

**APPENDIX D**  
**STANDARD OPERATING PROCEDURES**  
**FROM 2006 GEOTHERMAL LEASING EA**

## **D.1 STANDARD OPERATING PROCEDURES (SOPS) <sup>1</sup>**

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In addition to the restrictions on leasing authority contained in the Geothermal Steam Act, the CCFO CRMP, and other established law or regulation, as described in Chapter 1, the following SOPs for leasable minerals are set forth in the CCFO CRMP (BLM 2000). These SOPs define the approach to managing leasable mineral exploration and development in the CCFO management area.

1. Oil, gas, and geothermal exploration and production upon BLM land are conducted through leases with the Bureau and are subject to terms and stipulations to comply with all applicable federal and state laws pertaining to various considerations for sanitation, water quality, wildlife, safety, and reclamation. Stipulations may be site specific and are derived from the environmental analysis process.
2. Geophysical exploration permits for oil, gas or geothermal resources may be obtained prior to leasing of the lands. Mitigation of any resource conflicts identified in the review process will be stipulated in the permit.
3. Wilderness Study Areas are closed to mineral leasing.

## **D.2 CONDITIONS OF APPROVAL**

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All ground disturbing activity related to geothermal exploration, development, operation, and closeout in the CCFO management area are subject to BLM environmental review and permit approval. As part of these reviews, BLM may require the following types of measures to reduce impacts to resources. Measures listed below are representative of the types of measures that may be included as part of environmental review or permit approval. Additional measures may be included to address site-specific concerns, including SOPs for other resources described in the CCFO CRMP.

### **D.2.1 CONDITIONS OF APPROVAL**

#### **Geophysical Exploration**

1. The operator shall furnish a project map(s) at a minimum scale of 1:100,000 with the Notice of Intent (NOI) depicting the approximate line route to be used. A map shall also be filed with the Notice of Completion (NOC) depicting the actual location of the complete line.
2. Any changes in location of exploration lines or test arrays will be brought to the attention of the Authorized Officer (AO) prior to the change being made on the ground.
3. No blading or other dirt work will be allowed without prior approval of the AO.
4. All geophysical exploration activities will be in compliance with Washoe County or State of Nevada air quality standards.
5. Activities of the geophysical operations shall not prevent, obstruct, or unduly interfere with any activities of other authorized users of the public lands.
6. Removal or alteration of existing improvements (fences, cattle guards, etc.) is not permitted without prior approval of the AO. Existing improvements will be maintained in a serviceable and safe condition.

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<sup>1</sup> Taken from Carson City Field Office, Geothermal Leasing Environmental Assessment; July 2006.

7. Fences shall not be cut without prior approval of the AO. Before cutting through any fences, the operator shall firmly brace the fence on both sides of the cut; a temporary gate will be installed for use during the course of operations unless the fence is immediately repaired. Upon completion of operations, fences shall be restored to at least their original condition.
8. During periods of adverse conditions affecting soil moisture caused by climatic factors such as thawing, heavy rains, snow, flooding, or drought, all activities off existing maintained roads that create excessive surface rutting may be suspended. When adverse conditions exist, the operator will contact the AO for an evaluation and decision based on soil types, soil moisture, slope, vegetation, and cover.
9. Off-road vehicle travel will be limited to that which is necessary for the completion of the geophysical operations. Multiple off-road travel routes will not be permitted without AO approval.
10. The use of specialized low surface impact equipment (wide or balloon tired vehicles, ATVs) and/or helicopters may be required for any activities in off-road areas where it is deemed necessary by the AO to protect the fragile soils and/or other resource values.
11. Powder magazines shall be located at least ¼-mile from traveled roads. Loaded shot holes and charges shall be attended at all times.
12. No blasting will be permitted within ¼-mile of historic trails, natural areas, identified archaeological sites, recreation areas, known caves, water wells, or springs.
13. All trash, flagging, lath, etc. will be removed and hauled to an authorized disposal site. No oil or lubricants shall be drained into the ground surface.
14. Areas proposed for project routes or surface disturbance will be inventoried for the presence of noxious weeds prior to commencement of activities.
15. A noxious weed control program will be developed, maintained, and implemented by the lessee/operator in order to prevent and avoid the proliferation of noxious weeds, as defined in the Nevada Designated Noxious Weed List. The control program shall include a monitoring strategy and contingency plans to address noxious weed control for a period of at least 5 years following completion of use or closeout. The underside of all heavy equipment must be cleaned by water before entering public lands to do work. Driving through or parking on noxious weed infestations will be avoided.
16. It is the responsibility of the lessee/operator to control and treat for noxious weeds and all infestations of noxious or poisonous weeds, resulting from surface disturbance caused by the operator, will be controlled before spreading occurs into the surrounding area.
17. All disturbed areas will be reclaimed as directed by the AO. Bond liability will not be released until this reclamation is completed to the satisfaction of the AO.
18. Reclamation required by the AO will be done concurrently with the exploration operations insofar as possible or within 30 days of the AO's receipt of the NOC.
19. Disturbed areas will be re-seeded with a diverse native perennial seed mix, as specified in the Nevada Final Guidelines for Successful Revegetation, and approved by the AO. Where applicable, disturbed areas will be rehabilitated as lek habitat. Temporary fences will be used to protect re-vegetated areas.
20. Reseeding will be undertaken by the operator between the dates of October 1 and March 15.

