

Decision Record and Finding of No Significant Impact

For

Cherry Creek Geothermal Lease Proposed by Amigo, Inc.

EA # NV-040-06-038

DECISION: It is my decision to authorize the proposed geothermal lease of 640 acres of public land located near Cherry Creek in White Pine County, Nevada as described in the proposed action of the Environmental Assessment (EA) NV-040-06-038, dated July 13, 2006. The proposed action involves only the issuance of a lease and does not include any subsequent post-lease disturbance.

I concur with my staff's assessment of the environmental impacts and authorize the proposed action subject to the following leasing stipulations which will be attached to the geothermal lease:

1. **Wetlands Stipulation**

For the purpose of protecting wetlands, lease operations are subject to a Section 404 permit from the US Army Corps of Engineers.

2. **Pony Express Trail and Lincoln Highway Stipulation**

Any activity planned within the viewshed of the Pony Express and California National Historic Trails, the Historic Lincoln Highway, National Scenic and Historic Trails, listed National Register Districts, or properties eligible under Criterion a, b, and/or c, must undergo a visual assessment. Appropriate mitigation of visual impacts would be implemented as necessary to keep the setting of the management corridor in as natural condition as possible.

To meet visual management objectives for the Pony Express National Historic Trail/Overland Trail (Instruction Memorandum NV-2004-004 and NV-2004-006) a Section 106 consultation under the National Historic Preservation Act with the State Historic Preservation Officer for a determination of effect must be completed prior to actual operations. The consultation procedures would follow the Nevada State Protocol between the Nevada BLM and the Nevada State Historic Preservation Officer. The consultation process may involve review by the Advisory Council on Historic Preservation and development of a Memorandum of Agreement with the State Historic Preservation Officer and Advisory Council on Historic Preservation. These procedures may delay the operation up to 120 additional days above the 60-day timing limitations allowed under Section 6 of the lease instrument. Treatment plans and data recovery also may be required at the expense of the operator prior to approval of operations.

Data recovery also may result in additional delays which may exceed 120 days in addition to the Section 106 consultation process.

3. Migratory Bird Restriction

Operations commencing during the period May 1 to July 15 will be subject to the provisions of the Ely District Policy for Management Actions for the Conservation of Migratory Birds. A qualified wildlife biologist will survey the area for nesting migratory birds. If any are found, operations will be postponed until after July 15.

Rationale: Approval of the proposed action will allow leasing of public lands for the potential production of renewable energy resources. The proposed action may lead to increased use of renewable resources for the production of energy, help increase energy supplies, and help reduce energy shortages.

No ground disturbing activities are authorized under this decision. Additional site-specific NEPA analysis will be necessary prior to implementing any future ground disturbing activities on the lease. The probable impacts of these lease activities as presented in the Reasonable Foreseeable Development were analyzed in this EA.

The proposed action is in conformance with Egan Resource Management Plan and is consistent with the White Pine County Land Use Plan (1998).

FONSI:

Finding of No Significant Impact: I have reviewed Environmental Assessment (EA) NV-040-06-038, dated July 13, 2006. After consideration of the environmental impacts as described in the EA, and incorporated herein, I have determined that granting the geothermal lease, with the leasing stipulations as described in the EA will not significantly affect the quality of the human environment and that an Environmental Impact Statement (EIS) is not required to be prepared. This finding and conclusion is based on my consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 Code of Federal Regulations 1508.27), both with regard to the context and the intensity of impacts described in the EA.

Rationale:

I have determined the proposed action is in conformance with the approved Egan Resource Management Plan and the White Pine County Public Land Use Plan.

Intensity:

- 1) Impacts that may be both beneficial and adverse.

There will be no direct impacts from the proposed action - granting the geothermal lease.

The environmental assessment has considered both beneficial and adverse impacts of subsequent ground disturbing actions of the Reasonably Foreseeable Development Scenario. On the whole, the project will provide economic benefits to the local communities and perhaps the development of additional alternative energy reserves. Adverse effects will consist of disrupting as many as 27 acres of existing wetlands, floodplains, and associated riparian community.

- 2) The degree to which the proposed action affects public health or safety.
Implementation of the proposed action will not result in potentially substantial or adverse impacts to public health and safety. No post-lease actions, as analyzed through the RFD, would affect public health and safety.
- 3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
The lease is located within a wetlands, floodplain, and associated riparian area. Post-lease activities will be subject to a 404 permit.
- 4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.
Leasing itself is not controversial. Post-leasing activities, which would involve the use of wetlands, would be subject to a 404 permit. Should a geothermal resource be developed, impacts of the construction of a geothermal generating plant would most likely be analyzed through an EIS.
- 5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
Implementation of the proposed action – granting of the lease – will have no effect on the human environment. The effects and risks of post-lease actions leading to the development of a geothermal generating facility are well understood throughout the State.
- 6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
The proposed action does not establish a precedent for future actions with significant effects and does not represent a decision in principle about a future consideration.
- 7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.
Post-lease actions would add as many as 27 acres of Steptoe Valley to energy production. A total of 8,700 acres would be developed for coal fired and wind energy production. A total of 150 acre feet of groundwater would be consumed

by a geothermal generating plant. The coal fired power plants would use approximately 13,000 acre feet. No significant cumulative impacts due post lease actions identified in the RFD have been identified in the EA.

- 8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

The proposed action, itself would have no effect on National Register resources. No districts, sites, highways, structures or objects listed in or eligible for listing in the National Register of Historic Places were identified through the EA in the project area. A Class III cultural survey would be conducted prior to any post-lease ground disturbing actions. A visual assessment would be performed for the protection of the viewshed of the Pony Express Trail and Historic Lincoln Highway.

- 9) The degree to which the action may adversely affect a threatened or endangered species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

Granting of the lease will have no direct impact on threatened or endangered species. No threatened or endangered species were identified in the EA. All subsequent post-leasing actions will be subject to surveys and mitigation for threatened or endangered species.

- 10) Whether the action threatens a violation of Federal, State, or local law or requirement imposed for the protection of the environment.

The proposed action will not violate or threaten to violate any Federal, State, or local law or requirement imposed for the protection of the environment.

