4.0 Chapter 4: Environmental Effects

In accordance with 40 CFR 1502.16, this chapter discloses the environmental consequences of the Proposed Action, and the No Action Alternative on each of the affected resources. An environmental effect is defined as a change in the quality or quantity of a given resource due to a modification in the existing environment resulting from project-related activities. Effects may be beneficial or adverse, may be a primary (direct) result or secondary (indirect) result of an action, and may be permanent and long-term or temporary and of short duration. Environmental effects may vary in degree from a slightly discernible change to an overall change in the environment. This effects assessment assumes that all construction and reclamation measures described in the Proposed Action (as found in chapter 2 and the plan of operations) would be successfully implemented. If such measures are not implemented, negative impacts could occur. The terms ~~"e~~effects" and ~~"im~~pacts" are used interchangeably in this analysis.

Residual effects of the analysis are those remaining after mitigation has been applied to the Proposed Action or an alternative (BLM 2008a).

The effects analysis addresses direct, indirect, and cumulative effects related to each issue (BLM 2008a).

Each resource discussed in this chapter includes a description of:

- Direct and indirect effects due to implementation of the Proposed Action
- Direct and indirect effects due to implementation of the No Action Alternative
- Cumulative effects due to implementation of the Proposed Action, if applicable
- Cumulative effects due to implementation of the No Action Alternative, if applicable

Impact analysis assumes that monitoring and mitigation measures committed to in the NRC EA and PRI plan of operations are applied. These operator committed mitigation measures are incorporated into this EA. The impact analysis also assumes the successful implementation of the applicable and appropriate environmental protection and mitigation measures or best management practices (BMPs) discussed for the individual resources as well as compliance with all applicable federal, state, and local regulations and permit requirements.

For purposes of this analysis, the effects of the Proposed Action are defined as those actions taking place on BLM-administered surface. The area within the proposed wellfield monitoring well rings, on BLM-administered surface, would comprise approximately 252 acres; of this, approximately 34.57 acres would be short-term disturbance. Life-of-project disturbance (power lines, roads, header houses, and well pads) would affect another approximately 11 acres of the BLM-administered surface, for a total of 45.6 acres of disturbance. The No Action Alternative would result in the development of the project minus the portions of the project on BLM-administered surface. NRC has permitted the project, and it is being considered by

WDEQ/LQD. These activities would affect approximately 343 acres of private and state owned surface of which approximately 240.6 acres would be short-term disturbance and 102.52 acres would be life-of project disturbance within the 8,280-acre project area.

The Wyoming BLM has adopted a standard set of guidelines and conditions of approval (COAs) that apply, where applicable and appropriate, to all surface-disturbing activities on federal lands in Wyoming (BLM 2007a, appendix I). With the exception of specific mitigations excluded from the No Action Alternative (chapter 2), standard Wyoming BLM mitigation guidelines are applied to all alternatives analyzed in this EA.

4.1 DIRECT AND INDIRECT EFFECTS

4.1.1 Air Quality

The Casper RMP prescribes the following management goals with respect to air quality:

- Minimize the impact of management actions in the planning area on air quality by complying with all applicable air quality laws, rules, and regulations (Goal PR:1); and,

- Implement management actions within the scope of the BLM's land-management responsibilities to improve air quality as practicable (Goal PR:2).

4.1.1.1 Alternative I - Proposed Action

As a general rule, ISR mining is not a major source of non-radiological air pollutants. As discussed in the NRC EA, section 5.3, construction and wellfield development activities in the Reynolds Ranch area would include: preparation and construction of header houses; construction and vehicle traffic along unpaved access roads in the wellfields; pipeline laying; and well drilling. Air quality would be affected by the release of diesel emissions from drilling and construction equipment and from fugitive dust from construction activities and vehicle traffic. Diesel emissions would be minor and of short duration, and would be readily dispersed in the atmosphere. Fugitive dust generated from construction and drilling activity, as well as vehicle traffic on unpaved roads, would be localized and of short duration. Localized areas affected by the laying pipelines and drilling wells would be reclaimed, topsoiled, and re-seeded. PRI has committed additionally to re-seeding disturbed surface areas to minimize erosion from wind and water. Vegetation normally would be reestablished within two years of disturbance (PRI 2009). Reclaimed building sites and access roads would be re-contoured, covered with topsoil, and re-seeded to minimize long-term impacts to air quality.

Operations related air emissions would include dissolved radon gas generated by its dissolution from processing solutions. Without the implementation of appropriate NRC standard operating procedures (SOPs), radon could escape to the atmosphere and affect air quality in the wellfields and immediate vicinity of processing buildings. Radon can be vented to the atmosphere from the wellfields at each wellhead or from the process equipment. PRI would use pressurized downflow ion exchange columns; therefore, radon releases would occur only when individual ion exchange columns are disconnected from the circuit and opened to remove the resin for elution. The NRC

found that there would be no adverse impact to air quality from the proposed action; the radiological impacts of operations are more fully discussed in section 5.8 of the NRC EA (2006).

Possible air quality impacts from the transportation of ion exchange resin from the project area to the SR CPP could include exposure to radionuclides and vehicle emissions during shipping. Airborne release of uranium would not occur during shipping as the ion exchange resin would be shipped in a closed container, and the uranium would remain fixed to the resin beads (NRC 2009c). The additional traffic volume of approximately one truck per day is minor. Vehicle emissions from the additional traffic are not expected to significantly contribute to the vehicle emissions on these roadways (NRC 2009c).

Uranium recovered at Reynolds Ranch would be processed at the Smith Ranch. The main non-radiologic gaseous effluents that would be released from the operation of processing equipment in the CPP include gases, such as CO_2 and hydrogen chloride. At the CPP, these gases are vented directly to the atmosphere where they are readily dispersed. PRI operates SR-HUP under their WDEQ/AQD construction permit; Reynolds Ranch has been added to this permit.

Air quality effects would be similar to those associated with development, including fugitive dust and emissions from vehicle traffic and equipment used to plug and abandon wells. These effects would be short-term, but ongoing throughout the life of the project, and are expected to have minimal air quality effects.

Decommissioning activities would also generate the same pollutants as construction activities: fugitive dust, vehicle emissions, and diesel emissions. The NRC (2009c) identifies decommissioning activities as generating similar amounts of air pollutants as construction activities, mostly due to increased particulate matter from activities associated with dismantling buildings and equipment, removing contaminated soil, and grading activities during reclamation. These activities could cause a short-term increase in emissions, but emissions would decrease as decommissioning and reclamation activities proceed.

4.1.1.2 Alternative II - No Action Alternative

Under the No Action Alternative, the mining activities described in the 2009 POO would likely be undertaken on the remaining state and private surface lands, as would any other activities already approved by the BLM. Effects to air quality resources would generally be consistent with those described for the Proposed Action.

4.1.2 Geology, Minerals and Energy Resources

4.1.2.1 Geological Resources

The Casper RMP prescribes the following management goal (Goal PR:3) with respect to geologic resources:

- Manage geologic hazards and unique geologic features on BLM administered lands.

Alternative I - Proposed Action

The Proposed Action would not affect the basic geology of the Reynolds Ranch area; and the inherent geologic hazards in the area do not pose a significant danger or public safety hazard. Impacts related to natural geologic hazards are not likely to occur due to topographic alterations resulting from ISR activities. As described in section 3.3.1, ~~–~~Geologic Hazards," no landslide areas exist in the Reynolds Ranch area; and, because no subsurface rock volume is removed during the Proposed Action construction and operations, the project would not initiate landslides, mudslides, debris flows, slumps, or other forms of mass movement.

Due to low seismic activity in the project area, potential damage to ISR-related facilities is low (PRI 2006). The sandstone host rock containing the uranium is naturally water-filled. Since the ISR process simply re-circulates water, at slightly below normal pressures, within these sandstones, it is highly unlikely that the Proposed Action could initiate any seismic activity.

No unique geologic features are present in the Reynolds Ranch area.

Subsidence and flooding effects to the surface geologic environment have been addressed in chapter 3 and are not considered a concern.

Alternative II - No Action Alternative

Under the No Action Alternative, the mining activities described in the 2009 POO would likely be undertaken on the remaining state and private surface lands, as would any other activities already approved by the BLM. There would be no additional impacts to the geologic environment.

4.1.2.2 Energy Resources

The Casper RMP prescribes the following management goals with respect to mineral resources:

- Support the domestic need for energy resources (Goal MR:3); and,
- Manage mining claim location, prospecting, and mining operations in a manner that will not cause unnecessary or undue degradation of public lands (Goal MR: 4).

The RMP also prescribes the following management goals with respect to socioeconomic resources:

- Provide opportunities to develop national energy resources on BLM-administered lands within the planning area (SR:1).

Alternative I - Proposed Action

The Proposed Action is consistent with the National Energy Policy Act of 2005. Title VI of the Act authorizes funding for development of ~~–a~~ prototype Next Generation Nuclear Plant Project

to produce both electricity and hydrogen." Further, title IX (Research and Development) which –allows the Secretary of Energy to conduct a set of Nuclear Energy programs that increase the efficiency of nuclear energy intensive sectors via improved technologies, promote diversity of the energy supply, decrease the Nation's dependence on foreign energy sources, improve energy security, and decrease the environmental impact of energy related activities. These programs would include existing and advanced reactors and the education of future specialists."

The primary impact on mineral resources from the Proposed Action would be the removal of uranium from the Wasatch and Fort Union formations. As a result, uranium from the exploited zones would not be available in the future.

BLM has leased the subsurface oil and gas resources in the project area for development. As discussed in chapter 3, potentially developable coal beds (leasable minerals) are present under the Reynolds Ranch project area as are deeper oil and gas formations. The BLM CFO has received three APDs for conventional and CBNG exploratory wells in the Reynolds Ranch project area (BLM CFO pers. com. 2010).

Some conflict between developing energy resources can be anticipated. According to the NRC generic EIS for in-situ uranium development (NRC 2009a), –Competing access to mineral rights could be either delayed for the duration of the ISL project or be intermixed with ISL operations (e.g., oil and gas exploration)." The NRC (2009a) provides environmental safeguards, as follows, –If there are oil, gas, coal bed methane, or other production layers near the ISL facility, and if NRC determines that there could be potentials for cross contamination between the ISL production zone and other production layers based on environmental impact assessments, may require the licensee to expand the monitoring well ring for detection of potential contamination between the ISL production zone and other mineral production layers. That EIS goes on to say, –If excursions are detected, the monitoring well is placed on excursion status and reported to the NRC. Corrective actions are taken, and the well is placed on a more frequent monitoring schedule until the well is found to no longer be in excursion."

If CBNG and ISR activities were to occur simultaneously in the Reynolds Ranch area, safeguards are in place to preclude cross contamination; from an engineering perspective. Both processes are designed to work on a negative pressure basis, keeping the processes separated. The prospective zones of interest (uranium as opposed to coals) are at least 700 feet apart (figures 3-3 and 3-4). In addition, the respective regulatory processes (NRC and WDEQ/LQD for in-situ uranium and WOGCC and BLM for oil and gas development) require well casing to be cemented from surface to total depth, with the exception of the production or injection interval. Care would be taken while drilling occurs to avoid interference with either operation. The BLM would have to conduct additional environmental analyses before such duel activity could occur. The NRC could, as stated above, enhance the ISR monitoring requirements should the potential for cross contamination exist (NRC 2009a).

The CBNG development in the School coal seam to the west of the project area, near the Dave Johnson Coal Mine, was not successful and has been plugged and abandoned. The Duck Creek CBNG development to the north and east of Reynolds Ranch contains both an upper and lower Pawnee coal seam making the methane reserves economic. Figure 3-3 illustrates that the School

coal seam may be too shallow and thin to produce economic methane. Similarly, the Pawnee coal seam is at 1,700 feet and consists of only one bed making it likely too thin to be economic.

Oil and gas exploration for deeper formations is likely in the future as evidenced by the APD received by BLM to develop a 13,000-foot deep oil well in section 26, T. 37 N., R. 74 W. The prospective formations are generally below 9,000 feet and are separated by hundreds of feet of shale (aquitards); thus, there would be no conflict between the Proposed Action and deep oil and gas exploration. As with CBNG development, deep hydrocarbon wells are cased and cemented to preclude cross contamination between formations.

The subsurface coal resource (locatable minerals) in the project area is considered too thin for economically viable commercial mining. There are no active construction aggregate quarries (saleable minerals) in the area. The Proposed Action would have no impact on these resources, and no development conflicts are expected. If conflicts were to arise, development priorities would be in accordance with existing federal law and BLM policies and regulations.

Wind energy projects would not necessarily be precluded by development of in-situ uranium recovery operations, but as with oil and gas development, the location of facilities and transmission systems would require close coordination by the developers or possibly a delay in the development of the wind resource in wellfields until groundwater restoration activities had been completed.

Alternative II - No Action Alternative

Under the No Action Alternative, the mining activities described in the 2009 POO and NRC EA (2006) would be undertaken on the remaining state and private surface lands, as would any other activities already approved by the BLM. Under separate NEPA analysis, BLM could approve alternative energy development activities (oil and gas, CBNG, or wind energy) in the area if the Proposed Action were denied. BLM could also approve alternative energy development activities on the split-estate lands within the project area.

The state of Wyoming and local governments would suffer the loss of revenue from ad valorem, property, and severance taxes that could be realized from the development of the federal mineral estate associated with the project. Under the No Action Alternative, some of the uranium underlying federal lands within the project area would remain available for future recovery. However, a delay in development of federal mining claims would likely render some of this uranium unrecoverable and would result in the waste of uranium reserves within the affected areas. Other mineral resources located on BLM-administered lands would not be impacted by the proposed development activities and could be developed in the future based on product availability, demand, and federal land management policies.

Selection of the No Action Alternative would not preclude other energy resources from being developed. Implementation of the Proposed Action could still occur on state and private mineral claims.

4.1.3 Paleontological Resources

The Casper RMP prescribes the following management goals with respect to paleontological resources:

- Preserve and protect paleontological resources and ensure that they are available for appropriate use by present and future generations (HR:1),

- Reduce imminent threats to paleontological resources from natural or human–caused deterioration, or potential conflict with other resource uses (HR:2), and,

- Promote stewardship, conservation, and appreciation of paleontological resources (HR:3).

Alternative I - Proposed Action

Given that the BLM identifies the PFYC for the project area as 4 and 5, fossils with scientific significance could be present but not exposed at the surface. Little is known of the fossil record in the area due to a scarcity of formal paleontological research. Mitigation would be required to minimize impact to fossils that may be encountered during construction activities.