21. All topsoil from all disturbances will be stockpiled for use in reclamation. Vegetation that is removed will be stockpiled, shredded, and used as mulch during site rehabilitation. Any delay of reclamation for any reason, such as weather, must be approved by the BLM.
22. Drill hole cuttings will be returned to the hole if possible, or at a minimum, raked and spread out so as not to impede regrowth of vegetation or to create erosion problems.
23. The operator shall notify the AO the date rehabilitation operations commence and are completed.
24. A portable mud pit is recommended when drilling with fluids and will be required by the AO as needed to protect natural resources.
25. Geophysical exploration activities will comply with the regulations of the Nevada Division of Minerals under Nevada Administrative Code, Chapter 534A, Geothermal Resources.
26. A copy of these recommended operating procedures shall be kept by the party chief of each geophysical crew.
27. The operator may be required to have fire-fighting equipment available on-site while operations are in progress, depending on hazards inherent in the type of operation and fire hazard levels. The quantity and type of equipment will be specified by the AO. All uncontrolled fires will be reported immediately to the AO (775-885-6000).
28. Consultation with the U.S. Fish and Wildlife Service is required per section 7 of the Endangered Species Act if any proposed listed or listed threatened or endangered species or its critical habitat is likely to be affected by project activities. If, through consultation, there is deemed to be an adverse impact to a threatened or endangered species or its habitat, the proposal must be modified or denied.
29. Prior to surface disturbance, the Nevada Division of Wildlife will be consulted to determine how to avoid impacts to any special status species or critical habitat in the area proposed for geothermal resource development. If, through consultation, there is deemed to be an adverse impact to a threatened or endangered species or its habitat, the proposal must be modified or denied.
30. Actions which will adversely impact a plant or animal species or its habitat proposed for federal listing as threatened or endangered will be modified in order to prevent possible future listing of these species as threatened or endangered.
31. When BLM determines geophysical activities may impact BLM sensitive species, the operator will be required to conduct a sensitive species survey prior to BLM granting permit approval.
32. When BLM determines geophysical activities may impact migratory birds, the operator will be required to inventory the area prior to BLM granting permit approval.
33. No surface use within 0.6 miles of known migratory bird nesting areas will be permitted in the nesting season, between March and June, or as determined for specific areas by the AO and with input from appropriate wildlife agencies.
34. Any identified bald eagle roost sites, peregrine falcon hack sites, and occupied raptor aeries (nests) will be avoided during geophysical operations. A ½-mile buffer zone will be imposed on all activities in these areas.
35. Measures to avoid impacts to Sage Grouse
  - a. Prior to entry on any lease areas that include known or potential Sage Grouse habitat, lessee/operator shall contact the AO to discuss proposed activities.