Jeffrey A. Weeks
Assistant Field Manager

Date

**ENVIRONMENTAL ASSESSMENT
FOR
CHERRY CREEK
GEOTHERMAL LEASE**

Proposed By
AMIGO, INC

EA # NV-040-06-038

ELY FIELD OFFICE
BUREAU OF LAND MANAGEMENT

PREPARED BY
WILLIAM R. WILSON

JULY, 2006

TABLE OF CONTENTS

I.	BACKGROUND INFORMATION	1
A.	Introduction	1
B.	Need for the Proposal	1
C.	Relationship to Planning	1
D.	Issues	2
II.	DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES	2
A.	Proposed Action	2
_____	Mitigation	2
_____	Monitoring	2
B.	No Action Alternative.....	2
C.	Alternatives Considered But Eliminated From Detailed Analysis.....	2
IV.	DESCRIPTION OF AFFECTED ENVIRONMENT	3
A.	Geology	3
B.	Socio-Economic - Energy Development and Production	4
C.	Floodplains, Wetlands, and Riparian	5
D.	Water Quality (Drinking/Groundwater)	4
E.	Air Quality	5
F.	Cultural, Paleontological, and Historical Resource Values	5
G.	Wilderness	5
H.	Visual Resource Management (VRM).....	5
I.	Special Status Species (Federally Listed, Proposed or Candidate Threatened or Endangered Species, and State Sensitive Species).....	5
J.	Wildlife	5
K.	Migratory Birds	6
L.	Wild Horses and Burros.....	6
M.	Invasive, Non-Native Species (Including Noxious Weeds).....	6
V.	ENVIRONMENTAL CONSEQUENCES	6
A.	Socio-Economic - Energy Development and Production	8
B.	Floodplains, Wetlands, and Riparian	9
C.	Water Quality (Drinking/Groundwater).....	10
D.	Air Quality	10
E.	Cultural, Paleontological, and Historical Resource Values	11
F.	Visual Resource Management (VRM).....	11
G.	Wildlife	12
H.	Migratory Birds	13
I.	Invasive, Non-Native Species (Including Noxious Weeds).....	14
VI.	CUMULATIVE IMPACTS.....	14
A.	Socio-Economic - Energy Development and Production	156
B.	Visual Resource Management (VRM)	17
C.	Water Quality (Drinking/Groundwater)	18
D.	Floodplains, Wetlands, and Riparian	19
VII.	PROPOSED MITIGATION MEASURES	20
VIII.	SUGGESTED MONITORING	19
IX.	CONSULTATION AND COORDINATION	19
A.	Intensity of Public Interest and Record of Contacts.....	19
B.	Internal District Review	19
Appendix I – Appendix I: Location map of Proposed Lease Area		20
Appendix II – References		20
Appendix III – Special Stipulations for Cherry Creek Geothermal Leasing.....		22
Appendix IV -		24
REASONABLE FORESEEABLE DEVELOPMENT SCENARIO		24
A.	Geothermal Lease Development Processes	24
B.	Surface Disturbance.....	26
C.	Time Frame of the Proposed Action.....	26
D.	General Assumptions.....	26

**ENVIRONMENTAL ASSESSMENT
FOR
GEOTHERMAL LEASING
BY
AMIGO, INC**

EA NV-040-06-038

I. BACKGROUND INFORMATION

A. Introduction

Amigo, Inc. has applied for a non-competitive geothermal resources lease on 640 acres of public land administered by the Bureau of Land Management (BLM), Ely Field Office. Although the proposed action area is not a Known Geothermal Release Area (KGRA), it is believed that geothermal activity is moderate (60-100 megawatts/meters²) to high (>100 MW/m²).

The proposed action involves only the issuance of a lease and does not include any surface disturbance. In order to determine whether proposed lease area should be open or closed to leasing, this EA will analyze the probable impacts of typical geothermal lease activities – the Reasonable Foreseeable Development Scenario (RFD) - on the proposed lease area (Appendix eee). If open, stipulations may be attached to the lease that would inform the lessee of restrictions, such as timing or surface use, beyond those in the standard terms and conditions of the lease form.

Further site-specific NEPA analysis would be required for all subsequent surface disturbing activities. Exploration, development drilling, and power plant operations typically involve increasing levels of analysis, from an EA to an EIS. Standard Operating Procedures (SOPs) for geothermal exploration operations and Conditions of Approval (COAs) would be established for each plan to cover all aspects of construction, operation, and reclamation.

B. Need for the Proposal

The need for the proposed action is to allow leasing of public lands for the production of renewable energy resources. This would increase the use of renewable resources for the production of energy, help increase energy supplies, and help reduce energy shortages.

C. Relationship to Planning

The Proposed Egan Resource Management Plan and Final Environmental Impact Statement (FEIS), 1987, does not address issues pertaining to geothermal leasing. This land use plan is in general conformance stating, “the public lands shall remain open and available for mineral exploration and development unless withdrawal or other administrative action is clearly justified in the national interest” (page 15).

The White Pine County Land Use Plan (LUP) (May 1998) does not address geothermal leasing. However, the proposed action is consistent with this LUP, which encourages exploration and development for mineral resources.

D. Issues

Issues identified during the internal scoping process consist of socio-economic, visual, groundwater, and wetlands.

II. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

The proposed action is limited to leasing federally administered geothermal resources located approximately six miles northeast of Cherry Creek, White Pine County, Nevada (see map in Appendix I):

- T 24N, R 64 E, Section 19

Geothermal energy leasing would be conducted under authority of the 1970 Geothermal Steam Act and regulations stated in 43 CFR 3200 (Geothermal Resource Leasing).

Mitigation

Stipulations for the protection of wetlands, Pony Express Trail and Lincoln Highways, and migratory birds are listed in Appendix III and will be attached to the lease.

The proposed action is also subject to the standard lease terms located on the lease application form (Form 3200-24).

Conditions of Approval and Standard Operating Procedures would be developed for all subsequent site-specific activities.

Monitoring

No monitoring measures have been deemed necessary for implementation of the proposed action.

B. No Action Alternative

Under a no action alternative, the BLM would deny the lease.

C. Alternatives Considered But Eliminated From Detailed Analysis

No other alternatives are necessary to address unresolved conflicts concerning alternative uses of existing resources.

IV. DESCRIPTION OF AFFECTED ENVIRONMENT

A. Geology

The proposed Cherry Creek geothermal lease area is located in Steptoe Valley, approximately 45 miles north of Ely, Nevada. As part of the Basin and Range physiographic province, it is situated on the eastern edge of the north-trending Egan Range and the western margin of Steptoe Valley. Ephemeral and intermittent drainages and springs flow out of the Egan Range into Steptoe Valley where the water is used for agricultural purposes, and flows into Goshute Lake Playa.

Geologic mapping by Hose and Blake (1976) shows that near Cherry Creek, the Egan Range consists of a westward dipping sequence of Paleozoic carbonate strata that has been intruded by a north-trending series of Tertiary stocks. Quaternary sedimentary rocks cover the bedrock in the vicinity of the proposed lease area. Oil and gas wildcat holes along the western edge of Steptoe Valley typically intersect 2,000 to 3,000 feet of valley fill, which overlay 3,000 to 4,000 feet of Tertiary volcanic rocks, which in turn overlay the Paleozoic strata.

A major north-trending Basin and Range inferred fault with a displacement of several thousand feet is believed to border the range near the proposed lease area. Several geothermally anomalous springs occur along the trace of this inferred fault zone from Cherry Creek southward to Ely (Shevenell, et. al., 2000). Among them is the Monte Neva Hot Springs, once classified as a Known Geothermal Area (KGA), about 12 miles south of Cherry Creek, which has recorded spring temperatures as high as 193°F.

The proposed lease area is located approximately 2 to 3 miles east of the trace of this inferred fault zone north of Cherry Creek. It is widely believed that Basin and Range faults such as these allow for deep circulation of groundwater. Depths in excess of 10,000 feet are sufficient to tap heat sources available from the high thermal gradients of the Basin and Range. An abandoned oil well, Steptoe Unit #1, which was drilled to a depth of 8406 feet within the proposed lease area in 1976, reported a temperature of 304 degrees F.

