorn antelope winter ranges apply during the period 11/15-3/16, inclusive. Determining wintering seasonal buffer zones for mule deer on a site-specific basis would increase the protection BLM can afford these animals. Winter range is limited and dates reflect when large numbers of animals reside on these small areas. Displacement from these areas on these dates due to land use disturbance may be detrimental (Elko RMP (pg. 2-4)).

Raptors
Most lands in the Elko District may have raptor nesting sites and foraging areas and so are subject to seasonal protection from disturbance that are typically applied to a 0.5 mile radius around known nest sites. As indicated in Table 3.2.22a, inclusive dates of the seasonal restrictions from disturbance around the nesting sites vary depending on the species. Surveying areas to be disturbed and determining seasonal buffer zones for active raptor nests on a site-specific basis increases the protection BLM can afford raptors. An arbitrarily determined buffer zone, such as the .5 mile radius specified for each species above, may be inadequate to prevent line-of-sight contact between nesting raptor and disturbing human intrusions, particularly in open country. Furthermore, if a nest is readily visible to humans, it is more susceptible to vandalism. On the other hand, in rough or forested terrain, a .5 mile radius may be larger than necessary to prevent disturbance of a nesting raptor.

3.2.21 Migratory Birds

Existing Conditions

According to the BLM Elko District Office "Bird List", there are approximately 246 species that could inhabit the Field Office area of jurisdiction on a seasonal or yearlong basis (BLM, 1999). The Proposed Action area includes habitat for all of these migratory bird species on a seasonal or yearlong basis.

Effects of the Proposed Alternative

There would be no direct effects from issuing new oil and gas leases, leasing does not directly authorize oil and gas exploration, development, production, or any other ground disturbing activities. Indirect effects may occur during the exploration, development, and or production of the minerals within the lease parcels. These effects would be analyzed at the time that these activities are proposed. In addition to the generalized potential effects to fish and wildlife impacts to migratory birds may include temporary individual or population displacement from preferred habitat, decreased clutch survival, increased potential for animal mortality, or behavioral changes and physiological stress that negatively affect fitness. Ground disturbing activities associated with the lease parcels would need to be approved through additional NEPA analysis.

Cumulative Effects

The incremental effects of the proposed action combined with the past, present, and reasonably foreseeable future actions may have an impact on migratory birds. The entire nature of those impacts as to the severity and duration cannot be fully discussed in this document, but will be analyzed if or when an APD is submitted to the Elko District. Site specific NEPA documents will analyze those effects in detail, and quantify and qualify the compound effects to migratory birds and the habitat.

Mitigations

Ground disturbing activities during the nesting season (March to July) should be avoided to conserve migratory birds. Surveys for migratory birds should be conducted prior to site

development during the nesting season to identify either breeding adult birds or nest sites within the areas to be disturbed. If active nests are present, the proponent would coordinate with the BLM to develop appropriate protection measures for these sites, which could include avoidance, construction constraints and or establishing buffers (Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds). Best management practices along with specific restrictions would be implemented to minimize negative impacts to migratory birds.

3.2.22 Special Status Species

Existing Conditions

BLM Manual 6840 entitled Special Status Species Management states BLM special status species are those that 1) are listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as Bureau sensitive by the State Director(s). Additionally, all federal candidate species, proposed species, and delisted species in the 5 years following delisting will be conserved as Bureau sensitive species.

BLM signed a Memorandum of Understanding with the U.S. Geological Survey, U.S. Department of Agriculture Forest Service, Smithsonian Institution, U.S. National Park Service, USFWS, and The Nature Conservancy on November 6, 1998, to conserve springsnail species throughout the Great Basin. Federally threatened, endangered, candidate, and species of concern may occur in a variety of habitat types throughout the district.

Section 7 of the Endangered Species Act (ESA) of 1973, as amended, requires that BLM land managers ensure that any action authorized, funded, or carried out by the BLM is not likely to jeopardize the continued existence of any Federally Designated Threatened or Endangered (T&E) species, and that the action avoids any appreciable reduction in the likelihood of recovery of affected species.

Threatened and Endangered Species
Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), is listed as a Threatened species under the Endangered Species Act. Lahontan cutthroat trout are native to cold, clear, perennial waters of the Great Basin. In the desert environment of the Great Basin this habitat is rare and extremely important to the survival of the species. These fish often live in small streams that are only seasonally or rarely connected to other, larger bodies of water, even a slight reduction in flows or increases in; turbidity, sediment delivery, or temperature, could have serious consequences to individual populations.

Candidate Threatened and Endangered Species
The Greater Sage-Grouse has recently been determined by the Fish and Wildlife Service (FWS) that the species is "warranted for listing but precluded by species of higher priority" and categorized it as a Candidate species. The BLM is emphasizing conservation measures to promote sustainable Greater Sage-Grouse populations and conservation of its habitat. The BLM is in the process of amending Land Use Plans with language to be applied to public lands with greater sage-grouse.

There is Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH) located within the proposed parcels. There are parcels with PPH, which are areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-Grouse populations which include breeding, nesting, brood-rearing, and winter concentration areas. These lease parcels fall within project area boundaries that are currently being analyzed for oil and gas exploration of existing leases under the NEPA process. The effect of exploration on sage-grouse within the proposed leases that are also within the two project areas is being analyzed in the respective NEPA documents. No other lease parcels being offered are within PPH. There are numerous parcels with PGH, which are areas of occupied seasonal or year-round habitat outside of priority habitat.

BLM Sensitive Species
The *Preble's shrew* is known to inhabit portions of the Elko District. This species primarily occupies streamside sagebrush, rabbitbrush, bitterbrush, bunchgrass and forbs, willow and greasewood meadows, and aspen riparian habitat. They feed primarily on insects and other small invertebrates.

Pygmy rabbits have been documented throughout the Elko District. Pygmy rabbits are usually found in areas of deep, friable soils that are suitable for creating burrows. These sites generally support basin big sagebrush and may be associated with meadows or former meadows. Stands of Wyoming big sagebrush are also utilized. Pygmy rabbits dig their own burrows and are usually found close to their burrow systems. Their primary food source is sagebrush, particularly in the winter. Grasses are more important in the summer.

Numerous *bat species* occur throughout the Elko District. Suitable habitat may include rock crevices on steep cliff faces, springs, canyons, coniferous forests (including juniper), and deciduous forests. Roosting can occur in caves or mine shafts/adits. In general, bats use water between night-time foraging bouts. They utilize the habitat types mentioned above for foraging and feed on a variety of nocturnal insects. Many bat species within the district are migratory; while others, like the Townsend's big-eared bat occupy yearlong or winter roost sites within the area of the proposed action.

Effects of the Proposed Alternative

Initial leasing of oil/gas parcels will not have a direct effect on special status species, but surface disturbing activities of oil/gas exploration and facility construction of lease parcels have a possibility of occurring within the vicinity of resident special status species populations. Oil and gas development could affect species of concern in a variety of indirect ways. Potential impacts are summarized below, but a site-specific analysis of how each species would be affected would be conducted as proposals for development of a lease are received.

Environmental impacts of oil and gas resource development are similar to other activities that affect terrestrial and aquatic species and habitats. While each species would respond differently to various impacts, all species could be affected by activities that alter thermal, physical, or chemical characteristics of aquatic and terrestrial habitats.

Stipulations are in place to prevent or minimize adverse effects to special status species that must be complied with as a term of lease purchase. An inventory for special status species is required on leased parcels in known or potential habitat for threatened, endangered, or candidate species. If BLM determines an action "may affect" a listed threatened or endangered species Section 7 Consultation with the USFWS will be initiated (Elko RMP, ROD).

The application of stipulations to leasing activities are expected to negate displacement of special status plant species, long-term changes to habitat quality and modifications in population distribution and abundance, particularly in species with restricted distribution and specific habitat requirements. In most cases, drilling activities would not be allowed in areas where such activities could have a negative impact on any special status species. The BLM will require modifications or reject any proposed action that is likely to jeopardize the continued existence of a species or result in the destruction or modification of its habitat. As such, it is unlikely that any special status plants will be adversely affected.

Cumulative Effects

The incremental effects of the proposed action combined with the past, present, and reasonably foreseeable future actions may have an impact on special status species. The entire nature of those impacts as to the severity and duration cannot be fully discussed in this document, but will be analyzed if an APD is submitted to the Elko District. Site specific NEPA documents will analyze those effects in detail, and quantify and qualify the compound effects.

Mitigations

Inventories for special status species of vegetation and wildlife shall be conducted prior to site development. If special status species are located on sites proposed for development, it may be necessary to exclude disturbance, develop mitigation measures, and/or avoid the species.

Table 3.2.22a

Parcels with Specific Wildlife Stipulations

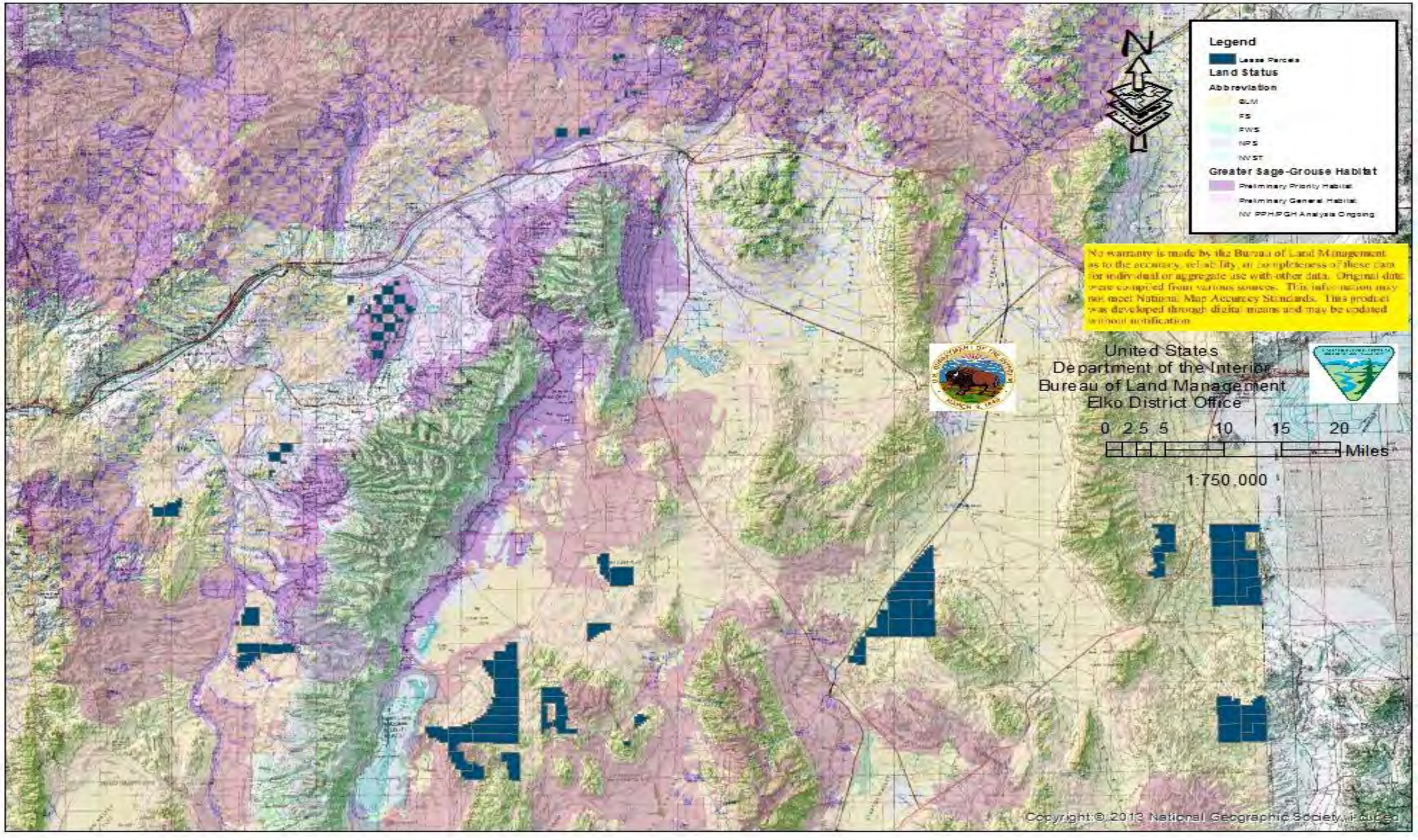
PARCEL	Raptor Nests	Crucial Mule Deer Winter Range	Crucial Antelope Winter Range	Antelope Kidding Area	Notes
NV-14-03-003			Y		
NV-14-03-005			Y		
NV-14-03-006			Y		
NV-14-03-007			Y		
NV-14-03-008			Y		
NV-14-03-009	Y				RETA
NV-14-03-010	Y		Y		
NV-14-03-012	Y		Y		
NV-14-03-013			Y		
NV-14-03-015	Y				FEHA nest
NV-14-03-025	Y				
NV-14-03-026	Y				
NV-14-03-032	Y				
NV-14-03-035	Y		Y		FEHA (2)
NV-14-03-039	Y				FEHA nest
NV-14-03-075	Y				
NV-14-03-077			Y		
NV-14-03-079			Y		
NV-14-03-136	Y				
NV-14-03-154	Y				GOEA <4 miles away
NV-14-03-191	Y				GOEA <4 miles away
NV-14-03-193	Y				GOEA <4 miles away
NV-14-03-194	Y				GOEA <4 miles away
NV-14-03-195	Y				GOEA <4 miles away
NV-14-03-196	Y				GOEA <4 miles away
NV-14-03-197	Y				GOEA <4 miles away
NV-14-03-198	Y				GOEA <4 miles away
NV-14-03-202	Y				GOEA <4 miles away
NV-14-03-213	Y				GOEA <4 miles away, FEHA nest
NV-14-03-214	Y				GOEA <4 miles away
NV-14-03-215	Y				GOEA <4 miles away
NV-14-03-222	Y				GOEA <4 miles away
NV-14-03-223	Y				GOEA <4 miles away
NV-14-03-224	Y				GOEA <4 miles away
NV-14-03-225	Y				GOEA <4 miles away
NV-14-03-226	Y				PRFA nest, GOEA <4 miles away
NV-14-03-227	Y				GOEA <4 miles away
NV-14-03-228	Y				GOEA <4 miles away
NV-14-03-229	Y				GOEA <4 miles away
NV-14-03-230	Y				GOEA <4 miles away