Alternative II - No Action Alternative

Under this alternative, no increase in effects or risks to paleontological resources would be realized on the 45.6 acres managed by the BLM, beyond those activities already authorized by the BLM. However, ISR development, as described in the 2009 POO and NRC EA (2006), would likely occur on private and state claim areas and could possibly result in the loss of some paleontological resources. Operator committed mitigation would reduce the opportunity to impact paleontological resources.

4.1.4 Soils Resources

The Casper RMP prescribes the following management goal (Goal PR: 4) with respect to soil resources:

- Maintain or improve soil health (e.g., chemical, physical, and biotic properties) and prevent or minimize soil erosion and compaction.

Alternative I- Proposed Action

Implementation of the Proposed Action would result in the short-term, incremental disturbance of approximately 45.6 acres of BLM-administered surface in the project area. A maximum of 22.5 acres (NRC EA 2006) of topsoil and suitable subsoil would be removed because of activities associated with well-drilling and construction of wellfield houses, pipelines, field use process chemical storage sites, and access roads. Potential effects of these activities would include: removal or reduction of vegetation, exposure of sub-surface soil horizons, mixing of soil

horizons, soil compaction, loss of topsoil productivity, loss or reduction of sub-surface biological organisms, and increased susceptibility to wind and water erosion. For areas with limited disturbance, such as well sites and along pipelines, topsoil and suitable subsoil will be separated from the unsuitable subsoil, piled separately, and reapplied in the reverse order once well work is completed or the pipeline ditch is backfilled. Topsoil and suitable subsoil would not be salvaged from two-track access roads, temporary structure locations, or temporary storage facilities.

After replacing the topsoil, areas would be reseeded to minimize the potential for erosion (figure 4-1). Effects of construction activities on soil resources are limited to the duration, area, and extent of the excavations. Construction activities may, in turn, result in increased storm water runoff, wind erosion, potential introduction of sediments and salts into the surrounding watershed, and increased potential for the invasion and establishment of invasive/noxious plants. Soils would be impacted, stabilized and re-vegetated by the Proposed Action two times, first as a result of project construction and development and second, following groundwater restoration and project decommissioning.

Potential spills could occur from ruptures or breaks in pipelines transporting ~~"p~~regnant" lixiviant, contaminated groundwater, or uranium-enriched. Short-term effects could range from small to large depending on the volume of soil affected. However, because of the required immediate response protocol, PRI's SOP for spill response, resultant spill recovery actions, and routine monitoring programs, effects from spills are temporary. Overall, long-term potential effects to soil resources would be minimal. Spills of hydrocarbon materials are not anticipated due to the nature of the mining operations but could occur as the result of a vehicle accident, equipment, or storage tank failure. Such releases would be mitigated through compliance with the SR-HUP SPCC plan and remediated following spill response protocols.

Portions of the project area may be difficult to re-vegetate due to the limited suitability of the soil as a plant growth medium (table 3-5). Generally, questionable chemical quality material (high pH and anticipated high calcium carbonate levels) is found within the deeper residual soils or within the high clay horizons of the sandy alluviated material. Revegetation problems would be reduced with minimal mixing of soil horizons and timely reapplication of topsoil and suitable subsoil from salvage stockpiles. Future climatic patterns, land use, and compliance with the reclamation plan and weed control efforts would influence revegetation success.

The general soil series, Aeric Haplaquept, is identified as the only hydric soil within the project area, according to the NRCS soils map for northern Converse County (NRCS 2008) (figure 3-5). It is limited in extent and is only associated with ponds (BKS 1998). Based on its proximity to and within ponds, this series would be avoided during construction activities and ISR operations. Field verification of the overlay of the NWI mapping with infrared aerial photos of the project area resulted in the development of a wetlands map relative to the proposed action (figure 3-6) (SVC 2008). This work indicates hydric soils potentially associated with wetlands are limited in extent and located primarily in drainages in the southeastern portion of the project area. The lack of hydric soils within the project area is likely due to the general overall sandy nature of many of these bottomlands. Limited extent and location of hydric soils within the

Figure 4-1: Example of Topsoil Management

project area, as well as general typical avoidance during the construction process and during ISR operations, should minimize disturbance to these soil types.

Total disturbance of soil resources on BLM-administered surface in the Reynolds Ranch project area is conservatively estimated to be approximately 45.6 acres.

Alternative II - No Action Alternative

Under the No Action Alternative, the mining activities described in the 2009 POO and NRC EA (2006) would likely be undertaken on the remaining state and private surface lands, as would any other activities already approved by the BLM. No additional disturbance/development would occur on the BLM-administered surface and mineral estate. Operator committed mitigation would reduce the impact to the soils resources.

Existing uses (livestock grazing) of the soil resources within the BLM-administered portions of the Reynolds Ranch project area (approximately 45.6 acres) would likely continue at current levels. The landowner would determine livestock grazing on private lands.

4.1.5 Water Resources

The Casper RMP prescribes the following management goal (Goal PR: 5) with respect to surface water resources:

- Maintain or improve surface water and grounds water resources consistent with applicable state and federal standards and regulations.

4.1.5.1 Surface Waters

The objectives in the Casper RMP (Goal PR:5) applicable to the surface water resources at the Reynolds Ranch project include:

- Maintain watershed, wetland, and riparian function to support surface-flow regimes and water quality,

- Minimize or control contribution of nonpoint source pollution from public lands to receiving water bodies, and,

- Improve control of sources of pollutants on federal lands that may threaten drinking-water sources.

Alternative I - Proposed Action

The only natural surface water in the project area is ephemeral runoff from occasional precipitation events and seasonal snowmelt. Intermittent surface flows within the area are the result of both the relatively low average annual precipitation in the region and the fact that quaternary deposits of high transmissivity underlie most stream channels in the area. Some of the limited intermittent surface runoff is collected in stock ponds.

Under the Proposed Action, three wellfields would be constructed, including roads, pipelines, and power lines. Surface water resources may be impacted by these actions including the limited ephemeral surface runoff discussed above. A very small amount of groundwater is discharged to the surface from monitoring well sampling events, but this water does not enter drainage channels (PRI 2009).

The activity with the largest potential to produce impacts to surface waters is the incremental surface disturbance of approximately 45.6 acres of BLM-administered public lands. The loss of vegetation and stable soil formations could result in increased erosion, runoff, sedimentation, and deposition, if mitigation were not applied. Transportation of invasive plant species could increase from runoff within disturbed watersheds. Proper construction and monitoring of roadways, pipelines, power lines, and well pads along with implementation of BMP's should mitigate impacts to ephemeral surface waters.

Well pad locations and associated infrastructure would be built on relatively flat areas. Implementation of the Storm Water Pollution Prevention Plan (SWPPP) and associated BMPs, such as waddles and silt fences, would contain and prevent any significant surface runoff or contamination from occurring at the well pad sites. Therefore, there would be limited short-term increased erosion, sedimentation, or impacts to surface water due to wellfield construction. In an effort to limit potential for serious long-term channel disturbances, wells would not be drilled in channel bottoms. PRI would not dam or reroute any drainage channels.

Road construction can result in channeling water into the borrow ditches and road ruts, thereby increasing the erosive power of the water and potential to carry suspended solids. In addition, roads can reroute water and may result in discharging water into areas that cannot handle excess water, or reroute it away from permitted stock reservoirs. Proper planning of roads and road construction, and implementing BMPs would reduce the opportunity for water channeling, thereby lessening the impact of erosion, gully formation, or water diversion from its original course.

The following WDEQ/LQD requirements (Non-coal Rules and Regulations, Chapter 2, Section S (I)) are applicable to the Reynolds Ranch project:

(i) Roads shall not be constructed along a stream channel or so close that the material shall spill into the channel, unless specifically approved by the administrator.

(ii) Streams shall be crossed at or near right angles unless contouring down to the streambed will result in less potential stream bank erosion. Structure of ford entrances and exits must be constructed to prevent water from flowing down the roadway.

(iii) Drainage control structures shall be used as necessary to control runoff and to minimize erosion, sedimentation and flooding. Drainage facilities shall be installed as road construction progresses.

(iv) Culverts shall be installed at prominent drainage ways, or as required by the administrator. When necessary, culverts must be protected from erosion by adequate rock, concrete or riprap. Culverts and drainage pipes shall be constructed to avoid plugging, collapsing, or erosion at inlets and outlets.

(v) Trees and vegetation may be cleared only for the essential width necessary to maintain slope stability and to serve traffic needs.

(vi) Access, haul roads and drainage structures shall be routinely maintained.

(vii) Other transport facilities and utilities shall be constructed and maintained to control diminution of degradation of water quality and quantity and to the extent possible prevent additional contributions of suspended solids to stream flow outside the permit area.

Another action that may result impacts to surface water is the potential for ISR process water spills or pipeline breakage. Potential spills may cause impacts to the water resources if they are not cleaned up promptly. PRI is required to respond immediately and has implemented real time monitoring programs; therefore, relatively minor short-term impacts could be expected. Long-term impacts to the surface water resources should also be insignificant for the following reasons: 1) PRI is required to respond immediately to releases of produced fluid, and 2) ephemeral channel flows within the watersheds are uncommon due to low precipitation within the project area. If the BMPs outlined in PRI's spill contingency plan and SOPs are used, no significant impacts should result from spills or pipeline breaks.

All groundwater brought to the surface through the drilling process would be pumped to the earthen drilling mud pit. After drilling and under-reaming are completed, the mud pits would be allowed to dry before being backfilled using a backhoe. No groundwater would be discharged to the surface; therefore, there should not be any impacts to surface water resources from drilling operations.

The WDEQ regulates water and discharges into waters within the Wyoming. Point source discharge permits would not be necessary for the mining operation. WDEQ requires a storm water discharge permit for construction, industrial, or mining projects that disturb one acre or more.

As discussed in chapter 3, the surface waters in the project area are connected to the Missouri River hydrologic system; and, therefore, activities at Reynolds Ranch would not affect the five listed Platte River species (interior least tern, pallid sturgeon, piping plover, Western prairie fringed orchid, and whooping crane). If surface water would be obtained from SR-HUP and the volume to be used in the project area were to exceed 0.1 acre-foot, PRI would enter into consultation with the FWS regarding Platte River depletions.

Alternative II - No Action Alternative

Under the No Action Alternative, the ISR development, as described in the 2009 POO, would occur on private and state mineral claim areas and would not be expected to impact surface waters in the project area. No additional disturbance/development would occur on the BLM surface beyond those activities already taking place. As there would still be disturbances in the same larger scale watersheds, the impacts would remain consistent with those of the Proposed Action. Operator committed mitigation would limit the opportunity for impacts to area surface water resources. On BLM-administered lands naturally occurring erosion, sedimentation, and deposition would continue, as would disturbance from livestock grazing activities.

4.1.5.2 Wetlands

The Casper RMP prescribes the following management goals with respect to wetlands resources:

- Manage for the biological integrity of terrestrial and aquatic ecosystems to sustain vegetation...while providing for multiple uses of BLM-administered lands (Goal BR:1);

- Manage all BLM actions or authorized activities to sustain plant…populations and their habitats and to avoid contributing to the listing of or jeopardizing the continued existence or recovery of special status species and their habitats (Goal BR:2);

- Manage environmental risks and associated effects in a manner compatible with sustaining plant…populations. Environmental risks include, but are not limited to, parasites, diseases, insect outbreaks, catastrophic fires, contamination, pesticides, rodenticides, herbicides, and other hazards (Goal BR:3); and,
- Manage terrestrial and aquatic ecosystems to provide sustainable recreational and educational benefits to the public (Goal BR:4).

Alternative I - Proposed Action

National wetlands inventory sites were field verified as described in section 3.6.1.3. No wetlands were identified in the areas intended for mining operations. However, they were found in the southeastern portion of the project area (figure 3-6). In the event that a wetland was overlooked during field verification and is in an area scheduled for construction and development activities, it would be avoided, if possible. In the alternative, a COE permit would be obtained prior to any disturbance.

The Casper RMP includes criteria to determine impacts to wetland and riparian areas. Development actions would be evaluated for impacts to wetland function and sedimentation, including assessment of activities on non-wetland areas (uplands, ephemeral channels, and riparian areas). Activities having the potential to spread noxious weeds into wetlands, dewater a wetland, increase sediment load into a wetland area, or alter the soil chemistry of a wetland would be mitigated.

Alternative II- No Action Alternative

Under the No Action Alternative, the ISR development would occur on private and state mineral claim areas. While four areas with wetland characteristics were located within the project area, none were found on lands included within the Proposed Action.

4.1.5.3 Groundwater

Alternative I - Proposed Action

The NRC (2006) environmental assessment for the Reynolds Ranch includes an extensive discussion of existing groundwater hydrology and the potential impacts of the proposed action could have on that resource, as does appendix D-6 (~~"H~~Hydrology") of the application for the under source material license (SUA-1548; PRI 2005). These documents contain a detailed discussion of the potential effects of the proposed action on groundwater resources.

Additional protection is provided to the public through the Safe Drinking Water Act (SDWA), which provides a series of strict definitions as to what constitutes a safe underground source of drinking water (USDW) and requirements for providing the public protection from groundwater contamination. The SDWA and underground injection control (UIC) programs also provide a series of criteria by which an aquifer can be ~~"e~~exempted" as a USDW thereby allowing injection into that aquifer to occur. The EPA and the WDEQ/WQD can ~~"e~~exempt" an aquifer and allow mining operations to go forward while providing the public protection from poor quality aquifers. The NRC staff's review of groundwater issues related to ISR projects provides the following, ~~"B~~Before an NRC-licensed ISR can begin operations at the project site, the licensee must obtain an underground injection control (UIC) permit from the U.S. Environmental Protection Agency (EPA) or EPA-authorized State. The permit must exempt the portion of the aquifer subject to uranium mining from classification as an underground source of drinking water (NRC 2009b)." The SDWA underground injection control program (40 CFR 146.4) exemption criteria follow:

40 CFR 146.4 Criteria for exempted aquifers

An aquifer or a portion thereof which meets the criteria for an ``underground source of drinking water'' in Sec. 146.3 may be determined under 40 CFR 144.8 to be an ``exempted aquifer'' if it meets the following criteria:

(a) It does not currently serve as a source of drinking water; and

(b) It cannot now and will not in the future serve as a source of drinking water because:

(1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.

(2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical;

(3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or

(4) It is located over a Class III well mining area subject to subsidence or catastrophic collapse; or

(c) The total dissolved solids content of the groundwater is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

The NRC recognizes these protections and limitations and stated the following in the 2008 GEIS, —Without an aquifer exemption, certain types of energy production, mining, or waste disposal into underground sources of drinking water would be prohibited."