B. Socio-Economic - Energy Development and Production

Economic activities in Steptoe Valley, north of Ely, have been generally confined to agriculture. Energy development has been limited to geophysical exploration and wildcat oil and gas drilling. A shallow geothermal well was drilled into the Monte Neva Hot Springs in 1965. There are no active geothermal leases in White Pine County.

Recently, the BLM has received applications for two coal fired power facilities – White Pine Energy (LS Power) and the Ely Energy Center (Sierra Pacific Power). A wind energy facility

has also been proposed and a right of way granted for the 500 kv Southwest Intertie Project (SWIP) utility corridor.

The State of Nevada has implemented Senate Bill 372, which states that 15% of energy production within the State would be renewable energy (i.e. – solar, wind, biomass, geothermal, etc.) by the year 2013. A production tax credit for several renewable energy sources has been added to an energy bill that would provide a 1.5 cent per kilowatt hour tax credit to geothermal energy developers for five years.

C. Floodplains, Wetlands, and Riparian Areas

The proposed lease area lies within the floodplain of Duck Creek. Duck Creek, the main north flowing ephemeral stream in the center of Steptoe Valley, consists of a seasonal 3 to 4 mile wide marsh during wet periods but is dry most of the summer and fall months. All soils in the proposed lease area are classified as hydric soils of Boofus-Equis association (USDA, Natural Resources Conservation Service. The water table is at a depth of 0 to 30 inches from January to July during the growing season. Most of the soils are frequently flooded for long or very long duration during the growing season. Floods occur at a frequency of one per 20 years.

An access road and 2-acre well pad were constructed for Steptoe Unit #1 (above) in the northeast corner of the proposed lease area in 1976. The well was plugged and abandoned, the location re-leveled, and seeded, but the gravel cover was not removed. The access road was not reclaimed and is used occasionally.

Executive Order 11990, issued in 1977, provides for the protection of wetlands. A policy of “No Net Loss” of the nation’s remaining wetlands was established in 1987 and is still in place.

D. Water Quality (Drinking/Groundwater)

The Basin and Range physiographic province is the driest in the United States, with large parts of it being classified as semiarid and arid. An estimated 6-8 inches of precipitation falls in the proposed lease area per year.

Most of the groundwater recharge comes from precipitation from the adjacent Cherry Creek Range, on the west, and the Schell Creek Range, on the east through infiltration of surface runoff and by underflow from the bedrock units that comprise the mountain ranges. Water levels recorded for 3 of the 8 wells located within 3 miles of the proposed lease area range from 5 to 14 feet below the surface with pH measurements that range from 7.9 to 8.9.

With the reported 304 degree temperature in the 8406 foot deep oil well on the proposed lease, it is reasonable to expect that geothermal production would come from reservoirs located at depths below 8,000 feet.

Surface Expression of Springs

There is no surface expression of hot or warm springs in the proposed action area. However, hot springs are present on the private land approximately 6 miles southwest of the proposed lease area.

E. Air Quality

Steptoe Valley is an attainment area for all pollutants.

F. Cultural, Paleontological, and Historical Resource Values

Cultural and paleontological resources exist throughout the Egan RA. Three seismic lines that pass through the proposed lease area have been surveyed for cultural resources. No artifacts were found within this area, but historic and pre-historic artifacts were identified nearby.

The Pony Express Trail is located approximately 8 miles southwest of the proposed action area (see map in Appendix I). A branch of the Historic Lincoln Highway is approximately 3 miles east.

G. Wilderness

The proposed action area is not within a designated Wilderness, Wilderness Study Area, or Instant Study Area. The Goshute Wilderness Study Area is approximately 4 miles west of the proposed action area.

H. Visual Resource Management (VRM)

The proposed action area has been determined to be Class IV. “The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements” (H-8431-1).

I. Special Status Species (Federally Listed, Proposed or Candidate Threatened or Endangered Species, and State Sensitive Species)

No special status species have been documented in the proposed action area. Yearlong sage grouse habitat, including brooding, summer, and winter areas, have been identified on the valley bench west of Duck Creek, as close as 4,000 feet from the proposed action area. The proposed lease area could be a potential brood habitat. Pygmy rabbits may be found in some valley bottoms but would also not be expected in this wetland habitat. Bald Eagles occasionally occupy the area.

J. Wildlife

The proposed action area is yearlong use area for pronghorn (*Antilocapra americana*) and elk (*Cervus elaphus*). Golden eagles and prairie falcons have been observed in this portion of Steptoe Valley.

K. Migratory Birds

Migratory birds nest in all habitats within the Great Basin, including the proposed action area. Waterfowl will occupy the proposed lease area and nest during wet periods.

L. Wild Horses and Burros

The project area is within the Antelope Horse Herd Management Area (HMA). The AML for the unit is 324 wild horses. The portion of the HMA west of U.S. 93 is cut off from the herd due to a Highway right of way fence. The AML for this portion of the HMA is established at zero wild horses.

M. Invasive, Non-Native Species (Including Noxious Weeds)

The proposed action area was inventoried for noxious weeds in 2003. Russian knapweed, squarrose knapweed, and whitetop (*cardaria draba*) are common along roads and other existing disturbance, but were not identified within the abandoned oil well site or elsewhere in the proposed action area. Invasive weeds, particularly cheatgrass, mustard, and Russian thistle are common throughout the Steptoe Valley area.

V. ENVIRONMENTAL CONSEQUENCES

Geothermal leasing on public lands would in itself not cause any environmental consequences because leasing neither involves nor authorizes surface disturbances or occupations. The issuance of a lease, however, grants the right to develop the lease through exploration, drilling, and production. The right to drill for geothermal resources also gives them a right to reach the proposed well site by a road route, the location of which has to be reasonable and cause no undue degradation to the environment.

Therefore, the environmental components described in the previous section have been analyzed for the proposed action and the no action alternative based on the Reasonable Foreseeable Development Scenario (RFD) (Appendix IV).

Assumptions for analysis are:

1. There would be no substantial change in the laws, regulations, or policies governing management of geothermal resources during the land use planning period.
2. The Special Stipulations developed for this leasing area would be adhered to for each leasing activity proposed.

3. The locations of potential exploration wells and field development are unknown. The impacts associated with these activities would likely occur anywhere within the proposed action area.
4. Should a generating plant be constructed, it would be located on the lease. It is quite possible, however, that a plant could be permitted at a location off of the proposed lease.
5. The RFD predicts that the maximum disturbance would be approximately 27 acres although actual disturbance may be more or less.
6. The appropriate National Environmental Policy Act (NEPA) documentation would be completed for all subsequent geothermal actions prior to implementation.
7. Plans for subsequent geothermal site-specific actions would include reclamation plans to restore the lease area to its present condition. Reclamation of the existing oil well pad would be considered, particularly if it were used in subsequent actions.

