Attachment OP-6

Wildlife Protection Plan and Wildlife Monitoring Plan

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PLATE

OP-A6-1 Lost Creek Sage Grouse Monitoring Areas

ADDENDUM

Addendum OP-A6-A Agency Review Letters, Wildlife Monitoring and Protection Plan

Attachment OP-6
Wildlife Protection and Monitoring Plans

LC ISR, LLC has completed extensive baseline wildlife surveys to evaluate existing wildlife resources in and adjacent to the Permit Area (**Appendix D9**). In addition, LC ISR, LLC has implemented protection measures as appropriate to the on-going exploration activities at the site, such as drilling restrictions based on location or timing for wildlife activities and use of appropriate fencing around activity areas. LC ISR, LLC will continue a combination of protection measures and monitoring to improve the current understanding of ISR impacts on wildlife and minimize the impacts.

The Wildlife Protection Plan and the Wildlife Monitoring Plan, in **Sections 1.0** and **2.0** of this attachment, respectively, were developed to prevent impacts to wildlife, where possible; and if impacts are identified or anticipated, the Plans will help minimize those impacts. If needed, additional wildlife protection or monitoring measures can be designed and implemented to minimize or offset anticipated impacts. The Plans were developed to be consistent with recommendations and requirements of USFWS, BLM, WGFD and WDEQ-LQD.

The results and conclusions from each year's wildlife protection and monitoring measures will be included in LC ISR, LLC's Annual Report to WDEQ-LQD, BLM, and NRC.

1.0 WILDLIFE PROTECTION PLAN

LC ISR, LLC recognizes that ISR activities have the potential to impact wildlife, including: loss of habitat; changes in habitat usage due to increased human presence, reductions in food sources, displacement to new areas; and collisions with structures and vehicles. The following protection measures include both impact avoidance and mitigation measures. Those measures that are currently in use during exploration drilling, that are also applicable to ISR operations, will be continued, and new measures will also be implemented as on-site activities increase during ISR operations.

The protection measures include a range of options, from activity restrictions to reclamation. Proposed measures are designed to be consistent with those recommended by the USFWS, BLM, and WGFD. The discussion of the measures is organized into those relating to: Activity Restrictions and Reporting; Infrastructure; Human Disturbance; Site Maintenance and Reclamation; and Habitat Enhancements.

Particular attention was given to protection measures for sage grouse, raptors, and MBHFI because of their presence in the area. The measures for sage grouse were adapted from the Core Population Area Stipulations (WGFD, 2008) to be practical in an ISR environment. The stipulations and their application are included in **Table OP-A6-1**. The project is located on the edge of the South Pass Sage-Grouse Core Breeding Area, as shown on **Figure OP-A6-1** (WGFD, 2008).

1.1 Observation and Reporting of Wildlife Activity

Wildlife observed within and near the Permit Area is described in detail in Appendix D9. The on-going wildlife monitoring plan, which includes annual reporting, is described in detail in **Section 2.0** of this attachment. However, there may be times at which more immediate reporting may be necessary. In particular, any unanticipated new or unusual wildlife activity which could interfere with site operations will be reported to the WDEQ-LQD (and other WDEQ divisions as necessary), USFWS, and WGFD. Similarly, any mortality that could be caused by exposure to toxic substances or other unusual project-related concern will be reported immediately to the WDEQ-LQD (and other WDEQ divisions as necessary), USFWS, and WGFD. The goal of such reporting will be to identify and solve the problem as quickly as possible.

1.2 Timing Restrictions

The major phases of the Lost Creek Project include: *exploration* for ore; *facility construction*; *delineation* of mine units (economic portions of the ore zone); mine unit *installation*; *production* and groundwater *restoration*; and surface *reclamation*. Six mine units are planned within the Lost Creek Permit Area. The units are brought on-line and reclaimed in scheduled succession during the life-of-mine, which is anticipated to be 12 years. The ISR operations and reclamation are described in detail in the main portion of the permit application; and the schedule is included in **Figure OP-4a** of the Operations Plan.

During *exploration* drilling, the standard timing restrictions identified by BLM will continue to be followed, unless otherwise approved by BLM. The timing restrictions for protection of specific species which occur in the vicinity of the Lost Creek Project are listed in **Table OP-A6-2**. It should be noted that exploration drilling took place at the site several times in the past (**Appendix D2**); and LC ISR, LLC has been conducting exploration and delineation drilling at the site since 2005 under Notice WYW-166224 with BLM.

Facility construction, i.e., construction of the on-site office building, the Plant, and associated support facilities, is anticipated to take six to seven months. Construction will begin once agency approvals are obtained.

The *delineation* and subsequent *installation* of the mine unit can be considered as the first step in accessing the ore - similar to topsoil stripping prior to opening a pit at a surface mine - and will occur year-round. However, the similarity ends there as topsoil removal is not necessary over the entire mine unit. Topsoil removal is only necessary at the mud pits, and the topsoil is replaced after drilling. Also, although vegetation is affected in the mine unit, removal throughout the mine unit is not generally required, and the surface area of the mine unit is largely reclaimed, with a native seed mix, prior to production. (In fact, topsoil and vegetation removal over the entire mine unit could be detrimental to shrub recovery given the relative resilience of sagebrush to mechanical disturbance). In addition, installation of injection and production wells and the associated facilities requires about 14 months rather than the several years a surface pit may be open.

During *production* and ground water *restoration*, the wellheads, header houses, and tertiary access roads are the only long-term ISR features on the surface in the mine units. In addition, activities within the mine unit are almost all restricted to daytime hours. A mine unit operator is present at night for security and for process control. Because of the limited surface disturbance during production, surface *reclamation* generally results in minimal disturbance.

1.3 Infrastructure

The infrastructure for the Lost Creek Project is shown on **Figure OP-2a** and **Plate OP-1**. A discussion of which items in the infrastructure are life-of-mine (e.g., the Plant) and which are shorter term (e.g., header houses in Mine Units) is included in **Section OP 2.1**. The reclamation of the infrastructure is described in **Sections RP 3.0 and 4.0**. The steps that will be taken to mitigate impacts of the infrastructure are discussed in the following subsections.

1.3.1 Locations and Disturbance Area

The locations for the mine units are dependent on the ore distribution (**Figure OP-2b**). Within the Lost Creek Permit Area (as in much of Wyoming), the ore occurs in long, narrow, sinuous ‘roll front’ deposits. The deposits are usually in sandstones, which are vertically separated by shales, so there may be mine units at different depths at overlapping locations. The ISR process is iterative; new mine units are brought into

production as older mine units are reclaimed. Therefore, not all of the disturbance occurs at once, and the disturbance is clustered, which will minimize disruptions to wildlife.

The proportion of disturbance within the Permit Area is less than 10% of the Permit Area (**Table OP-A6-3**). In addition, ISR minimizes surface disturbance since in most cases topsoil and vegetation are left intact. In areas where vegetation is removed, revegetation efforts will commence at the next appropriate season, using native seed mixes approved by BLM and WDEQ-LQD. Consideration was also given to use of existing roadways wherever possible to minimize disturbance of new lands (**Table OP-A6-1**).

The orientation of the project facilities and existing sage grouse leks are shown on **Figure OP-A6-2**. The majority of the mine units are outside the two-mile buffers for the closest active and occupied leks, which are the Green Ridge Satellite Lek to the east and the Discover 2 Lek to the west. (Although the two-mile buffers are no longer applicable in the Core Breeding Areas, the buffers were recognized when wildlife monitoring for the Project began in 2006.) The necessary support facilities were sited, in part, based on distance from existing occupied sage grouse leks. In particular, the Plant was sited between the two-mile buffers for the closest active and occupied leks. The closest lek (Crooked Well lek) is considered "occupied and inactive" based on data from the last several years (**Attachment D9-4**).

For comparison with the current sage grouse Core Population Area Stipulations, the disturbance is broken down by section in **Table OP-A6-3.**

Existing raptor nests are located greater than one mile away from proposed ISR activities (**Figure D9-7**). If the annual raptor nest survey locates a new raptor nest (Section 2.3), the USFWS and WGFD will be consulted to determine appropriate mitigation measures. If needed, appropriate mitigation permits will be obtained from the USFWS and WGFD.

Based on breeding bird surveys, the Lowland Big Sagebrush habitat, described in **Appendix D8**, provides the most important breeding habitat for MBHFI passerine bird species in the area. Only a small portion of this habitat will be disturbed (**Table OP-A6-3**), and where possible, project activities will be located outside of this habitat area.

1.3.2 Roads and Utilities

Access roads will follow existing two-track roads to the extent possible to help minimize disturbance of habitat. Road widths will be minimized while still conforming to the International Fire Code, as requested by county zoning. The existing two-track road network is shown on **Figure D7-3**, and proposed road locations and improvements are

discussed in **Section OP 2.6**. Existing two-track roads that are adjacent to the main access road and Plant will be gated (only if approved by the BLM) and or signed to help prevent additional traffic disturbances in the area. Travel outside of primary construction and drilling areas will be minimized through the installation of main and secondary access roads.