PRI/Cameco would apply to the WDEQ and the EPA to have the affected aquifers at Reynolds Ranch designated as —exempt" from the drinking water standards. This exemption provides future protection to the public as these aquifers would not be considered useable as drinking water sources and would not be permitted as such (WDEQ/WQD 2008).

As stated in the NRC EA (2006) and the PRI POO (2009) aquifers suitable for in-situ uranium recovery operations are by their nature confined, minimizing the possibility of cross-aquifer contamination. The extensive monitoring of aquifers above and below all injection and recovery wells associated with the ISL project would allow PRI and the WDEQ to respond rapidly to any identified excursion of uranium enriched water. In addition, following completion of uranium recovery operations, groundwater undergoes an extensive process of quality restoration to bring the water back to the pre-mining condition and use. The NRC staff report (2009b) states, —The primary goal of restoration is to return the production zone to pre-operational conditions, which would result in no impact; however, that is usually not attainable for all constituents at most ISRs. NRC regulations allow restoration to other standards that are protective of public health

and safety and the environment but as restoration to these standards results in changes from preoperational conditions, restoration results in impacts." Relative to deep well injection disposal operations associated with ISR, the NRC staff report (2009b) found, "The data for the existing NRC-licensed operating facilities indicate that on-site deep well disposal of byproduct material waste has been conducted in a manner that is protective of human health and the environment."

The NRC (2009b) concluded, "The monitoring data indicated no impacts attributed to the migration of impacted groundwater from the existing facility," and, "The staff is unaware of any situation indicating that: (1) the quality of groundwater at a nearby water supply well has been degraded; (2) the use of a water supply well has been discontinued; or (3) a well has been relocated because of impacts attributed to an ISR facility."

Water needed for well drilling operations would be obtained from wells permitted by the WSEO. The water supply wells are located in the Cheyenne/Missouri River Basin and would not deplete groundwater thus the FWS listed North Platte River species (interior least tern, pallid sturgeon, piping plover, Western prairie fringed orchid, and whooping crane) would not be affected.

Alternative II - No Action Alternative

Under the No Action Alternative, the mining activities described in the 2009 POO and NRC EA (2006) would likely be undertaken on the remaining state and private surface lands, as would any other activities already approved by the BLM. BLM would deny activities on approximately 45.6 acres of BLM-administered surface in the project area. This decision would not provide any net benefit to groundwater underlying the projects area; PRI would obtain an aquifer exemption for the reminder of the Reynolds Ranch project and commence ISR operations. Depletion to the North Platte River and associated impacts to species would not occur as the Reynolds Ranch project and water supply wells lie north of the defined hydrologic divide.

4.1.6 Vegetation and Invasive Non-native Species

The Casper RMP prescribes the following management goals with respect to vegetation resources:

- Manage for the biological integrity of terrestrial and aquatic ecosystems to sustain vegetation...while providing for multiple uses of BLM-administered lands (Goal BR:1);

- Manage all BLM actions or authorized activities to sustain plant…populations and their habitats and to avoid contributing to the listing of or jeopardizing the continued existence or recovery of special status species and their habitats (Goal BR:2);

- Manage environmental risks and associated effects in a manner compatible with sustaining plant…populations. Environmental risks include, but are not limited to, parasites, diseases, insect outbreaks, catastrophic fires, contamination, pesticides, rodenticides, herbicides, and other hazards (Goal BR:3); and,

- Manage terrestrial and aquatic ecosystems to provide sustainable recreational and educational benefits to the public (Goal BR:4).

Alternative I - Proposed Action

Implementation of the Proposed Action would result in the short-term, incremental loss of 45.6 acres of vegetation and vegetative production as a result of well drilling activities and construction of associated facilities and access roads. The anticipated impacts would consist of short-term reduction of herbaceous vegetation and a long-term loss of shrub cover. Potential indirect effects to the vegetation resource could be influenced by soil compaction, mixing of soil horizons, and loss of topsoil productivity, increased soil surface exposure causing increased soil loss due to wind and water erosion, and increased potential for noxious/invasive plant establishment.

These disturbances and loss of forage would be greatest during the construction period and would typically last one to three construction seasons (NRC 2009a). Areas not needed for operations would undergo interim soil stabilization and reclamation within the year of the disturbance or the first planting season following wellfield construction (figure 4-2).

Figure 4-2: Example of Reclamation Effort

Wellfields would be fenced to prevent livestock entry in order to enhance reclamation success and safeguard equipment. Wildlife entry would not be prevented. Grasses and forbs comprise the BLM recommended seed mix (table 4-1), which is similar to the seed mix approved by WDEQ/LQD (table 3 in the POO) and would be re-established on disturbed areas within a few

growing seasons. Over the long-term locally dominant shrub species would invade the disturbed areas. Anticipated life-of-project surface disturbance is an estimated 11 acres.

Table 4-1
BLM Recommended Seed Mix

Common Name	Cultivar	Scientific Name	Lbs/PLS/Acre[(1)]
Western wheatgrass	Rosana	*Pascopyrum smithii*	3.0
Thickspike wheatgrass	Critana	*Elymus laceolatus*	2.0
Indian ricegrass	Rimrock	*Achnatherum hymenoides*	2.0
Prairie junegrass	Common	*Koeleria macrantha*	1.0
Sandberg bluegrass	Common	*Poa sandbergii*	1.0
American vetch	Common	*Vicia Americana*	2.0
Purple prairie clover	Common	*Petalostemum purpureum*	0.5

[(1)]This recommendation is at the drilled application rate. Double rate if seed is to be broadcast. Seed should be certified weed free and meet state of Wyoming requirement for other weed seed. For federal surface, the BLM requires seed mixes contain no more than 0.5% of other weed seed which includes cheatgrass brome. It is recommended this be seeded in the fall or early spring. Using mulch and crimping it in will improve the rate of success of the seeding.

Disturbance of soil and existing native vegetation would create opportunities for invasive non-native species to establish themselves. These species may increase the danger of wildfires and prevent or deter establishment of native species. Compliance with the SR-HUP weed control plan and prompt, successful reclamation would minimize the opportunity for invasive and non-native species to spread and re-establish themselves. The weed control efforts in place at Smith Ranch-Highland are effective and should be equally effective at Reynolds Ranch. Future climatic patterns, land use, and compliance with the WDEQ/LQD and BLM reclamation plans and weed control efforts would be primary factors influencing successful reclamation efforts.

Alternative II - No Action Alternative

Under the No Action Alternative, the ISR development, as described in the 2009 POO and NRC EA (2006), would occur on private and state mineral claim areas. No additional disturbance/development would occur on the BLM-administered surface and minerals beyond those activities already approved by the BLM. Effects to vegetation would remain at current levels within those areas.

4.1.7 Range Management and Livestock Grazing

The Casper RMP prescribes the following management goal (Goal LR:6) with respect to range resources:

- Improve and (or) maintain rangeland health while providing opportunities for livestock grazing to support and sustain local communities.

Alternative I - Proposed Action

Implementation of the Proposed Action would affect the availability and composition of livestock and wildlife forage on about 45.6 acres of BLM-administered surface within the project area. The surface disturbance and loss of forage would occur over a 15-year period as the three proposed wellfields are developed, reclaimed, produced, restored, and decommissioned. Areas not needed for operations would undergo reclamation and soil stabilization within the year of the disturbance or the first planting season following wellfield construction.

During the life of the project, approximately 46 acres would be fenced to prevent livestock entry and to enhance reclamation success and safeguard equipment. Wildlife entry would not be prevented. Grasses and forbs comprise the BLM-approved seed mix, and over the long term locally dominant shrub species would invade the disturbed areas. Due to the sequential nature of ISR development and restoration, approximately one third of the area anticipated for wellfield development could be fenced off at a time, leaving approximately 15 acres (50 animal unit months—AUMs) unavailable at any one time. Assuming an average stocking rate of 3.3 acres per AUM, the Proposed Action (table 3-8) would result in a long-term, life-of-project, reduction of 132 AUMs.

The short-term disturbed areas (wellfields) would occur incrementally allowing for reclamation of portions of wellfields and area not needed for long-term operations. These areas would return to some level of forage production for livestock grazing within two to three years. Unsuccessful reclamation attempts would result in longer periods without full forage production. The Casper RMP provides the CFO the flexibility to adjust AUMs as needed to address forage conditions based on implementation of the BLM standards and guidelines for healthy rangelands.

Long-term fenced out areas would be unavailable for livestock grazing for approximately 15 years or until ISR activities are completed, wellfields and facilities have been abandoned, and all remaining disturbed areas have been reclaimed. Once successful reclamation is completed, forage production would return and allow for some level of livestock grazing within two to three years.

The quality and quantity of water available for livestock and wildlife could be affected as PRI develops stock ponds, wells, and other resources for landowners as a result of their ongoing working relationship. The pumping operations associated with ISR operations are not expected to impact groundwater quantity or quality. The uranium production zones are geologically isolated (NRC 2006).

Alternative II - No Action Alternative

Under the No Action Alternative, the ISR development, as described in the 2009 POO and NRC EA (2006), would likely occur on private and state mineral claim areas, resulting in reduced livestock use over the life of the project. No additional disturbance/development would occur on the BLM-administered surface and minerals beyond those activities already approved by the BLM. Effects to livestock grazing on BLM lands could remain at current levels.

4.1.8 Fish and Wildlife Resources

The Casper RMP prescribes the following management goals with respect to fish and wildlife resources:

- Manage for the biological integrity of terrestrial and aquatic ecosystems to sustain vegetation, fish, wildlife, and special status species, while providing for multiple uses of BLM-administered lands (BR:1),

- Manage all BLM actions or authorized activities to sustain plant, fish, and wildlife populations and their habitats and to avoid contributing to the listing of or jeopardizing the continued existence or recovery or special status species and their habitats (BR:2); and,

- Manage environmental risks and associated impacts in a manner compatible with sustaining … special status species populations. Environmental risks include, but are not limited to, parasites, diseases, insect outbreaks, catastrophic fires, contamination, pesticides, rodenticides, herbicides, and other hazards (Goal BR:3).

Threatened, endangered and BLM designated special status species are discussed in Section 4.1.9.

4.1.8.1 Mammals

Big Game

The development of wellfields, pipelines, and roads in the project area would temporarily eliminate areas of forage and habitat cover, and would change the seral stage or forage type available into the future. Increased traffic on Ross Road and the access roads would increase the mortality rate of animals.

Big game affected by noise and human activity could be displaced to forage in key winter and parturition areas in the region. Big game animals could be forced into areas where they might compete with livestock and interfere with crop production. However, mule deer and pronghorn in the existing Smith Ranch–Highland project areas appear to have become accustomed to the repeatable, non-threatening activities associated with the mining operations.

Elk

The Pine Ridge elk herd unit is located immediately to the west of Ross Road, along the western edge of the project area (figure 3-10). Yearlong habitat identified by the WGFD is approximately 11 miles to the west and outside of the proposed project. Elk are rarely seen in the Ross Road area. Classified yearlong habitat is also outside the proposed project area and the cumulative effects analysis area. Therefore, the Proposed Action would not have any influence on the herd or harvest.

Mule deer

The proposed project lies within the north Converse mule deer herd unit. The entire project area is classified as yearlong range (figure 3-9). No crucial habitats have been identified in the project area.

Pronghorn

The proposed project lies within the north Converse pronghorn herd unit. The entire project area is classified either as yearlong or winter/yearlong range (figure 3-8). No crucial habitats have been identified in the project area.

Alternative I - Proposed Action

The Proposed Action would result in the sequential development of three wellfields. Over the life of the project, approximately 46 acres of big game habitat would be disturbed. Currently, these species use the analysis area as well as the active ISR mining areas as yearlong habitat and are regularly seen by operations crews. Wellfield fencing does not preclude entry of these species to the reclaimed areas. Hunting access would continue to be controlled by the private landowners and grazing lessees. Thus, the Proposed Action would have no effect on the continued use of the area.

Alternative II - No Action Alternative

Under the No Action Alternative, there would be no affect on the north Converse pronghorn or mule deer herds for the same reason as the Proposed Action.

Small Mammals

The abundance of Swainson's, ferruginous, and red-tailed hawks, as well as golden eagles, in the proposed project area is due in large part to the abundant prey base including mammals, such as cottontail rabbits, jack rabbits, kangaroo rats, black-tailed prairie dogs, chipmunks, and mice.

Alternative I - Proposed Action

The Proposed Action would result in the sequential development of three wellfields. Over the life of the project, approximately 46 acres of small mammal habitat would be disturbed. All areas disturbed by ISR mining would be aggressively reclaimed using selected native forbs, grasses, and shrub species approved by the BLM. Small mammals are highly mobile and would be expected to re-populate disturbed areas quickly when localized disturbance factors are eliminated. While some individuals may be impacted, it is not expected that the Proposed Action would negatively affect small mammal populations in the project area.

Alternative II - No Action Alternative

Selection of the No Action Alternative would result in no surface disturbance on 45.6 acres of BLM-administered grassland dominated sagebrush habitat. It is likely that the remainder of the project would be developed as described in the POO (PRI 2009) and NRC EA (2006). The No Action Alternative would not result in a net benefit or loss to small mammal populations.

4.1.8.2 Avian Species

Migratory Bird Species

Brood rearing and nesting habitat requirements for avian species can be very specialized. Activities that break up contiguous ecosystems shrink the useable landscapes available for nesting and brood rearing, and the resulting losses of cover mean eggs and young are more vulnerable to predation or abandonment.

Alternative I - Proposed Action

The Proposed Action would occur within nesting and brood rearing habitat for some of the avian species listed in table 3-11, and would alter patches of grassland and sagebrush that these species use for nesting and foraging. Development of the wellfields would create patches of early succession grassland. Approximately 45.6 acres of BLM-administered surface would be impacted by these activities, and about 11 acres would be life-of-project disturbance. Wellfield and infrastructure development on BLM surface within project area would affect less than 0.005% of the total planning area; therefore, the actual magnitude of direct habitat loss and subsequent displacement would be minimal. The displacement of bird species to adjacent, undisturbed habitats would be relatively short-term in nature given the overall duration of activities associated with the proposed ISR project. This project will not contribute to the loss of species viability, nor cause a trend toward federal listing.

Alternative II - No Action Alternative

The selection of this alternative would avoid the disturbance of approximately 45.6 acres of mixed sagebrush grassland habitat suitable for nesting and brood rearing for migratory bird species. It is likely that the remainder of the project would be developed as described in the POO (PRI 2009) and NRC EA (2006). The No Action Alternative would not result in a net benefit or loss to migratory bird species populations.

Raptor Species

Nesting and brood rearing habitat requirements for raptor species can be very specialized. Activities that breakup contiguous ecosystems shrink the useable landscapes available for nesting, brood rearing, and foraging. Changes in vegetation types often affect forage production and availability and may alter the prey base for raptors.