Resources Not Present or Not Affected by the Proposed Action

There would be no impacts to Special Status Species (Federally listed, proposed, or candidate threatened or endangered species; State protected species; or BLM sensitive species); wilderness values; areas of critical environmental concern; wild horses and burros; wild and scenic rivers; prime or unique farmlands; wastes, hazardous and solid; Native American religious concerns; or environmental justice.

A. Socio-Economic - Energy Development and Production

Proposed Action

Exploration

Drilling and related construction would provide economic opportunities for the local work force and businesses.

Development and Production

Development of proposed lease would provide economic opportunities for the local and regional work force and businesses during development and operation. Facilities may be subject to local taxes which would contribute to White Pine County revenues.

Development of a 10 to 15 megawatt geothermal generating plant would contribute to the State of Nevada's targeted 15% of energy production coming from renewable sources.

Closeout

Decommissioning would again provide construction jobs, but terminate renewable power generation from the proposed lease.

No Action Alternative

Under the no action alternative, the economic opportunities as described above would not occur.

B. Floodplains, Wetlands, and Riparian Areas

Proposed Action

Since the proposed geothermal lease is entirely within the wetlands, the ground disturbance and facilities would occupy as much as 27 acres of wetlands. At the termination of the lease, all new disturbances would be reclaimed. Reclamation plans would be developed for these site-specific actions through further NEPA analysis.

Exploration

Graveled drill pads and access roads would probably be constructed for exploration activities outside of the existing 1.7 acre oil well pad and access road. Up to three shallow Temperature Gradient Exploration Wells (less than 3,000 feet deep) may be drilled this lease. This would disturb up to .3 acre. Three new access roads, each one half mile in length, would disturb of total of 3.6 acres. Total disturbance per lease is 3.9 acres. Should one of the holes be drilled from the existing oil well pad, the disturbance would be reduced to approximately 2.6 acres.

Development and Production

According to the Reasonable Foreseeable Development Scenario (RFD) (Appendix IV), should exploration be successful, up to two production or injection wells would be drilled on this lease. Each well pad would disturb 2 acres. A 2-mile access road would disturb 9.6 acres. Each pipeline would disturb 4.8 acres. A power plant would occupy 10 acres. A transmission line would disturb 1 acre per mile of line. Total surface disturbance for all phases of development would be approximately 27 acres. Facilities would be constructed so as not to disrupt surface water migration into and through the adjoining off-lease wetlands.

Waste water from test well drilling may be temporally stored in holding ponds, then reinjected back into the producing aquifer at the completion of the test.

It is likely that the power plant, if constructed, would be located off of the proposed lease area where soil conditions would be more favorable for construction and physical stability of any facilities. It is also likely that one of the wells would be drilled from the existing oil well pad. This would result in a total disturbance of 14.4 acres and no transmission facilities on the proposed action area. Land, other than this proposed lease, then, would have to be obtained to locate these facilities.

Closeout

Should geothermal production be established, it may be many years before the project is decommissioned. During closeout, there would be renewed disruption due to the removal of facilities and reclamation operations. Reclamation strategies would focus on returning the wetlands to their pre-lease condition and consider opportunities for their enhancement through trenching, impoundments, and other techniques.

No Action Alternative

Under the no action alternative, impacts as described above would not occur.

C. Water Quality (Drinking/Groundwater)

Proposed Action

Exploration

Based on the results of the oil well previously drilled on the proposed lease, test pumping would be from depths below 8,000 feet. Test pumping could cause a temporary drop in the water table. Any produced fluids are generally re-injected into the same aquifer or reservoir during and at the end of the testing.

Nevada drilling regulations and hole plugging requirements would also adequately mitigate down hole contamination and loss of fluids. As exploration wells are drilled, the State of Nevada and BLM would require that the drilling company monitor the temperature and outflow of water from any local hot springs. If the temperature and outflow of water from the hot spring were impacted by the geothermal project, all activities would be stopped immediately, and appropriate actions would be taken in conjunction with BLM.

During exploration, water-bearing strata may be discovered. Such strata could be used in future development of this region.

Development and Production

Geothermal steam development is included in the Nevada Water Law (NRS 534A). A permit is required before steam may be diverted to generate power. Regulations on such a permit help protect existing water rights and public welfare from potential adverse impacts. Re-injection of produced waters also requires a permit from the State. Groundwater would not be degraded because of regulations and mitigation measures.

The Reasonable Foreseeable Development Scenario predicts a consumption of as much as 0.4 acre feet per day (150 acre feet per year) of water. Nevada Statutes allow for a “reasonable loss of water” (NRS 524A.004) during well testing and operations in systems where the water is reinjected back into the same aquifer or reservoir. With the anticipated production depth below 8,000 feet the reservoir would be recharged through a combination of re-injecting the same water after the heat is extracted by the power plant, deep circulation of natural groundwater, and recharge through the deep carbonate aquifer that crops out in the adjacent mountain ranges. Experience at other geothermal fields has shown that there would be little effect on the surface springs.

Closeout

With closeout, the affected water table would return to its pre-operation condition.

No Action Alternative

Under the no action alternative, impacts as described above would not occur.

D. Air Quality

Proposed Action

Localized, short-term impacts to air quality would occur. Such impacts may result from particulate matter (dust), the release of gases and vapors, and vehicular emissions.

Exploration

Dust would be attributed to exploratory drilling and vehicle travel in the proposed action area. Vehicles and equipment would contribute a negligible amount of emissions into the local atmosphere.

Development and Production

Earthmoving, drilling activities, construction, and vehicle travel would add particulate material to the atmosphere. The removal of vegetation for construction would subject soils to wind erosion until regrowth occurs.

Non-condensable gases such as carbon dioxide, methane, hydrogen, nitrogen, argon, carbon monoxide, hydrogen sulfide, radon, and ammonia, and vapors such as boric acid are often associated in varying amounts with geothermal development. Although present in small percentages, some of these non-condensable gases may pose possible pollution and health hazards. Existing technology and strict regulatory standards would reduce such emissions below hazardous levels.

Non-condensable gases, particularly hydrogen sulfide (H₂S), emitted from a well during testing, or from a cooling tower when a power plant is operating, can cause health hazards and/or unpleasant odors (rotten egg smell) in and around the developed area.

Condensed steam from geothermal development may contain contaminants that, if present in high concentrations, could be damaging to plant and animal life, depending upon mode of release. Terrestrial and aquatic animals ingesting natural food contaminated by emission fallout could be affected; however, existing geothermal experience indicates that biotic problems of this nature are generally negligible.

Pollution control measures required by current regulations to maintain ambient air quality standards and Prevention Significant Deterioration (Best Available Control Technology) would result in minimal effects on air quality in the region from released gases from exploration, development, and production of geothermal resources.

Closeout

Dust would be attributed to reclamation processes such as recontouring. Once reclamation is completed, fugitive dust, emissions, and steam production would cease.

No Action Alternative

Under the no action alternative, impacts as described above would not occur.