Table 3.2.22b

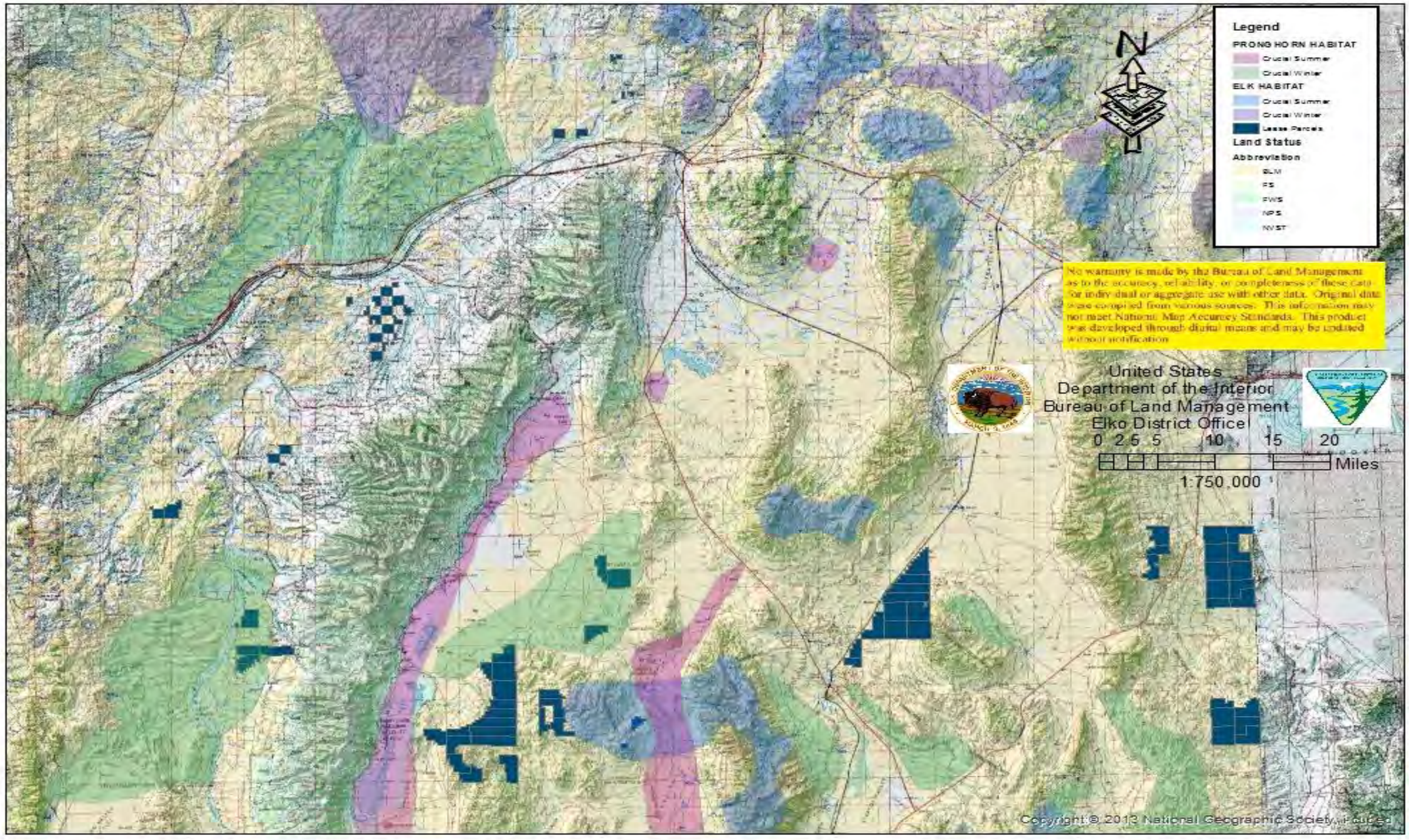
Nesting Raptor Timing Restrictions and Spatial Buffer Restrictions

Species	Timing Restriction	Spatial Buffer
Bald Eagle	1/1 - 8/31	1.0 mile
Golden Eagle	1/1 - 8/31	0.5 mile
Turkey Vulture	2/1 - 8/15	0.5 mile
Northern Goshawk	3/1 - 8/15	0.5 mile
Northern Harrier	4/1 - 8/15	0.25 mile
Cooper's Hawk	3/15 - 8/31	0.25 mile
Sharp-shinned Hawk	3/15 - 8/31	0.25 mile
Red-tailed Hawk	3/15 - 8/31	0.33 mile
Swainson's Hawk	3/1 - 8/31	0.25 mile
Ferruginous Hawk	3/1 - 8/1	1.0 mile
American Kestrel	4/1 - 8/15	0.125 mile
Prairie Falcon	3/1 - 8/31	0.5 mile
Peregrine Falcon	2/1 - 8/31	1.0 mile
Barn Owl	2/1 - 9/15	0.125 mile
Long Eared Owl	2/1 - 8/15	0.125 mile
Short Eared Owl	3/1 - 8/1	0.25 mile
Flammulated Owl	4/1 - 9/30	0.25 mile
Western Screech Owl	3/1 - 8/15	0.125 mile
Great Horned Owl	12/1 - 9/30	0.125 mile
Northern Pygmy Owl	4/1 - 8/1	0.25 mile
Burrowing Owl	3/1 - 8/31	0.25 mile
Northern Saw-whet Owl	3/1 - 8/31	0.125 mile

Greater Sage-Grouse Habitat Map



Big Game Crucial Habitat Map



4 – CONSULTATION AND COORDINATION

4.1 SCOPING

In addition to scoping efforts stated in Section 3.2.16., information was sent out on via press release on December 16, 2013. This document was released for public comment between January 10 and February 10, 2014. The administrative record for the project is available at the Elko District Office.

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Appendices

Appendix A - List of Offered Parcels

Appendix B - Elko District Office Stipulations for Oil and Gas Leasing

Appendix C - Reasonably Foreseeable Development Scenario for Oil and Gas

Appendix D - Typical Oil and Gas Exploration and Development Activities

Appendix E - List of Acronyms Used

Appendix F- List of deferred parcels

APPENDIX A LIST OF OFFERED PARCELS

```
NV-14-03-002        680.000 Acres
  T.0310N, R.0540E, 21 MDM, NV
    Sec.
         014   SESE;
         024   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N38596, N63214,
N77563
Formerly Lease No.


NV-14-03-003        2324.100 Acres
  T.0280N, R.0550E, 21 MDM, NV
    Sec. 017   ALL;
         020   ALL;
         029   LOTS 1-4;
         029   W2NE,N2NW,W2SE;
         036   ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N92160
FORMERLY LEASE (NO)S. N43456, N74445,
FORMERLY LEASE (NO)S. N80296
Formerly Lease No.


NV-14-03-004        1373.450 Acres *
  T.0310N, R.0550E, 21 MDM, NV
    Sec. 017   SW,S2NW,NENW;
         018   LOT 4;
         018   E2SW,SE;
   019   LOTS 1-2,5-6,7-8;
   019   E2NW,E2;
         020   LOTS 2-3;
         020   W2SW;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N35416
Formerly Lease No.


NV-14-03-006        1868.870 Acres
  T.0280N, R.0560E, 21 MDM, NV
    Sec. 002   LOTS 3,4;
         002   S2N2,S2;
         003   LOTS 1-4;
         003   S2N2,S2;
         004   LOTS 1-4;
         004   S2N2,S2;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N89921
PENDING PRESALE OFFER NO. n89842
Formerly Lease No.
```

NV-14-03-007 1259.020 Acres
T.0280N, R.0560E, 21 MDM, NV
Sec. 005 LOTS 1-4;
005 S2N2,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N89842
Formerly Lease No.

NV-14-03-008 1033.240 Acres *
T.0280N, R.0560E, 21 MDM, NV
Sec.
007 LOTS 3-4;
007 E2NE,SWNE,SE,E2SW,SENW;
008 N2,SW,NESE;
017 NWNW;

Elko County
Elko DO
PENDING PRESALE OFFER NO. N89843
Formerly Lease No.

NV-14-03-010 469.880 Acres *
T.0280N, R.0560E, 21 MDM, NV
Sec. 018 LOTS 1-3;
018 NE,E2W2,NWSE;

Elko County
Elko DO
PENDING PRESALE OFFER NO. N89843
Formerly Lease No.

NV-14-03-013 2031.360 Acres *
T.0290N, R.0560E, 21 MDM, NV
Sec. 017 ALL;
018 E2NE,NESE,S2SE;
019 LOTS 3,4;
019 E2W2;No Surface Occupancy
019 E2;
020 ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N89842
Formerly Lease No.