Because of the proximity of existing public roads and the access roads to some of the leks, line-of-sight analyses were conducted with GIS and in the field. The GIS analyses evaluated what was visible if the viewer's line of sight were one meter above the ground (slightly taller than a sage grouse) and two meters above the ground. The results for the leks that are 'Occupied and Active' are included on **Figures OP-A6-3a** (Green Ridge Lek), **OP-A6-3b** (Green Ridge Satellite Lek), **OP-A6-3c** (Discovery Lek), and **OP-A6-3d** (Discovery Satellite [or Discovery 2] Lek). The results for the Crooked Well Lek that is 'Occupied and Inactive' are included on **Figure OP-A6-3e**. Purple is used to show areas that are visible from the lek at a line of sight one meter above the ground, and blue is used to show additional areas that are visible from two meters above the ground. (On the figures, the green triangle is a relatively large symbol because the dimensions of the lek are not precise.)

From the Green Ridge Lek, part of the Sooner Road, which is an existing public road (BLM Road 3215), and the East Access Road may be visible from the eastern side of the lek. Portions of the Permit Area may also be visible, although those portions are three miles away or more. Less of the roads may be visible from the Green Ridge Satellite Lek, a closer portion of the Permit Area may be visible. However, the only facility in this portion of the Permit Area is one of the deep wells (**Plate OP-1**). From the Discover Lek, parts of the Wamsutter-Crooks Gap Road, which is an existing public road (County Road 23), the West Access Road, and the main portion of the Permit Area are visible. However, most of the closest of these features, the West Access Road, is not visible. (At its closest point, the West Access Road is about 0.5 miles north of the Discover Lek.) From the Discover 2 Lek, even less is visible as it sits in a topographic low. The GIS results for the Discover and Discover 2 Leks were confirmed by field observations in September 2009. **Figure OP-A6-4** includes 360° panoramic views standing at the approximate locations of the Discover and Discover 2 leks. In both cases, a subtle ridgeline to the north obstructs a clear view of the West Access Road. The Crooked Well Lek is apparently in a topographic low given the scattered visibility from the lek.

LC ISR, LLC will complete a detailed analysis of potential road and disturbance impacts to sage grouse in the Permit Area and a larger regional monitoring area (Section 2.3.3).

The proposed pipelines, transmission line, and any other utilities will be placed in or adjacent to the access road ROW to help minimize habitat impacts where possible. To prevent the electrocution of raptors, the primary and secondary transmission lines and

power poles will be built to the latest approved methods (Olendorf et al., 1996). This will include cross-arm design, and transformer design. Tertiary transmission lines will be buried in order to minimize risks to raptors and large birds. In addition, to discourage roosting by raptors and corvids (and, in turn, increased predation on sage-grouse), appropriate anti-perching and anti-roosting devices will be placed on power poles and cross-arms.

1.3.3 Fencing or Screening

The ISR activities that require a visual deterrent, fencing, or screening include: the mine units; mud pits used during well installation; and the storage ponds. The specific types of deterrent, fencing, or screening for these activities are outlined below.

1.3.3.1 Plant and Mine Units

The Plant and mine units will be fenced to keep out cattle and wild horses but will be constructed to allow the passage of antelope and other wildlife (Type III fencing per LQD Guideline 10). The fences will be removed after ISR operations are complete and vegetation has become reestablished in accordance with permit requirements (**Section RP 4.5.4**) unless otherwise approved and agreed upon with the landowner (BLM).

Deleted: M

1.3.3.2 Mud Pits

As during exploration drilling, LC ISR, LLC will continue to fence mud pits outside of the fenced portion of the Mine Units. Inside the fenced portion of the mine units, mud pits will not be fenced, in part due to the limited time the pits are open and the level of activity around the pits while they are open. Mud pits have not been the cause for significant wildlife mortality at other ISR operations. If conditions are found to differ from those at other ISR operations, more protective measures, such as temporary fencing, will be evaluated.

1.3.3.3 Storage Ponds

The only fluid-holding structures will be the storage ponds, which are described in detail in **Section OP 2.9.4**. The ponds will be fenced to prevent access by wildlife on the ground and for safety reasons (Type I fencing per LQD Guideline 10). Based on the anticipated quality of the water in the ponds (**Table OP-A6-4**), fencing and deterrents will be used and algae and plankton growth will be prevented. If birds are attracted to the ponds, it will most likely be waterfowl that would be exposed via water ingestion. If sage grouse and local sagebrush endemic passerine bird species use the ponds as a regular water source there is an exposure potential. However, the amount of freeboard, and water depth maintained for the two ponds should make it difficult for land birds (such as

sage grouse), passerine birds, and wading birds (such as herons) to drink from the ponds. An exception might be swallows, if present in the area, that drink water on the wing. Waterfowl are not expected to reside on the ponds for more than a few days. A study of wastewater ponds in central Idaho noted that waterfowl resided from 1 to 25 days, with an average residence time at the ponds of 6 days (Halford et al., 1982).

Recommended drinking water quality guidelines for wild birds are not known to exist (although there are water quality standards that are thought to indirectly protect wild birds). However, guidelines for drinking water quality do exist for poultry (Carter and Sneed, 1996). The list of major constituents in the storage ponds (**Table OP-A6-4**) are not considered hazardous to poultry, with the exception of radium-226, which is discussed in more detail below. High concentrations of chloride, magnesium, sodium, and sulfate cause mild symptoms such as metabolic effects or loose droppings or act as a diuretic or laxative, respectively, in poultry (Carter and Sneed, 1996). Maximum recommended concentrations for poultry were not available in the North Carolina Cooperative Extension publication (Carter and Sneed, 1996) for the trace parameters listed above non-detect levels.

A document published by the National Academy of Sciences (NAS, 1980) provides "maximum tolerable levels" (MTLs) of various minerals in the diet for poultry, among other domestic animals. The MTLs for poultry regarding aluminum, arsenic, fluoride, manganese, selenium, and vanadium match or are greater than the anticipated maximum concentrations listed for these analytes in **Table OP-A6-4**.

Selenium

A study focused on waterfowl determined that water concentrations of 20 micrograms per liter (µg/L) [or 0.020 milligrams per liter (mg/L)] and greater are hazardous to aquatic birds (Skorupa and Ohlendorf, 1991). This value is ten times less than the anticipated maximum concentration in the storage ponds (**Table OP-A6-4**). Another study of waterfowl using irrigation drainwater ponds in California with abnormally high concentrations of selenium up to 300 parts per billion (equivalent to 0.3 mg/L) noted severe reproductive effects (Ohlendorf et al., 1986). Selenium is known to greatly bioconcentrate in aquatic ecosystems between concentrations in water and that in primary producer organisms such as algae and plankton, as well as bioaccumulate many-fold between primary producers and waterfowl (Lemly, 1993). If algae and plankton were allowed to flourish in the storage ponds, even higher concentrations of selenium might become available to waterfowl while feeding.

Contrary toxicological evidence is manifested using methods from the practice of ecological risk assessment. A comparison of avian toxicity criteria for selenium used in California was made by the California Department of Toxic Substances Control

(CalEPA, 2000). The values ranged from 0.23 to 0.5 mg/kg body weight (BW)/day. The maximum anticipated storage pond concentration of 0.2 mg/L can be compared to the lowest criterion of 0.23 mg/kg BW/day by multiplying the pond concentration by a calculated water ingestion rate of 0.0514 L/day for various bird species (EPA, 1993) and dividing the product by the approximate body weight of a lesser scaup duck (EPA, 1993), 0.8 kg, as follows:

0.2 mg Se/L pond water x 0.0514 L water ingested/day = 0.010 mg Se/day;

0.010 mg Se/day from pond water / 0.8 kg body weight of duck =
0.013 mg Se/kg BW/day;

Hazard Quotient = Dose / Toxicity Criteria = 0.013 / 0.23 = 0.06.

When the hazard quotient is less than 1, it can be assumed that there are no risks to the organism from the contaminant. These calculations apply only to selenium exposure from drinking water and assume that there is no selenium exposure (and bioaccumulation) from food items in the water.

WDEQ recently published a literature review of health effects of inorganic contaminants in drinking water for livestock and wildlife (Raisbeck et al., 2007). The document, however, does not contain information on avian species. There is discussion of aquatic life criterion and whole body tissue concentrations for fish and macroinvertebrates and the relationship of those parameters to risk to avian species. However, fish will not be present in the ponds. In addition, algae and plankton growth will be controlled and the pond habitat will not be suitable for macroinvertebrates, so these parameters are not applicable.

Radium-226

The anticipated maximum concentration of radium-226 is 1,500 picoCuries per liter (pCi/L). Radium-226 is a radionuclide that emits alpha and gamma particles, meaning that waterfowl would receive both internal and external doses of radiation when sitting on the ponds and drinking water. It is a long-lived radionuclide with a decay half-life of 1,620 years. Acting similarly to calcium, radium-226 is stored in bone tissue and is slow to be released from bone. Radium-226 has been shown to bioconcentrate in plankton at 100 to 2,750 times that of the concentration in the water column (Whicker and Schultz, 1982).