Inactive raptor nest sites may be used in subsequent years; therefore, all nests in good condition have the potential to be active in any given year. All raptors and their nests are protected from take or disturbance under the Migratory Bird Treaty Act (16 USC, § 703 et seq.) and Wyoming Statute (WRS 23-1-101 and 23-3-108).

Alternative I - Proposed Action

The Proposed Action would occur within nesting and brood rearing habitat for some of the avian species listed in table 3-11, and would alter patches of grassland and sagebrush that these species use for nesting and foraging. Development of the wellfields would create patches of early succession grassland. Approximately 45.6 acres of BLM-administered surface would be impacted by these activities, and about 11 acres would be life-of-project disturbance. Wellfield and infrastructure development on BLM surface within project area would affect less than 0.005% of the total planning area; therefore, the actual magnitude of direct habitat loss and subsequent displacement would be minimal. Three raptor nests are known to be within ½ mile of the Proposed Action; these nests were not identified as active during the 2007 and 2008 nesting seasons (figure 3-11 and table 3-12). The displacement of bird species to adjacent, undisturbed habitats would be relatively short-term given the overall duration of activities associated with the proposed ISR project. This project would not contribute to the loss of species viability, nor cause a trend toward federal listing.

Alternative II - No Action Alternative

The No Action Alternative would avoid the disturbance of approximately 45.6 acres of mixed sagebrush grassland habitat suitable for nesting and brood rearing for raptor species. It is likely that the remainder of the project would be developed as described in the POO (PRI 2009) and NRC EA (2006). The No Action Alternative would not result in a net benefit or loss to raptor populations.

4.1.8.3 Reptiles and Amphibians

Alternative I - Proposed Action

As with the other wildlife species inhabiting the Proposed Action area, surface-disturbing activities would result in reptile and amphibian habitat loss and species displacement. All areas disturbed by ISR mining would be aggressively reclaimed using selected native forbs, grasses, and shrub species approved by the BLM. It is not expected that the Proposed Action would negatively affect reptile and amphibian populations in the project area. This project may affect individuals, but it is unlikely to result in a loss of species viability in the project area. Any mitigation applied to minimize impacts to other wildlife species would result in reduced disturbance to reptile and amphibian species.

Alternative II - No Action Alternative

The selection of the No Action Alternative would result in no surface disturbance on 45.6 acres of grassland dominated sagebrush habitat on lands under the jurisdiction of the BLM. It is likely

that the remainder of the project would be developed as described in the POO (PRI 2009) and NRC EA (2006). The No Action Alternative would not result in a net benefit or loss to reptile and amphibian populations.

4.1.9 Threatened, Endangered, and Special Status Species

4.1.9.1 Federally Listed Threatened or Endangered Plant and Animal Species

4.1.9.1.1 Federally Listed Plant Species

As noted in section 3.7.4.1, three plant species listed under the ESA as threatened, endangered, proposed, or candidate species are potentially present within the proposed project area (table 3-7). None of these species or their habitats are known to occur in the Proposed Action area (WYNDD 2008, BKS 2008a). Therefore, "no effect" determinations would be appropriate for all three species, and no FWS consultation is required.

4.1.9.1.2 Federally Listed Animal Species

There are no ESA listed animal species or their habitats present within the project area. Table 3-13 contains a listing of potential federally listed species and their status within the analysis area.

4.1.9.2 BLM Wyoming Special Status Species

This section addresses the impacts the proposed action will have on special status species listed within the BLM Casper Field Office. Tables 3-7, 3-14, and 3-15 contain the plant, bird, and mammal species identified on the Wyoming BLM sensitive species list that may occur in the project area. Pre-field review was conducted regarding species occurrence records, habitat preferences, and ecological requirements to determine if field reconnaissance was needed to complete the analysis. Information sources included BLM Casper Field Office wildlife observation maps, WYNDD Database records (2008), WGFD records (Cerovski et al. 2004), and published research. No further analysis was required for species that are not known or suspected to occur in the project area and for which no suitable habitat is present.

4.1.9.2.1 BLM Wyoming Special Status Plant Species

As noted in section 3.7.4.2, six plants occur on the BLM sensitive species list in the BLM CFO management area (table 3-7). Suitable habitat for all of the BLM plant species of special concern is absent in the Reynolds Ranch area (BKS 2008a). Therefore, the Proposed Action would not affect any of these six plant species.

4.1.9.2.2 BLM Wyoming Special Status Avian Species

Brood rearing and nesting habitat requirements for avian species is very specialized. Activities that break up contiguous ecosystems shrink the useable landscapes available for nesting and brood rearing. The resulting loss of cover mean eggs and young are more vulnerable to predation or abandonment. Inactive raptor nest sites may be used in subsequent years; therefore,

all nests in good condition have the potential to be active in any given year. All raptors and their nests are protected from take or disturbance under the Migratory Bird Treaty Act (16 USC, § 703 et seq.) and Wyoming Statute (WRS 23-1-101 and 23-3-108) (table 4-2). Changes in vegetation types often affect forage production and availability and may alter the prey base for raptors.

Table 4-2
Seasonal Restrictions for Raptor Nests Identified in the Project Area

Species Name	ROD Decision Number	Seasonal Restriction On Human Activity	Timing Limit Stipulation
Ferruginous hawk	4047[(1)]	February 1 to July 31, or until young birds have fledged	½ mile
Golden eagle	4047	February 1 to July 31, or until young birds have fledged (1-mile total)	½-mile
Swainson's hawk	4047[(1)]	February 1 to July 31, or until young birds have fledged	¼-mile
Red-tailed hawk	4047[(1)]	February 1 to July 31, or until young birds have fledged	¼-mile
[(1)]The authorized officer, on a case-by-case basis, may grant exceptions to seasonal stipulations.			

Bald eagle

The bald eagle was federally listed as threatened, but was removed from the ESA list (FWS 2007). No bald eagle nesting or roosting areas were found within 1 mile of project activities during raptor surveys, and BLM records do not identify any nests or roosts in this area.

Alternative I - Proposed Action

There are no known bald eagle nest or roost sites in the area that would be affected by project activities. Prey base and carrion availability would continue in the project area. This project would have no effect on the bald eagle.

Alternative II - No Action Alternative

The No Action Alternative will have no effect on bald eagles.

Greater sage grouse

On December 29, 2009, the BLM Wyoming State Office issued internal guidance (Instruction Memorandum No. WY-2010-012) which describes the management of greater sage grouse habitat on BLM-administered public lands in Wyoming. This guidance specifically exempted the Reynolds Ranch Proposed Action, stating, ~~"I~~n addition, the policy herein will not apply to nondiscretionary activities managed under 43 CFR 3809 for locatable minerals and for discretionary activities approved under 43 CFR 3400 including Coal Management, and 43 CFR

3500 including Non-energy Leasables (i.e., trona operations)" (BLM 2009b). Regardless of this exemption, the Casper RMP (BLM 2007) provides the application of the standard stipulation for protection of sage grouse habitat on BLM-administered lands. The Casper RMP places timing and spatial limitations on disturbance to greater sage grouse leks. There can be no surface occupancy within ¼ mile of any sage grouse lek and no surface disturbing activity within ¼ mile of any lek between March 1 and May 15. In addition, no surface-disturbing activities are allowed within 2 miles of a lek between March 15 and July 15. Also, winter habitats are protected from surface-disturbing and disruptive activities from November 15 to March 14, annually.

In addition, the Governor of Wyoming issued an executive order establishing "core breeding areas" for greater sage grouse (WGO 2008). The Governor's office, through the WGFD, encourages voluntary application of these operating standards on private and federal land and has written them into mineral leases on state lands. Activities within state of Wyoming-designated core areas should not lead to negative impacts to the species (WGFD 2008b and 2008c). The WSEO (2009b) has provided the following information regarding how they would implement the EO relative to water well applications, "Effective January 4, 2010, the State Engineer's Office will begin screening all new water right permit applications to determine if they are located within a defined Core Population Area. For those applications falling within a Core Population Area, the applicant will be notified of the need to conserve sage grouse and asked to select an option to accomplish this goal." As all wells drilled for use in the Reynolds Ranch in-situ uranium project would be permitted through the WSEO, their potential to affect defined sage grouse core areas would be evaluated.

One lek of unknown status has been identified approximately 2 miles west of the project area boundary. The proposed wellfield development areas do not fall within a state-designated or proposed core area (WGFD 2010) or within 2 miles of an active sage grouse lek. According to the BKS (1998a) vegetation report, approximately 45% of the project area is sagebrush/grassland vegetation type with an average 26% shrub cover. Winter habitats have not been identified in the project area. The project area is near the eastern edge of the range of the greater sage grouse in Wyoming and demonstrates less than optimal nesting and brood rearing habitat cover characteristics (WSGWG 2003).

Alternative I - Proposed Action

Sage grouse habitat would likely be affected because some project-related disturbance would occur in potential nesting and brood rearing areas in the grassland-dominated sagebrush habitat. The extent of this disturbance is unknown. The Proposed Action would not affect sage grouse core areas or 2-mile lek radii.

Development and production activities needed for the life of the ISR project may affect individuals, but is not likely to result in a loss of species viability in the project area or cause a trend toward federal listing.

Alternative II - No Action Alternative

The No Action Alternative will have a similar impact on greater sage grouse as the Proposed Action. It is likely that the ISR project development would occur on state and private minerals regardless of the BLM decision.

Ferruginous hawk

Four ferruginous hawk nests were identified within the project area boundary during field surveys (figure 3-11).

Alternative I - Proposed Action

The Proposed Action is greater than ½ mile from any of the four known active ferruginous hawk nests within the greater project area. Therefore, development of the Proposed Action would not contribute to the loss of species viability or cause a trend toward federal listing.

Alternative II - No Action Alternative

A possible decrease in disturbance to three ferruginous hawk nests and the number of acres of habitat disturbed by ISR development would occur under this alternative. The project proposal as presented in the NRC EA (2006) and the POO (2009) would be developed regardless of whether the BLM approves the Proposed Action.

Mountain plover

Mountain plovers were not seen during wildlife surveys conducted by SVC in 2007 or 2008. As these birds are a level I MBHFI, any taking of an active nest is prohibited. Bare ground is the preferred nesting habitat of the species.

Alternative I - Proposed Action

Mountain plover are known to occur in short grass prairie, low shrubs, and within prairie dog towns. The species is an uncommon nester in the planning area (BLM 2007). The Proposed Action would not affect the stability of mountain plovers, as their habitat is limited in this area. The Proposed Action could, in the short-term, create potential nesting habitat as a result of wellfield development activities but continued activity associated with the project would likely discourage the nesting. This project would not contribute to the loss of species viability or cause a trend toward federal listing.

Alternative II - No Action Alternative

Selection of the No Action Alternative would neither benefit nor adversely affect mountain plover.

Burrowing owl

Burrowing owls were not observed during wildlife surveys conducted by SVC in 2007 or 2008. As these birds are a level I MBHFI, any taking of an active nest is prohibited. Burrowing owl nesting habitat is generally related to prairie dog burrows.

Alternative I - Proposed Action

The proposed project could disturb individual black-tailed prairie dog burrows and therefore potential owl habitat. Due to the extremely limited number of black-tailed prairie dogs in the proposed project area, no impacts to the burrowing owl are anticipated. This project would not contribute to the loss of species viability or cause a trend toward federal listing.

Alternative II - No Action Alternative

Selection of the No Action Alternative would not impact or benefit the burrowing owl.

Sagebrush Obligate and Song Birds

Loggerhead shrike and sage sparrows have been observed in the Reynolds Ranch project area. Numerous other neo-tropical species and sagebrush obligate avian species may also use the area. Nesting and brood rearing habitat for many of these species occurs within the proposed project area boundary.

Alternative I - Proposed Action

The Proposed Action would occur within nesting and brood rearing habitat for some of these species and will alter the availability and quality of up to 45.6 acres of grassland/sagebrush that these species use for nesting and foraging. This project would not contribute to the loss of species viability or cause a trend toward federal listing.

Alternative II - No Action Alternative

The No Action Alternative would avoid the disturbance of approximately 45.6 acres of mixed sagebrush grassland habitat suitable for nesting and brood rearing for these species.

4.1.9.2.3 BLM Wyoming Special Status Mammalian Species

Black-tailed prairie dog

There are scattered black-tailed prairie dog burrows throughout the study area but no colonies or towns.

Alternative I - Proposed Action

Project activities on 45.6 acres of BLM-administered lands may occur in areas where prairie dog burrows are present. As a result, there is a possibility that individual prairie dog burrows could be damaged and individuals temporary displaced. The project is not likely to result in a loss of species viability in the project area or cause a trend toward federal listing.

Alternative II - No Action Alternative

The No Action Alternative could reduce impacts to individual prairie dogs or their burrow systems on 45.6 acres of BLM-administered lands but would have no impact on black-tailed prairie dog viability in the project area. The REY project would proceed as described in the POO (2009) and the NRC EA (2006).

Swift fox

Most of the Reynolds Ranch project area is swift fox habitat though no swift fox were observed during wildlife surveys conducted in 2007 and 2008.

Alternative I - Proposed Action

The Proposed Action would occur in areas of swift fox habitat; as a result, there is a possibility for this project to impact individuals or their denning habitat. Implementation of the Proposed Action is not likely to result in a loss of species viability in the project area or cause a trend toward federal listing.

Alternative II - No Action Alternative

The No Action Alternative could reduce impacts to individual swift fox or their dens on 45.6 acres of BLM-jurisdictional lands but would have no impact on swift fox viability in the project area. The REY project would proceed as described in the POO (2009) and the NRC EA (2006).

4.1.10 Recreation Resources

The Casper RMP prescribes the following management goals with respect to recreation resources:

- Manage recreation resources on public lands to provide a diverse array of benefits to the public, including economic, environmental, personal, and social benefits (Goal LR:7); and,

- Issue Special Recreation Permits in an equitable manner for specific recreational uses of public lands and related waters as a means to minimize user conflicts, control visitor use, protect recreation resources, and provide for private and commercial recreation use (Goal LR:9).

Alternative I - Proposed Action

As noted in section 3.10, big game hunting is the primary recreational use in the project area. Under the Proposed Action, construction and development on BLM-administered lands would result in the direct loss of approximately 45.6 acres of big game habitat and decreased use of the area due to disturbance from human activity and traffic. While big game may be temporarily displaced within and adjacent to areas being developed, experience in SR-HUP indicates that mule deer and pronghorn continue to use areas throughout mining operations, as these activities are generally non-harassing and non-threatening. Interim reclamation of developed areas attracts both species. Once ISR mining operations are completed in an area, facilities removed, and disturbed areas successfully reclaimed, big game species are expected to re-occupy the project area and hunting opportunities would return to pre-disturbance levels.