NV-14-03-015 1560.000 Acres *
T.0320N, R.0560E, 21 MDM, NV
Sec. 014 ALL;
022 ALL;
026 N2NW;
034 N2NW,SWNW,NWSW;
Elko County

```
Elko DO
PENDING PRESALE OFFER NO. N92209
Formerly Lease No.


NV-14-03-016        520.000 Acres *
  T.0350N, R.0570E, 21 MDM, NV
    Sec.
         026   NW,W2SW,NESW;
         036   SE,E2NE;
Elko County
Elko DO
PENDING PRESALE OFFER NO. 89848
Formerly Lease No.


NV-14-03-018        1720.000 Acres *
  T.0270N, R.0580E, 21 MDM, NV
    Sec.
         023   S2N2,S2;
         024   S2,S2NW;
         025   N2,N2SW,SESW,SE;
         026   NE,E2NW;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N37542, N81591
Formerly Lease No.


NV-14-03-020        1529.510 Acres
  T.0340N, R.0580E, 21 MDM, NV
    Sec. 004   LOTS 4;
         004   SWNW,SW,W2SE;
         006   LOTS 1-7;
         006   S2NE, SENW, SE;
         008   ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO.N92165
FORMERLY LEASE (NO)S.N10295, N40781,
FORMERLY LEASE (NO)S. N87495
Formerly Lease No.


NV-14-03-021        2131.340 Acres
  T.0340N, R.0580E, 21 MDM, NV
    Sec. 016   W2NW,NWSW;
         018   LOTS 1-4;
         018   E2,E2W2;
         020   NENE,NENW,W2W2;
         026   N2,SE;
         030   LOTS 1-4;
         030   E2,E2W2;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N92159
FORMERLY LEASE (NO)S. N10295, N40781,
N87495
Formerly Lease No.
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NV-14-03-022        2160.000 Acres
  T.0350N, R.0580E, 21 MDM, NV
    Sec. 016   SW;
         020   ALL;
         028   ALL;
         030   NE,E2NW,SE;
         034   W2NW,SENW,SW,NWSE;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N92158,
FORMERLY LEASE (NO)S. N09768, N46153,
N47752, N82865, N86702
Formerly Lease No.


NV-14-03-023        640.000 Acres
  T.0350N, R.0580E, 21 MDM, NV
    Sec. 032   ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N92165
FORMERLY LEASE (NO)S. N10296, N46153
FORMERLY LEASE (NO)S. N47752, N82865
Formerly Lease No.


NV-14-03-024        2242.230 Acres
  T.0260N, R.0590E, 21 MDM, NV
    Sec. 001   LOTS 1-4;
         001   S2N2,S2;
         002   LOTS 1,2;
         002   S2NE,SE;
         012   ALL;
         013   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17814,  N81602,
N85841, N85959
Formerly Lease No.


NV-14-03-025        1641.900 Acres
  T.0260N, R.0590E, 21 MDM, NV
    Sec. 005   LOTS 4;
         005   SWNW,W2SW;
         006   LOTS 1-5;
         006   S2NE,SENW,E2SW,SE;
         007   NE,NENW,SE;
         008   S2NE,W2,SE;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17838, N81603,
N85842, N85960
Formerly Lease No.


NV-14-03-026        1680.000 Acres
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```
  T.0260N, R.0590E, 21 MDM, NV
    Sec. 009   W2NW,SENW,S2;
         016   ALL;
         017   N2,N2SW,SESW,SE;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17838, N81606,
N85843, N85961
Formerly Lease No.



NV-14-03-027        1480.480 Acres *
  T.0270N, R.0590E, 21 MDM, NV
    Sec. 001   LOTS 1-4;
         001   S2N2,S2;
         002   LOTS 1-4;
         002   S2N2,S2;
         003   LOT 1;
         003   SENE,NESE,S2SE;

Elko County
Elko DO
FORMERLY LEASE (NO)S. N14464
Formerly Lease No.


NV-14-03-029        1760.000 Acres *
  T.0270N, R.0590E, 21 MDM, NV
    Sec.
         010   E2,S2SW,NESW,SENW;
         011   ALL;
         012   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N16174, N81614,
N82953
Formerly Lease No.


NV-14-03-030        2320.000 Acres *
  T.0270N, R.0590E, 21 MDM, NV

    Sec. 013   ALL;
         014   ALL;
         015   ALL;
         016   NENE,S2NE,SE,S2SW,NESW;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N14464
Formerly Lease No.


NV-14-03-031        1113.550 Acres *
  T.0270N, R.0590E, 21 MDM, NV
    Sec. 017   SESE;
         019   LOTS 2-4;
         019   S2NE,SENW,E2SW,SE;
         020   E2,SW,E2NW,SWNW;
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Elko County
Elko DO
FORMERLY LEASE (NO)S. N16176, N81617,
N85969
Formerly Lease No.



NV-14-03-032        2560.000 Acres
  T.0270N, R.0590E, 21 MDM, NV
    Sec. 021   ALL;
         022   ALL;
         023   ALL;
         024   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N16174, N17836,
N81616, N82954
Formerly Lease No.


NV-14-03-033        2560.000 Acres
  T.0270N, R.0590E, 21 MDM, NV
    Sec. 025   ALL;
         026   ALL;
         027   ALL;
         028   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N16177
Formerly Lease No.


NV-14-03-034        1950.240 Acres
  T.0270N, R.0590E, 21 MDM, NV
    Sec. 029   ALL;
         030   LOTS 1-4;
         030   E2,E2W2;
         031   LOTS 1-4;
         031   N2NE,SWNE,W2,W2SE;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17836, N81620,
N85971
Formerly Lease No.


NV-14-03-035        1879.440 Acres
  T.0280N, R.0590E, 21 MDM, NV
    Sec. 001   LOTS 1-3;
         001   S2N2,S2;
         011   ALL;
         012   ALL;
Elko County
Elko DO
Formerly Lease No.


NV-14-03-037        2560.000 Acres
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  T.0280N, R.0590E, 21 MDM, NV
    Sec. 013   ALL;
         014   ALL;
         023   ALL;
         024   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N14333, N14461,
N81624
Formerly Lease No.


NV-14-03-038        920.000 Acres *
  T.0280N, R.0590E, 21 MDM, NV
    Sec. 015   E2,NW,N2SW,SESW;
         022   NENW,NE,N2SE,SESE;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N15693, N81625
Formerly Lease No.


NV-14-03-039        2560.000 Acres
  T.0280N, R.0590E, 21 MDM, NV
    Sec. 025   ALL;
         026   ALL;
         035   ALL;
         036   ALL;
Elko County
Elko DO
Formerly Lease No.


NV-14-03-051        1762.560 Acres
  T.0270N, R.0600E, 21 MDM, NV
    Sec. 003   LOTS 1-4;
         003   S2N2,N2SW,SESW,SE;
         004   LOTS 1-4;
         004   S2N2,N2SW,SWSW,N2SE;
         010   E2,E2W2;
         011   W2W2;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17300, N39691,
N81634, N85972
Formerly Lease No.


NV-14-03-052        1080.000 Acres
  T.0270N, R.0600E, 21 MDM, NV
    Sec. 009   W2;
         016   W2,S2SE;
         021   N2NE,SWNE,NW,W2SW;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17300;  N39691,
N81636, N85973, 87385
Formerly Lease No.
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```
NV-14-03-053        1480.000 Acres
  T.0270N, R.0600E, 21 MDM, NV
    Sec. 014   W2NW;
         015   NE,E2NW,S2;
         022   NE,N2NW,SENW,E2SW,SE;
         023   S2;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17298, N39691,
N81637, N85974
Formerly Lease No.


NV-14-03-054        1240.000 Acres
  T.0280N, R.0600E, 21 MDM, NV
    Sec. 033   ALL;
         034   W2NE,W2,SE;
         035   SWSW;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17309, N39695,
N81643
Formerly Lease No.


NV-14-03-060        640.000 Acres *
  T.0380N, R.0600E, 21 MDM, NV
    Sec. 026   ALL;

Elko County
Elko DO
PENDING PRESALE OFFER NO. N92162
FORMERLY PARCEL (NO)S. NV-12-03-062
FORMERLY LEASE (NO)S. N10387, N46158,
N87505,  N88914,
Formerly Lease No.


NV-14-03-063        560.000 Acres *
  T.0270N, R.0610E, 21 MDM, NV
    Sec.
         013   SWNW;
         014   NWNE,S2NE,NENW,S2NW,SW,W2SE,NESE;

Elko County
Elko DO
FORMERLY LEASE (NO)S. N17305, N80868,
N81648
Formerly Lease No.


NV-14-03-064        280.000 Acres *
  T.0270N, R.0610E, 21 MDM, NV
    Sec. 023   N2NW,SWNW;
         034   NW;

Elko County
Elko DO
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FORMERLY LEASE (NO)S. N17148, N47856,
N81651, N85976
Formerly Lease No.

NV-14-03-073 1582.920 Acres *
T.0290N, R.0610E, 21 MDM, NV
Sec. 029 W2,NE,N2SE;
030 LOTS 1-4;
030 E2,E2W2;
031 LOTS 1-4;
031 E2NW,W2NE,NENE,NESW;

Elko County
Elko DO
FORMERLY LEASE (NO)S. N11486, N32167
Formerly Lease No.

NV-14-03-077 1400.000 Acres *
T.0300N, R.0610E, 21 MDM, NV
Sec. 017 NESW,S2SW,SE;
020 E2,NW,E2SW;
029 E2,E2NW,NESW;
032 N2NE,SENE;
Elko County
Elko DO
NATL SCENIC & HISTORIC TRAIL
FORMERLY LEASE (NO)S. N25847, N47814,
N52217
Formerly Lease No.

NV-14-03-079 2560.000 Acres
T.0300N, R.0610E, 21 MDM, NV
Sec. 027 ALL;
028 ALL;
033 ALL;
034 ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N25850
Formerly Lease No.

NV-14-03-080 195.870 Acres
T.0380N, R.0610E, 21 MDM, NV
Sec. 002 LOTS 1,2;
002 SENE;
010 LOTS 1,2;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N92163
NATL SCENIC & HISTORIC TRAIL
Formerly Lease No.

NV-14-03-081 133.320 Acres

```
  T.0380N, R.0610E, 21 MDM, NV
    Sec. 002   LOTS 5,6;
         002   NWSW;
Elko County
Elko DO
NATL SCENIC & HISTORIC TRAIL
Formerly Lease No.


NV-14-03-082        511.900 Acres
  T.0380N, R.0610E, 21 MDM, NV
    Sec. 030   LOTS 1-4;
         030   NE,E2NW,NESW,N2SE;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N92162
NATL SCENIC & HISTORIC TRAIL
Formerly Lease No.


NV-14-03-084        388.220 Acres
  T.0390N, R.0610E, 21 MDM, NV
    Sec. 015   LOTS 1,3-10;
         015   N2NE,SENE,W2NW;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N92163
FORMERLY LEASE (NO)S. N15278, N89918
Formerly Lease No.


NV-14-03-154        1039.870 Acres
  T.0280N, R.0640E, 21 MDM, NV
    Sec. 001   LOTS 1,2;
         001   S2NE,E2SW,SE;
         012   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N16729, N38345,
N47717, N52841, N86430
Formerly Lease No.


NV-14-03-155        840.000 Acres *
  T.0280N, R.0640E, 21 MDM, NV
    Sec. 013   N2,SE,N2SW,SESW;
         014   NE,N2SE;

Elko County
Elko DO
FORMERLY LEASE (NO)S. N1196, N16727,
N38345, N47717, N52840, N53395, N86433
Formerly Lease No.




NV-14-03-191        2203.710 Acres
  T.0290N, R.0650E, 21 MDM, NV
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```
    Sec. 001   LOTS 1-4;
         001   S2N2,S2;
         002   LOTS 1-4;
         002   S2N2,S2;
         003   LOTS 1-4;
         003   S2N2,S2;
         004   LOTS 1;
         004   SENE,SESW,SE;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N18729, N86448
Formerly Lease No.


NV-14-03-193        2520.000 Acres
  T.0290N, R.0650E, 21 MDM, NV
    Sec. 009   NE,NENW,S2NW,S2;
         010   ALL;
         011   ALL;
         012   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N18728, N86451
Formerly Lease No.


NV-14-03-194        2480.000 Acres
  T.0290N, R.0650E, 21 MDM, NV
    Sec. 013   E2NE,W2,SE;
         014   ALL;
         023   ALL;
         024   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N18724, N86452
Formerly Lease No.


NV-14-03-195        2560.000 Acres
  T.0290N, R.0650E, 21 MDM, NV
    Sec. 015   ALL;
         016   ALL;
         021   ALL;
         022   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N18725, N86451
Formerly Lease No.


NV-14-03-196        2433.070 Acres
  T.0290N, R.0650E, 21 MDM, NV
    Sec. 020   NE,E2NW,S2;
         029   ALL;
         031   LOTS 2-4;
         031   E2,E2W2;
         032   ALL;
Elko County
Elko DO
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FORMERLY LEASE (NO)S. N18726, N86453
Formerly Lease No.


NV-14-03-197        2560.000 Acres
  T.0290N, R.0650E, 21 MDM, NV
    Sec. 025   ALL;
         026   ALL;
         035   ALL;
         036   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N18723, N86454
Formerly Lease No.


NV-14-03-198        2560.000 Acres
  T.0290N, R.0650E, 21 MDM, NV
    Sec. 027   ALL;
         028   ALL;
         033   ALL;
         034   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N18722, N86457
Formerly Lease No.


NV-14-03-202        2400.000 Acres
  T.0300N, R.0650E, 21 MDM, NV
    Sec. 013   NENE,S2NE,E2SW,SE;
         023   SENE,SE;
         024   ALL;
         025   ALL;
         026   NE,E2NW,S2;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N17337, N87888
Formerly Lease No.


NV-14-03-206        1720.000 Acres
  T.0300N, R.0650E, 21 MDM, NV
    Sec. 034   NE,NESW,S2SW,SE;
         035   ALL;
         036   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N10251, N87888
Formerly Lease No.



NV-14-03-213        2076.810 Acres
  T.0300N, R.0690E, 21 MDM, NV
    Sec. 004   LOTS 5-8;
         004   S2N2, S2;
         005   LOTS 5-12;
         005   S2NE,SE;
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         008   NE,E2NW,E2SE;
         009   ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N91441
Formerly Lease No.