In a study of waterfowl using wastewater ponds at the Idaho National Engineering Laboratory, the maximum total dose to any waterfowl was calculated to be 5,600 millirad for American coots that resided on the ponds for 20 days (Halford et al., 1982). No tissue

abnormalities were noted and no long-term effects from the radiation were expected. The anticipated dose from the storage ponds at the Lost Creek Project is being evaluated.

For comparative purposes, the WDEQ-WQD Rules and Regulations (WDEQ, 2007a) state that the total radium-226 concentration shall not exceed 60 pCi/L for effluent-dependent waters. This narrative standard is less than the anticipated concentrations. However, the ponds are not 'surface waters of the State' (WDEQ, 2007b) and are only in place to provide for temporary storage prior to deep disposal (**Section OP 5.2.3.1**).

Mitigation

As described in **Section OP 2.9.4**, the water quality in the ponds will be checked quarterly, to ensure unanticipated changes in the water quality are detected, and whenever a process change may result in a significant change in water quality. The location of the ponds adjacent to the Plant, and associated human activity (including daily checks of the ponds), is anticipated to reduce the attractiveness of the ponds to wildlife. Deterrents, such as flagging and predator silhouettes or decoys, will also be used. The growth of algae and plankton will be monitored, and if necessary, a herbicide approved for use in pond settings will be used to reduce or eliminate such growth.

1.4 Human Activity

All employees will be informed of applicable wildlife laws and penalties associated with unlawful take and harassment of wildlife and will be trained to recognize types of wildlife in the area.

1.4.1 Road and Equipment Use

Mitigating the impacts of the roads and equipment will depend on the number of vehicles and the way in which they are used. For example, use of carpools will help minimize traffic, and use of designated roadways (especially in the mine units) will help limit disturbance.

1.4.1.1 Type and Amount of Equipment

The vehicles used to operate the site are classified in three categories: Company Owned - On Site Only; Company Owned - On and Off Site; and Contractor Owned - On and Off Site. The types and numbers of vehicles that will be used when the Project is at peak production are listed below. Many of the vehicles will only be working in a specific portion of the site at one time, e.g., in the Plant or in a given mine unit.

1. Company Owned - On Site Only
   a. Pickups: A total of approximately 24 ½-ton, ¾-ton and 1-ton pickups for supervision, construction, operations and maintenance in production, exploration and monitoring areas.
   b. Equipment: Approximately 3 All Wheel Drive (AWD) Forklifts: 2 Hard Surface Forklifts; 1 Motor Grader; 2 Backhoes; 3 Geophysical Logging Trucks; 1 All Terrain Vehicle (ATV); 3 Flat Bed Trailers; 3 Reel Trailers; 1 High-Density Polyethylene (HDPE) Fusion Cart; 9 Generators; 2 Water Trucks; 1 Mechanical Integrity Testing (MIT) Truck; and 6 Cementers; 1 Pulling Unit and 1 Grout Trailer.

2. Company Owned - On and Off Site
   a. Pickups: Approximately 3 ½-ton or ¾-ton pickups used by supervisors on site and to travel to and from the site.
   b. Vans: Approximately 4 vans to transport personnel to and from the site and Casper, Rawlins, or other town.
   c. Tractor/Trailer: One tractor will be used to mobilize two slurry trailers at the site. In addition, a side-dump or end-dump trailer (in conjunction with the tractor) is planned for off-site waste transport.

3. Contractor Owned - On and Off Site
   a. Pickups: Approximately 10 ¾-ton and/or 1-ton pickups may be used by drilling contractors for travel to and from the site as well as travel on the site.
   b. Water Trucks: Approximately 10 80-barrel to 100-barrel water trucks will be used on site to support contract drilling operations.
   c. Truck-Mounted Drilling Rigs: Approximately 10 1500-Class drill rigs will be used on site to support contract drilling operations.
   d. Deliveries: Standard deliveries will occur of materials used for construction, operations, as well as maintenance of the site. Frequency of deliveries will be based on production rate, usage, time of year and other needs. The materials can be separated into the following categories:
      i. Chemicals (weekly to monthly): Carbon dioxide, oxygen, salt, soda ash, peroxide, gasoline, and diesel;
      ii. Yellowcake shipments (weekly to monthly);
      iii. Construction (weekly to monthly): Steel, polyvinyl chloride (PVC) and HDPE pipe, wire, valves, fittings, and structural steel;
      iv. Operations (weekly): Potable water, trash, and office supplies; and
      v. Maintenance (weekly to monthly): Grease, oils, pipe, wire, and fittings.

1.4.1.2 Road Use

All employees and contractors will be trained to recognize types of wildlife in the area, their susceptibility to disturbance or to collisions with motor vehicles, and measures that should be taken to avoid disturbance and wildlife/vehicle collisions. Speed limits will be set at 30 mph on main access routes and no greater than 20 mph on secondary roads. All new employees will receive training on these speed limits with refresher training at least once per year. LC ISR, LLC will enforce these traffic rules to minimize the likelihood of vehicle collisions with wildlife.

Speed limits within the permit area will be set based on the following considerations: the condition of the road, design of the road, safety factors, protection of equipment, wildlife and livestock protection, and dust mitigation measures. Generally, the speed limit on main roads will be 30 miles per hour and on secondary roads the speed limit will be 20 miles per hour. However, in no case shall the speed limit be greater than 30 miles per hour. All employees will receive training regarding speed limits during indoctrination training. Site visitors will be advised of the site speed limits during site specific training. Speed limits signs will be posted on the main roadways with the permission of BLM.

Compliance to safety rules is of utmost importance. Supervisors will be responsible for ensuring their employees abide by traffic safety rules; including speed limits. Employees who don't abide by traffic rules will be subject to progressive discipline up to and including dismissal. The Safety Department will from time to time monitor speed limits to ensure compliance.

1.4.2 Hours of Operation

Normal field operations at the facility will take place between the hours of 7 a.m. and 5 p.m. Mining operations, i.e., pumping and injection of production solutions, will continue around the clock. However, during a routine night shift, only one employee will be in the field in a light truck to monitor equipment.

1.4.3 Noise

Background noise in the Permit Area under calm wind conditions is representative of a quiet rural area. Field measurements were made using a Sper Scientific Sound Meter 840005, which accurately measures noise between 40 and 80 A-weighted decibels dB(A) to within ±3.0 dB(A). At eight cardinal directions, noise levels were measured for three 30-second intervals facing a cardinal direction. The peak noise level of each interval was

recorded. The mean of the peak noise levels for each of the eight cardinal directions is presented in **Table OP-A6-5a**.

Initial noise measurements were made on the afternoon of June 13, 2007. Meteorological conditions at the time of measurement were relatively calm, with an east wind averaging 4.8 meters per second (m/s). As shown in **Table OP-A6-5a**, the measured noise levels were below the instrument detection limit of 40 dB(A).

Noise measurements at the Plant site were repeated on the morning of April 28, 2009, when no workers were on site and no heavy equipment was operational. Meteorological conditions at the time of measurement were windy, with a south-southwest wind averaging 11 m/s, and gusts up to 15 m/s. **Table OP-A6-5a** shows the measured noise levels ranged from 68 to 89 dB(A), with the greatest noise levels measured while facing west and southwest. The maximum peak noise level of a 30-second interval was 94 dB(A) facing east and west. The minimum peak noise level was 66 dB(A), facing north and south. The noise levels measured on April 28, 2009 were greater than on June 13, 2007 due to the high winds present.

An in situ mine is unlike conventional mines in that it does not use large equipment such as haul trucks, drag lines, and large loaders. The transfer of production and injection fluids is done by submersible pumps in wells, similar to water well pumps, and the metering of the solutions occurs in enclosed buildings (header houses). There is no conventional ore processing, only the filtration of production fluid inside the Plant. Therefore, most noise is generated by the field equipment listed in **Section 1.4.1** (Road Use). Of the field equipment, the drill rigs generate the most noise. **Figure OP-A6-5** is a graph of noise levels versus distance from two of the drill rigs typical for use on site. While the rig noise is on the order of 95 dB(A) at the rigs, the noise attenuates to background levels, as measured on a windy day, within a couple of hundred feet of the rig. **Table OP-A6-5b** is a table of the noise levels versus distance from machinery typical for use on site. The highest levels measured were on the order of 80 dB(A), with wind noise over-riding the equipment noise within a couple of hundred feet of the equipment. On a calm day, noise levels are also not anticipated to be elevated at distances of concern because noise levels diminish by 6 dB(A) for each doubling of the distance from the source (Golden et al., 1979).

1.4.4 Hunting

For health and safety reasons, public access to the Plant and mine units is restricted. Hunting and other recreation will also be restricted to the extent allowable under BLM guidelines, within the Permit Area.