Big game hunting may be reduced from current levels by implementation of the proposed Action, but would not be precluded by in-situ development on BLM-administered surface. Commercial hunting outfitters and guides desiring to access BLM lands for their clients must seek BLM approval, via the issuance of ~~–s~~special recreation permits." Non-hunting related recreational activities would likely remain at current levels, which is very limited.

Alternative II - No Action Alternative

Under the No Action Alternative, the BLM would deny ISR activities on approximately 45.6 acres of BLM-jurisdictional surface in the Reynolds Ranch project area. On these lands, no additional disturbance/development would occur beyond those activities already approved by the BLM. However, ISR development, as described in the 2009 POO and NRC EA (2006), would likely occur on private and state mineral claim areas, resulting in a reduced, but not eliminated, opportunity for big game hunting. The private landowners manage hunting activities on 88% of the proposed project area; permission must be obtained from the private landowner to gain access for hunting. Recreational activities not related to hunting would likely remain at current levels, which is very limited. Since the vast majority of the project area is private surface estate, selection of the No Action Alternative would have a minor impact on public recreation within the area.

4.1.11 Cultural and Historical Resources

The CRMP prescribes the following management goals with respect to cultural resources:

- Preserve and protect cultural resources and ensure that they are available for appropriate use by present and future generations (HR:1),

- Reduce imminent threats to cultural resources from natural or human–caused deterioration, or potential conflict with other resource uses (HR:2), and,

- Promote stewardship, conservation, and appreciation of cultural resources (HR:3).

4.1.11.1 Cultural and Historical Resources

Alternative I - Proposed Action

In 1997, a historical inventory of the Reynolds Ranch area was initiated. This report considered the segment of the Bozeman Trail located just north of the Reynolds Ranch as non-contributing to the trail's overall significance (Rosenberg 1997). A "no effect" determination was recommended, and no further historical work was believed necessary. A cultural clearance was recommended for this area with no stipulations. The Holdup Hollow segment of the trail is considered contributing, so the project was designed to avoid affecting this historic feature.

In addition to the Bozeman Trail, three historic period dry land homesteads were recorded and evaluated. All of these sites are ineligible for the NRHP, and a determination of "no effect" is recommended. A cultural clearance was recommended for this area with no stipulations (Rosenberg 1997).

The Pronghorn Archaeology survey conducted in 2008 also included a review of 1883 GLO plat for the southwestern portion of the Reynolds Ranch project area that might be located within ¼ mile of the Bozeman Trail. This portion of the trail is considered a non-contributing portion and lies under the Ross Road.

No significant prehistoric cultural materials have been identified in the various surface inventories conducted to date, and no protective measures are needed regarding the known sites. There is an unknown but presumably low potential for buried cultural resources to be present in the project area.

The Proposed Action would not affect any identified historical or pre-historical cultural resources in the project area.

Alternative II - No Action Alternative

The selection of the No Action Alternative would preclude any opportunity for impact to as yet undiscovered cultural resources on the 45.6 acres of BLM-administered surface proposed for development. It would not change the outcome of anticipated ISR operations relative to cultural and historic resources in the remainder of the project as it is likely that uranium recovery operations, as described in the 2009 POO and 2006 NRC EA, would occur on state and private land and mineral claims, regardless of the BLM decision. Operator-committed mitigation, as found in the NRC EA and WDEQ/LQD permit, would minimize the opportunity for impacts to cultural and historical resources.

4.1.11.2 Native American Religious Concerns

The Casper RMP prescribes the following management goal with respect to Native American religious concerns:

- Establish a working relationship with Native American tribes (HR:4).

Alternative I - Proposed Action

Based on the information available to-date, no effects to Native American religious concerns would result from the BLM's approval of the Proposed Action. The BLM has consulted with Tribal representatives on previous projects in this general area and has provided project proponents with instructions for the protection of culturally sensitive sites, should any be discovered during construction. BLM circulated a request for consultation or comments to four Native American tribal councils and cultural representatives in July 2010. No specific concerns were identified at that time.

The Pronghorn Archaeological Services reports from 1997 and 2009 recommended a cultural clearance for the surveyed areas with no stipulations.

Alternative II - No Action Alternative

Under the No Action Alternative, the project as described in the 2009 POO and the NRC EA (2006) would be developed with the exception of approximately 45.6 acres of BLM-administered surface. Operator-committed mitigation relative to cultural resources should minimize the impact to Native American religious concerns.

4.1.12 Visual Resources

The Casper RMP prescribes the following management goals with respect to visual resources:

- Manage public lands in a manner that will maintain the overall scenic (visual) quality of these lands (HR:5).

The objectives for the implementation of HR:5 in the project area include the following:

- Class III: Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape (HR:5.2), and.

- Class IV: Provide for management activities that require major modification of the existing landscape. The level of change to the characteristic landscape can be very high. These management activities may dominate the view and be the focus of the viewer's attention; however, every attempt should be made to minimize the impacts of these activities through careful location, minimizing disturbance, and repeating elements (HR:5.3).

Alternative I - Proposed Action

Wellfields and associated surface structures would be the visual contrast to the existing natural landscape. The Proposed Action comprises all or portions of three wellfields affecting approximately 45.6 acres in the project area, or about 0.005%. The rolling to flat topography

would vary the visibility of the individual wellfields and associated infrastructure as viewed from Ross Road.

As one approaches the northern end of the Reynolds Ranch project area along Ross Road, portions of the wellfields would be viewed as foreground/middle ground. During construction of the wellfields, temporary high contrasts from surface disturbance would dominate surrounding landscape. As surface disturbance is reclaimed and softened with native grasses, wellfields (header houses) would attract attention but not dominate the landscape.

Decision 5019 (pg. 2-30) of the ROD for the Casper RMP identifies portions of trail segments (as mapped in the CFO GIS data base) that contribute to the overall significance of historic trails. Segments for which setting is determined to be a component of that significance are to be managed as VRM class II. Holdup Hollow (T. 36 N., R. 74 W., secs. 15, 10, and 3) has been identified as such a contributing segment. That segment flanks the west side of Ross Road for approximately 3 miles and is located ¼ mile to the west of the project area. The potential for viewing portions of wellfields from this section of trail (Ross Road) would depend on final topographic location of individual components of the individual wellfields. No wellfields are planned within the ¼-mile national historic trail buffer; therefore, the Proposed Action would not affect the VRM classification of the area. The Glenrock Rolling Hills wind energy project turbines are visible along this trail segment (figure 3-12). The turbines dominate the landscape, catch the eye, and compromise the VRM classification of the area.

Further, Casper RMP decision 7072 (pg. 2-48) states that national historic and other trails, not contributing to NRHP eligibility, will be protected from physical impacts and controlled surface use (CSU) within ¼ miles, or the visual horizon, whichever is closer. The setting, or viewshed, of non-contributing trail segments is managed as the surrounding VRM class. No wellfields are planned within the ¼-mile buffer.

The amount of visual contrast added to a landscape is a major indicator used to analyze impacts of any given project. A visual contrast rating was performed on October 19, 2009, using field notes, representative landscape photos, and photos of the existing facilities. This analysis resulted in a low to moderate visual contrast rating from the proposed project. The Proposed Action meets the objectives of VRM classes III and IV. The key to reducing the overall visual footprint is placement of maintenance facilities or access routes and the quality of reclamation efforts. Reclamation begins immediately after the initial development phase is completed reducing the scope of long-term visual contrast within the landscape.

Alternative II - No Action Alternative

Under the No Action Alternative, it would be expected that development on private and state surface and mineral claims would occur; wellfields on these properties may be visible from Ross Road depending on topographic screening. Visibility would be reduced or softened by reclamation of vegetation and the use of environmentally neutral colors.

The primary overlook of the Reynolds Ranch project occurs approximately 1.5 miles south of the Proposed Action and is along Ross Road. The two southernmost wellfield locations are 1 mile

north from this point. The viewing distance of the project from this elevated location would be approximately 2½ miles. From this vantage point, initial project development would draw attention but not dominate the landscape. Selection of the No Action Alternative would not affect the overall outcome of the project on the visual resources of the area.

4.1.13 Socioeconomics

The Casper RMP prescribes the following management goals with respect to socioeconomic resources:

- Provide opportunities to sustain the cultural, social, and economic viability of local and regional communities… including housing, employment, population, fiscal impacts, social service, cultural character, and municipal utilities (SR:3).

4.1.13.1 Employment

Alternative I -Proposed Action

PRI has estimated that a temporary workforce of between 20 and 30 persons would be needed for construction of facilities required for the Reynolds Ranch project ISR mining operations. After construction has been completed, it is estimated that no additional employees would be needed for on-going operations. In-place employees who are currently working at SR-HUP would operate the Reynolds Ranch facility as part of the existing SR-HUP operation. Therefore, little to no change in current levels of permanent jobs is anticipated.

Short-term employment (16 years over the life of the project) would become available to a variety of construction workers to make up the necessary temporary workforce. During wellfield development, the workforce and traffic associated with the Proposed Action would be at its most diverse. Trades that would be represented include: dirt contractors, electricians, linemen, plumbers and pipefitters, pipeliners, welders, cement layers, well drillers (utilizing truck mounted rotary drilling rigs) and roustabout crews, water truck drivers, surveyors, reclamation crews, and operations supervisors. An estimated 100% of this workforce would be made up of local workers. Therefore, a slight increase in overall employment rates, income, and earnings for local workers may be expected.

Alternative II - No Action Alternative

Under the No Action Alternative, it would be expected that development on private and state surface and mineral claims would take place as described in the 2009 POO and 2006 NRC EA. BLM denial of the project would result in the elimination of all or part of three wellfields currently described in the POO (2009). Associated with the elimination of these wellfields would be the commensurate reduction of work available throughout the development phase of the Reynolds Ranch project and associated employment opportunities. This would result in a decrease in either the number of contractors needed to complete wellfield development or the period of time these contractors are employed by PRI. While this alternative would not create a percentage point type change in overall reported unemployment levels in Converse and Natrona

counties, it could result in a lack of employment for individual shallow drilling companies, small construction firms, and individuals.

4.1.13.2 Housing Resources

Alternative I - Proposed Action

Construction and testing of each wellfield would take from 18 months to two years, with the majority of activity taking place between May and October. Uranium recovery in each wellfield is expected to continue for five years followed by four years of groundwater restoration and another year and a half for decommissioning. REY would provide stable employment opportunities for at least 15 years and supplement the long-term stability of the SR-HUP project.

The construction and development workforce would be made up of contractors and personnel who currently reside in Converse and Natrona counties. Given the current job market and economic situation in Wyoming, obtaining a qualified, local workforce would not be difficult. If temporary accommodations are necessary for a specialized outside contractor, the communities of Douglas, Glenrock, and Casper have more than adequate housing available to provide this small number of workers and their families with housing without significant effects to the baseline housing supply or demand. Such specialized and short-term workers are not expected to enter into long-term leases for rental housing. They would rely primarily on temporary housing categories including: hotel/motel rooms, apartments, mobile homes, and recreational vehicle sites.

Alternative II - No Action Alternative

Selection of the No Action Alternative would result in the reduced development of approximately 25% of the wellfields at Reynolds Ranch. This would cause a decrease in either the number of contractors needed to complete wellfield development or the period of time these contractors are employed by PRI. Under this alternative, a slight decrease in demand for housing in local communities could result from the reduced of developed wellfields.

4.1.13.3 Educational Facilities

Alternative I - Proposed Action

The number of children entering the local public schools would not be expected to change as both the temporary and permanent workforces needed for implementation of the Proposed Action are likely already in residence in Converse and Natrona counties.

Alternative II - No Action Alternative

Under the No Action Alternative, the scope of the project would be reduced by approximately 25% and with it the number of ~~"s~~short-term" yet temporary construction and development jobs. The permanent workforce is in place at SR-HUP. Under this alternative, a slight decrease in

demand for educational facilities could result from the reduced output from Smith Ranch-Highland project.

4.1.13.4 Social Services

Alternative I - Proposed Action

Under the Proposed Action, no additional construction and development or long-term workforce would be attracted to the area as this demographic would be available within the generally under-employed workforce in Converse and Natrona counties. The incidence of crime in local communities would be reduced slightly by the continuation of stable employment opportunities. The need for other social and municipal services would remain at current levels.

Alternative II - No Action Alternative

Under this alternative, a slight decrease in employment opportunities ensuing from the reduced output from SR-HUP could result in a slight increase in crime and demand for public safety, social, and municipal services.

4.1.13.5 Economic Activities Near the Proposed Project

Alternative I - Proposed Action

No effects to the existing cultural, social, and economic viability of local and regional communities would be expected from implementation of the Proposed Action. Uranium mining has been part of the custom, culture, and socioeconomic condition of Converse County, and Glenrock and Douglas since the 1970s.

- Development of the project may result in some minimal additional demand for services in the surrounding communities; but since PRI has indicated that no new jobs would be created in order to run both SR-HUP and the Reynolds Ranch Project area, this increase would not be significant.

- The Black Hills Lignite mine is within the vicinity of the project area. Due to differences in mining techniques and workforce needs, development of the Proposed Action would probably not affect the lignite mining operation.

- Access to the Reynolds Ranch project area is via Ross Road (Converse County Road 31). The posted speed limit is 55 mph. As identified in the NRC EA (2006), transportation of uranium-charged resin beads to Smith Ranch for processing and transportation of the stripped beads back to Reynolds Ranch would require approximately two to four 14-mile round-trip shipments a week along Ross Road. No increase in the number of yellow-cake shipments is anticipated as Reynolds Ranch is intended to augment the natural decline in production anticipated from SR-HUP. Therefore, uranium operation-related traffic would not significantly increase the current traffic load on Ross Road in the area. Section 5.7 of

the NRC EA (2006) and the NRC EA for toll milling operations (2009c) contains a more complete assessment of transportation-related impacts.

- Additional traffic is anticipated on Ross Road as employees attend to the field and contractors develop the project. No estimation of the number of vehicles associated with this activity is available.

- Wellfields would be fenced to prevent livestock entry in order to enhance reclamation success and safeguard equipment. Wildlife entry would not be prevented. Grasses and forbs comprise the BLM-recommended seed mix. Over the long term locally dominant shrub species would invade the disturbed areas.