NV-14-03-214        1120.000 Acres
  T.0300N, R.0690E, 21 MDM, NV
    Sec. 016   ALL;
         017   NENE,S2NE,SENW,S2;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N91441
Formerly Lease No.


NV-14-03-215        1792.210 Acres
  T.0300N, R.0690E, 21 MDM, NV
    Sec. 020   LOTS 1,2;
         020   N2,SW,N2SE;
         029   LOTS 1,2;
         029   S2NE,N2NW,SENW,
         029   NESW,S2SW,SE;
         031   NE;
         032   N2,N2S2;
Elko County
Elko DO
UNIT NVN 91436X
PENDING PRESALE OFFER NO. 91441
Formerly Lease No.


NV-14-03-216        1120.000 Acres
  T.0270N, R.0700E, 21 MDM, NV
    Sec. 007   ALL;
         008   S2NE,W2NW,S2;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N31631
Formerly Lease No.


NV-14-03-217        2034.780 Acres
  T.0270N, R.0700E, 21 MDM, NV
    Sec. 010   NE,SENW,S2;
         011   LOTS 2-4;
         014   LOTS 1-4;
         015   ALL;
         016   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N31631
Formerly Lease No.


NV-14-03-218        2560.000 Acres
  T.0270N, R.0700E, 21 MDM, NV
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    Sec. 017   ALL;
         018   ALL;
         019   ALL;
         020   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N25196
Formerly Lease No.


NV-14-03-219        2053.840 Acres
  T.0270N, R.0700E, 21 MDM, NV
    Sec. 021   ALL;
         022   ALL;
         023   LOTS 1-4;
         028   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N25195
Formerly Lease No.


NV-14-03-220        2193.410 Acres
  T.0270N, R.0700E, 21 MDM, NV
    Sec. 026   LOTS 1-4;
         027   ALL;
         033   ALL;
         034   ALL;
         035   LOTS 1-4;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N29208
Formerly Lease No.


NV-14-03-221        2560.000 Acres
  T.0270N, R.0700E, 21 MDM, NV
    Sec. 029   ALL;
         030   ALL;
         031   ALL;
         032   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N25197
Formerly Lease No.



NV-14-03-222        2061.080 Acres
  T.0290N, R.0700E, 21 MDM, NV
    Sec. 002   LOTS 1-4;
         003   LOTS 8-11;
         003   S2N2,S2;
         004   LOTS 5-8;
         004   S2N2,S2;
         009   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N31635
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Formerly Lease No.


NV-14-03-223        2558.280 Acres
  T.0290N, R.0700E, 21 MDM, NV
    Sec. 005   LOTS 5-8;
         005   S2N2,S2;
         006   LOTS 8-11;
         006   S2N2,S2;
         007   ALL;
         008   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N31635
Formerly Lease No.


NV-14-03-224        2197.580 Acres
  T.0290N, R.0700E, 21 MDM, NV
    Sec. 010   ALL;
         011   LOTS 1-4;
         014   LOTS 1-4;
         015   ALL;
         016   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N31635
Formerly Lease No.


NV-14-03-225        1280.000 Acres
  T.0290N, R.0700E, 21 MDM, NV
    Sec. 017   ALL;
         018   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N31635
Formerly Lease No.


NV-14-03-226        1910.210 Acres
  T.0300N, R.0700E, 21 MDM, NV
    Sec. 002   LOTS 1-4;
         003   LOTS 8-11;
         003   S2N2,S2;
         004   LOTS 5-8;
         004   S2N2,S2;
         009   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N32144
Formerly Lease No.


NV-14-03-227        2482.200 Acres
  T.0300N, R.0700E, 21 MDM, NV
    Sec. 005   LOTS 1-4;
         005   S2N2,S2;
         006   LOTS 1-4;
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```
         006   S2N2,S2;
         007   ALL;
         008   ALL;
Elko County
Elko DO
FORMERLY LEASE (NO)S. N32144
Formerly Lease No.


NV-14-03-228        1920.000 Acres
  T.0300N, R.0700E, 21 MDM, NV
    Sec. 016   ALL;
         021   ALL;
         022   ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N91442
Formerly Lease No.


NV-14-03-229        2560.000 Acres
  T.0300N, R.0700E, 21 MDM, NV
    Sec. 017   ALL;
         018   ALL;
         019   ALL;
         020   ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO. 91442
Formerly Lease No.


NV-14-03-230        2560.000 Acres
  T.0300N, R.0700E, 21 MDM, NV
    Sec. 027   ALL;
         028   ALL;
         033   ALL;
         034   ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO. N91442
Formerly Lease No.



NV-14-03-231        2560.000 Acres
  T.0300N, R.0700E, 21 MDM, NV
    Sec. 029   ALL;
         030   ALL;
         031   ALL;
         032   ALL;
Elko County
Elko DO
PENDING PRESALE OFFER NO. 91442
Formerly Lease No.


*Parcels modified due to resource concerns. LLDs and Acres changed.
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APPENDIX B ELKO DISTRICT OFFICE STIPULATIONS FOR OIL AND GAS LEASING

LEASE STIPULATION OG-010-05-03: **Cultural Resources**

This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

LEASE STIPULATION OG-010-05-04: **Mule Deer Crucial Winter Range**

This lease contains lands which have been identified as mule deer crucial winter range (BLM EA 2005/030, September 2005). These lands are subject to seasonal protection from disturbance to avoid displacement and mortality to animals during the winter. Seasonal restrictions from disturbance in mule deer crucial winter ranges apply during the period 11/15-3/16, inclusive.

Authority/Supporting Documentation: Wells RMP ROD (p. 10); Elko RMP ROD (pg. 3); Field Guide to Mammals (1976)

LEASE STIPULATION OG-010-05-05: **Pronghorn Antelope Crucial Winter Range**

This lease contains lands which have been identified as pronghorn antelope crucial winter range. These lands are subject to seasonal protection from disturbance to avoid displacement and mortality to animals during the winter. Seasonal restrictions from disturbance in pronghorn antelope crucial winter ranges apply during the period 11/15-3/16, inclusive.

Authority/Supporting Documentation: Wells RMP ROD (p. 25); Elko RMP ROD (p. 3); Field Guide to Mammals (1976)

LEASE STIPULATION OG-010-05-06: **Pronghorn Antelope Kidding Areas**

This lease contains lands which have been identified as pronghorn antelope kidding areas. These lands are subject to seasonal protection from disturbance to avoid displacement and mortality to animals during kidding season. Seasonal restrictions from disturbance in pronghorn antelope kidding areas apply during the period 5/1-6/30, inclusive.

Authority/Supporting Documentation: Elko RMP (pg. 2-6), ROD, Field Guide to Mammals (1976)

LEASE STIPULATION OG-010-05-07: **Sage Grouse Strutting Ground (Leks)**

This lease contains lands which have been identified as sage grouse strutting grounds (leks) that are subject to seasonal protection from disturbance. No Surface Occupancy is permitted within 0.5 miles, or other, lesser, appropriate distance based on site-specific conditions, of sage grouse leks.

Authority/Supporting Documentation: Wells RMP ROD (p. 10); Elko RMP ROD (p. 35); Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, 2000; State Director Decision: Horse Canyon Decision, 2005

LEASE STIPULATION OG-010-05-08: **Sage Grouse Brood Rearing Areas**

This lease contains lands which have been identified as sage grouse brood rearing areas that are subject to seasonal protection from disturbance. Seasonal restrictions from disturbance n sage grouse brood rearing areas apply within 0 .5 miles or other appropriate distance based on site-specific conditions from 5/15 to 8/15, inclusive. This restriction does not apply to operating facilities.

Authority/Supporting Documentation: Wells RMP ROD (p. 25); Elko RMP ROD (p. 3 and 36) Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, 2000, State Director Decision: Horse Canyon Decision, 2005

LEASE STIPULATION OG-010-05-09: Sage Grouse Crucial Winter Habitat

This lease contains lands which have been identified as sage grouse crucial winter habitat that are subject to seasonal protection from disturbance. Seasonal restrictions from disturbance in sage grouse crucial winter habitat apply during the period November 1 to March 15. This stipulation does not apply to operating facilities.

Authority/Supporting Documentation: Wells RMP ROD (p. 22 and 25); Elko RMP ROD; Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, 2000;

LEASE STIPULATION OG-010-05-10: I-80 "Low Visibility Corridor"

This parcel includes lands within the I-80 Visual Corridor. Visual impacts are to be minimized within 1.5 miles on either side of Interstate 80. Within this three-mile wide Low Visibility Corridor, the objective is for management actions not to be evident in the characteristic landscape. Management objectives for Class II VRM areas will be used as a guideline when evaluating projects within the Low Visibility Corridor. The Class II VRM objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Authority: Wells RMP ROD (p. 3); Elko RMP ROD (p. 1); Elko Field Office IM NV-2004-013)

LEASE STIPULATION OG-010-05-11: Special Recreation Management Areas

This parcel includes lands within a Special Recreation Management Area (South Fork Canyon SRMA, Wild Horse SRMA, Wilson Reservoir SRMA, South Fork Owyhee River SRMA, Zunino/Jiggs SRMA, or proposed Salmon Falls Creek SRMA) that are within ½ mile of the high water line. No surface occupancy is allowed within ½ mile of the high water line.

Authority: Wells RMP ROD (p. 25); Elko RMP ROD (p. 3)

LEASE STIPULATION OG-010-05-12: Tabor Creek Campground

This parcel includes lands within the Tabor Creek Campground area. No surface occupancy is allowed on lands within the designated boundaries of Tabor Creek Campground: T41N R61E, S1/2 Section 16, S1/2SE1/4 Section 16, E1/2 Section 20, Section 21, NW1/4 Section 28, Section 29.

Authority: Wells RMP ROD (p. 25)

LEASE STIPULATION OG-010-05-13: Congressionally Designated Historic Trails

The following lease stipulation is to advise the permittees or lease operators of the presence of a congressionally designated National Trail and the BLM's responsibility not to permit uses along trails that would substantially interfere with the nature and purposes of the trail, and also to make efforts to avoid activities incompatible with the purposes for which trails were established, to the extent practicable, while respecting valid existing rights. Where a proposed action is found to be inconsistent with the purpose for which the National Trail was designated, the BLM shall consider rejecting applications for proposed projects. (BLM Manual 6280 5.3 A-B). There is no surface occupancy within one mile of the center of Congressionally designated historic trails unless approved by the authorizing officer. The lease may be limited or modified to protect the historical and scenic values of the trails.
Authority: Nevada BLM Manual 6280 Section 5.3 A-B.

LEASE STIPULATION NSO-010-64: No Surface Occupancy

This stipulation restricts surface occupancy in defined portions of the leased parcels.

APPENDIX C REASONABLY FORESEEABLE DEVELOPMENT SCENARIO FOR OIL AND GAS RESOURCES

The following reasonably foreseeable development scenario (RFDS) for the Elko District is based in part on the development history observed within Railroad Valley, as well as the observed development history in the Elko District's Pine Valley. Railroad Valley is located within the same geologic province as the Elko District and has been subjected to similar depositional, tectonic and thermal history as the southern portion of the Elko Resource Area. Railroad Valley is the site of the first producing oil fields within Nevada. We expect any future development within the Elko District will be similar to Railroad Valley. This RFDS, based on a fifteen year projection, was created as an assumption for analysis in order to estimate environmental impacts including direct, indirect, and cumulative impacts. This scenario notes that most exploration and development is expected in the Pine Valley area as that is the area in which discoveries have occurred in the past. For geologic reasons, the further east and north from Pine Valley, the less likely the possibility of discovering economic quantities of oil and gas.

ASSUMPTIONS FOR GEOPHYSICAL EXPLORATION:

The assumptions for geophysical exploration used for the preparation of this reasonable foreseeable development scenario are based on the actual geophysical exploration activities in Railroad Valley between 1954 and 1989, and in the Elko Resource Area between Oct. 1, 1979 and Jan. 29, 1991. These dates represent the most active period of exploration in the Elko District. These assumptions are also based on District wide development of oil and gas resources as opposed to the 125,220 acres in the 73 proposed parcels for this sale. In recent years, exploration has been nearly curtailed due to cyclical commodity prices, environmental regulation uncertainty, and a lack of exploration success. The last geophysical survey for oil and gas was in 2000. Table 4-1displays the data available for the Elko Resource Area from Fiscal Year 1980 to 1990.