- b. No surface occupancy will be permitted within 0.6 miles of any known Sage Grouse strutting grounds (leks).
  - c. No surface use will be permitted within 2 miles of known Sage Grouse breeding areas during the breeding season, March through May, or as determined for specific areas by the AO and with input from appropriate wildlife agencies.
  - d. No surface use will be permitted within 0.6 miles of known Sage Grouse nesting and brood rearing areas between April and August, or as determined for specific areas by the AO and with input from appropriate wildlife agencies.
  - e. No surface use shall be permitted within 0.6 miles of known Sage Grouse winter range between October and March.
  - f. Potential Sage Grouse habitat shall be avoided where possible, or if not possible, off-site mitigation to create habitat at least as suitable as the lost habitat, and at a replacement ratio of 2 to 1, shall be considered.
36. No surface use shall be permitted in crucial migratory routes or winter habitat for mule deer and antelope, between October 15 and April 15, or as determined for specific areas by the AO and with input from appropriate wildlife agencies.
37. Cultural resource inventories will be conducted on all proposed project routes or areas of potential surface disturbing impacts prior to authorization of the geophysical operations. Inventories will be completed by BLM or BLM-approved cultural resource permit holders and section 106 consultation will be completed.
38. All identified cultural resources will be avoided by project-related activities as per the Nevada BLM Programmatic Agreement for Cultural Resources. If avoidance is not feasible, geophysical activities must cease until mitigating measures are developed and implemented and Section 106 consultation is completed. Archaeological monitors may be required in special cases.
39. All traffic associated with geothermal exploration, development, production, and closeout must follow routes that avoid cultural resources. Flagging crews will identify and flag anticipated detours on the route, so that potential detours can be inventoried. The following may be excluded from cultural inventory requirements:
- Operations located on constructed roads or well defined existing roads and trails;
  - Pedestrian routes and placement sites for hand-carried equipment;
  - One time pass routes of wheeled vehicles under 10,000GVW;
  - Helicopter-supported activities that do not require helicopter staging area preparation and use of off-roads and trails; and
  - Exploration activities defined as casual use in 43 CFR 3250.
  - The decision to conduct a cultural clearance on projects involving methods listed above is at the discretion of the AO. All projects that include methods not listed above will require a clearance prior to their initiation.
40. Cultural resource clearance for projects will, at a minimum, involve one of the following types of inventories:
- Class I: A review of existing historic documentation, and field station records. This type of inventory is generally used when the proposed project is located in an area of complete disturbance, or where the area has been previously inventoried using methods consistent with existing standards.

- Class II: A review of existing historic documentation, and field station records and some fieldwork. This type of inventory is generally used when only a portion of the project area has been disturbed, or portions of the project area have been previously inventoried using methods consistent with existing standards. It may also include a determination of significance for cultural properties located within the project area, and a determination of effect.
  - Class III: A complete inventory that includes a review of existing historic documentation and field station records, and a complete inventory of the project area. It will also include an evaluation of significance for cultural properties located within the project area and a determination of effect. This type of inventory is used in areas where there have been no previous inventories, in areas where there has been a change in ground visibility, or the area was inventoried using methods not acceptable by existing standards.
41. The operator is responsible for informing all persons associated with the project that knowingly disturbing cultural properties (historic or archaeological) or collecting artifacts is illegal.
42. During winter geophysical operations, requirements for cultural resource inventories may be waived by the AO if the unsurveyed lines are located on bare and frozen ground or are completely covered (100%) by snow and the snow is sufficiently deep (approximately 4-6") to prevent ground disturbing ruts. Should conditions change while operations are in progress, the Operator must contact the AO to determine if an archaeological monitor or a Class III survey is required prior to continuance of geophysical activities.
43. For any geophysical operations occurring within ¼ mile of listed National Register Districts or National Register-eligible properties and districts, a Section 106 consultation for a Determination of Effect must be completed and mitigation measures developed and implemented prior to authorization.

## **D.2.2 APPLICATION FOR PERMIT TO DRILL (APD) AND SUNDRY NOTICES**

The regulations governing drilling operations on public lands are stated in 43 CFR 3260. With submittal of an APD or Sundry Notice by the operator or lessee, the following conditions of approval will be required for the operation, as applicable.