- During the life of the project, approximately 46 acres would be fenced to prevent livestock entry and to enhance reclamation success and safeguard equipment. Due to the sequential nature of ISR development and restoration, approximately one third of the area anticipated for wellfield development could be fenced off at a time, leaving approximately 15 acres (50 AUMs) unavailable at any one time. Section 4.1.7 of this EA contains a discussion of grazing resource impact detail. This is a "worst-case" estimate. The 2009 POO for the Proposed Action outlines the sequential development of wellfields, with final reclamation to take place as soon as uranium extraction is completed within a single wellfield. Under the scenario of prompt concurrent reclamation, the loss of AUMs is more likely to be for three to four years, or the expected time to re-establish a self-sustaining reclaimed plant community.

- The Reynolds Ranch project area generates revenues from hunting big game--specifically pronghorn antelope and mule deer. PRI estimates the Proposed Action would directly affect 45.6 acres of the 62,893 acres of hunt areas, as defined by the WGFD. Because the acreage to be disturbed by the Proposed Action is a small amount, effects to big game hunting are expected to be minimal. It is assumed that commencement of mining operations would displace wildlife for a very short period. Due to the non-harassing nature of mining activities and the speed with which reclamation is implemented, wildlife species would quickly habituate to the activity. The area would continue to be available to hunting as allowed by the BLM and private landowners.

- The area has historically been used for livestock grazing and big game hunting. The Proposed Action would place some constraints on these activities but not preclude them, as discussed in the "Range Resources" and "Recreation Resources" sections, respectively.

Alternative II - No Action Alternative

Selection of the No Action Alternative would result in negative effects to the existing cultural, social, and economic viability of local and regional communities. BLM has jurisdiction over approximately 45.6 acres of surface resources in the Reynolds Ranch project area and, selection of this alternative would reduce the project by 25%. Denial of the Proposed Action would result

in a decreased life of the mining operation and the reduction in the number of third party contractors and long-term staff needed to develop the project and recover the uranium.

4.1.13.6 Environmental Justice

Neither the Proposed Action nor the No Action Alternative would disproportionately affect minority or low income people. The Proposed Action would provide some additional employment opportunities for a small number of workers in Converse County and contribute to the long-term stability of the mine, thereby contributing to the local economy.

4.1.14 Health, Waste Management and Safety

The Casper RMP prescribes the following management goals with respect to public health and safety:

- Protect public health and safety and environmental resources through complying with federal and state hazardous materials laws and regulations; maintaining the health of ecosystems through assessment, cleanup, and restoration of contaminated sites; and integrating environmental protection and compliance into all BLM activities (Goal SR:4) and,

- Reduce potential risks associated with known hazards resulting from human activity, including, but not limited to, health and safety issues and other sensitive resource values (Goal SR:5).

4.1.14.1 Hazardous Materials

Alternative I - Proposed Action

PRI is required to provide inventories and location information relative to onsite hazardous materials, which exceed the TPQ, to state and local emergency responders for use in case of emergency. Wellfield development would require the use of hazardous materials, such as cement and commercial drilling mud products for well completions, corrosion inhibitors, glycol, anti-freeze, new and used lube oils, paints, gasoline, and diesel fuel for equipment operation and infrastructure construction. Drilling contractors working in the field would probably stage their equipment elsewhere and would bring only those materials needed for the specific operation being completed to the field locations. Therefore, it is not anticipated that the volume of any single material on hand at any one time would exceed the TPQ of 10,000 pounds for hazardous materials, as required by Title III of the SARA. It is not expected that any EHS, as defined in SARA, will be used in the operations.

Hazardous chemicals could pose a threat to the public and wildlife in the event that a spill or release was prolonged and a nearby drinking water source contaminated. PRI has numerous SOPs related to worker and public health and safety in place; including but are not limited to hazard communication (HAZCOM) program, SPCC plan, the SWPPP, wellfield monitoring, and radiological emergencies. These plans and protocols are intended to reduce the opportunity for

hazardous materials releases and the risk of human contact. These measures provide response protocols and employee training to deal with unplanned releases, should they occur. A detailed listing of all monitoring requirements is found in the WDEQ/LQD permit to mine and the 2009 POO.

During production operations, up to 100,000 pounds of liquid oxygen may be stored in various locations in the field; this volume exceeds the SARA TPQ. No use of materials or chemicals considered extremely hazardous wastes as defined in 40 CFR 355 is proposed.

Alternative II - No Action Alternative

Under the No Action Alternative, ISR mining activities would occur on state and private surface and mineral claims regardless of a BLM decision to deny the project. No additional disturbance/development would occur on BLM lands beyond those activities already approved. Effects due to hazardous materials would be as described in the Proposed Action.

4.1.14.2 Waste Management

Alternative I - Proposed Action

Wastes generated in wellfields associated with the Proposed Action would be managed on-site at SR-HUP or in NRC-permitted facilities and would not have an impact on county or city solid waste disposal services.

Solid wastes generated at the site would include both contaminated (i.e. 11e.(2) by-product waste) and non-contaminated wastes. As discussed in section 3.16, PRI operates a solid waste disposal facility for on-site management of miscellaneous non-contaminated materials. Non-contaminated solid waste from the Proposed Action would be managed at this facility. Operation of this unit falls under the WDED/LQD permit to mine.

Radioactive solid wastes with contamination levels requiring disposal at a NRC-licensed facility would be isolated in drums or other suitable containers prior to offsite disposal. Under NRC license condition 10.1.7 of SUA-1548, PRI is required to maintain a location within the restricted area boundary to store contaminated materials prior to their disposal. It is expected that the Proposed Action would generate less than one 10 cubic yards container of 11e.(2) byproduct waste annually.

Process water recycling and waste water minimization programs would be employed at the project in an effort to minimize the volume of water to be disposed. Process waste water (mine unit production bleed and groundwater restoration bleed) would be disposed through deep well injection. Details concerning the water management plans, including water balance calculations, treatment and disposal facilities and surface water management plans, are provided in chapters 4 and 5 of the WDEQ/LQD application and NRC permit.

Portable toilet facilities would be available in the field during wellfield development operations and at the satellite facility, which has a county-approved septic system.

Alternative II - No Action Alternative

Under the no Action Alternative, ISR development and recovery would occur, as described in the 2009 POO and 2006 NRC EA. The expected generation and management of mining-related wastes would be as described in the Proposed Action.

4.1.15 Noise

Alternative I - Proposed Action

Noise generated by the Proposed Action would be short term and related to the construction and development phase. Once dirt work, drilling, and infrastructure construction equipment-related noise is eliminated from a wellfield, the uranium recovery operation is relatively quiet. Noise sources during this phase would be limited to occasional pick-up truck traffic related to monitoring and maintenance operations.

There are no residential or commercial receptors within the project area, with the exception of PRI operations staff and contractors. Sensitive wildlife receptors include ferruginous hawk nests and sage grouse leks. The four known ferruginous hawk nests are all located at least ½ mile east of the project area. The nearest sage grouse lek is located over 2.5 miles southwest of the Proposed Action and outside the project area.

Alternative II - No Action Alternative

Under this alternative, there would be no change in the generation and management of ISR-related noise. ISR development and recovery would occur as described in the 2009 POO and 2006 NRC EA, regardless of BLM approval of the Proposed Action.

4.2 CUMULATIVE EFFECTS

40 CFR 1508.7 defines cumulative effects as:

> *...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.*

Cumulative effects can result from individually minor, but collectively significant, actions occurring over time.

The cumulative effects analysis area (CEAA), as defined for the Reynolds Ranch project, is intended to disclose cumulative effects for resources that may be affected by the Proposed Action or No Action Alternative, and varies in size depending on the resource in question. The CEAA for geology, geologic hazards, minerals and paleontology, soils, vegetation, noxious and invasive weeds, range resources including livestock grazing, threatened, endangered, and special status species, recreation, visual resource management, cultural values, health, safety, transportation and waste management, and noise is illustrated on figure 4-3. The cumulative

effects analysis area for socioeconomics is Converse County and the communities of Douglas and Glenrock, and the cumulative effects analysis area for deer, elk, and pronghorn antelope are their respective herd units (figures 3-9, 3-10, and 3-11). If the Proposed Action and the analyzed alternatives would have no direct or indirect effects on a resource, no cumulative effects analysis is conducted relative to that resource (BLM 2008a).

Ongoing, planned or reasonably foreseeable activities within the CEAA include the Reynolds Ranch and Smith Ranch-Highland uranium projects, the Rolling Hills/Glenrock wind energy projects, the Black Hills lignite mine, various oil and gas developments (Hornbuckle and Duck Creek) as well as livestock grazing and limited recreation. Other ISL projects are being considered in Converse County and are in the very preliminary stages of permit discussions (NRC 2010, Wise-Uranium 2010, Uranium One 2010). It is not known if these projects are within the CEAA or what the extent of the operations might be. Similarly, additional wind energy projects could be proposed in the general area, but no information is available as this time.

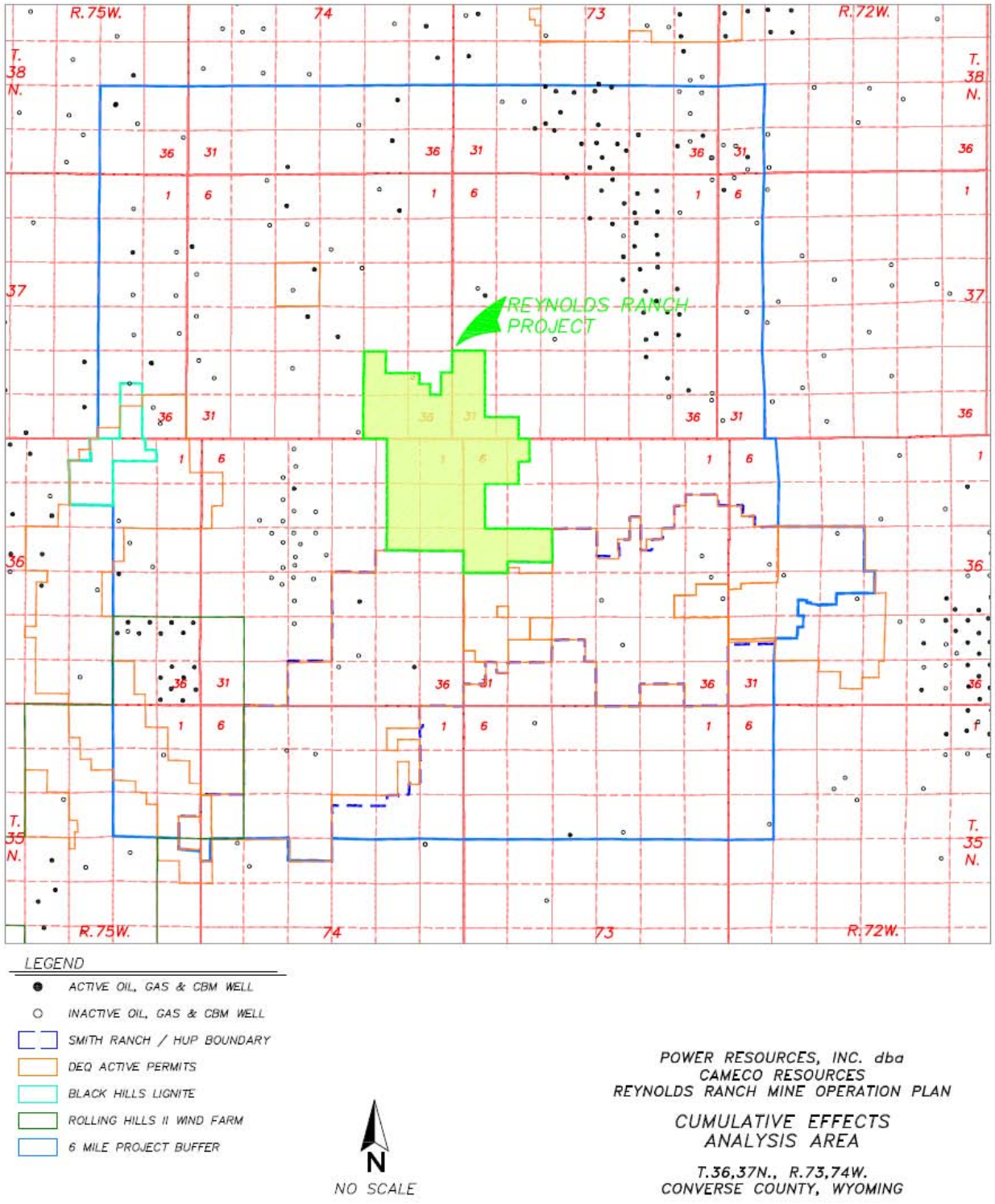
The NRC has permitted the Reynolds Ranch addition to the SR-HUP as an amendment to the existing SR-HUP license SUA-1548. Under SUA-1548, PRI is authorized, through its ISL process, to produce up to 5.5 million pounds per year of tri-uranium octoxide (U_3O_8), also known as ~~–y~~ellowcake." PRI's current annual production is less than half of this limit (NRC 2006). WDEQ/LQD is considering the Reynolds Ranch addition as an amendment to the existing SR-HUP permit. The project is generally regarded as a replacement of the uranium being depleted as SR-HUP is restored and reclaimed. PRI would have the ability to maintain existing levels of production and to increase production with development of the Reynolds Ranch project., as provided by the NRC license .

4.2.1 Air Quality

Alternative I - Proposed Action

ISR mining at Smith Ranch-Highland, operated by PRI, is the only currently permitted and operating ISR facility in the area. Other than the Proposed Action, no other ISR projects are currently planned in Converse County although there are two or three projects that are in the pre-permitting discussion stage (NRC 2010). Air emitting activities at Smith Ranch–Highland include those discussed relative to the Proposed Action. At SR-HUP, wellfields are in all stages of operations, additional wellfields will be constructed, some are in the production mode, and others are undergoing restoration, decommissioning, and final reclamation. Uranium processing is occurring and would occur into the future. The construction and development of the Reynolds Ranch project would result in some additional fugitive dust, vehicle and diesel emissions, and radiological air emissions in the area. Reductions in emissions because of the restoration, abandonment, and reclamation of wellfields in SR-HUP over time would effectively offset air emissions realized from development, operations, restoration, and reclamation activities at Reynolds ranch. These effects would be short-term. Vehicle emissions and fugitive dust generated during routine wellfield maintenance would be minimal.

Figure 4-3: Cumulative Effects Analysis Area for Reynolds Ranch Project



In August 2009, NRC announced that it had approved the PRI application for resin transport and toll milling at the SR-HUP CPP. The activity could bring uranium rich ion exchange resin from third party uranium producers to Smith Ranch for processing into yellowcake. The NRC EA (2006) determined "PRI's proposed action to process third party ion exchange resin at SR-HUP would not result in a significant impact to the environment." These activities are not expected to come from the north end of Ross Road and would not add to truck traffic coming from Reynolds Ranch. The NRC (2009c) further determined, "This action would occur within existing footprint of operations at PRI. No building construction is required and PRI will not open any new wellfields beyond what is already approved in its current license. PRI will remain within its currently approved production limits of a flow rate of 20,000 gallons of uranium rich process water per minute, exclusive of restoration, and annual yellowcake production shall not exceed 5.5 million pounds of yellowcake per year. PRI will not make any changes to equipment or techniques for processing the third party ion exchange resin."