TABLE 4-1 GEOPHYSICAL SURVEYS IN THE ELKO RESOURCE AREA

FISCAL YEAR	MILES OF SURVEY
1980	180.5
1981	252.0
1982	281.0
1983	62.0
1984	73.0
1985	64.0
1986	111.0
1987	24.0
1988	49.0
1989	108.0
1990	14.0

TOTAL 1218.5 (AVERAGE 110.7)

Within the Elko Resource Area, the subsurface geology is not always accurately represented by the surface outcrop and it is for this reason exploration geologists use geophysical methods to help locate oil and gas traps. Geophysical exploration includes a variety of instruments and

techniques but all geophysical exploration is based on the measurement of one of three physical properties: A) Gravitation field, B) Magnetic field, and C) Seismic reflection characteristics.

Of those described, only seismic reflection surveys result in detectable surface disturbance. Initial geophysical surveys may cross tens of miles in what will appear to be a random pattern. These surveys attempt to piece together the local subsurface geology or confirm geologic inference. If real or perceived geologic structures of interest are located, surveys of specific areas will be intense and may be repeated frequently.

There will be an estimated average of 110 miles of line surveyed per year over the life of this project. This will vary from as many as 300 to as few as 10 miles of line in any one year. Each year up to 182 acres will be disturbed from seismic surveys. Usually, such disturbance includes crushing and destruction of brush, but survival of the understory of grasses. In steep or wet areas, the grasses may also be destroyed. In either case, reclamation will be completed on these lines within one year.

ASSUMPTIONS FOR EXPLORATION DRILLING. The exploration drilling assumptions that are used in this reasonable foreseeable development scenario were made after review of the oil and gas drilling activities in Railroad Valley between 1954 and 1989, and in the Elko Resource Area between October 1, 1979 and January 29, 1991. These dates were the most active exploration period. For instance, an average of 3 wells per year were drilled in the Elko District from 1980-1991 while the Elko District has averaged about two exploration wells per year for the last ten years (Schmidt, per comm., 2013). This pattern is consistent throughout Nevada. The Nevada Bureau of Mines and Geology Mineral Industry Report for 2002 (NBMG, 2003), shows exploration well drilling throughout Nevada to have decreased from a high of 36 wells in 1984 to a total of 16 in the four year period from 1999-2002. Table 4-2 displays the Exploration Drilling data available for the Elko Resource Area from Fiscal Year 1980 to 1991.

TABLE 4-2 SURFACE DISTURBANCE (Acres) CAUSED BY OIL AND GAS EXPLORATION ACTIVITY IN THE ELKO District (public and private)

Fiscal Year	No. of Holes	Pipelines (acres)	Roads (acres)	Drill Pads (acres)
1980	2	0	4.8	3.4
1981	3	0	19.6	6.3
1982	5	0	26.5	9.7
1983	3	0.24	4.5	4.0
1984	3	0	21.8	7.6
1985	7	0	15.6	18.7
1986	1	0	2.4	3.7
1987	4	0	2.6	6.0
1988	1	0	89.7	7.0
1989	3	0	4.3	6.9
1990	4	0	6.2	6.0
1991	1	0	2.2	2.1
Total	37	0.24	200	81.3
Ave./Yr.	3.1	0.002	16.7	6.8

AVERAGE DISTUIRBANCE = 23.5ac./year
AVERAGE Road WIDTH = 31 ft.

AVERAGE Road LENGTH = 7490 ft.
There have been over 70 recorded exploration wells for oil and gas within the Elko District. The search for oil and gas has been more or less continuous since the 1950's. Currently, there are five producing oil and gas wells in four different fields in the District (public and private lands).

For the purposes of this analysis, the following assumptions are made for exploration drilling operations:

A) An estimated 80 wells will be drilled during the fifteen year life of this projection.
B) The Elko District is considered to be a high risk (wildcat) exploration region.
C) Approximately 10% of the wells drilled will be producers.
D) An estimated 72 wells will be reclaimed during the life of the plan.
E) Drilling time will average sixty to ninety days per well.
F) The average pad size including the reserve pit is 2.0 acres.
G) The average access road is 31 feet wide by 1.4 miles long and will have one foot of gravel on the road surface (6740 bank cubic yards).
H) No more than three drill rigs will be operating in the same area at the same time.
I) Well stimulation (hydraulic fracturing) will be done on 95% of the wells.

DISTURBANCE DURING THE LIFE OF THE PROJECTION:
Using the assumptions for exploration drilling combined with the drilling and production history in Railroad Valley, it is projected that the surface disturbance from exploratory and production well pads combined with the construction of service roads and main access roads will result in 481 acres of disturbance. The construction of local pipelines to connect the wells to storage tank facilities will result in 10.6 acres of disturbance. The scenario for the greatest development impact, including a branch and trunk pipeline network to transport oil and gas from the wells to the Carlin oil terminal will result in 236 additional acres of surface disturbance. Gravel sources for construction of roads, pipelines and drill pads will result in 129.6 acres of disturbance. Total surface disturbance during the life of the projection will be 858 acres.

Recontouring and revegetation of the dry well pads, service roads and associated gravel sources will result in 676.8 acres being reclaimed for other uses. Surface disturbance from oil and gas activities would result in a net loss of 181.2 acres of vegetation over the remaining life of the plan. The valleys will expect 95% (76) of the projected wells. Drilling trends may fluctuate greatly, with no drilling occurring in as many as five consecutive years. On the other hand, in any ten year period, nearly half of the wells which are projected to be drilled in the area will be drilled. Each new discovery will foster an increase in drilling activity which may last for two to three years.

ASSUMPTIONS FOR PRODUCTION:
The average geographic area for a producing oil and gas fields in the United States is about 640 acres. Field sizes tend to be smaller in Nevada. There will be 40-acre spacing for wells less than 5000' in depth and 160-acre spacing for wells more than 5000 feet in depth. Normally, drilling depths are greater than 5000 feet; therefore, most of the well spacing can be expected to be 160 acres. No more than three drilling or workover rigs will be in operation in a field at the same time.

Limited reclamation work would occur until the producing field was abandoned. No producing fields will be abandoned during the life of the plan.

Well Stimulation/Hydraulic Fracturing
Well Stimulation may be used to enhance oil recovery. Several methods of well stimulation could be used. Hydraulic Fracturing is one of these methods that is reasonably foreseeable for the leases on this sale. Hydraulic fracturing is the process of applying high pressure to a subsurface formation via a wellbore, to the extent that the pressure induces fractures in the rock. Typically the induce fractures will be propped open with a granular "proppant" to enhance fluid connection between the well and formation. The process was developed experimentally in 1947 and has been used routinely since 1950. The Society of Petroleum Engineers (SPE) estimates that over one million hydraulic fracturing procedures have been pumped in the United States and tens of thousands of horizontal wells have been drilled and hydraulically fractured. It can greatly increase the yield of a well, and development of hydraulic fracturing methods and the drilling technology in which it is applied (in particular, long wells drilled horizontally within the targets) have enabled production of oil and gas from tight formations formerly not economically feasible.

Hydraulic Fracturing Technology
A general description of the hydraulic fracturing technology follows:

- All exploratory, testing, and production wells are multiply cased and sealed with cement between the wellbore and the formation. Well integrity is tested throughout the process.
- Drilling and hydraulic fracturing fluids can be contained in a pitless system (aboveground tanks) or a lined pit. Cuttings could be contained in roll-off boxes for hauling to disposal or surface casing interval cuttings could be spread over the site during reclamation.
- Hydraulic fracturing fluids are recovered to a large degree in "flowback" or produced water when the well is tested or produced.
- All recovered fluids are generally handled by one of four methods.
    - Underground injection
    - Captured in steel tanks and disposed of in an approved disposal facility.
    - Treatment and reuse
    - Surface disposal pits
- Drilling cuttings could be land farmed and buried on site 3 feet below root zones. Any cuttings that do not fit this waste profile will be disposed of at an approved disposal facility.

As many as four producing fields may be discovered during the life of the plan. These fields are hypothesized to be equivalent in size and surface disturbance to the Kate Springs and Bacon Flat Oil Fields. Of the four projected producing fields, two would be the equivalent to the Kate Springs Field and two would be the equivalent to the Bacon Flat Field. The fields would be as close as one mile and as far as 20 miles from each other. The cost factors involved would usually limit drilling to depths of 6000 feet, although some operators would speculate that larger reservoirs would be encountered at greater depths (10,000 to 15,000 feet). Production rates of each field would range from negligible amounts (10 Barrels of Oil per Day (BOPD) to extremely prolific (6300 BOPD), and the production life of a field would last for 18 months to 35 years.

Assumptions for the Kate Springs Oil Field Equivalent:
For the purposes of analysis, it is assumed that during the life of the plan there will be two new small oil fields discovered within the Elko Resource Area that are equivalent in size to the Kate Springs Oil Field. For each of these fields the following assumptions are made:

A) Twenty wells will be drilled. There will be three producing wells, three injection wellsand fourteen plugged and abandoned wells in the field.
B) Tank batteries will be placed on existing drill pads and no additional surface disturbance will be required.
C) The field will be six miles from a major pre-existing road. This field will require a major access road six miles long and 40 feet wide with three feet of gravel.
D) Drill pads will be 200 x 250 feet with two and one-half feet of gravel.
E) Two miles of pipeline will be required. The disturbance will be 15 feet in width.
F) 28 miles of 31 -foot-wide service roads will be required with two feet of gravel.
G) Gravel will be obtained locally. Gravel pits are assumed to average 12 feet in depth.

At each Kate Springs Equivalent field, there will be a total of 176.7 acres of new surface disturbance resulting from the construction of service roads, main access roads, drill pads, local pipelines and gravel pits. There will be 125 acres of surface disturbance resulting from the construction of service roads and drill pads. The construction of a new main access road will cause an additional 29 acres of new surface disturbance, and the development of a local pipeline network to connect each producing well to the storage tank battery will result in 3.6 acres of new surface disturbance at each field. The development of gravel pits for use in road and pipeline construction will cause 19.2 acres of new surface disturbance. A component breakdown of surface disturbance for the Kate Springs Model is listed on Table 4-3.

Assumptions for the Bacon Flat Oil Field Equivalent
For the purposes of analysis, it is assumed that during the life of the plan there will be two new very small oil fields discovered within the district, that are equivalent in size to the Bacon Flat Oil Field. The following assumptions result:
A) Ten wells will be drilled. There will be 1 producing well, 1 injection well and 8 plugged and abandoned wells in the field.
B) The tank battery will be placed on existing drill pads. Thus, no additional surface disturbance will be required.
C) The field will be three miles from a major existing road requiring construction of a major access road three miles long and 40 feet wide with three feet of gravel.
D) Drill pads will be 200 x 250 feet and will require two and one-half feet of gravel.
E) One mile of pipeline will be required. Surface disturbance is estimated to be 15 feet in width along the pipeline.
F) There will be fourteen miles of access roads 31 feet wide with two feet of gravel.
G) Gravel will be obtained locally. Gravel pits are assumed to average 12 feet deep.

At each Bacon Flat Equivalent field, there will be a total of 103.3 acres of new surface disturbance resulting from the construction of service roads, main access roads, drill pads, local pipelines and gravel pits distributed as follows: 72 acres from construction of service roads and drill pads,. 14.5 acres from construction of a main access road, 1.8 acres for development of a local pipeline network to connect each producing well to the storage tank battery, and 15 acres or gravel pits for use in road and pipeline construction. A component breakdown of disturbance for the Bacon Flat Oil Filed Equivalent is listed on Table 4-4.

Assumptions for Pipelines
With the production of oil and gas there is the possibility of a pipeline being built between the oil fields and the Carlin Oil Terminal. The pipeline will be constructed in a cherry stem pattern with the main trunk of the pipeline running along Pine Valley .The main trunk of the pipeline will

most likely be approximately 35 miles long. Approximately 30 miles of branch lines will connect the widely spaced producing wells to the trunk line. The construction of the trunk and branch pipeline would disturb 236 acres plus 62 additional acres of disturbance at the gravel source.

Assumptions for Oil Fields
Table 4-3 lists the number of wells that are projected to be drilled in the life of the plan. Two new small fields equivalent in size to the Kate Springs Field will be discovered during the life of the plan and each will include three producing wells. Two very small fields equivalent to the Bacon Flat Field will also be discovered and each of these will include one producing well. It is projected that for the Elko Resource Area during the life of the plan there will be an additional 8 producing wells discovered and 52 dry exploration holes (Table 4-4).