E. Cultural, Paleontological, and Historical Resource Values

Proposed Action

All subsequent ground disturbing activities are subject to the Section 106 compliance process. Under the provision of Section 106 of the NHPA and its implementing regulations (36 CFR 800), the BLM is required to identify, evaluate, and mitigate effects to historic and cultural properties within the Area of Potential Effect (APE) for any undertaking. A Class III cultural inventory would be conducted over all ground disturbing project areas within the proposed lease. Results would be evaluated and mitigated so that undertakings effects would be minimized in accordance with the State Protocol Agreement between the Bureau of Land Management, Nevada and the Nevada State Historic Preservation Officer.

A visual assessment would be required for subsequent activities to determine whether or not the activity would adversely affect the visual integrity of the Pony Express Trail and the Lincoln Highway.

Exploration

Exploration activities that do not require surface disturbance (i.e. – geological and geochemical surveys) would not impact any cultural, paleontological, or historical resources. Surface disturbing exploration activities (i.e. - drilling temperate gradient wells) would be subject to cultural inventories prior to exploration in order to mitigate any potential impacts.

Development and Production

An intensive cultural inventory would be required prior to development. If any cultural resources were found in the proposed development area, development would be subject to established protocols and coordination with the State Historic Preservation Office.

Closeout

No impacts are anticipated during reclamation of disturbed areas.

No Action Alternative

Under the no action alternative, impacts as described above would not occur.

F. Visual Resource Management (VRM)

Proposed Action

The proposed action and RFD would meet the objectives of VRM Class IV.

As stated under Cultural, Paleontological, and Historical Resource Values, a visual assessment would be required for subsequent activities to determine whether or not the activity would adversely affect the visual integrity of the Pony Express Trail and the Lincoln Highway.

Exploration

Exploration activities would meet the objectives of VRM Class IV.

Development and Production

Development and production would meet the objectives of VRM Class IV. According the VRM Class IV objectives stated in Visual Resource Contrast Rating (H-8431-1) (January 17, 1986), "...management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful locations, minimal disturbance and repeating the basic elements" (Appendix 2). The basic elements are form, line, color, and texture. Additional Visual Resource Contrast Rating assessments would be performed prior to the approval of such activities, and may result in additional stipulations. Information needed to complete this assessment would include:

1. Exact locations where structures are to be placed within the project area
2. Design of structures (size, type, form, texture of building materials and construction method)
3. Life expectancy
4. Operations and maintenance schedule

Closeout

Activities associated with closeout would meet the objectives of VRM Class IV. Additional Visual Resource Contrast Rating assessments would be performed prior to the approval of such activities, and may result in additional stipulations. Information needed to complete this assessment would include:

1. Final landform appearance (grades, slopes, drainage patterns)
2. Type, location, method, quantity, and timing of replanting and/or reseedling

No Action Alternative

The no action alternative would not affect visual resources and would meet the objectives of VRM Class IV.

G. Wildlife

Proposed Action

Exploration

Wildlife present in the proposed action area may experience short-term stress and temporary displacement due to exploratory activities

Loss of approximately 3.9 acres of wildlife habitat would occur.

Development and Production

Wildlife could experience short-term stress if displaced from areas of development and production. The RFD would not obstruct access to water sources. No long-term effects on behavior, health, or species survival are anticipated. No loss of wildlife is expected because it is assumed that wildlife would leave the area once development activities commence.

Condensed steam from geothermal development may contain contaminants that, if present in high concentrations, could be damaging to plant and animal life, depending upon mode of release. Terrestrial and aquatic animals ingesting natural food contaminated by emission fallout could be affected; however, existing geothermal experience indicates that biotic problems of this nature are generally negligible.

Activities including construction of roads, ponds, drill sites, wells, and transmission facilities would result in loss of approximately 27 acres of habitat over the life of the project.

Construction and production noises may affect predator-prey relationships or mating and rearing habits. Noise would also cause some species and/or individuals to relocate.

Species such as coyote and antelope with large home ranges are less likely to be affected.

Closeout

Reclamation would restore wildlife habitat to its present state and, through mitigation, may result in improved habitat.

No Action Alternative

Under the no action alternative, impacts as described above would not occur.

H. Migratory Birds

Proposed Action

Timing restrictions for subsequent actions would mitigate impacts to migratory birds by limiting ground disturbing activities during nesting seasons.

Exploration

Loss of approximately 3.9 acres of nesting habitat would occur.

Development and Production

Loss of nesting habitat would occur. Development would result in surface disturbance of approximately 27 acres. The presence of facilities, as well as noise from construction and

production, would cause migratory birds to not nest in areas immediately adjacent to any developments.

Closeout

Reclamation would restore nesting habitat to its present state and may result in improved habitat.

No Action Alternative

Under the no action alternative, impacts as described above would not occur.

J. Invasive, Non-Native Species (Including Noxious Weeds)

Proposed Action

Exploration

Surface disturbing exploratory activities in the proposed action area would provide approximately 3.9 acres of surface disturbance where invasive, non-native species can become established.

Development and Production

Approximately 27 acres of surface disturbing activity would likely result in establishment of invasive, non-native species in the disturbed areas, especially along roads and in drill pad areas. After reclamation is completed, the opportunistic, annual, invasive species in the area often establish themselves as the dominant species for the first growing season. As the native perennials become established, it is expected that these invasive annuals would decrease over time.

Closeout

As stated above, invasive species would decrease over time, as native vegetation becomes re-established.

No Action Alternative

Under the no action alternative, the opportunity for large infestations on new disturbance would not occur. Invasive species, particularly cheatgrass, continue to gradually increase throughout the Steptoe Valley even without additional disturbance.

VI. CUMULATIVE IMPACTS

According to the BLM handbook Guidelines for Accessing and Documenting Cumulative Impacts (1994), the amount of analysis that is necessary can be greatly reduced by limiting cumulative analysis only to those issues and resource values identified during scoping that are of major importance. The issues and resource values of major importance or public concern which

will be analyzed for cumulative impacts are impacts to socio-economic - energy development and production; visual resources; water quality; and wetlands, floodplains, and riparian.

Cumulative impacts result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts could result from individually minor, but collectively significant actions, taking place over a period of time (Council on Environmental Quality, Regulations for Implementation of NEPA, 1508.7).

A. Socio-Economic - Energy Development and Production

Past Actions

Economic activities in Steptoe Valley, North of Ely, have been generally confined to agriculture. A major highway - US 93 - and the Northern Nevada Railroad run through the valley. Energy development has been limited to oil and gas exploration. A shallow geothermal well was drilled into the Monte Neva Hot Springs in 1965.

Present Actions

In addition to the continuation of the past actions, there are currently two proposals for coal fired generating facilities. White Pine Energy (LS Power) is planning a 1,300 acre facility that would generate up to 1.600 megawatts. Sierra Pacific is planning a 3,000 acre Ely Energy Center with multiple 500 to 750 megawatt plants.

Wind energy facilities have been proposed for the mountain ranges that bound Steptoe Valley. Nevada Wind / LS Power is proposing a 4,400 acre wind generation facility which would produce up to 500 megawatts of electricity.

LS Power / Idaho Power currently holds a right-of-way grant for a 500 kv transmission line, South West Intertie Appendix II Project (SWIP), that would be constructed in the SWIP corridor.