1.4.5 Cumulative Impacts

Information on cumulative impacts is based on publicly available information on existing and proposed projects, general knowledge of the conditions in Wyoming, reasonably foreseeable changes to existing conditions, and will be reviewed based on the Project monitoring information (Section 2.0). The primary concern in the evaluation of cumulative impacts is the resurgence in interest in mining and oil and gas development within the last few years. This resurgence has not necessarily translated into projects on the ground as of yet, making it difficult to evaluate cumulative impacts because of the lack of definitive information. For example, uranium exploration, including exploration by LC ISR, LLC, is ongoing in the Great Divide Basin, but uranium mines have not been established. The Sweetwater Uranium Project, which includes a reclaimed surface mine and associated milling facility, currently on standby, is located about two miles south of the Lost Creek Project. An application for the Antelope-Jab ISR Project, about six miles north of the Lost Creek Project, was submitted to federal and state agencies in 2008; however, in October 2009, the applicant requested that NRC defer review of its application (NRC, 2009).

ISR operations will minimize disturbance by chemically removing the uranium and leaving the matrix surrounding the ore intact. After mining, ground water restoration is required to return water quality to specified conditions based on pre-mine conditions and potential uses. Disturbed areas (mine units, the Plant, pipelines, and access roads) will be reseeded with a native seed mix as soon as conditions allow. Ultimately, the disturbed areas will be reclaimed to their pre-operational contours and revegetated to support the approved land uses. Due to this reclamation and restoration, long-term impacts to ecological resources are not anticipated.

1.4.6 Climate Change

According to the Nuclear Energy Institute, in 2007, U.S. nuclear power plants prevented the emission of 1 million short tons of nitrogen oxides and 3 million tons of sulfur dioxide. The amount of nitrogen oxide emissions that nuclear plants prevent annually is the equivalent of taking more than 51 million passenger cars off the road. Also in 2007, U.S. nuclear plants prevented the emissions of almost 693 million metric tons of carbon dioxide. This is nearly as much carbon dioxide as is released from all U.S. passenger cars (see http:/www.nei.org/keyissues/protectingtheenvironment/factsheets/ nuclearenergyandtheenvironment/). Environmentally responsible production of uranium from the Lost Creek Project will minimize the emissions of carbon dioxide and other greenhouse gases.

1.5 Site Maintenance and Reclamation

1.5.1 Vegetation

1.5.1.1 Invasive Plants

Vegetation surveys across the permit area reveal that the only noxious weed is Tansy Mustard (**Appendix D8**). LC ISR, LLC commits to performing annual surveys to locate and eradicate invasive plant species including but not limited to Cheat Grass. These efforts will cover the entire permit area as well as along all access roads to the site.

1.5.1.2 Conifers

Conifer invasion has not been an issue within the area of the project. However, LC ISR, LLC will work with BLM to control or eradicate conifers if they begin to move into the permit area.

1.5.1.3 Revegetation

All surface disturbances will be revegetated at the soonest appropriate season using a mixture of native seed including sage brush (seed mixture approved by both BLM and WDEQ-LQD). LC ISR, LLC will continue to reclaim disturbed areas as soon as possible after exploration and ISR activities to help ensure re-establishment of habitat, as described in the Reclamation Plan (**Section RP 4.5**).

1.5.2 Fire

1.5.2.1 Wildfire

LC ISR, LLC will implement procedures to minimize the likelihood of starting a wildfire (including but not limited to Hot Work Permits, Site Inspections, Proper Storage of Waste, etc.) All field personnel will be trained in Emergency Response Procedures, including reporting of fires. In situ uranium facilities generally use plastic piping, therefore, minimal welding and cutting takes place in the field. LC ISR, LLC will maintain a generous supply of fresh water that can be used for wildfire suppression, if necessary.

1.5.2.2 Prescribed Fire

LC ISR, LLC will not use prescribed fire to remove vegetation or to control invasive species unless prior approval is granted by the BLM and the Wyoming Game and Fish Department (WGFD).

1.5.2.3 Grazing

The area surrounding the mine units and the Plant will be removed from grazing by wildlife friendly fencing. The remainder of the Permit Area will continue to be grazed according to the existing BLM grazing permit.

1.5.3 Predation and Disease Control

1.5.3.1 Predation

LC ISR, LLC will work proactively with the WGFD to control predators on the permit area that pose a threat to species of concern, particularly sage grouse. Predators of concern include skunks, coyotes, raptors, and corvids. Above-ground transmission line supports will include perching and roosting deterrents. To the extent possible, LC ISR, LLC will also design and construct structures in a manner that does not encourage roosting or nesting by raptors.

1.5.3.2 Disease

To reduce the threat of mosquito-borne illnesses in wildlife, LC ISR, LLC will treat the two holding ponds with an approved insecticide to prevent mosquito hatches. Drilling mud pits will be backfilled as soon as possible after use in order to eliminate their use by mosquitoes. Equipment and materials will be stored in a manner that minimizes the accumulation of stagnant water. Used tires will be disposed of as they are generated or will be stored in a manner that prevents accumulation of water until taken off-site for disposal.

1.5.4 Potentially Harmful Materials

As described in the Operations Plan, LC ISR, LLC will implement several measures to prevent exposure to potentially harmful materials, and should an accident occur, procedures will be in place to promptly remove/remediate any releases. All liquid chemicals and petroleum products in and around the Plant will be maintained within bermed areas sufficient to contain any potential spill. No bulk hazardous chemicals will be used in the Mine Units. The mining solutions will have a pH of around 8.0 and will

not contain any petroleum based chemicals or elevated levels of heavy metals that present an acute hazard to wildlife or employees.

Any mortality that could be caused by exposure to toxic substances will be reported immediately to the WDEQ-LQD (and other WDEQ divisions as necessary), BLM, USFWS, and WGFD. The goal of such reporting will be to identify and solve the problem as quickly as possible.

1.5.5 Storage Ponds

The water quality in the storage ponds will be monitored quarterly and whenever a process change may result in a significant change in water quality. The ponds will contain produced groundwater and process waters with a near neutral pH. No petroleum based products will be sent to the holding ponds. LC ISR, LLC does not anticipate the water quality within the ponds will pose a risk to birds, with the use of fencing, deterrents, and control of algae and plankton, but will work with WGFD to ensure the protection of birds.

1.6 Habitat Enhancements

LC ISR, LLC will work with BLM and WGFD to develop enhancements in the Permit Area. Additional enhancements may be completed on nearby areas (areas outside the Permit Area) that are not proposed for operations or disturbance if permitting agencies deem them desirable to offset onsite impacts. These enhancements could include: placement of new raptor nest platforms, creation of new water sources, or habitat modifications/improvements to improve specific habitat conditions for sage-grouse (Section 2.2.6) or other high interest species.

2.0 WILDLIFE MONITORING

Wildlife monitoring in and near the Permit Area will be completed on an annual basis through the life of the Project. Consultation with BLM, WGFD, and USFWS will be conducted as needed prior to completing any annual survey work. An annual monitoring report will be prepared and submitted to the WDEQ-LQD, BLM, and NRC each year. The report will include: survey methods; results; any trends; an assessment of protection measures implemented during the past year; recommendations for protection measures for the coming year; recommended modifications to monitoring or surveying; and any recommendations for additional species to be monitored (e.g., a newly listed species). The Annual Wildlife Monitoring Report, data and mapping will be formatted to meet WDEQ-LQD requirements. Only qualified wildlife biologists or ecologists will be employed for wildlife monitoring.

In addition to the specific annual monitoring for wildlife, LC ISR, LLC will document all known instances where Project activities may have impacted wildlife (such as wildlife/vehicle collisions on roads, or other mortality within the Permit Area). Any large die-offs or other evidence of possible wildlife exposure to toxic chemicals will be reported immediately to WDEQ-LQD (and other WDEQ divisions as necessary), BLM, USFWS, and WGFD. A record of wildlife mortality will be kept at the mine site and included in the Annual Report.

Monitoring and survey methods are designed to be consistent with standard protocol used by the WGFD (WGFD, 2007), and to also follow monitoring requirements and recommendations from WDEQ-LQD (Wildlife Monitoring Requirements for Surface Coal Mining Operations).

Table OP-A6-6 includes the wildlife monitoring schedule, which is described in more detail in the following sections.

2.1 Big Game

2.1.1 Seasonal Distribution and Habitat Affinity

Based on current WGFD GIS mapping, the Permit Area is mapped as winter/yearlong range for pronghorn. The Permit Area is out of mapped range for mule deer, elk and moose. Both elk and mule deer have been observed on the site during baseline studies. The survey area for big game will include the Permit Area and surrounding 2-mile buffer.