TABLE 4-4 PROJECTED OIL FIELDS

TYPE	PRODUCING WELLS	EXPLORATION WELLS
Two New Small Fields (Kate Springs Type)	6 wells	34 wells
Two Very Small Fields (Bacon Flat Type)	2 wells	18 wells
TOTAL	8 wells	52 wells

The number of exploration wells may decrease if oil is discovered. In Railroad Valley, exploration dropped significantly to approximately two wildcat wells per year, after oil was found. For our scenario, exploration will maintain its current pace.

SUMMARY:
Over the fifteen year projection, Geophysical Exploration will disturb 110 miles (182 acres), all of which will be reclaimed. Exploration drilling will result in 80 wildcat wells and access roads with a total of 600 acres of disturbance, 563 of which will be reclaimed. The discovery of the two projected small oil fields (Kate Springs equivalents) will result in 353.4 acres of surface disturbance. An additional 206.6 acres of disturbance will result from the discovery of the two very small oil fields (Bacon Flat equivalents). The construction of the cherry stem pipeline network in Pine Valley and the development of the associated gravel sources will result in 298 acres of additional surface disturbance.

There will be a total surface disturbance of 1360 acres through the remaining life of the plan. Through reclamation efforts during the life of the plan, a total of 744 acres will be reclaimed. This reclamation includes recontouring and revegetation of unsuccessful exploration well pads, the associated service roads, the underground pipelines and gravel sources. No reclamation is expected on the four new producing oil fields during the life of the plan. Surface disturbance from oil and gas activities will result in a net loss of 616 acres of vegetation during the fifteen year projection. Eventually all the acreage will be reclaimed and revegetated. The total surface disturbance associated with the RFDS for oil and gas exploration and development activities is summarized in table 4-5.

TABLE 4-5 PROJECTED SURFACE DISTURBANCE CAUSED BY OIL AND GAS ACTIVITIES DURING THE LIFE OF PROJECTION

Geophysical		Reclaimed acres
Miles	110	
acres/mi	1.65	
Total acres	181.5	181.5 reclaimed
Exploration Drilling		
Holes	80	
acres/hole	2 160	
roads	80	
acres/road	5.3 424	
gravel pits	80	
acres/pit	0.2 16	
Total	600	37.5 reclaimed
562.5 reclaimed		
Production		
Kate Springs Equivalent		
Total acres disturbed	176.7	
Bacon Flat Equivalent		
Total acres disturbed	103.3	
Pipeline to Oil Terminal		
Miles	65	
acre/mile	3.63	235.95ac reclaimed
Gravel pits	62	
acres/pit	1	62ac reclaimed
Total	297.95	
TOTAL	1359.45	
Total Reclaimed	744	
Unreclaimed	615.45	

APPENDIX D TYPICAL OIL AND GAS EXPLORATION AND DEVELOPMENT ACTIVITIES

INTRODUCTION

Typical oil and gas exploration and development operations occur in four phases, each of which in a predictable pattern that is contingent on the success or failure of the previous phase. The phases include: Exploration, Development, Production, and Abandonment. Leases are sometimes purchased after Preliminary Exploration but are most often obtained prior to the exploration phase.

EXPLORATION

Exploration includes all activities from the decision to explore for oil and gas resources to the discovery of economically viable oil and gas deposits. As easy-to-find oil and gas deposits have been discovered, increasingly complex and expensive technology is necessary to find those deposits which remain.

PRELIMINARY EXPLORATION

Oil and gas exploration is conducted in unexplored areas and geologic rock formations where commercial quantities of these resources are thought or known to be located. Area where commercial quantities of petroleum are thought to occur are classified as frontier or rank wildcat areas. In recent years with declining known oil and gas reserves, along with increasing price and an unstable world market, it has now become profitable to explore for oil and gas in less promising geologic provinces and in areas where climate, terrain, and depth of deposits has previously discouraged exploration efforts. Each year, new exploration and drilling technology along with improved transportation facilities have enhanced exploration efforts and improved prospects for locating, extracting and marketing oil and gas resources.

SURFACE EXPLORATION

Oil and gas can accumulate in geologic traps which include anticlines, faults, etc., and the surface exposure of these features would lead to the discovery of the trap. In the past, it was often possible to predict where oil and gas had accumulated by a thorough study of the surface exposure of the bedrock geology. Today, most of the oil and gas traps that could be found using simple surface exploration methods have already been found and exploited. There still remain a few examples of this type of trap and therefore these surface exploration techniques are still in use. These exploration methods may include preparation of geologic maps using field studies, aerial photos, and landsat imagery. Low level aircraft may also be used to gather additional data during reconnaissance flights over a target area. This would be followed by one or more geologists conducting field studies where the geologists would sample outcrops in the area and map the surface geology. This type of exploration is performed with little or no surface damage using four wheel drive vehicles, motorcycles, all-terrain vehicles, or on foot.

GEOPHYSICAL EXPLORATION

As stated previously, most of the oil and gas traps that could be found using simple surface exploration techniques have already been found and exploited. Subsurface geology is not always accurately represented by the surface outcrop and in these cases the Exploration Geologist would turn to geophysical methods to help locate oil and gas traps. Geophysical exploration can be done using a variety of instruments and processes but, all geophysical exploration is based on the

measurement of one of the three subsurface characteristics which are: 1) Gravitational field, 2) magnetic field, 3) seismic reflection characteristics.

Gravitational and Magnetic
Gravitational and magnetic surveys involve the use of portable units which are easily transported using light ground vehicles or by light aircraft. Off-road vehicle travel is common in these two types of surveys and on some surveys there is minor surface disturbance when small hand dug holes are used for instrument placement along survey lines.

Surface Seismic Surveys
Reflection seismologic surveys are frequently employed by the Exploration Geologist because these surveys can provide the largest amount of subsurface data. This type of survey involves the collection of subsurface geological information by recording the impulses from an artificially generated shock wave. On land, this would begin with the creation of a shock wave and the recording, as a function of time, the reflected seismic energy as it arrives at the vibration detectors. The vibration detectors are on-half to five pound seismometers which are placed on the ground at set intervals and are connected to a recorder truck that receives and records the reflected seismic energy.

The vibration detectors and shock wave generator would be located along lines on a one or two mile grid. Surveys may be laid out in excess of 40 miles in a series of grid patterns or in a single line. Seismic operations are conducted on existing roads where possible but, the clearing of vegetation and rocks may be required to improve access for seismic source and recording trucks. Completely clearing a seismic line of vegetation is unusual and most lines are not bladed except at drainage crossings. In some rough or sandy areas it may be necessary to use a bulldozer to pull the seismic trucks through the difficult spots.

In remote areas where there is little known subsurface data, a series of short seismic lines may be required to determine the characteristics of the subsurface formation. After this, seismic lines would be aligned to make seismic interpretations more accurate. Although alignment may be fairly critical, spacing of the lines can often be changed up to a quarter mile on a one mile grid before the results will affect the investigation program.

Seismic methods are usually classified by the various methods of generating the shock wave. These methods include: 1) Thumper, 2) Vibrator, 3) Spark Ignition, 4) Surface Explosive, 5) Subsurface Explosive.

The thumper method involves dropping a three ton steel slab to the ground many times in succession along a predetermined line.

The vibrator method is widely used and is replacing the explosive methods in areas where vehicle access is not difficult. An operation of this type would use three or four large vibrator trucks, four or five support vehicles, and a crew of ten to fifteen people. The four foot square vibrator pads are lowered to the ground and the vibrators on all trucks are then operated electronically from the recording truck. After the reflections are recorded the trucks move forward a short distance and the process is repeated.

The spark ignition method can be used with a variety of vehicles and consists of a bell shaped chamber mounted underneath the vehicle. The shock wave is generated by the spark ignition of a propane and oxygen mixture and is imparted to the ground through the bell shaped chamber. This method causes little surface damage.

The thumper, vibrator, and spark ignition methods all have surface disturbing factors in common. Generally, these methods involve the use of existing roads or cross-country travel by four or five energy source trucks (usually weighing to one and one-half to ten tons) plus the recording truck, cable trucks, or pickup trucks. Bulldozer assistance may be required to cross drainages or to traverse steep terrain. The vehicles may travel off road along a single trail made by the trucks as the survey progresses. The vehicles may make several parallel trails in an attempt to distribute travel loads over a broader area. Travel along the line is usually a matter of one to two passes by the vehicle since the energy source is mobile and recording is done as the vehicles move down the line.

Subsurface Seismic Surveys

Historically, both subsurface and surface explosive methods have been the most widely used process to generate shock waves. In the subsurface method, five to fifty pounds of explosive charge are detonated at the bottom of a twenty-five to two hundred foot deep drill hole. These drill holes are usually two to six inches in diameter and drilled with a truck mounted drill. Detonation of the charge in some areas causes no surface disturbance, while in other areas, a small crater up to six feet in diameter is created. The same hole may be reloaded and shot several times to find the depth and charge returning the best signal. Cuttings from the well are normally scattered by hand near the shot hole, or put back in the shot hole after detonation. Bentonite mud is often used to plug the shot hole after the survey is completed.

The trucks used while conducting explosive seismic methods are similar to the trucks used in thumper and vibrator methods except that the trucks used to transport the drill are much heavier (15 to 20 tons). As with other truck transportation operations, existing roads may be used or trails may be blazed by the drill or bulldozer. A truck mounted drill and shot operation generally takes longer to complete and requires more trips by drill service vehicles than do vibrator and thumper operations.

In areas where there are limitations, steep topography, or other restraints prevent use of truck mounted drill rigs or recording trucks, light weight portable drill equipment can be used. Various kinds of portable drills can be backpacked or delivered by helicopter to the study area. These portable operations use a pattern of holes drilled to a depth of about 25 feet, the holes are then loaded with explosives and detonated simultaneously.

The surface explosive charge method involves the placing of explosives directly on ground, on snow, or on a variety of stakes and platforms including paper cones, survey stakes, lathes, or 2x4 wooden posts up to eight feet high. For this reason, surface explosive methods are very mobile and can be transported using 4X4 vehicles or adapted to airborne or ground pack teams.

A given area may be explored several times by the same or different companies over a long period of time using one or more of the geophysical methods mentioned above. This multiple exploration may be undertaken because the initial attempts were unsuccessful, another company wants its own information, or new and different techniques and/or equipment are used.

EXPLORATION DRILLING

Drilling does not begin until a lease has been acquired by the operator. When surface investigations are favorable and warrant further exploration, exploration drilling may be justified. Stratigraphic tests and wildcat tests are the two types of exploratory drill holes. Stratigraphic tests involve drilling relatively shallow holes to supplement seismic data. These tests aid in revealing the nature of near surface structural features. The holes are usually from 100 to several thousand feet deep, and are drilled primarily by a high pressure airflow or circulating drilling mud. Samples of these chips are collected, bagged, and identified by depth and rock composition. The chips are studied by a geologist to determine age, rock type, and formation. Truck-mounted drilling equipment used for stratigraphic tests is mobile and therefore, minimal construction is necessary for access into sites on level and solid ground. In hilly or mountainous areas, more road building is necessary.

Access Roads

Generally, access roads are bladed 12 to 14 feet wide and are not crowned or ditched. Under certain conditions it may only be necessary to brush the access route to clear vegetation. Other roads may require road cuts in excess of 20 feet and fills of more than 10 feet. Stratigraphic tests that require large amounts of surface disturbance are unusual since construction costs may outweigh the value of the information gained.

Drilling

The average drill site requires an area of one-half acre or less surface disturbance in order to position the drill and support equipment. If high pressure air is used to circulate the rock chips, dust may be emitted to the air when samples are collected. If mud is used as a drilling fluid, mud pits may be dug but, it is more common to use portable mud tanks. Usually one to three days is required to drill the test holes, depending on depth to and hardness of the bedrock. In areas with shallow, high-pressure, water bearing zones, casing may be required to prevent water from entering the hole.

After the surface and subsurface geological studies, the seismic, and other geophysical surveys, comes the evaluation of the prospect. Only by drilling a wildcat well (a well drilled in unproved territory) will the oil company know if the rocks in the prospect they have identified contain oil or gas. Nationally, one in 16 wildcat wells produces significant amounts of oil or gas. The deeper wildcat wells may require several months or more to complete; shallower wells up to a few thousand feet deep may be completed in as little as a few weeks. The deeper the test, the larger the drilling rig and the longer the drilling time required. Prior to approval of drilling, on-site inspections are conducted with the proposed drill pad and access road staked out, to assess potential impacts and attach appropriate mitigations to the permit to drill. A drill pad from one to four acres in size is then cleared of all vegetation, and leveled for the drill rig, mud pumps, mud (or reserve) pit, generators, pipe rack, and tool house. Topsoil and native vegetation is usually removed and stockpiled for use in the reclamation process. The mud pit may be lined with plastic or bentonite to prevent fluid loss or prevent contamination of water resources. Other facilities such as storage tanks for water and fuel are located on the pad or are positioned nearby on a separate cleared area. If the well site is not large enough for the equipment required to rig-up (prepare the drilling rig for operation), a separate staging area may be constructed. Staging areas are usually no larger than 200 feet by 200 feet and may only require a wide flat spot along the access road on which vehicles and equipment are parked.