### **Pre-Construction**

1. Existing roads should be used to the extent possible. Additional roads, if needed, shall be kept to an absolute minimum and the location of routes must be approved by the AO prior to construction.
2. All access roads will be constructed and maintained to BLM road standards (BLM Manual Section 9113).
3. Off-road travel will be restricted to terrain with less than 30 percent slopes, 20 percent if highly erodible, unless approved by the AO.
4. Proposed surface disturbance and vehicular travel will be limited to the approved well location and access route.
5. Any changes in well location, facility location, access, or site expansion must be approved by the AO in advance.
6. Prior to approval of an APD or other lease operations, a Section 106 consultation must be completed by the AO as provided for under the Nevada BLM Programmatic Agreement for Cultural Resources.

7. Any activity planned within a ¼-mile on either side the Pony Express National Historic Trail must undergo a visual assessment. Appropriate mitigation of visual impacts will be implemented as necessary to keep the management corridor in as natural a condition as possible.

### **Well Pad and Facility Construction**

1. A site diagram depicting the location of production facilities, recontoured slopes and stabilization measures shall be approved by the AO prior to installation of production facilities.
2. The design of all facilities, including well pads, roads, pumps, and pipelines, shall be approved by the AO prior to construction to avoid unnecessary conflicts with visual resources management objectives.
3. Drainage from disturbed areas will be confined or directed so that erosion of undisturbed areas is not increased. In addition, no runoff water (including that from roads) will allowed to flow into intermittent or perennial waterways without first passing through a sediment-trapping mechanism. Erosion control structures may include: water bars, berms, drainage ditches, sediment ponds, or devices.
4. Access road construction for exploratory wells should be planned such that a permanent road can later be constructed in the event of field development.
5. Construction of access roads on steep hillsides and near watercourses will be avoided where alternate routes provide adequate access.
6. Access roads requiring construction with cut and fill will be designed to minimize surface disturbance and take into account the character of the landform, natural contours, cut material, depth of cut, where the fill material will be deposited, resource concerns, and visual contrast.
7. Fill material will not be cast over hilltops or into drainages. Cut slopes should normally be no steeper than 3:1 and fill slopes no steeper than 2:1.
8. Low water crossings should be used whenever possible. Installation of culverts, if necessary, will be designed to maintain the original stream gradient and will be of adequate size to accommodate a 24-hour 100-year event. Fill material will be properly compacted in layers not exceeding 6 inches in thickness to insure stability and to prevent washing out or dislocation of the culvert. The road surface should not be less than 12 inches above the culvert to prevent crushing from weight loads.
9. As required, fill slopes surrounding culverts will be riprapped with a well-graded mixture of rock sizes containing no material greater than two feet or smaller than three inches. The ratio of maximum to minimum dimension of any rock shall not exceed 6:1.
10. Water turnouts needed to provide additional drainage will be constructed not to exceed two percent slope to minimize soil erosion.
11. Well site layout should take into account the character of the topography and landform. Deep vertical cuts and steep long fill slopes should be avoided. All cut and fill slopes should be constructed to the least percent slope practical.
12. Trash will be retained in portable trash cages and hauled to an authorized disposal site for disposal. Burning will not be allowed on the well site.