Reasonably Foreseeable Future Actions

The past and present actions would continue and a geothermal generating plant would be constructed on or near the proposed lease. One or more coal fired power generating facilities would be constructed and begin production. The wind energy farm would be developed. The SWIP transmission line would be constructed. The Nevada Northern Railroad track would be upgraded to supply coal to the power plants and possibly transport copper concentrate from Ely to connecting rail lines. Transmission lines and railroad spurs would be constructed for the coal fired power plants. A total of 8,700 acres would be developed for coal fired and wind energy production. As many as 27 acres would be developed for geothermal production.

Should the exploration and production of this lease area prove economically beneficial to the operator, additional geothermal activities would probably be proposed. Similarly success with coal and wind generation facilities may lead to expanded production.

Production tax credits may be awarded to renewable energy sources in the near future.

Impacts - Proposed Action

The past, present, and reasonably foreseeable future actions in combination with the RFD of the proposed action would help increase alternative and conventional power supplies throughout the Southwest. They would increase the tax base and economic opportunities for employment and businesses in White Pine County.

Impacts - No Action Alternative

Geothermal production would not contribute to energy development and production. Wind and coal fired generation would go forward.

B. Visual Resource Management (VRM)

Past Actions

Steptoe Valley, in the area of the proposed lease, is generally undeveloped agricultural land. Features include three abandoned oil well pads and access road, County roads, US highway 93, power lines, and the Northern Nevada Railroad.

Present Actions

Same as past actions.

Reasonably Foreseeable Future Actions

Several proposals for new operations involving large infrastructure have been proposed. A coal fired power plant would be constructed and begin production. A wind energy farm would be developed. The SWIP transmission line would be constructed. The Nevada Northern Railroad track would be upgraded to supply coal to the power line and possibly transport copper concentrate from Ely to connecting rail lines.

Impacts - Proposed Action

The past, present, and reasonably foreseeable future actions in combination with the RFD of the proposed lease action would alter the rural character of this portion of Steptoe Valley. A geothermal facility would add approximately 27 acres of visual disturbance to the Steptoe Valley Area. Power plants would add as much as 4,300 acres; a wind farm, 4,400 acres. Railroad spurs and transmission lines add additional visual disturbance.

Impacts - No Action Alternative

Geothermal activities would not contribute to visual changes to Steptoe Valley. The other projects in the Reasonably Foreseeable Future Actions would probably go forward.

C. Ground Water Quality/Quantity

Past Actions

Shallow wells have been developed along Duck Creek in Steptoe Valley to provide water for irrigation of agricultural lands.

Present Actions

Agricultural water continues to be pumped from shallow wells along Duck Creek in Steptoe Valley.

Reasonably Foreseeable Future Actions

The Reasonable Foreseeable Development Scenario predicts a consumption of as much as 0.4 acre feet per day (150 acre feet per year) of water. Nevada Statutes allow for a “reasonable loss of water” (NRS 524A.004) during well testing and operations in systems where the water is reinjected back into the same aquifer or reservoir. It is expected that geothermal production would come from reservoirs located at depths below 8,000 feet. Water at this depth would be part of the carbonate aquifer and be recharged by deep circulating waters.

The proposed coal fired facilities would obtain water from a series of wells to be drilled in Steptoe Valley. The northern-most well proposed by White Pine Energy is located approximately 3 miles southeast (upstream) of the proposed geothermal lease. Well depths would be in the hundreds of feet and tap water in the valley alluvium. The consumption is estimated at 5,000 acre feet per year for one facility and 8,000 acre feet per year for the other, a total of 13,000 acre feet.

Impacts – Proposed Action

Pumping of 13,000 acre feet of groundwater for the coal fired power plants plus continued agricultural pumping would probably lower the water table in the Steptoe, including the proposed lease area. The geothermal pumping and reinjection would result in a net use of approximately 150 acre feet per year. Because it would probably occur within the carbonate aquifer at depths below 8,000 feet, drawdown effects would be spread out over an extremely wide area in comparison to the shallower alluvial well systems and have little influence on the water table in the valley alluvium.

It is not anticipated that pumping of the deep geothermal aquifer would affect the shallower valley fill aquifer of the power plant wells. Likewise, it is probable, but less certain that pumping from the valley alluvium would not disrupt the recharge to the deep geothermal reservoir.

Impacts – No Action Alternative

Groundwater pumping by a power plant and continued agriculture use would decrease the amount of available near surface water in this portion of Steptoe Valley by an amount relatively unaffected by the operation of a geothermal facility.

D. Floodplains, Wetlands, and Riparian

The wetlands along the floodplain of Duck Creek extend from McGill, northward to Goshute Lake in Elko County.

Past Actions

Wetlands along Duck Creek in Steptoe Valley have been developed for agricultural purposes, both grazing and irrigated croplands. Much is in private ownership.

Present Actions

The US Army Corps of Engineers is seeking jurisdictional authority over the wetlands in Steptoe Valley. Once granted, a Section 404 permit will be required for all activities affecting the wetlands.

Reasonably Foreseeable Future Actions

Exploration and development of a possible geothermal field and generating plant would occupy as many as 27 acres of the proposed 640 acre lease. Pumping and reinjection would probably occur from depths below 8,000 feet. There would be a “reasonable loss of water” (NRS 524A.004) during exploration drilling and operation.

The coal fired power plants would obtain groundwater from a series of shallow wells in Steptoe Valley. The proposed geothermal lease is located on the downstream (north) end of the proposed LS Power (White Pine Energy) water field.

Reconstruction of the Northern Nevada Railroad, construction of the rail spurs that would supply coal to the proposed power plants, and construction of the SWIP utility line could all cross or otherwise occupy portions of the wetlands.

Impacts – Proposed Action

The proposed action would contribute to the temporary occupation of as much as 27 acres of wetlands. Wetlands acreage occupied by the reasonably foreseeable future actions has not been determined.

As discussed above in “C. Groundwater Quality/Quantity,” groundwater pumping for the coal fired power plants and continued agricultural use would decrease the amount of water available to the wetlands. This would result in a smaller area of marsh land and a shorter duration of time

of inundation. There would be comparatively little, if any, contribution to drawdown from the geothermal pumping.

Impacts – No Action Alternative

The no action alternative would not contribute to cumulative impacts to wetlands and floodplains. Continued and proposed consumptive uses of water in Steptoe Valley may still decrease the amount of water available to the wetlands.

VII. PROPOSED MITIGATION MEASURES

A lease stipulation has been included in the proposed action. No additional mitigation measures are proposed as a result of the analysis of the potential impacts.

VIII. SUGGESTED MONITORING

No monitoring measures have been deemed necessary for implementation of the proposed action. No monitoring is suggested as a result of the analysis of the potential impacts.

IX. CONSULTATION AND COORDINATION

A. Intensity of Public Interest and Record of Contacts

The proposed action was posted on the Ely BLM website on May 17, 2006. No comments were received regarding the proposed action.

The proposed action was discussed during the Ely Field Office's Tribal Coordination Meeting held on May 18, 2006. No concerns were identified.