One aerial survey and one ground survey will be completed between January 1 and mid-March each year to determine winter habitat use. Aerial surveys will be completed on a clear day when snow cover is near 100 percent. Transects will be flown at approximately 0.5 mile intervals (with one observer). The ground survey will be completed as soon as possible after the aerial survey. If appropriate snow conditions have not developed by March 1st, the aerial survey will be conducted when snow cover is either less than 20 percent or between 80 to 100 percent. If these snow conditions are not present the aerial survey will be cancelled for the year and only the ground survey would be completed.

To determine spring and summer habitat use, one ground survey of the Permit Area will be completed in April, early June, and August. This survey will be completed while driving a standard route within the Permit Area.

During each survey the number of pronghorn (and other big game species) will be counted, and the general location will be recorded by GPS. Data on breeding status (e.g., doe with fawn), age (e.g., adult, yearling, young-of-year), sex, and general activity (e.g., feeding, resting, etc.) will additionally be collected. The dominant vegetation/habitat type that is being used will be noted.

2.1.2 Climate Information

Climate data from the nearest NOAA weather station or the on-site weather station will be summarized year around.

2.1.3 Range Conversion

The entire Permit Area is within winter/yearlong pronghorn range; no other mapped big game ranges are present. The acreage of this range impacted will be detailed in each annual report (the total for the project life and the incremental area impacted per year will be summarized).

2.1.4 Mortality and Concentration Buildups

An annual record of all big game mortality due to fence entanglements, vehicle collisions, and other factors will be completed. Winter mortalities will be estimated each spring from observations taken during wildlife surveys and other mine activities. The data to be recorded include: species, date, probable cause of mortality, and location. A table summarizing big game mortality will be submitted in the annual report.

If concentrations of pronghorn appear suddenly or if apparent migration blocks (fences, snow drifts along roads or other blocks) are observed they will be reported immediately to the local WGFD personnel. Any big game concentrations or migration blocks will be reported in the annual report.

2.2 Sage Grouse/Upland Birds

The only upland birds in the Permit Area are greater sage-grouse (sage grouse). The sage grouse monitoring protocols presented here are designed to assess the effects of ISR activities on: sage grouse populations; seasonal habitat selection; and productivity within the Sage Grouse (SG) Monitoring Areas. The SG Monitoring Areas are shown on **Plate OP-A6-1** and include:

- The Large SG Monitoring Area which is delineated to maximize the probability that 'control' leks will be included. Control leks are considered to be leks within or near Core Area boundaries which are not influenced by ISR activities, major highways, or other anthropogenic activities except livestock grazing and public recreation; and

- The Small SG Monitoring Area which is delineated to conservatively establish the area where nesting and early brood-rearing females may be influenced by ISR activities.

LC ISR, LLC will use lek search and lek count protocols to assess potential impacts of ISR activities on sage grouse populations. The objective of lek counts is to track male breeding population size within the SG Monitoring Areas through the life of the Project. The objective of lek searches is to determine if new leks become active within the SG Monitoring Areas during the life of the Project.

To determine the potential effects of ISR activities on habitat selection, LC ISR, LLC will model the seasonal habitats existing within the Small SG Monitoring Area. The objectives of these models are to quantify the amount of habitat functionally influenced by ISR activities on a seasonal basis (e.g., nesting, early brood-rearing, summering and wintering habitats).

LC ISR, LLC will use brood survey routes and wing surveys to assess potential impacts of ISR activities on sage grouse productivity. The objective of both surveys is to track chick productivity of females potentially influenced by ISR activities through the life of the Project.

Sage grouse surveys discussed below will follow standard protocol as recommended by the WGFD Sage Grouse Technical Committee and by Connelly et al. (2003).

This comprehensive sage grouse monitoring plan is designed to accomplish definitive monitoring of the effects of ISR activities on the sage grouse. The monitoring will lead to and guide effective mitigation actions. However, it is a cost intensive, long-term commitment and is timed to establish baseline conditions. Should a situation arise which prohibits or significantly delays LC ISR. LLC's activities (before or after regulatory approvals for the Project are issued), the commitment may be curtailed and may be limited to only annual lek counts within the Small SG Monitoring Area. LC ISR, LLC will inform WGFD, BLM, WDEQ-LQD, and NRC should this monitoring change be necessary.

2.2.1 Populations

2.2.1.1 Lek Counts

Lek count data will be the primary data used to assess the population-level effects of developing the Lost Creek uranium deposits. The lek monitoring methods are therefore as comprehensive as possible. The objective of lek count monitoring is to track, as inclusively as possible, male breeding populations on leks potentially influenced by ISR activities concurrent with leks not influenced by such activities but similar in other aspects through the life of the Project.

Counts will be conducted at all known leks within the SG Monitoring Areas starting with a 2010 baseline list of known leks. The 2010 baseline list will be established from existing data (e.g., the WGFD sage grouse database) and a comprehensive lek search of the SG Monitoring Areas to be conducted in April 2010. The list of known leks will be updated on a three-year cycle based on lek search flight results (Section 2.2.1.2).

All known leks within the SG Monitoring Areas will be counted annually. This number of leks may increase, depending on results of lek searches conducted throughout the life of the Project; however, the number will not be decreased from the 2010 baseline unless leks are established as 'unoccupied' following protocols outlined by the WGFD Sage grouse Technical Committee (Section 2.2.2). LC ISR, LLC will coordinate monitoring efforts with the BLM and WGFD to avoid duplicative efforts and, as a result, undue disturbance of the leks. The count methodology that LC ISR, LLC will use is outlined below.

General Lek Count Methodology:

- Counts will be conducted during the month following the peak of mating activity (April 1 – May 7). Research has shown that the highest number of male sage grouse is observed during this period. The increased number of males is due to young males showing up later in the strutting season even though most of the breeding has already occurred.

- Counts will be conducted from the ground as close to sunrise as possible and extended for one-half hour after sunrise. The phase of the moon may affect use patterns of leks. During a full moon, grouse may display at night and consequently terminate activities earlier in the morning. This variation in activity may influence choice of counting dates.

- Counts will be conducted a minimum of three times each year for each lek (at least one count every 7 to 10 days.)

- All leks within a lek complex will be counted on the same day, with lek complexes estimated from spatial orientation of leks within the SG Monitoring Areas;

- Counts will be completed on days with good weather conditions. Optimum weather conditions for counts are clear, calm days. Wind speeds should be less than 20 mph because high winds reduce lek activity. Temperature seems to have little effect on activity. Weather conditions will be recorded during each count.

- Known lek sites are located in mid-day periods prior to completing any counts. Access routes and counting points are predetermined to allow the observer to count the lek without disturbing birds by driving or hiking. Counts are made by using binoculars and spotting scopes from observation points. Observation points for each lek will be established and noted in 2010 and each lek will be counted from these points in subsequent years.

- The location of each lek will be accurately determined and recorded in UTMs using NAD83 datum. Observers should not disturb grouse to obtain lek locations. If a lek is active, the observers should make the best estimate of the lek location and return later to confirm.

- Data will be recorded on the standardized statewide reporting form with the following format:

						LOCATION			GPS UTM			
Date	Time	Observer	Males	Females	Unk	QQ	Sec	Twn	Rng	Northing	Easting	Grouse Sign	Comments

2.2.1.2 Lek Searches

Breeding sage grouse may be displaced by some ISR activities and thereby occupy active leks or form new leks farther from those activities. Thus, lek searches will be required to accurately assess the population-level response of sage grouse to ISR activities.

During the peak breeding period in April 2010, LC ISR, LLC will systematically search for leks within the SG Monitoring Areas from the ground to ensure the baseline survey is as thorough as possible. Ground searches will be conducted from 0.5 hours prior to sunrise to 1.5 hours after sunrise. If the April full moon coincides with the peak breeding period, LC ISR, LLC will additionally conduct searches throughout the nights with good moonlight. The ground at all potential leks will be searched once the birds have left the site for evidence of consistent use (e.g., fecal droppings and feathers). Ground searches for leks can be more effective than aerial searches due to the birds' reaction to aircraft (crouching which makes the birds difficult to see and thus the leks difficult to identify, especially smaller leks.) Ground searches can also be more effective as a result of focusing all locating techniques such as listening and habitat inspection. Additionally, as grouse display all night during the full moon at the peak of the breeding period, night surveys can be effective at finding leks by sound.

LC ISR, LLC will conduct lek searches of the SG Monitoring Areas from fixed-wing aircraft every third year following establishment of baseline (i.e., 2013, 2016 …). Searches will be conducted during the peak of the breeding period between 0.5 hours before and 1.5 hours after sunrise. Transects (approximately 1.0 km apart) will be flown along north-south lines. Flights will be limited to days with good visibility and weather. Transects will be flown from approximately 100-150 meters above ground level. Return visits from the ground to all potential new sites will be conducted to confirm a location as a lek as soon as feasible following flight. If a new lek is found, it will be added to the known lek list and counted annually. Although counting of new leks the year of discovery will be initiated later in the breeding period (i.e., after the lek search) maximum male attendance generally occurs after the peak of breeding due to the behavior of yearling males, thus counts should not be biased.