13. No drilling or storage facilities will be allowed within 650 feet of any pond, reservoir, canal, spring, or stream. Other protective areas near water may be required to protect riparian habitat and special status species.
14. As wells are drilled, the AO will require that the drilling company monitor the temperature and outflow of water from local hot springs. If the BLM determines the drilling or production operations have had a significant impact on spring level, outflow, or chemistry, the AO will require the operator take corrective action, which may include amending or shutting down operations
15. Spring and water developments on public lands may be used only with the prior written approval of the AO or the water rights holder.
16. To maintain aesthetics values, all semi-permanent and permanent facilities will be painted to blend with the natural surroundings. Standard environmental colors will be used for color selection. Fences shall be made of non-reflective materials.
17. Fences shall not be cut without prior approval of the AO. Before cutting any fences, the operator shall firmly brace the fence on both sides of the cut; a temporary gate will be installed for use during the course of operations unless the fence is immediately repaired. Upon completion of operations, fences shall be restored to at least their original condition.
18. As directed by the AO, cattle guards will be installed whenever access roads are through pasture gates or fences. These cattle guards shall be maintained. This includes cleaning out under cattle guard bases when needed.
19. The depth of surface soil material to be removed and stockpiled will be specified by the AO. If topsoil is stockpiled for more than one year, the stockpile shall be seeded or otherwise protected from wind and water erosion. The stockpile shall be marked or segregated to avoid loss or mixing with other subsurface materials. Any trees removed will be separated from soils and stockpiled separately.
20. Mud, separation pits, and other containments used during the exploration or operation of the lease for the storage of any hazardous materials shall be adequately fenced, posted, and/or covered.
21. Lessee/operator shall comply with all regulatory requirements for storage and handling of hazardous materials and wastes.
22. All drilling and production operations will be in compliance with Washoe County or State of Nevada air quality standards.
23. If historic or archaeological materials are uncovered during construction, the operator is to immediately stop work that might further disturb such materials, and contact the AO. Within five working days the AO will inform the operator as to whether:
  - a. the materials appear eligible for the National Register of Historic Places
  - b. the mitigation measures the operator will likely have to undertake before the site can be used (assuming in situ preservation is not necessary)
  - c. a timeframe for the AO to complete an expedited review under 36 CFR 800.11 or other applicable Programmatic Agreement, to confirm, through the State Historic Preservation Officer, that the findings of the AO are correct and that mitigation is appropriate
24. If the operator wishes, at any time, relocate activities to avoid the expense of mitigation and/or the delays associated with the process described in item 23 above for inadvertent discovery of cultural resources, the AO will assume responsibility for whatever recordation and stabilization of the exposed materials may be required. Otherwise, the operator will be

responsible for mitigation costs. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, the operator will then be allowed to resume construction.

25. No surface use will be permitted within 0.6 miles of occupied raptor aeries (nests) during the nesting and fledging period.
26. Field development construction activities within 2 miles of a sage grouse lek will require motorized equipment to have noise abatement devices to preclude excessive noise during the sage grouse strutting period.
27. The cutting of rare, unique or unusual trees will not be permitted.
28. Consultation with the U.S. Fish and Wildlife Service is required per section 7 of the Endangered Species Act prior to approval of an APD or other lease operations if any proposed listed or listed threatened or endangered species or its critical habitat is likely to be affected by project activities. If there is deemed to be any adverse impact, the proposal will be modified or the request denied.
29. Fences shall be flagged with bright colored flagging at least every rod for visibility to wild horses. All fences should be constructed using green steel posts with white or silver tops to increase visibility. Fences should also avoid obvious horse migration routes (deep trails, stud piles) if at all possible.
30. No access roads, drill pads, mud pits or storage facilities will be allowed within 500 feet of cave entrances, drainage areas and subsurface passages. No waste material or chemicals will be placed, or disposed of, in sinkholes or gates during specified time frames by cave entrances. If during construction activities any sinkholes or cave openings are discovered, construction activities will cease and the AO will be notified.
31. The discharge of dredged or fill material into surface waters such as navigable and interstate waters and their tributaries, wetlands adjacent to those waters and all impoundments of those waters may require an individual permit or notification under Section 404 of the Clean Water Act (CWA) issued by the District Engineer (DE) of the Corps of Engineers (COE). Criteria applied under Section 404 are established in regulation and will be used to determine the type of permit or notification required.

### **Field Operation**

1. Operations shall be done in a manner that prevents damage, interference, or disruption of water flows, and improvements associated with all springs, wells, or impoundments. It is the operator's responsibility to enact the precautions necessary to prevent damage, interference, or disruptions. Monitoring wells may be required at all sites where exploration or development will occur to assess long-term impacts to quantity and quality.
2. Companies controlling roads that provide access into crucial wildlife areas may be required to close the road with a lockable gate to prevent general use of the road during critical periods of the year when resource problems are experienced (during hunting seasons, winter, etc.). This restrictive measure will be applied where needed to protect wildlife resources or to minimize environmental degradation.
3. The use of closed road segments will be restricted to legitimate, authorized agents of the lessee and/or their subcontractor(s), the land managing agency, and other agencies with a legitimate need (NDOW, other law enforcement agencies, etc.).
4. Unauthorized use or failure to lock gates during specified time frames by the lessee or its subcontractors will be considered a violation of the terms of the APD or associated grants.