As mentioned in the NRC EA (2006), open pit and underground mining for uranium has occurred in the past near the Reynolds Ranch project area. However, these mines have been closed, and no further activities are expected.

Conventional oil and gas wells are being drilled and are producing within the cumulative effects analysis area. In March 2009, BLM approved the drilling of eight horizontal wells in the Hornbuckle Field located approximately 6 miles to the east and north of the project area. CBNG operations have also been developed to the north and east of the area. One conventional oil well and two CBNG wells have been proposed less than 1 mile from area. Construction and development activities would include those similar to the proposed projects, such as emissions from diesel drilling rigs and water and equipment haul trucks, and dust from construction activity. These are short-term impacts that are replaced by operations maintenance vehicle traffic and crude oil hauling, if the wells are productive. Emissions associated with the oil and natural gas operations would include PM_{10}, SO_2, NOx, CO, and VOCs from combustion activities associated with production equipment (heater treaters), fugitive emissions from stock tanks and, possibly, compressor stations. These would be isolated emissions that would occur at each well location and would generate an almost undetectable level of emissions that would be limited to the near-field with no impact in the far-field (BLM 2009a). Additional isolated oil and gas production operations within the cumulative effects analysis area, with emissions similar to those found in the Hornbuckle Field, are not expected to have a lasting effect on air quality or visibility within the air shed of the area, Converse County, or Wyoming.

Black Hills Lignite operates an open pit leonardite mine approximately 6 miles west of the project area. Impacts to air quality from this facility include fugitive dust from the 8 to 12 mining and transportation vehicles involved with mining operations. This plant produces periodically through the year and at a relatively small volume. Emissions area anticipated to be low volume and limited to the mining area (BHL 2009).

Pacific Power/Rocky Mountain Power operates the Rolling Hills/Glenrock wind farms located to the southeast of the project area and within the cumulative effects analysis area. Duke Energy has proposed the Top of the World wind energy project in the same general area (Duke 2009).

Emissions from these operations and the reclaimed Dave Johnson Coal Mine include fugitive dust from construction and maintenance vehicles on unpaved road surfaces (PacifiCorp 2007).

Alternative II - No Action Alternative

Under the No Action Alternative, the mining activities described in the 2009 POO and approved by the NRC (2006) would likely be undertaken on the remaining state and private surface lands, as would any other activities already approved by the BLM. Effects to air quality resources would generally be consistent with those described for the Proposed Action. Air quality effects from Smith Ranch–Highland, would continue with any declines offset by the increased activities at the project area. Conventional oil and gas and CBNG development and operations would also continue in the analysis area, as would lignite production and wind energy. Each of these activities would generate fugitive dust.

4.2.2 Geology, Minerals and Energy Resources

4.2.2.1 Geological Resources

Alternative I - Proposed Action

As mentioned in the NRC EA (2006), open pit and underground mining for uranium has occurred in the past near the Reynolds Ranch area. However, these mines have been closed and no further activities are expected.

ISR mining at Smith Ranch-Highland, operated by PRI, is the only currently permitted and operating ISR facility in the CEAA. ISR activities at Smith Ranch-Highland have the same geological impacts as the Proposed Action, and the combined projects would have little impact on the geologic environment.

Numerous ISR projects are being considered in Converse County (NRC 2008 and NRC 2009a). Two or three projects are in the pre-permitting discussion stage (NRC 2010), and one is in the NRC review process. None of these projects is located in the CEAA.

While CBNG and conventional oil and gas wells are not currently being drilled on or immediately adjacent to the Reynolds Ranch project area, these activities are on-going in the cumulative effects analysis area. If additional liquid hydrocarbon production activities were to occur in the CEAA, they would not increase the risk of geologic hazards occurring.
Wind energy development, and the associated transmission systems, in the CEAA would not increase the likelihood of geologic hazards occurring.

None of these cumulative disturbances would be likely to trigger geologic hazards such as landslides, mudslides, debris flows, slumps, or earthquakes. Therefore, there would be no incremental impact associated with geologic hazards in the cumulative impact area.

Alternative II -No Action Alternative

Under the No Action Alternative, the mining activities described in the 2009 POO and approved by the NRC (2006) would likely be undertaken on the remaining state and private surface lands as would any other activities already approved by the BLM. Other reasonably foreseeable activities in the cumulative effects analysis area, including horizontal oil well drilling in the Hornbuckle Field, the various wind energy projects, Black Hills lignite mining, and the PRI SR-HUP ISR project would occur as permitted. Existing effects to the geologic resources within the Reynolds Ranch project area would continue, as would the other reasonably foreseeable and current activities discussed above.

4.2.2.2 Energy Resources

Alternative I - Proposed Action

The Proposed Action would not be expected to affect future ISL operations that may be proposed in the CEAA. Wellfields associated with in-situ recovery operations are well defined, and movement of fluids in the subsurface is tightly controlled by monitoring wells and the application of NRC, WDEQ, and BLM required monitoring protocol.

Cumulative effects from Reynolds Ranch and Smith Ranch-Highland activities, and potential future CBNG or oil and gas drilling activities conducted adjacent to or within the Reynolds Ranch area could result in surface use conflicts. As evidenced by the receipt of APDs for the development of oil and gas and CBNG wells in the Reynolds Ranch project area (BLM CFO pers. com. 2010), hydrocarbon exploration activities are possible, but they are exploratory in nature and may or may not result in broad scale CBNG development. The NRC generic EIS for ISL operations (NRC 2009a) provides the following regarding the potential for CBNG development in the project area, "In the southern part of the Powder River Basin in the Monument Hill District, there are only a few scattered coal bed methane sites (U.S. Geological Survey, 2001). Future ISL facilities in the Monument Hill District therefore would not interfere with land use for coal bed methane facilities." The Reynolds Ranch project is located within the Monument Hill uranium district (T. 35-39 N., R. 71-74 W.).

While both coal bed methane and ISR operations can affect the aquifers in the Reynolds Ranch area, the coals are generally considered either too thin or too shallow to be highly prospective for coal bed methane. The failure of the CBNG operation near the reclaimed Dave Johnson Coal Mine some 6 miles to the southwest is evidence that the shallow School coal seam in the Reynolds Ranch operation areas most likely will not be developed.

The Duck Creek Project, located approximately 9 miles northeast of the Reynolds Ranch area, is extracting methane from two coal beds in the Fort Union Formation--the upper and lower Pawnee seams. The Pawnee in the Reynolds Ranch area is a single seam generally thought to be too thin to contain economic methane reserves. However, should CBNG drilling occur closer to Reynolds Ranch, cumulative impacts on mineral resources from both activities would need to be re-evaluated at that time (BLM 2007). The NRC generic EIS for ISL development (NRC 2009a) provides the following mitigation, "Competing access to mineral rights could be either delayed

for the duration of the in-situ leach (ISL) project or be intermixed with ISL operations (e.g., oil and gas exploration)." The NRC (2009a) provides additional safeguards, as follows, "If there are oil, gas, coal bed methane, or other production layers near the ISL facility, and if NRC determines that there could be potential for cross contamination between the ISL production zone and other production layers based on environmental impact assessments, NRC may require the licensee to expand the monitoring well ring for detection of potential contamination between the ISL production zone and other mineral production layers. If excursions are detected, the monitoring well is placed on excursion status and reported to the NRC. Corrective actions are taken, and the well is placed on a more frequent monitoring schedule until the well is found to no longer be in excursion."

The development of deeper oil and gas resources is underway within the CEAA in the Hornbuckle Field. The outcome of this project could lead to additional deep well projects. Scattered oil and gas development has occurred in the CEAA for decades and is expected to continue. With the exception of the three individual APDs received by the BLM CFO in March 2010 there are no reasonably foreseeable oil and gas or CBNG projects proposed on which to base an analysis of cumulative impacts.

Wind energy development is expected to continue in the area north of Glenrock. Currently, there are no projects proposed within the CEAA upon which to base the analysis of reasonably foreseeable cumulative impacts.

Alternative II - No Action Alternative

Under the No Action Alternative, the mining activities described in the 2009 POO and approved by the NRC (2006) would likely be undertaken on the remaining state and private surface lands as would any other activities already approved by the BLM. Under separate NEPA analysis, BLM could approve alternative energy development activities (oil and gas, CBNG, or wind energy) in the area of the denied Proposed Action. BLM could also approve alternative energy development activities on the split-estate lands within the project area.

The state of Wyoming and local governments would suffer the consequential loss of revenue from ad valorem, property, and severance taxes that could otherwise be realized from the development of the federal mineral estate. Future CBNG or oil drilling activities conducted adjacent to or within the Reynolds Ranch area could also occur. These activities would have the same cumulative effects as the Proposed Action. Other mineral resources located on BLM-administered lands would not be impacted by these activities and could be developed in the future based on product availability, demand, and federal land management policies.

4.2.3 Paleontological Resources

Alternative I - Proposed Action

Because scientifically significant fossils are relatively rare, the risk of affecting them is small. A non-fossilized mammoth was located 15 to 20 miles north of the project area during excavation of a conventional oil well reserve pit. Given the +255 mile square cumulative effects analysis

area, it is possible that another such find could be located in conjunction with any of the reasonably foreseeable projects that could occur in the area.

Alternative II- No Action Alternative

Under the No Action Alternative, the BLM would deny activities on approximately 45.6 acres of BLM-administered surface in the project area. No additional disturbance/development would occur on the federal surface and mineral estate beyond those activities already approved by the BLM. However, ISR development, as described in the 2009 POO and NRC EA (2006), would likely occur on private and state areas and could possibly result in the loss of some paleontological resources. Operator committed mitigation would reduce the opportunity to impact paleontological resources. Under this alternative and given the +255 mile square cumulative affects analysis area, it is possible that scientifically significant fossils could be located in conjunction with any of the reasonably foreseeable projects that could occur in the area.

4.2.4 Soils Resources

Alternative I - Proposed Action

Impacts to soils within the Reynolds Ranch project area would be by earth-moving activities resulting from construction and development of the ISR operation by the Proposed Action. Total disturbance of soil resources within the project area would include 45.6 acres of BLM-administered surface. However, the potential effects on the soil resources are of limited duration and extent of the disturbance. Anticipated life-of-project surface disturbance is 13% of the initial disturbance or an estimated 11 acres.

Livestock grazing would continue affect soils in the area seasonally. Livestock grazing would be excluded from ISR operational areas in an effort to speed reclamation and safeguard equipment; grazing would likely continue at the current levels outside the operational areas.

In the past open pit and underground mining for uranium has occurred near the project area; however, these mines have been reclaimed, and no further activity is expected (NRC 2006). Currently, the only permitted and operating ISR facility in the area is Smith Ranch-Highland, operated by PRI. Additional wellfields would be developed in those areas; however, the potential effects on the soil resources are controlled or mitigated by aggressive reclamation standard operating procedures as described for the Proposed Action and found in the WDEQ/LQD permit to mine. Other than the Proposed Action and No Action Alternative, no other ISR projects are currently planned in the CEAA (NRC 2008).

Wind energy development on the reclaimed Dave Johnson Coal Mine site is overseen by the WDEQ/LQD due to the implications to the long-term stability of the mine site. Wind turbines and associated access roads contribute approximately 200 acres of long-term disturbed surface to the soil resources in the cumulative effects analysis area (PacifiCorp 2007). All other surface disturbances associated with the wind energy projects are aggressively stabilized and reclaimed,

as are those from the Proposed Action. The Duke Energy Top of the World wind energy project would likely not affect soils in the cumulative effects analysis area (Duke 2009).

The Hornbuckle horizontal well project contributes another potential for 50 acres of short-term disturbance, reduced to 18.5 acres life-of-project soil disturbance (BLM 2009a). As with the wind energy projects, these disturbance areas are aggressively stabilized and reclaimed. The extent to which rural real estate development activity may occur in the cumulative effects analysis area is unknown; this kind of development would affect soil stability.

The above activities would affect approximately 275 acres, or 0.168%, of the 163,200 acres in the cumulative effects analysis area over the long term.

Alternative II - No Action Alternative

Under the No Action Alternative, the BLM would deny activities on approximately 45.6 acres of BLM-administered surface in the Reynolds Ranch project area. No additional disturbance/development would occur on the federal surface and mineral estate beyond those activities already approved by the BLM. However, ISR development, as described in the 2009 POO and NRC EA (2006), would likely occur on private and state claim areas and could possibly result in the loss of some soil resource function. Operator-committed mitigation would reduce the impact to the soils resources.

Existing effects (livestock grazing) to the soil resources within the BLM-administered portions of the project area (approximately 45.6 acres) would likely continue at current levels. The landowner would determine whether livestock grazing would take place on private lands. The dominant land use within the 255 square-mile cumulative effects analysis area is livestock grazing.

Existing effects to the soil resources within the project area would continue as would the other reasonably foreseeable and current activities within the cumulative effects analysis area.

4.2.5 Water Resources

4.2.5.1 Surface Waters

Alternative I - Proposed Action

Within the Reynolds Ranch area, the Proposed Action would disturb approximately 45.6 acres. Other foreseeable actions within the cumulative effects analysis area include the continued operation and development of SR-HUP, road construction on Ross Road, additional conventional oil and gas or CBNG development activities, wind farm and power line construction, livestock grazing and rural residential development. Additional disturbances would occur with any of these actions.

Cumulative effects to the surface water resources would parallel those of the proposed action as surface disturbances and associated road systems would be similar. Existing roads should be used when available to reduce the surface disturbances. All construction activities that disturb

more than one acre are required to implement storm water management plans and associated mitigation. The possible impacts and mitigations for surface disturbances and road construction were discussed above.

Alternative II - No Action Alternative

Under the No Action Alternative, the ISR development, as described in the 2009 POO and NRC EA (2006), would likely occur on private and state mineral claim areas and is not expected to impact surface waters in the project area. No additional disturbance/development would occur on the BLM surface and mineral estate beyond those activities already approved by the BLM. As there would still be disturbances in the same larger scale watersheds, the impacts would remain consistent with those of the Proposed Action. Operator-committed mitigation would limit the opportunity for impacts to area surface water resources. On BLM-administered lands naturally occurring erosion, sedimentation, and deposition would continue as would disturbance from livestock grazing activities.