As noted above, aerial searches may not be as effective as ground searches; however, ensuring the data is collected in a standardized manner through the life of the Project is critical. Aerial searches do not require the same level of experience as a ground-based search and logistic considerations are less daunting. Therefore, aerial searches increase the likelihood that comparable data can be collected throughout the life of the Project.

2.2.1.3 Analysis of Lek Data

LC ISR, LLC is interested in investigating the effects of the Lost Creek Project on sage grouse populations, and as such, needs to account for other potential impacts to populations, particularly other energy development, grazing, and traffic. (Given the size of the Large SG Monitoring Area, natural factors influencing populations at large spatial scales (e.g., weather) should be standardized across the area.) The measures that will be taken to identify other potential impacts and the subsequent data analysis methods are described below.

Energy Development

Anthropogenic energy development data will be compiled within the SG Monitoring Areas plus a six-km buffer around that area. (Six km represents a consistently documented impact distance on breeding sage grouse in relation to natural gas development [Naugle et al., 2010].) These data will be updated annually to reflect the conditions encountered by sage grouse during each breeding season. The six-km buffer region is included to ensure that the potential cumulative effects of anthropogenic activity not associated with Lost Creek are accounted for during analyses. All energy developments (e.g., uranium, gas, oil, etc.) will be mapped.

ISR activities within this area will be quantified over a distinct spatial area. Due to the nature of ISR, mapping of mine units or groups of wells within mine units, rather than single well locations, is more representative of the ISR activities. (The mine units or groups of wells within mine units are referred to as 'ISR polygons' in the data analysis.) Gas or oil development will be mapped to individual well pads. Development data will be compiled from publically available records and verified in the field.

Currently, gas and oil leases within the SG Monitoring Areas are undeveloped. If these leases are developed, any lek within six km of a pad being drilled during the breeding season, or within three km of a producing pad, will be monitored but removed from the subsequent data analyses. (The impact distances of gas or oil development are estimated in Holloran, 2005).

Grazing

LC ISR, LLC will use BLM grazing records to determine if livestock management in any particular grazing allotment differs dramatically. If LC ISR, LLC finds such a lease, any lek where at least 20% of a five-km buffer around that lek includes that grazing allotment will be removed from analyses (Connelly et al., 2000). [A majority of females bred on a lek nest, within five- km of that lek in contiguous habitats (Holloran and Anderson, 2005)].

Traffic

Traffic will be quantified on all improved surface roads within this area using pneumatic axle counters. Axle counters will be checked as working and data recorded at least weekly during the breeding season; all counters will be checked the day following a snow storm to ensure plowing has not damaged or pushed the counter tubing from roadway.
Although traffic volume changes will be directly related to the Lost Creek Project, to assess the effects of traffic on breeding sage grouse, LC ISR, LLC will need to standardize for activities associated with uranium recovery. LC ISR, LLC will remove any lek within six km of developed uranium polygons (Lost Creek plus other companies), and investigate annual changes in the number of males (response variable) on the remaining leks in terms of distance to the closest point along an improved surface road and traffic levels (predictor variables). Scatter plots will be used to establish linearity of predictor variables; transformations will be used to generate linear predictive data. LC ISR, LLC will use multiple regression to assess the effects of distance to and traffic volumes on improved surface roads to the number of males on leks.

Models assessing the effects of traffic will be used to estimate distance to a road with a given level of traffic where impacts to grouse activity are minimized. These estimates will be used to assess which leks that are greater than six km from the Lost Creek Permit Area, and are potentially influenced by traffic and, therefore, will be removed from analysis of the impacts of ISR activities.

Data Analysis

Initially, LC ISR, LLC will plot annual change in the number of males per lek against distance to the closest ISR polygon. If there is a 'distance effect', then a best-fit line through this data should flatten at the distance where impacts to the number of males per leks are eliminated. LC ISR, LLC will use this 'distance effect', if it is evident, to categorize leks as either within or outside of the area of ISR influence. If new leks are found, they will be included.

A drawback to this approach is that annual changes in lek size may be unduly influenced by smaller leks. For example, a five-male lek that loses two birds will have an annual change estimate of -40%, where a 30-male lek would be required to lose 12 males to equal the same decline. Therefore, in the third year after the 'baseline year' (2013), there will be sufficient data to use an analytical technique independent of lek size. (This technique cannot be used until at least three years after the baseline year, because it depends on the slopes of best-fit lines, and three points are required to generate an acceptable line for establishing slope).

Starting in the third year after the baseline year, the maximum number of males per lek will be plotted by year and the best-fit straight line will be fit to these data. There will be a plot for each lek, and the slope of that plot will represent the rate of increase or decrease in the lek size. The slope of the line for each plot will, in turn, be plotted against distance to the closest ISR polygon. Then, the best-fit line for this plot of change in lek size versus distance will be used to assess distance effect of ISR activities on male occupancy of leks. As this effect may generate a pattern that cannot be fit to single line, LC ISR, LLC may have to bin the data into distance categories and generate lines separately by bin. For example, if grouse are displaced from areas of ISR activity to leks within a given distance of that activity the curve that fits the close leks will not accurately reflect the relationship farther from the activity. In addition, LC ISR, LLC will also note the type of activity in the nearest ISR polygon as that may influence grouse displacement. For example, during mine unit installation in a given polygon, sage grouse may avoid that polygon, but during production, sage grouse may return to that polygon.

To quantify the population-level effects of developing the Lost Creek Project, LC ISR, LLC will use results from the above analyses. These analyses are designed to establish the potential reaction of populations to ISR activities, and the techniques for quantifying population-level effects will depend on these modeled reactions. For a more detailed discussion of the analytical techniques to be applied, see Holloran, 2005.These analyses have the added advantage of indicating the habitats selected by individual birds (e.g., displaced individuals) directly influenced by ISR activities . By pinpointing these locations, LC ISR, LLC will be able to focus habitat enhancements on areas used by birds actually influenced by ISR activities (Section 2.2.5).

2.2.2 Habitat Selection

Non-invasive techniques for monitoring sage grouse nesting and early brood-rearing habitat selection and success are limited to radio telemetry [Spotlight capture and collaring of females during the peak of breeding appears to have negligible effect on subsequent behavior.(Holloran, verbal communication, January 2010)]. However, given the potential reaction of females to ISR activities, the probability of maintaining a sample of radio-equipped birds in areas affected by ISR activities through the life of the Project may be low (deduced from Walker, 2007). Therefore, for the purposes of designing the monitoring program, LC ISR, LLC has assumed that uranium extraction in the Lost Creek Permit Area will have an influence on nesting and early brood-rearing females similar to the influence of natural gas development.

Information from nesting female long-term reaction to natural gas development suggests that the area within one km of infrastructure associated with energy development is functionally lost as nesting habitat (Holloran et al., 2010). Holloran et al. (2010) also

report that sage grouse females in Wyoming rear their broods during the early brood-rearing period within 1.65 km of their nest. Thus, the amount of nesting and early brood-rearing habitat that will be influenced by developing the Lost Creek Permit Area will be conservatively estimated as all suitable habitats within the Permit Area and within 2.65 km of the Permit Area. Additionally, UR Energy Inc.'s (LC ISR, LLC's parent company) two-year proposed exploratory drilling plan suggests activity south and southeast of the Lost Creek Permit Area. LC ISR, LLC will buffer this area of proposed activity by 2.65 km and include this as potentially impacted habitats (i.e., as part of the Small SG Monitoring Area). Given the nature of exploratory drilling, this portion of the Small SG Monitoring Area may be modified to reflect on-the-ground activities that occur that differ from proposed future plans.

To establish suitable habitats within the Small SG Monitoring Area, LC ISR, LLC will conduct seasonal habitat selection monitoring in 2010-2011 using radio-equipped female sage grouse. Forty female sage grouse will be captured in April 2010 from leks closely associated with the Lost Creek Permit Area using spotlighting and hoop-netting techniques. The leks where females will be captured include: Eagles Nest Draw, Prospects (and Prospects South), Discover (and satellite), Green Ridge (and satellite), Minex West, and Sooner (Plate OP-A6-1). Each captured female will be: fitted with a 19.5-g, necklace style radio-transmitter (Advanced Telemetry Systems); identified as yearling or adult (at least two years old) by shape of outermost wing primaries; and released at point of capture. Starting in late April, pre-nesting females will be located at least twice weekly to determine nest initiation. Nesting locations of radio-equipped females will be found by circling the signal source until females can be observed; nest sites will be marked with a GPS to facilitate location following the completion of incubation. Incubating females will be monitored at least twice weekly.