B. Internal District Review

Gary Medlyn	Air Quality; Water Quality; Floodplains; Riparian/Wetlands
Stephen Leslie	Wilderness; Visual Resource Management
Jared Bybee	Wild Horses and Burros
John Longinetti	Invasive, Non-Native Species; Range
Paul Podborny	Wildlife; Migratory Birds; Special Status Species;
Susan Baughman	Environmental Coordination
Nathan Thomas	Cultural, Paleontological, and Historical Resources
Elvis Wall	Tribal Coordination
Bill Wilson	Geology

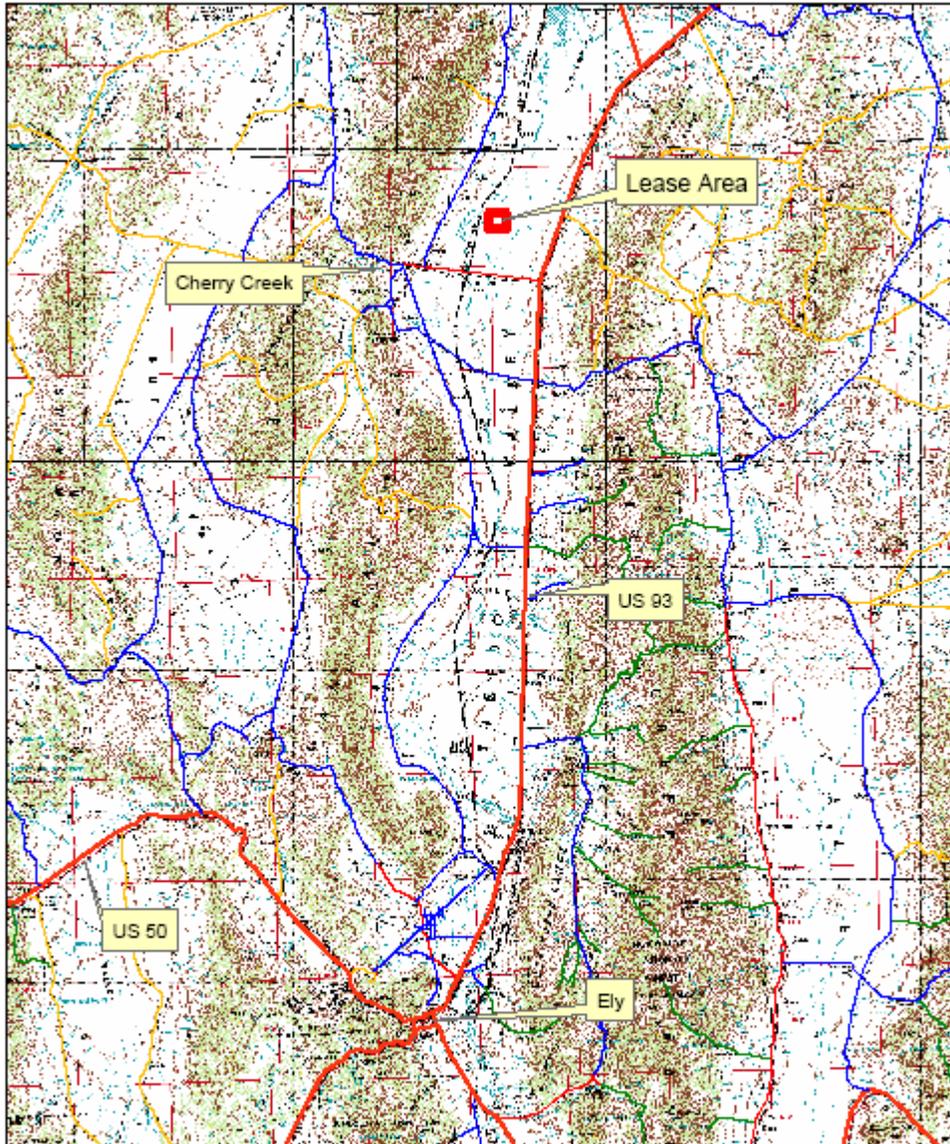
Appendix I: Location map of Proposed Lease Area

Cherry Creek Station 7.5' Quad
T 24 N, R 64 E, Sec 19

Location Map
Proposed Geothermal Lease
Cherry Creek
White Pine Co., Nevada



Ely BLM District



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.

w/w 7-12-06
N-80071
EA NV-040-06-038

Appendix II – References

Garside, L.J. and Schilling, J.H., 1979, Thermal Waters of Nevada: Nevada Bureau of Mines and Geology, Bulletin 91

Hose, R.K. and Blake, M.C., 1976, Geology and Mineral Resources of White Pine County, Nevada: Nevada Bureau of Mines and Geology, Bulletin 85, Part I: Geology

Shevenell, L., Garside, L.J., and Hess, R.H., 2000, Map 126 Nevada Geothermal Resources: Nevada Bureau of Mines and Geology

Appendix III

SPECIAL STIPULATIONS FOR CHERRY CREEK GEOTHERMAL LEASING

General

1. The lessee is hereby made aware that consistent with 43 CFR 3200.4, all post lease operations will be subject to appropriate environmental impact analysis. If impacts cannot be mitigated below significant, subsequent geothermal stages may be limited or denied.
2. The lessee shall contact the appropriate BLM Authorized Officer (AO) to discuss any proposed activities prior to entry on any lease areas.

In addition to the standard lease terms and conditions, the following stipulations are made part of the lease.

Wetlands Stipulation

For the purpose of protecting wetlands, lease operations are subject to a Section 404 permit from the US Army Corps of Engineers.

Pony Express Trail and Lincoln Highway Stipulation

Any activity planned within the viewshed of the Pony Express and California National Historic Trails, the Historic Lincoln Highway, National Scenic and Historic Trails, listed National Register Districts, or properties eligible under Criterion a, b, and/or c, must undergo a visual assessment. Appropriate mitigation of visual impacts would be implemented as necessary to keep the setting of the management corridor in as natural condition as possible.

To meet visual management objectives for the Pony Express National Historic Trail/Overland Trail (Instruction Memorandum NV-2004-004 and NV-2004-006) a Section 106 consultation under the National Historic Preservation Act with the State Historic Preservation Officer for a determination of effect must be completed prior to actual operations. The consultation procedures would follow the Nevada State Protocol between the Nevada BLM and the Nevada State Historic Preservation Officer. The consultation process may involve review by the Advisory Council on Historic Preservation and development of a Memorandum of Agreement with the State Historic Preservation Officer and Advisory Council on Historic Preservation. These procedures may delay the operation up to 120 additional days above the 60-day timing limitations allowed under Section 6 of the lease instrument. Treatment plans and data recovery also may be required at the expense of the operator prior to approval of operations. Data recovery also may result in additional delays which may exceed 120 days in addition to the Section 106 consultation process.

Migratory Bird Restriction

Operations commencing during the period May 1 to July 15 will be subject to the provisions of the Ely District Policy for Management Actions for the Conservation of Migratory Birds. A qualified wildlife biologist will survey the area for nesting migratory birds. If any are found, operations will be postponed until after July 15.