Five thousand to 15,000 gallons of water per day may be needed for mixing drilling mud, cleaning equipment, cooling engines, etc. A surface pipeline may be laid to a stream or a water/well, or the water may be trucked to the site from ponds or streams in the area.

The drill rigs are very large and may be moved in pieces. In some instances, rigs can be moved short distances on level terrain with little or no dismantling of equipment which will shorten the tearing-down and rigging-up time. Moving a dismantled rig involves use if heavy trucking equipment for transportation, and crews to erect the rig. Gross weight of vehicles may run in excess of 80,000 lbs.

In order to move a drill rig and well service equipment from one site to another, and to allow access to each site, temporary roads may be built. These roads are generally 16 feet to 18 feet wide (driving surface) and may be as short as 200 feet or as long as ten miles or more. Bulldozers, graders and other types of heavy equipment are used to construct and maintain temporary wildcat roads.

The start of a well is called “spudding in” and, this procedure is started by forcing a short piece of tubing called conductor pipe into the ground and cementing it in place. This prevents surface sand and dirt from sloughing into the well hole. Next the regular drill bit and drill string (the column of drill pipe) are then used. These pass vertically through a heavy steel turn table (the rotary table), the derrick floor and the conductor pipe. The rotary table is geared to one or more engines, and rotates the drill string and bit. As the bit bores deeper into the earth, the drill string is lengthened by adding more pipe to the upper end.

Once the hole reaches a depth of several hundred feet, another string of pipe (the surface casing) is set inside the conductor pipe and cemented in place by pumping cement between the casing and the hole wall. Surface casing acts as a safety device to protect fresh water from drilling fluid contamination. Blowout preventors (large metal rams) are installed around the surface casing just below the derrick floor to prevent the well from “blowing out” in the event that the drill bit encounters a high pressure zone. In an emergency, these rams would be activated and the rams would close around the drill string and seal the well.

After setting the surface casing, drilling resumes using a smaller diameter bit. Depending on well conditions, additional strings of casings (intermediate casing) may be installed before the well reaches the total depth. During drilling, a mixture of water, clay and chemical additives known as “mud” are continuously pumped down the drill pipe. The mud exits through holes in the bit and returns to the surface outside the drill-pipe. As the mud circulates, it cleans and cools the bit and carries the rock chips (cuttings) to the surface. It also helps to seal off the sides of the hole (thus preventing cave-ins), and to control the pressure of any water, gas or oil encountered by the drill bit.

The mud is the first line of defense against a blow-out since it is used to control pressure. It is for this reason that a pit full of “reserve” mud (the reserve pit) is maintained on location. The reserve mud is used in emergencies to restore the proper drilling environment when radical or unexpected changes in down-hole pressure is encountered.

Testing
The cuttings are separated from the mud and sampled so that geologists can analyze the various strata through which the bit is passing. The remainder of the cuttings pass into the reserve pit as waste. Some holes are drilled at least partially with compressed air which serves the same purpose as drilling mud of cooling and cleaning the bit and circulating the cuttings out of the hole.

During completion of drilling activity, the well is logged. This entails the use of geophysical instruments to measure the physical characteristics of the rock formations and associated fluids through which the borehole passed. These instruments are lowered to the bottom of the well, and slowly raised to the surface while recording data. Other measuring procedures include the drill stem test, in which pressures are recorded and fluid samples taken from zones of interest. After studying the data from those logs and tests, the geologist and/or petroleum engineer decide if the well will produce petroleum.

Well Stimulation/Hydraulic Fracturing
Well Stimulation may be used to enhance oil recovery. Several methods of well stimulation could be used. Hydraulic Fracturing is one of these methods that is reasonably foreseeable for the leases on this sale. Hydraulic fracturing is the process of applying high pressure to a subsurface formation via a wellbore, to the extent that the pressure induces fractures in the rock. Typically the induce fractures will be propped open with a granular "proppant" to enhance fluid connection between the well and formation. The process was developed experimentally in 1947 and has been used routinely since 1950. The Society of Petroleum Engineers (SPE) estimates that over one million hydraulic fracturing procedures have been pumped in the United States and tens of thousands of horizontal wells have been drilled and hydraulically fractured. It can greatly increase the yield of a well, and development of hydraulic fracturing methods and the drilling technology in which it is applied (in particular, long wells drilled horizontally within the targets) have enabled production of oil and gas from tight formations formerly not economically feasible.

Plugging and Abandonment
If the well did not encounter oil and gas, it is plugged with cement and abandoned. The well pad and access road are recontoured and revegetated.

If the well will produce, casing is run to the producing zone and cemented in place. A proper cementing of the production casing string is required to provide coverage and prevent interzonal communication between oil and gas horizons and usable water zones. The drill is usually replaced by a smaller rig that is used for the final phase of completing the well.

DEVELOPMENT
If a wildcat well becomes a discovery well (a well that yields commercial quantities of oil or gas), development wells will be drilled to confirm the discovery, to establish the extent of the field, and to efficiently drain the reservoir. The procedure for drilling development wells are about the same as for wildcats, except there is usually less subsurface sampling, testing, and evaluation. If formation pressure can raise oil to the surface, the well will be completed as a flowing well. Several down-hole acid or fracture treatments to enhance the formation permeability may be necessary to make the well flow. A free-flowing well is simply closed off with an assembly of valves, pipes, and fittings (called a christmas tree) to control the flow of oil and gas to other production facilities. A gas well may be flared for a short period to measure the amount of gas per day the well can produce, then shut in or connected to a gas pipeline.

If the well is not free-flowing, it will be necessary to use pump methods. After the pump is installed, the well may be tested for days or months to see if it is economically justifiable to produce the well and to drill additional development wells, During this phase, more detailed seismic work may be run to assist in precisely locating the petroleum reservoir and to improve previous seismic work.

FIELD DEVELOPMENT

As with wildcat wells, field development well locations will be surveyed. A well spacing pattern must be established by the state (usually the wells can be spaced no closer than 330 feet from the quarter-quarter lines). Under special conditions, this spacing can be varied somewhat. Oil well spacing for production from federal leases uses units of 160, 320, and 640 acres per well.

Spacing for both oil and gas wells is based on the characteristics of the producing zones. If oil or gas is producing from more than one formation, the surface location of the wells may be closer than one per 40 acres. Once well spacing has been approved, development of the lease proceeds. During the development stage, the road system of the area is greatly expanded. Once it is known which wells produce and the expected length of their productive life, a system of permanent roads can be designed and built. Because it often takes several years to develop a field and determine field boundaries, the permanent road system is usually built in segments. For this reason, many temporary roads (built initially for wildcats or development) end up as long term (in excess of 15 years) main access or haul roads. The planning of temporary roads for wildcats and development wells is done with road conversion to long term in mind.

Since development wells have longer life spans than wildcat wells, access roads for development wells are better planned, designed and constructed. Access roads are normally limited to one main route to serve the lease areas, with a maintained side road to each well. Upgrading of temporary roads may include ditching, draining, installing culverts, graveling, crowning, or capping the roadbed. The amount of surface area needed for roads would be similar to that for temporary roads mentioned earlier and would also be dependent on topography and loads to be transported over it. Generally, main access roads are 20 feet to 24 feet wide and side roads are 14 feet to 18 feet wide. These dimensions are for the driving surface of the road and not the maximum surface disturbance associated with ditches, cuts or fills. The difference in disturbance is simply a matter of topography. Surface disturbance in excess of 130 feet is not unusual in steep terrain (slopes exceeding 30 percent).

When an oil field is developed on the current minimum spacing pattern of 40 acres per well, the wells are 1320 feet apart in both north-south and east-west directions. If a one square mile section is developed with 16 wells, at least four miles of access roads may be increased since steep slopes, deep canyons, and unstable soil areas must often be circumvented in order to construct stable access to the wells. Surface use in a gas field may be similar to an oil field though usually less) even though the spacing of wells is usually 1600 acres. Though a 160 acre spacing requires only four wells per section, the associated pipeline system often has similar initial surface requirements (acreage of surface disturbance).

FACILITY DEVELOPMENT

Tank Batteries and Well Siting

In addition to roads, other surface uses required for development drilling may include flowlines, storage tank batteries; facilities to separate oil, gas and water (separators and treaters); and injection wells for salt water disposal. Some of the facilities may be installed at each producing

well site, and others at places situated to serve several wells. Surface use in an oil and gas field may be affected by unitization of the leaseholds. In many areas with federal lands, an exploratory unit is formed before a wildcat is drilled. The boundary of the unit is based on geologic data. The developers unitize the field by entering into an agreement to develop and generate it as a unit, without regard to separate ownerships. Costs and benefits are allocated according to agreed terms.

Unitization reduces the surface-use requirements because all wells are operated as though on a single lease. Duplication of field processing facilities is minimized because development operations are planned and conducted by a single unit operator, often resulting in fewer wells. The rate of development well drilling depends on whether the field is operated on an individual lease basis or unitized, the probability of profitable production, the availability of drilling equipment, protective drilling requirements (drilling requirements to protect federal land from subsurface petroleum drainage by off-setting nonfederal wells), and the degree to which limits of the field are known. The most important development rate factor may be the quality of production. If the discovery well has a high rate of production and substantial reserves, development drilling usually proceeds at a fairly rapid pace. If there is some question whether reserves are sufficient to warrant additional wells, development chilling may occur at a much slower pace. An evaluation period to observe production performance may follow between thedrilling of successive wells.

Development on an individual lease basis usually proceeds more rapidly than under unitization, since each lessee must drill his own well to obtain production from the field. On a unitized basis, however, all owners within the participating area share in a well's production regardless of upon whose lease the well is developed. Spacing requirements are not applicable to unit wells. The unit is developed on whatever the operator considers to be the optimal spacing pattern to maximize recovery. As mentioned earlier, drilling in an undeveloped part of a lease to prevent drainage of petroleum to an offset well on an adjoining lease (protective drilling) is frequently required in fields of intermingled federal and privately owned land. The terms of federal leases require such drilling if the offset well is on non-federal lands, or on federal lands leased at a lower royalty rate.

Many fields go through several development phases. A field may be considered fully developed and produce for several years, then a well may be drilled to a deeper pay zone. Discovery of a new pay zone in an existing field is a "pool" discovery, as distinguished from a new field discovery. A pool discovery may lead to the drilling of additional wells with the bore holes separated only by feet or inches. Existing wells may also be drilled deeper.

Transporting Production

Usually four to six inch diameter pipelines transport the petroleum between the well, the treating and separating facilities, and central collection points. These lines can be on the surface, buried, or elevated. Most pipelines are buried.

Trucking and pipeline are the two methods used separately or in conjunction to transport oil out of a lease or unitized area. Trucking is used to transport crude oil from small fields where installation of pipelines is not economical and the natural gas in the field is not economically marketable.

Pipelines are the most common way to transport oil and gas. If a field has substantial amounts of natural gas, separate pipelines will be necessary for oil and gas. Pipelines move the oil from gathering stations to refineries. As existing fields increase production or new fields begin production, new pipelines may be needed. These new lines usually vary in size from four to 16 inches in diameter, and range in length from a few miles (to tie into an existing pipeline), to hundreds of miles to supply a refinery. Construction of a pipeline requires excavating and hauling equipment, a temporary and/or permanent road, possibly pumping stations, clearing the right-of-way of vegetation and possibly blasting.

Natural gas pipelines transport gas from the wells (gathering or flow lines) to a trunk line then to the main transmission line from the area. Flow lines are usually two inches to four inches in diameter and mayor may not be buried. Trunk lines are generally six inches to eight inches in diameter and are buried, as are transmission lines which vary in diameter from ten inches to 36 inches. The area required to construct a pipeline varies from about 15 inches wide (for a two inch to four inch surface line) to greater than 75 feet for the larger diameter transmission lines (24 inches to 36 inches). Surface disturbance is primarily dependent on size of the line and topography of the area on which the line is being constructed.