Nest success (hatched or not) will be assessed by visual examination of eggshell fragments after a female has left her nesting area. Conditions at unsuccessful nests will be examined to determine cause of failure. Females with broods will be found twice between 5 days and 14 days post-hatch to determine early brood-rearing habitat selection. At 14 days post-hatch, early brood-rearing success will be determined (at least one chick alive 14 days post-hatch is a successful female); the existence of chicks will be assessed either through direct visual confirmation of a chick, or through the reaction of the female to researcher. Brooding females will be located at least once per week from 14 days post-hatch through August (It is expected that late brood-rearing habitat selection will be associated with mesic sites.) At 35 and 36 days post-hatch, spotlight surveys of brood-rearing females will be conducted on consecutive nights to determine fledge rates (e.g., the number of chicks fledged per brood). Barren females (e.g., females that were unsuccessful nesters or brooders) will be located at least bi-weekly from nest or brood loss through August to determine seasonal habitats selection.

From September through March, all radio-equipped grouse will be located from fixed wing aircraft at least once per month. Reference transmitters (i.e., transmitters of known location deployed pre-flight by observers) will be used to determine flight location accuracy. Radio transmitters from birds that die during the 2010-11 field season will be redeployed April 2011 using capture techniques described above. (If possible, the cause of death will also be identified.) The radio telemetry work will be completed following the March 2012 telemetry flight.

Seasonal habitat selection data (nest, early brood, late brood, summer, and winter) will be used to generate Resource Selection Functions (RSF) in a 'used' versus 'available' analysis. RSFs will be applied to map the suitable seasonal habitats existing within the Small SG Monitoring Area. LC ISR, LLC will assume that ISR activities within the Lost Creek Permit Area will influence the total acreage of suitable area by season that occurs within the boundaries of the Small SG Monitoring Area.

2.2.3 Productivity

Three approaches will be used to used in evaluating sage grouse productivity: transects; wing barrels; and climate.

Transects

Late brood-rearing and barren female summer locations from radio-equipped birds will be used to identify areas where birds using nesting or early brood-rearing habitats closely associated with the Lost Creek Permit Area concentrate during the summer. LC ISR, LLC will establish at least two permanent walking transects 1000 m in length in each of these areas. An equal number of transects will be established in areas where radio-equipped females were not closely associated with Lost Creek Permit Area during nesting or early brood-rearing summer. Transects will be surveyed twice during a one-week period in late July from sunrise to two hours after sunrise to ensure feeding times are captured in monitoring efforts. All grouse observed will be counted and classified (adult male, adult female, young of the year). All transects will be surveyed annually through the life of the Project. Data collected from these efforts will be compared by total grouse use by sex and numbers of chicks per female.

Wing Barrels

LC ISR, LLC will work with biologists from WGFD to establish wing-barrel locations to further investigate annual differences in productivity relative to ISR activities. Wing barrels with signs designed to explain the reasoning for monitoring will be placed at

access routes to areas where females closely associated with the Lost Creek Permit Area during nesting or early brood-rearing summer (treatment area). A comparable area in terms of available summering habitats and spatial scale will also be monitored in this fashion to act as a control. Barrels will be placed and monitored each hunting season through the life of the Project. Wings collected from these barrels will be compared (treatment versus control area) by the number of chicks per female in the harvest.

Climate

Seasonal weather patterns may dictate sage grouse use of traditional summering areas. In particular, brood-rearing females will remain in sagebrush upland habitats until range desiccation forces them onto more mesic sites. LC ISR, LLC will use seasonal weather data as described in Section 2.1.2 to assist in assessing the potential effects of this behavior on productivity results.

2.2.4 Mitigation

Based on available information, LC ISR, LLC is conservatively anticipating that at least some ISR activities within the Lost Creek Permit Area will negatively influence populations at least within the Small SG Monitoring Area. (For example, activities during mine unit installation may be more disruptive than activities during production.) LC ISR, LLC proposes to mitigate these consequences by enhancing habitats within the buffered region around ISR activities where lek numbers increase above that expected by controls. LC ISR, LLC will use the results from the RSF analyses (Section 2.2.2) to focus enhancement efforts on the seasonal habitat(s) most influenced by ISR activities. This focus will dictate the objectives of enhancements. For example, if suitable nesting habitat is most influenced, then habitat enhancements will focus on increasing grass height and cover within relatively dense sagebrush stands and maintaining that height and cover to the following nesting season as residual grass.

Upon identification of a locale where grouse are being displaced, LC ISR, LLC will initially use the RSFs established from the telemetry study (Section 2.2.2) to map the seasonal habitat(s) occurring in this locale. LC ISR, LLC will then conduct vegetation surveys of the focus seasonal habitat(s). The surveys will be designed to establish current vegetative condition(s) at the patch scale, and to gather the data necessary to estimate a patch's vegetative potential (e.g., soil characteristics). Using this information, LC ISR, LLC will be able to identify suitable patches of habitat that are of low quality relative to the conditions that could occur within that patch. Once these patches are identified, LC ISR, LLC will develop pro-active enhancement options on a patch-by-patch basis.

LC ISR, LLC will use published information to develop management options that have been shown to result in the desired changes. Unless conditions of a site are such that no other options are feasible, LC ISR, LLC will not suggest shrub manipulating management (e.g., prescribed fire, herbicide application), but will focus on alternative forms of habitat enhancement (e.g., interseeding native cool-season bunchgrasses and livestock management modifications). LC ISR, LLC will develop the habitat enhancement plan at a relatively large spatial scale to increase the probability that actions taken will have a population-level effect. Vegetation and sage grouse post-treatment monitoring protocol will be established, and these activities will be continued for at least five years post-treatment, and at regular intervals (e.g., every three to five years) while Ur-Energy, Inc. is active within the general region. This enhancement plan will be developed and implemented with the assistance of BLM and WGFD rangeland specialists.

The relatively short temporal scale of mine unit installation, along with the reclamation that occurs within a producing mine unit (**Section OP 2.7**), additionally suggests LC ISR, LLC may be able to manage for individual grouse using habitats within the Small SG Monitoring Area (e.g., the time proposed from initial ISR activities to reclamation is less than the average life-span of a female sage grouse). Sage grouse show remarkable fidelity, especially to nesting locations, and it has been shown in a developing natural gas field that adult females will not vacate their nesting areas regardless of the level of development that occurs within those areas (Holloran, 2005). Because of this fidelity, maintaining individuals that are using habitats within the Small SG Monitoring Area may expedite re-colonization of the Lost Creek Permit Area following completion of production. LC ISR, LLC will curtail personnel activities that may disturb females using habitats under LC ISR., LLC control (e.g., dogs must be leashed at all times, walking into undisturbed habitats will be discouraged, speed limits will be strictly enforced, etc.). LC ISR, LLC will pick up all trash and road kill on a regular basis to minimize corvid occurrence within the Small SG Monitoring Area. Whenever a nesting female is discovered, LC ISR, LLC may institute additional protective measures including but not limited to delaying or limiting ISR activities close to her nest until she has left the area. Protective measures will be determined on a case-by-case basis depending on factors such as proximity and timing relative to critical ISR activities.

2.3 Raptors

2.3.1 Nest Status and Production Success

Existing raptor nests are located more than one mile away from proposed ISR activities (**Figure D9-7**). Annual monitoring of known raptor nests will be completed each spring

between April and July to determine nest status. Nest surveys can be completed by air or from the ground.

A ground or aerial survey of the Permit Area and surrounding one-mile radius will be completed during the first two weeks of February each year for signs of golden eagle and great-horned owl nesting and or courtship. LC ISR, LLC will document early courtship behavior in new nesting areas and consult with USFWS and WGFD to determine appropriate mitigation measures.

Three thorough surveys for nesting raptors will be completed for the Permit Area and surrounding one-mile perimeter through the spring. One survey will be completed during March to locate great-horned owl and golden eagle nests. A second survey will be completed in April to locate most of the nests of other species. Reporting will indicate whether nesting territory is: not occupied (inactive); occupied by one raptor (active); or occupied by a pair (active).

One survey will be completed from mid-May to mid-June to locate new raptor nests (nests that have become established since the April survey) and to check the status (activity, number of young birds) of all nests. Follow-up visits to previously identified nests will be timed to facilitate documentation of nesting activity, according to the biology of the species present and variations in breeding chronology, including: nest building; reproductive attempts and success; and fledging success. The status and productivity of all nests will be reported annually (by location, nest type and characteristics, species, and number of fledged birds.

Nest surveys will be completed either from the air or the ground. Nest checks will be brief and conducted to avoid flushing incubating raptors.

2.3.2 Measures of Disturbance

The linear distance of each nest site (active and inactive) from the nearest known regular human or equipment activity will be determined each breeding season. The presence of visual barriers (does a direct line of site exists between the disturbance and the nest) will be noted. It will be determined if the activity/disturbance is unrelated or related to ISR activities. This information will be shown on a raptor monitoring map with each year's annual report.

2.3.3 Prey Abundance

2.3.3.1 Lagomorphs

Lagomorphs present include desert cottontails and white-tailed jackrabbits. Pygmy rabbits are also present in lowland sagebrush habitat.

Desert cottontail and white-tailed jackrabbit populations will be evaluated using spotlight surveys through native habitat in the Permit Area. Surveys will be completed on a night as close to the full moon as possible. One survey will be completed in June and another survey will be completed in August of each year. Transects will be established along approximately 1.5 mile of road within the Permit Area. Once reclaimed/restored areas are established, a transect will be established in these areas. All transect locations will be presented on a map in the Wildlife Monitoring Report.