Appendix IV

REASONABLE FORESEEABLE DEVELOPMENT SCENARIO FOR A TYPICAL GEOTHERMAL LEASE IN THE CHERRY CREEK AREA

The Reasonable Foreseeable Development Scenario (RFD) for subsequent exploration and development on a 1,000-acre parcel such as this would be to develop a 10 to 15 megawatt plant. Total of surface disturbance would be on the order of 26.4 acres including the power plant, wells, roads, pipelines, power lines, and other associated features. The following scenario, developed for similar geothermal leases in Nevada, is similar to that expected for the Cherry Creek lease.

A. Geothermal Lease Development Processes

Four separate and sequential stages of geothermal development would occur. The probable sequence and degree of environmental impact would be contingent upon the success or failure of each preceding stage. These are exploration, development, production, and closeout.

1. Exploration

This stage includes all activities from the decision to explore through the drilling of temperature gradient wells. The discrete actions or identifiable actions, which, in aggregate, comprise this exploration include:

- a. Geological, geochemical, and geophysical surveys
- b. Drilling temperate gradient wells

Geological and geochemical surveys are the first type of investigations an operator would conduct, and consist of analyzing the surface geology and collecting water samples from hot springs. This work usually covers a broad area. Based on the geological and geochemical analyses, inference may be made as to where higher temperature gradients may occur. Geological and geochemical surveys are considered casual use operations because they typically do not cause surface disturbance or impact resources. Therefore, an operator is not required to obtain authorization from BLM prior to conducting these operations.

The next step in exploration would be to confirm where higher temperature gradients occur. This would be done by drilling temperature gradient wells. Such wells would be narrow in diameter and drilled to depths of several hundred to several thousand feet. When completed, the operator would lower a thermistor down the well to measure how much the temperature gradient increases with depth.

An operator may not produce any fluids out of, or inject any fluids into, a temperature gradient well.

An operator may drill several gradient wells on a lease to determine the aerial extent of the temperature anomaly and where the highest temperature gradient occurs. Well pads are about 0.07 acres (55 feet by 55 feet) in size. Typically, these wells are located adjacent to existing roads, but some road construction may be necessary. All surface disturbances must be reclaimed. An operator may receive approval of a Notice of Intent to conduct exploration without having a lease in effect.

2. Development

This would be the stage of the most intense activity. Developmental drilling would outline the producing limits of the field(s). Because of the intense drilling at this time, accidental spills, leaks, blowouts, and fires are more likely to occur and have the greatest impact on the surface. Development would include the following discrete operations:

- a. **Road construction:** Often new access roads must be built to well pad sites. These roads are usually ½-3 miles in length.
- b. **Drill site development:** A well pad for a production well is usually 2 acres (300 feet by 300 feet) in size. One or two wells may be drilled on a lease.
- c. **Geothermal pipelines:** Pipelines are usually 24-36 inches in diameter and covered with insulation, and would parallel the access road when possible and may be 1-4 miles in length.
- d. **Power plant construction:** Electrical generation plants would range in generating capacity from 10 to 15 megawatts. The plant and other required facilities would occupy up to 10 acres. Direct use facilities, used for green houses or vegetable dehydration, may be built. These facilities may occupy 5-30 acres.
- e. **Electric transmission lines:** Electric transmission lines may range in length from 5 to 50 miles. They would most likely be supported by wooden poles.
- f. **Rehabilitation:** All surface disturbances must be reclaimed to BLM's satisfaction. All wells must be properly plugged and abandoned.

3. Production

This stage would involve the operation and maintenance of the field(s) and would include the following discrete operations:

- a. New drill sites
- b. Maintenance of existing facilities
- c. Waste disposal
- d. Production of geothermal energy
- e.

4. Closeout

This stage would involve abandonment after production ceases and would include the following discrete operations:

- a. Removal of surface equipment
- b. Capping and cementing drill holes and wells
- c. Surface rehabilitation

B. Surface Disturbance

1. Exploration

Up to three Shallow Temperature Gradient Exploration Wells (less than 3,000 feet deep) may be drilled this lease. This would disturb up to .3 acre. Three new access roads each ½-mile in length would disturb of total of 3.6 acres. Total disturbance per lease is 3.9 acres.

2. Development

Up to two production or injection wells would be drilled on this lease. Each well pad would disturb 2 acres. A 2-mile access road would disturb 9.6 acres. Each pipeline would disturb 4.8 acres. A power plant would occupy 10 acres. A transmission line would disturb 1 acre per mile of line. Total surface disturbance for all phases of development would be 26.4 acres plus one acre per mile of transmission line.

C. Time Frame of the Proposed Action

The issuance of competitive and noncompetitive geothermal leases can take place before, during, or after the completion of the initial exploration stage. The time frame for a typical geothermal project is estimated as follows:

Exploration.....1 to 5 years

Development.....2 to 10 years

Production.....10 to 30 years (depending on the time required to construct geothermal power producing facilities)

TOTAL TIME.....13 to 45 years

D. General Assumptions

- 1. Until actual exploration and development of geothermal begins, it is difficult to quantify the resource potential and possible future intensified production measures necessary to develop the resources. In order to assess environmental impacts resulting

from an action as general as geothermal exploration, development, and production, it is necessary to assume given levels or intensities of such development.

2. Geothermal fluid production and associated waste production of geothermal fluids are likely for short periods as wells are tested to determine reservoir characteristics. If geothermal fluids are discovered in commercial quantities, development of the geothermal field is likely.
3. The rate of fluid production from a geothermal reservoir is unknown until the production-testing phase is completed. Using data from other areas of geothermal development, it appears that production of geothermal fluids could be expected to vary from 440,000 to 900,000 gallons per day per well and average 670,000 gallons per day per well.
4. About 15-25 percent of the geothermal fluid produced from wells would flash to steam and be used to drive the turbines in the power plants. Using 20 percent as an average, the following compilation lists the amounts of geothermal fluids expected to be produced during a 15-day testing period of a 2,560 acres lease:

Fluid Production per Test Well	10,050,000 gallons	31 ac. ft.
Amount Converted to Steam	- 2,010,000 gallons	- 6 ac. ft.
Amount Left for Disposal	8,040,000 gallons	25 ac. ft.

5. During the initial testing stage, one well is likely to be tested at a time. Therefore, the quantities shown above are likely to be spread over a period of time rather than one 15-day period.
6. The following compilation summarizes the amounts of fluids that could be produced and disposed of each day for a producing well, if testing is successful:

Fluid Production per Well per Day	670,000 gallons	2.0 ac. ft.
Amount Converted to Steam	- 134,000 gallons	- .4 ac. ft.
Amount Left for Disposal	536,000 gallons	1.6 ac. ft.

7. A wide range of minerals may be dissolved in geothermal fluids. Some of these minerals may be undesirable and/or detrimental in large quantities. Standard drilling procedures would prevent geothermal fluid from mixing with surface and ground waters.
8. Most of geothermal fluids produced in the proposed action area would be disposed of by re-injection into the geothermal reservoir. Smaller portions may be disposed of in holding ponds, particularly during the exploration/testing phase.