Compressor stations may be necessary to increase production pressure to the same level as pipeline pressure. The stations vary in size from approximately one acre to as much as twenty acres for a very large compressor system. Construction techniques for natural gas lines are similar to those used for oil pipelines.

PRODUCTION

INITIAL METHODS

Production in an oil field begins just after the discovery well is completed and is usually concurrent with development operations. Temporary facilities may be used at first, but as development proceeds and reservoir limits are determined, permanent facilities are installed. The extent of such facilities are dictated by the number of producing wells, expected production, volume of gas and water produced with the oil, the number of leases, and whether the field is to be developed on a unitized basis.

The primary means of removing oil from a well is by the use of pumping jacks. The pumps are powered by electric motors (power lines required) or if there is sufficient casing head gas (natural gas produced with the pumped oil), or another gas source is available, it may be used to fuel internal combustion engines.

Some wells may produce sufficient water that must be disposed of during operation of the well. Although most produced waters are brackish to highly saline, some are fresh enough for beneficial use. If water is to be discharged, it must meet certain water quality standards. Because water may not come from the treating and separating facilities completely free of oil, oil skimmer pits may be established between separating facilities and surface discharge.

When salt water is disposed of underground, it is always introduced into a formation containing water of equal or poorer quality .It may be injected into the producing zone from which it came or into other producing zones. In some cases, it could reduce the field productivity and may be prohibited by state regulation or mutual agreement of operators. In some fields, dry holes or depleted producing wells are used for salt water disposal, but occasionally new wells are drilled

for disposal purposes. Cement is squeezed between the casing and sides of the well to prevent the salt water from migrating up or down from the injection zone into other formations. Underground oil is under pressure in practically all reservoirs. This pressure is usually transmitted to the oil through gas or water in the reservoirs with the oil. When oil is pumped out of the well, pressure is reduced in the reservoir around the drill hole. This allows the gas or water in the reservoir to push more oil into the space next to the well. A reservoir that has mostly gas pushing the oil is called "gas drive", and one that has mostly water pushing the oil is called "water drive". Oil that is recovered under these natural pressures is considered primary production. Primary production accounts for about 25 percent of the oil in a reservoir.

INCREASING RECOVERY

Methods of increasing recovery from reservoirs generally involve pumping additional water or gas into the reservoir to maintain or increase the reservoir pressure. This process is called secondary recovery. Recently, the trend has been to institute secondary recovery processes very early in the development of a field. Surface disturbance from a water flooding recovery system is similar to drilling and development of an oil and gas well itself, i.e., a drill pad and access road are constructed and water pipelines may be built. Surface use is increased substantially since as many as four injection wells may be used for each oil well in the field (there are many different patterns as well as many other methods of secondary recovery).

Tertiary recovery methods increase recovery rates by lowering the viscosity of the oil either by heating it or by injecting chemicals into the reservoir so that the oil flows more easily. Heating of reservoir oil can be accomplished by injecting steam into the reservoir. Tertiary recovery methods are not yet widely used in this Elko Resource Area. By the year 2000, ultimate recovery (including secondary and tertiary recovery) from any given oil reservoir is expected to average 40 percent nationally.

POST PUMPING TREATMENT

Crude oil is usually transferred from the wells to tank storage facilities (tank battery) before it is transported from the lease. If it contains gas and water, they are separated before the oil is stored in the tank battery .The treating and separating facilities are usually located at a storage tank battery on or near the well site.

After the oil, gas, and water are separated, the oil is piped to storage tanks located on or near the lease. There are normally at least two tanks; so that one tank can be filling as the contents of the other is measured, sold, and transported. The number and size of tanks vary with the rate of production on the lease, and with the extent of automation in gauging the volume and sampling the quality of the tank's contents.

ABANDONMENT

The life span of fields varies because of the unique characteristics, the nature of the petroleum, subsurface geology, and political, economic, and environmental constraints. All affect a field's life span from discovery to abandonment. The life of a typical field is 15 to 25 years. Abandonment of individual wells may start early in a field's life and reach a maximum when the field is depleted.

Well plugging and abandonment requirements vary with the rock formations, subsurface water, well-site, and the well. In all cases, the formations bearing useable-quality water, oil, gas or geothermal resources, and/or prospectively valuable deposits of minerals will be protected.

Generally, in dry wells, the hole below the casing is filled with heavy drilling mud, a cement plug is installed at the bottom of the casing, the casing is filled with heavy drilling mud, and a cement cap is installed on top. A pipe monument giving the location, lease number, operator, and name of the well is required unless waived by the Authorized Officer. If waived, the casing may be cut off and capped below ground level. Protection of aquifers and known oil and gas producing formations may require placement of additional cement plugs.

In some cases, wells that formerly produced are plugged as soon as they are depleted. In other cases, depleted wells are not plugged immediately but are allowed to stand idle for possible later use in a secondary recovery program. Truck-mounted equipment is used to plug former producing wells. In addition to the measures required for a dry hole, plugging of a depleted-producing well requires a cement plug in the perforated section in the producing zone. If the casing is salvaged, a cement plug is put across the casing stub. The cement pump-jack foundations are removed or buried below ground level. Surface flow and injection lines are removed, but buried pipelines are usually left in place and plugged at intervals as a safety measure.

After plugging, the drilling rig is removed and the surface, including the reserve mud pit, and the well pad area is restored to the requirements of the surface management agency. This may involve the use of bulldozers and graders to recontour those disturbed areas associated with the drill pad plus the access road to the particular pad. The reserve pit (the part of the mud pit in which a reserve supply of drilling fluid and/or water is stored) must be evaporated or pumped dry, and filled with soil material stockpiled where the site was prepared. There is little leakage if the pit was lined with plastic or bentonite. The area is reshaped to a useful layout that will allow revegetation to take place, the landform is restored as near as possible to its original contour, and erosion minimized. After grading the subsoil and spreading of the stockpiled topsoil, the site is seeded with a grass mixture that will establish a good growth. A fence may be erected to protect the site until revegetation is complete, particularly in livestock concentration areas.

APPENDIX E LIST OF ACRONYMS USED

ACEC	Area of Critical Environmental Concern
AO	Authorized Officer
APD	Application for Permit to Drill
AQRV	Air Quality Related Values
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
COA	Condition of Approval
CTGR	Confederated Tribes of the Goshute Reservation
DOI	Department of the Interior
DR	Decision Record
EA	Environmental Assessment
EOI	Expression of Interest
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy & Management Act
FO	Field Office
FONSI	Finding of No Significant Impact
GIS	Geographic Information Systems
GHG	Greenhouse Gasses
HAP	Hazardous Air Pollutants
HF	Hydraulic Fracturing
ID	Interdisciplinary
IPCC	Intergovernmental Panel on Climate Change
LWC	Lands with Wilderness Characteristics
NAAQS	National Ambient Air Quality Standards
NCLS	Notice of Competitive Lease Sale
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife

NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NSO	No Surface Occupancy
NTL	Notice to Lessee
PGH	Preliminary General Habitat
POD	Plan of Development
PPH	Preliminary Primary Habitat
RFD	Reasonably Foreseeable Development
RMP	Resource Management Plan
ROW	Right-of-Way
SHPO	Nevada State Historic Preservation Office
T&E	Threatened and Endangered
TCP	Traditional Cultural Properties
TSP	Total Suspended Particulates
USFWS	United States Fish & Wildlife Service
VOC	Volatile Organic Compounds
VRM	Visual Resource Management
WMA	Wildlife Management Area

APPENDIX F LIST OF DEFERRED PARCELS

Parcel	Deferred Acres	Presale Offer	Current Sale Deferral Rationale	Timeframe for renominating parcel
Fully Deferred				
NV-14-03-001	1,885.840	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-005	1,719.080	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-009	2,400.000	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-011	1,438.680	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-012	1,880.000	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-014	1,930.340	Yes	Source Water Area	Completion of Elko RMP
NV-14-03-017	1,520.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-019	1,280.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-028	2,307.470	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-036	1,131.220	No	Proposed TCP	Completion of Elko RMP
NV-14-03-040	1,872.260	No	Proposed TCP	Completion of Elko RMP
NV-14-03-041	1,511.560	No	Proposed TCP	Completion of Elko RMP
NV-14-03-042	2,560.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-043	1,920.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-044	2,240.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-045	2,542.640	No	Proposed TCP	Completion of Elko RMP
NV-14-03-046	1,974.400	No	Proposed TCP	Completion of Elko RMP
NV-14-03-047	2,560.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-048	1,360.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-049	1,245.080	No	Proposed TCP	Completion of Elko RMP
NV-14-03-050	2,031.160	No	Proposed TCP	Completion of Elko RMP
NV-14-03-055	2,539.640	No	Proposed TCP	Completion of Elko RMP
NV-14-03-056	2,405.500	No	Proposed TCP	Completion of Elko RMP
NV-14-03-057	1,440.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-058	1,840.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-059	1,760.000	No	Proposed TCP	Completion of Elko RMP
NV-14-03-061	1,843.120	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-062	1,922.160	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-065	916.850	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-066	1,240.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-067	1,920.760	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-068	2,519.960	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-069	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-070	2,440.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-071	2,440.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-072	1,280.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-074	1,236.970	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-075	2,520.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-076	2,440.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-078	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-083	625.680	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-085	1,802.280	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-086	1,640.440	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-087	1,142.640	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-088	2,240.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-089	2,240.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-090	1,920.080	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-091	2,535.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP

Parcel	Deferred Acres	Presale Offer	Current Sale Deferral Rationale	Timeframe for renominating parcel
Fully Deferred				
NV-14-03-092	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-093	2,525.760	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-094	2,524.560	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-095	2,499.080	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-096	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-097	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-098	2,526.560	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-099	1,280.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-100	2,529.600	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-101	1,919.720	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-102	1,763.650	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-103	2,074.030	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-104	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-105	2,440.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-106	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-107	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-108	2,557.360	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-109	2,320.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-110	2,000.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-111	1,424.690	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-112	1,880.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-114	1,882.160	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-115	1,800.330	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-116	2,080.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-117	1,800.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-118	1,640.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-119	1,761.200	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-120	1,718.600	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-121	1,182.900	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-122	2,530.200	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-123	1,903.720	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-124	2,524.540	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-125	1,920.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-126	1,923.120	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-127	1,923.840	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-128	1,924.920	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-129	1,882.240	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-130	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-131	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-132	2,549.440	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-133	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-134	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-135	2,550.680	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-136	1,921.020	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-137	1,924.280	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-138	2,480.920	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-139	2,320.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-140	1,720.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP

Parcel	Deferred Acres	Presale Offer	Current Sale Deferral Rationale	Timeframe for renominating parcel
Fully Deferred				
NV-14-03-141	2,109.700	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-142	1,080.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-143	1,280.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-144	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-145	2,235.310	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-156	2,560.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-157	2,558.560	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-158	2,559.320	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-159	2,160.240	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-160	2,280.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-161	1,480.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-162	2,178.460	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-163	1,933.380	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-164	2,455.790	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-165	2,283.720	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-166	1,600.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-167	2,440.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-168	2,400.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-169	1,839.820	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-170	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-171	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-172	2,557.720	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-173	1,922.080	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-174	1,926.080	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-175	1,925.350	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-176	1,922.120	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-177	2,520.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-178	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-179	2,554.680	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-180	2,040.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-181	2,362.520	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-182	1,920.520	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-183	2,034.590	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-184	1,900.730	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-185	2,440.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-186	2,360.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-192	2,525.290	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-199	1,880.220	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-200	2,534.800	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-201	2,520.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-203	2,120.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-204	2,072.190	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-205	1,640.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-207	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
NV-14-03-208	2,560.000	No	Spruce Mtn. Planning Area	Completion of Elko RMP
Total Deferral				
Acres Deferred	293,483.120			

Parcel	Deferred Acres	Presale Offer	Sale Deferral Rationale	Timeframe for renominating parcel
Partially Deferred				
NV-14-03-004	722.940	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-008	713.160	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-010	1,113.630	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-015	1,000.000	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-016	840.000	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-018	680.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-027	1,078.480	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-029	800.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-030	240.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-031	1,427.630	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-038	1,160.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-060	1,280.000	Yes	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-063	1,840.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-064	1,960.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-073	960.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-077	280.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
NV-14-03-155	1,400.000	No	4-mile lek buffer	Completion of Sage Grouse EIS
Partial Deferral				
Acres Deferred	17,495.840			
Total Acres Deferred	310,978.960			