Based on current wildlife inventories, pygmy rabbits are restricted to lowland sagebrush habitat areas within the Permit Area. Pygmy rabbits will be surveyed using techniques described in Ulmschneider et al. (2004). Four transects will be established in pygmy rabbit occupied lowland sagebrush swales within the Permit Area. Lowland sagebrush occurs in narrow swales and drainages on the site. Transect length (from start and stop point) will be 0.5 miles. Transects will not be linear but will meander through the habitat area. Meandering transects will start and end at the same points each year. Data will be recorded on standard data forms using the recommended data recording methods (Ulmschneider et al., 2004). Annual transect tracts will be recorded and presented on a map in the Wildlife Monitoring Report.

2.3.3.2 Small Mammals

Surveys for other small mammals are not proposed at this time.

2.4 Migratory Birds of High Federal Interest (MBHFI)

Nesting non-game bird surveys will be conducted in representative vegetation/habitat types within the Permit Area. These surveys will be used to document breeding MBHFI that are present in the area.

Surveys will follow techniques recommended by the WDEQ (WDEQ-LQD, 1994). Two transects will be established in each vegetation type of the Permit Area. Transects will be 1,000 meters in length (2,000 meters per habitat type). The two vegetation types in the Permit Area are Upland Big Sagebrush and Lowland Big Sagebrush (**Appendix D8**).

Based on already completed baseline breeding bird surveys, the Lowland Big Sagebrush habitat provides the most important nesting habitat to MBHFI on the site.

In the both vegetation types, belt transects (100 meters) wide will be walked. All birds (including non-game and non-MBHFI birds) observed or heard will be recorded. Transect start and stop points will be located by GPS. Transect locations will be shown on a 1:24,000 scale quad map.

Surveys will be completed during the peak of the nesting season during the 1st week of June. Surveys will be completed from 0.5 hours before sunrise to 9:30 am. Nesting bird surveys were completed during the spring of 2007.

2.5 Federally Listed Threatened and Endangered Species

Any observation of a federally listed (threatened or endangered) species will be recorded and promptly reported. Any mortality of a listed species will be reported to the USFWS within one day of discovery.

If new species (that are present in the Permit Area) are listed as threatened or endangered during the period of mine operation, the USFWS will be consulted to develop specific mitigation and monitoring measures.

2.6 Non-Game Mammals

Specific monitoring surveys of non-game mammals are not proposed. Incidental observations of non-game mammals will be made while completing other wildlife surveys. These incidental observations will be summarized in a table in the Annual Report.

2.7 Non-Game Birds

Specific surveys for non-game birds are not proposed. However, as noted in Section 2.4, during the surveys for MBHFI, all birds observed or heard will be recorded. In addition, incidental observations of non-game birds will be made while completing other wildlife surveys. These incidental observations will be summarized in a table in the Annual Report.

2.8 Reptiles and Amphibians

Specific surveys for reptiles and amphibians are not proposed. Incidental observations of reptiles and amphibians will be made while completing other wildlife surveys. These incidental observations will be summarized in a table in the Annual Report.

REFERENCES

California Environmental Protection Agency. 2000. HERD Ecological Risk Assessment (ERA) Note Number 4. Issue: Use of Navy/U.S. Environmental Protection Agency (USEPA) Region 9 Biological Technical Assistance Group (BTAG) Toxicity Reference Values (TRVs) for Ecological Risk Assessment. Human and Ecological Risk Division Department of Toxic Substances Control. December 8. Table 2.

Carter, TA and Sneed RE. 1996. Drinking Water Quality for Poultry. Publication No. PS&T #42. North Carolina Cooperative Extension Service – Water Quality & Waste Management. March. Viewed 8/30/09 at:
http://www.bae.ncsu.edu/programs/extension/publicat/wqwm/pst42.html.

Connelly, JW, Reese, KP, and MA Schroeder. 2003. Monitoring of greater sage grouse habitats and populations. College of Natural Resources Experiment Station publication No. 979, University of Idaho, Moscow, ID, USA.

Connelly, JW, Schroeder, MA, Sands, AR, and Braun, CE. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28:1-19.

Environmental Protection Agency (US). 1993. Wildlife Exposure Factors Handbook. Vol. I of II. EPA/600/R-93/187a. Office of Research and Development, Washington, DC. December.

Golden J, Ouellette RP, Saari S, Cheremisinoff PN. 1979. Environmental impact book. Ann Arbor (MI): Ann Arbor Science Publishers, Inc.

Halford, DK, Markham, OD and Dickson, RL. 1982. Radiation doses to waterfowl using a liquid radioactive waste disposal area. Journal of Wildlife Management 46(4): 905-914.

Holloran, MJ. 2005. Greater sage-grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. PhD Dissertation, University of Wyoming, Laramie, WY, USA.

Holloran, MJ., and Anderson, SH. 2005. Spatial distribution of greater sage-grouse nests in relatively contiguous sagebrush habitats. Condor 107:742-752.

Holloran, MJ., Kaiser, RC, and Hubert, WA. 2010. Yearling greater sage-grouse response to energy development in Wyoming. Journal of Wildlife Management 74:65-72.

Lemly, AD. 1993. Guidelines for evaluating selenium data from aquatic monitoring and assessment studies. Environmental Monitoring and Assessment 28: 83-100.

National Academy of Sciences (US). 1980. Mineral Tolerance of Domestic Animals. National Academy Press, Washington, DC. Table 1.

Naugle, DE, Doherty, KE, Walker, BL, Holloran, MJ and Copeland, HE. 2010. Energy development and greater sage-grouse. Studies in Avian Biology: *In Press*.

Nuclear Regulatory Commission. 2009. Letter of November 12, 2009 from J. Webb (NRC) to M. Griffin (Uranium One, Inc.) acknowledging receipt of request to defer review of the Antelope-Jab application. NRC ADAMS Accession No. ML093140278.

Ohlendorf, H.M, Hoffman, DJ, Saiki, MK and Aldrich, TW. 1986. Embryonic mortality and abnormalities of aquatic birds: apparent impacts of selenium from irrigation drainwater. Science of the Total Environment 52:49-63.

Olendorf R.R., A. Miller, R. Lehman R. 1996. Suggested practices for raptor protection on power lines: the state of the art in 1996. Raptor Research Foundation.

Raisbeck, MF, Riker, SL, Tate, CM, Jackson, R, Smith, MA, Reddy, KJ and Zygmunt, JR. 2007. Water Quality for Wyoming Livestock and Wildlife. A Review of the Literature Pertaining to Health Effects of Inorganic Contaminants. Funded by UW Dept Veterinary Sciences & Renewable Resources, Wyoming Department of Game & Fish, and Wyoming Department of Environmental Quality.

Skorupa, JE and Ohlendorf, HM. 1991. Contaminants in Drainage Water and Avian Risk Thresholds. *In* A. Dinar and D. Zilberman (Eds.), The Economics and Management of Water and Drainage in Agriculture. Kluwer Academic Publishers, Dordrecht and Boston. pp. 345-368.

Ulmschneider, H., et al. 2004. Surveying for Pygmy Rabbits (*Brachylagus idahoensis*). Fourth Draft available from:
http:\\sagemap.wr.usgs.gov/docs/DraftPygmy%20RabbitProtocol6_10_04.doc

Walker, BL 2008. Greater sage-grouse response to coal-bed natural gas development and West Nile virus in the Powder River Basin, Montana and Wyoming, USA. PhD Dissertation, University of Montana, Missoula, MT, USA.

Whicker, FW and Schultz, V (eds.). 1982. Radioecology: Nuclear Energy and the Environment, Vols. I, II. CRC Press, Boca Raton, FL. pp. 151-152.

Wyoming Department of Environmental Quality, Land Quality Division. 1994. Guideline No. 5- Wildlife. Cheyenne (WY). Available from: http://deq.state.wy.us/lqd/guidelns/Guideline5.pdf

Wyoming Department of Environmental Quality (WYDEQ). 2007a. Water Quality Rules and Regulations, Chapter 1: Wyoming Surface Water Quality Standards. Section 22, Radioactive Material and Appendix B, Water Quality Criteria.

Wyoming Department of Environmental Quality (WYDEQ). 2007b. Water Quality Rules and Regulations, Chapter 1: Wyoming Surface Water Quality Standards. Section 2(b)(l), Definition of Surface Waters of the State.

Wyoming Game and Fish Department. 2008. Stipulations for Development in Core Sage Grouse Population Areas. Available at: http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/FINALStateLandCoreAreaSageGrouseStips7312008.pdf

Addendum OP-A6-A

Agency Review Letters

USWFWS

Letter of December 18, 2009 from B.T. Kelly (USFWS) to J.W. Cash (LC ISR, LLC) is included after this cover page.

WGFD

To be provided after review by WGFD.