5. The operator shall regularly maintain all roads used for access to the lease operation. A maintenance plan may be required. A regular maintenance program may include, but not be limited to, upgrading of existing roads, blading, ditching, culvert and drainage installation, and graveling or capping of roadbed.
6. Management actions within riparian areas will be designed to maintain or, where possible, improve riparian habitat condition.
7. All power poles and potential raptor perches within a 2-mile radius of a potentially active sage grouse lek will include anti-perching devices, placed underground, or otherwise designed to eliminate use by raptors.
8. Noxious weeds that may be introduced due to soil disturbance and reclamation will be treated by methods to be approved by the AO. These methods may include biological, mechanical, or chemical. Should chemical methods be approved, the lessee must submit a Pesticide Use Proposal to the AO 60 days prior to the planned application date.

### **Reclamation and Abandonment**

1. A water well may be accepted by the Carson City Field Office upon completion of operations. Please submit the following information to the Office:
  - Water Analysis
  - Type of inside diameter of casing used in well
  - Total depth of well
  - Depth of concrete seal
  - Depth of static water level
  - Water bearing formation or description of aquifer
2. The operator or contractor will contact the AO 48 hours prior to reclamation work.
3. Restoration work may not begin on the well site until the reserve pits are completely dry.
4. Disturbed areas will be recontoured to blend as nearly as possible with the natural topography prior to revegetation. This includes removing all berms and refilling all cuts. Compacted portions of the pad will be ripped to a depth of 12 inches unless in solid rock.
5. Site preparation for reclamation may include contour furrowing, terracing, reduction of steep cut and fill slopes, and the installation of water bars, etc.
6. All portions of the access roads not needed for other uses as determined by the AO will be reclaimed.
7. The stockpiled topsoil will be spread evenly over the disturbed area.
8. The operator will be required to construct water bars and re-open drainages on abandoned access roads and pipeline routes to minimize erosion as required. Water bars will be spaced appropriately dependent upon topography and slope. Pipeline routes shall be water-barred perpendicular to the fall line of the slope.
9. The area is considered to be satisfactorily reclaimed when all disturbed areas have been recontoured to blend with the natural topography, erosion stabilized and an acceptable vegetative cover has been established. The Nevada Guidelines for Successful Revegetation for the Nevada Division of Environmental Protection, the Bureau of Land Management and the US Forest Service will be used to determine if revegetation is successful.

10. Rehabilitation shall be planned on the sites of both producing and abandoned wells. The entire site or portion thereof, not required for the continued operation of the well, should be restored as nearly as practical to its original condition. Final grading of back-filled and cut slopes will be done to prevent erosion and encourage establishment of vegetation.
11. Petroleum products such as gasoline, diesel fuel, helicopter fuel, crankcase oil, lubricants, and cleaning solvents used to fuel, lubricate, and clean vehicles and equipment will be containerized in approved containers.
12. Hazardous material shall be properly stored in separate containers to prevent mixing, drainage, or accidents. Hazardous materials shall not be drained onto the ground or into streams or drainage areas.
13. Totally enclosed containment shall be provided for all solid construction waste including trash, garbage, petroleum products, and related litter will be removed to an authorized sanitary landfill approved for the disposal of these classes of waste.
14. All construction, operation, and maintenance activities shall comply with all applicable Federal, State, and local laws and regulations regarding the use of hazardous substances and the protection of air and water quality.
15. In construction areas where recontouring is not required, vegetation will be left in place wherever possible and the original contour will be maintained to avoid excessive root damage and allow for resprouting.
16. Watering facilities (e.g. – tanks, developed springs, water lines, wells, etc.) will be repaired or replaced if they are damaged or destroyed by construction activities to its predisturbed condition as required by the AO.
17. When sites are abandoned, they will be inventoried for the presence of noxious weeds and treated if noxious weeds are present.
18. Seed and mulch used to reclaim disturbed areas must be weed free. Mulching of the seedbed following seeding may be required under certain conditions (i.e. – expected severe erosion), as determined by the AO.
19. Seed will be broadcast between October 1 and March 15 using a site-specific seed mixture and depth of planting as determined by the AO. Seed may be applied with a rangeland drill at half the rate of broadcast seeding. All seeding application rates will be in pounds of pure live seed per acre. Seed should be adapted varieties.