Other reasonably foreseeable activities already permitted within the cumulative effects analysis area would be expected to occur in the future, resulting in additional surface disturbance and road construction. Impacts, such as increased erosion, head cutting, sedimentation, and deposition may occur due to the implementation of various projects. The application of applicable and appropriate mitigation should minimize the impacts from these activities. On BLM-administered lands naturally occurring erosion, sedimentation, and deposition would continue.

4.2.5.2 Wetlands

Alternative I - Proposed Action

The Proposed Action and other reasonably foreseeable activities within the cumulative effects analysis area would have limited impacts to surface hydrology as the same operating standards apply relative to protection of wetlands. These include COE 404 permits, where applicable, and avoidance of wetlands as per BLM and WDEQ permitting authorities and the application of appropriate mitigation measures. The extent of wetlands in the CEAA are limited.

Other reasonably foreseeable activities already permitted within the cumulative effects analysis area would occur into the future, resulting in additional surface disturbance and road construction. Increased erosion, head cutting, sedimentation, and deposition may occur due to the implementation of various projects. Applying appropriate mitigation measures should minimize the impacts from these activities.

Alternative II -No Action Alternative

As with the discussion of impacts to surface waters, a No Action Alternative would result in no additional disturbances taking place on 45.6 acres of BLM-administered lands and minerals except those that are currently permitted. It can be assumed that ISR mining operations, as described in the POO (2009) and NRC EA (2006), would still take place on private, split estate,

and state lands. There would still be disturbances in the same larger-scale watersheds; the impacts, though lessened, would remain consistent with those of the proposed action. On BLM-administered lands naturally occurring erosion, sedimentation, and deposition would continue.

4.2.5.3 Groundwater Resources

Alternative I - Proposed Action

ISR operations at SR-HUP are under authorizations from NRC, WDEQ, and BLM. These operations are consistent with the Proposed Action in that lixiviant injection, uranium recovery, and groundwater monitoring are taking place and affecting the exempted producing aquifers in the active mining areas. SR-HUP is in the production phase in some wellfields and has entered the restoration phase in others. It is expected that as SR-HUP goes through the aquifer restoration phase Reynolds Ranch would begin injection and recovery in the same formations.

The majority of the developed and producing oil and gas operations, within the cumulative effects analysis area, are located in the Missouri River hydrologic unit. These operations are, therefore, not a threat to the five ESA-listed North Platte River species (interior least tern, pallid sturgeon, piping plover, Western prairie fringed orchid, and whooping crane). It is not likely that surface or groundwater from the North Platte River basin would be transported to Reynolds Ranch or to the oil and gas operations for use. In the event that greater than 0.1 acre-foot of North Platte River water were needed, consultation with the FWS would be triggered, if the activity were connected to a federal action. A similar situation would occur if North Platte River water were transported for use in any other project within the CEAA. Oil and gas well operations, including downhole construction and surface operations, are conducted in compliance with the BLM and WOGCC regulations, which include specific protections for groundwater.

Wind energy projects use water for turbine pad construction activities in cement and for facilitating dirt work. Road and highway reconstruction operations also use water. Given the location of these activities and the base of operations for construction crews and cement contractors, it is likely that they would use water from the North Platte River basin. These short-term activities would trigger FWS consultation if connected to a federal action and required greater than 0.1 acre-foot.

Livestock grazing operations within the CEAA use ground and surface waters in both the Missouri and Platte River hydrologic units. The volume of water used for these operations is unknown. Irrigated agriculture is not common in the area. As with any other operation in the CEAA that used North Platte River water, if it were a federal action, FWS consultation would be triggered, if greater than 0.1 acre-foot of water was needed. Increased residential development may increase the demand for groundwater in either basin, but the number of residences within the CEAA is minimal.

Alternative II - No Action Alternative

Selection of the No Action Alternative would not change the outcome of potential impacts to the five ESA-listed North Platte River species (interior least tern, pallid sturgeon, piping plover, Western prairie fringed orchid, and whooping crane) or the risk of contamination of the shallow groundwater aquifers in the Reynolds Ranch project area; both of which are negligible. It is expected that development at Reynolds Ranch, as described in the 2006 NRC EA and the POO (2009), would occur.

4.2.6 Vegetation and Invasive Non-native Species

Alternative I - Proposed Action

Vegetation within the Reynolds Ranch project area would primarily be impacted by earth-moving activities resulting from construction and development of the ISR operation under this alternative. The Proposed Action would affect approximately 45.6 acres of vegetation on BLM-administered surface within the project area. It is reasonably foreseeable that another 343.4 acres would be affected by the non-BLM jurisdictional aspects of the project. However, the potential effect on the vegetation resource is mitigated in the cumulative impact area due to the limited duration and extent of the disturbance. Anticipated life-of-project surface disturbance for the entire project is an estimated 53 acres.

Currently, PRI operates the only permitted ISR facility in the area (Smith Ranch- Highland). Additional wellfields would be developed in those areas. The ISR activities at Smith Ranch–Highland have the same effect on vegetation resources as would the Proposed Action. These effects would be mitigated by aggressive reclamation. Other than the Proposed Action, no other ISR projects are currently planned in the CEAA (NRC 2009a). Open pit and underground mining for uranium has occurred in the past near the Reynolds Ranch project area (NRC EA 2006).

Past, present, and future livestock grazing would continue to seasonally impact vegetation in the area. Livestock grazing would be excluded from ISR operational areas in an effort to speed reclamation and safeguard equipment; grazing would continue at the current levels outside the operational areas.

The WDEQ/LQD and WISC oversee wind energy development on the reclaimed Dave Johnson Coal Mine because of the implications to the long-term stability of the mine site. Wind energy project construction, including installation of wind turbines and access road development, contribute approximately 250 acres of long-term disturbed surface to vegetation in the cumulative effects analysis area (Duke 2009, PacifiCorp 2007). All other surface disturbances associated with the wind energy projects are aggressively stabilized and reclaimed.

The Hornbuckle horizontal well project contributes another potential for 50 acres of short-term disturbance, reduced to 18.5 acres life-of-project disturbance. As with the wind energy projects, these disturbance areas would be aggressively stabilized and reclaimed.

The extent to which rural real estate development activity may occur in the cumulative effects analysis area is unknown; this kind of development would affect vegetation and its availability as forage for livestock and wildlife.

The above activities would have a long-term affect on grass and forb cover on approximately 325 acres, or 0.2%, of the 163,200 acres in the cumulative effects analysis area. The long-term impact to shrub cover would be larger in aerial extent due to the period of time needed for re-establishment of shrub species. All operators in the cumulative effects analysis area are committed, through their respective permits, to dust and weed control and timely reclamation. These management actions would work to mitigate cumulative effects to vegetation in the area.

Alternative II -No Action Alternative

Under the No Action Alternative, the BLM would deny activities on approximately 45.6 acres of BLM-administered surface in the project area. No additional disturbance/development would occur beyond those activities already approved by the BLM. Effects to vegetation would remain at current levels within those areas. However, ISR development, as described in the 2009 POO and NRC EA (2006), would likely occur on private and state mineral claim areas.

Existing effects to the vegetation within the Reynolds Ranch project area would continue, as would the other reasonably foreseeable and current activities within the cumulative effects analysis area.

4.2.7 Range Management and Livestock Grazing

Alternative I - Proposed Action

In the event the entire project is developed, approximately 570 acres would be fenced to preclude livestock at one time or another throughout the life of the project, including approximately 45.6 acres of BLM-administered surface, resulting in a worst case, long-term, life-of-project, reduction of 1,881 AUMs per year. Approximately 132 AUMs would be displaced from BLM grazing allotments. Due to the sequential nature of ISR development and restoration, if it is assumed that one third of the area anticipated for wellfield development was fenced off at a time, approximately 200 acres and 630 AUMs would be unavailable at any one time.

Currently, PRI operates the only permitted ISR facility in the area (Smith Ranch- Highland). The NRC-approved the development of 14 wellfields in this area anticipating that 5 wellfield units would be in production at any one time; the specific locations and size of these units are unknown (NRC 2001). Due to the sequenced manner in which ISR wellfields are developed and restored, the number of unavailable AUMs would not change appreciably over time. Other than the Proposed Action and No Action Alternative, no other ISR projects are currently planned in the CEAA (NRC 2009a). Open pit and underground mining for uranium has occurred in the past near the Reynolds Ranch project area; however, these mines have been reclaimed, and no further activity is expected (NRC EA 2006).

Wind energy development on the reclaimed Dave Johnson Coal Mine site is overseen by the WDEQ/LQD due to the implications to the long-term stability of the mine site. Wind energy project construction including the installation of wind turbines and development of access roads contribute approximately 325 acres of long-term disturbed surface to the vegetation in the cumulative effects analysis area (Duke 2009, PacifiCorp 2007) and a reduction in 1,073 AUMs. All other surface disturbances associated with the wind energy projects are aggressively stabilized and reclaimed, as are those from the Proposed Action. These private lands are likely covered by landowner agreements and grazing permits that provide consideration for loss of AUMs; these agreements are outside the scope of this analysis. Specific to the Dave Johnson Coal Mine site, it is assumed that this area has been unavailable for livestock grazing for some time and would continue to be unavailable until WDEQ/LQD bond release.

The Hornbuckle horizontal well project contributes the potential for another 50 acres of short-term disturbance, and 18.5 acres life-of-project disturbance. AUMs would be reduced by 61 over the life of the Hornbuckle field assuming the same AUM stocking rate applies in this area. Three wells have been proposed within or immediately adjacent to the project area. These three well sites and associated access roads combined would displace approximately 10 to 15 AUMs.

The extent to which rural real estate development activity may occur in the cumulative effects analysis area is unknown; this kind of development would affect vegetation and its availability as forage for livestock and wildlife.

The above activities would have long-term effects on available livestock forage resulting in a reduction of approximately 1,746 AUMs and 529 acres at any one time throughout the cumulative effects analysis area. Grazing would continue at the current levels outside the operational areas discussed above.

The Proposed Action could also have an effect on the quality and quantity of water available for livestock and wildlife as PRI develops stock ponds, wells, and other resources for landowners as a result of their ongoing working relationship. The quantity or quality of water would be not impacted because of groundwater pumping operations associated with ISR operations, as the uranium production zones are geologically isolated, as discussed in the geology and groundwater sections of this EA and the NRC EA (2006). Wind energy projects and the Hornbuckle oil field are not expected to impact livestock water availability or quality.

Alternative II - No Action Alternative

Under the No Action Alternative, the ISR mining activities would likely occur as described in the POO (20009) and NRC EA (2006) on state and private lands regardless of approval by BLM. No additional disturbance/development would occur on BLM-administered lands beyond those activities already approved. Forage would remain available to livestock within the BLM allotments. Existing impacts to the available forage for livestock within the BLM allotments would continue, as would the other reasonably foreseeable and current activities within the cumulative effects analysis area.

4.2.8 Fish and Wildlife Resources

4.2.8.1 Mammals

Big Game

Alternative I – Proposed Action

Selection of the No Action Alternative would avoid the disturbance of approximately 45.6 acres of mixed sagebrush grassland habitat suitable for mule deer and pronghorn within the cumulative effects analysis area.

The entire Reynolds Ranch cumulative effects analysis area lies fully within the north Converse mule deer and pronghorn herd units and is classified either as yearlong or winter/yearlong range. No crucial habitats have been identified in the area. Reasonably foreseeable activities within the cumulative effects analysis area could affect individuals or sub-populations of these species. Ongoing and planned activities include livestock grazing, road construction and maintenance by the county or state, proposed and active wind energy projects, power transmission lines, rural real estate development activity, and oil and gas operations. The effects of wind energy on big game are generally unknown, could result in displacement, and overcrowding in areas with less threatening activities. It is likely that big game would become accustomed to these operations as they appear to be with ISR operations.

Alternative II – No Action Alternative

Cumulative effects under the No Action Alternative would be similar to those discussed under the Proposed Action.

Small Mammals

Alternative I – Proposed Action

Selection of the No Action Alternative would avoid the disturbance of approximately 45.6 acres of mixed sagebrush grassland habitat suitable for small mammal species within the cumulative effects analysis area.

The most common impacts to non-game mammals are activities that cause displacement from habitat, habitat fragmentation, or loss of habitat. Reasonably foreseeable activities occurring across the cumulative effects analysis area, including oil and gas operations, lignite and ISR mining, highway and road construction, rural real estate development activity, and wind energy development displace animals from their habitat or damage or otherwise reduce the quality of their preferred habitat. These impacts are not long-term as small mammals and their respective predatory species generally adapt to these human-caused changes on the landscape.

Alternative II – No Action Alternative

Cumulative effects under the No Action Alternative would be similar to those discussed under the Proposed Action.

4.2.8.2 Avian Species

Migratory Bird Species

Alternative I - Proposed Action

Migratory bird species are likely to occur seasonally throughout the cumulative effects analysis area (figure 4-3); and activities occurring within this area may affect some individuals of these species. The current, proposed, and reasonably foreseeable activities within the cumulative effects analysis area would have a long-term affect on approximately 325 acres, or 0.2%, of the 163,200 acres used by migratory bird species. The long-term impact to shrub cover would likely be larger in aerial extent due to the time needed for shrubby species to re-establish themselves. All operators in the cumulative effects analysis area are committed through their respective permits to reclaim disturbed vegetation timely. Rapid and effective reclamation would act to mitigate cumulative effects to migratory bird use of the area.

Avian mortality has been documented due to wind energy development. Mortality may be heavy if the wind farms and meteorological tower facilities are not designed properly. Habitat loss from road construction and development of various forms of energy would also affect these species, as would predation by domestic pets associated with rural real estate development activity.

If the project proponents limit disturbance within sagebrush habitats, cumulative impacts to these species would be reduced.

Alternative II - No Action Alternative

Selection of the No Action Alternative would avoid the long-term disturbance of approximately 11 acres of mixed sagebrush grassland habitat suitable for nesting and brood rearing for these species within the cumulative effects analysis area. Other current, proposed, and reasonably foreseeable activities within the area would continue.

Raptor Species

Alternative I - Proposed Action

Raptor species are likely to occur seasonally throughout the cumulative effects analysis area (figures 4-3 and 4-4); activities occurring within this area may affect some individuals of these species. Current, proposed, and reasonably foreseeable activities within the cumulative effects analysis area would have a long-term affect on approximately 325 acres, or 0.2%, of the 163,200 acres used by raptor species. The long-term impact to shrub cover would likely be larger in

aerial extent due to the time needed for shrubby species to re-establish themselves. All operators in the cumulative effects analysis area are committed through their respective permits to timely reclaim disturbed vegetation and avoid known raptor nest sites. Rapid and effective reclamation would work to mitigate cumulative effects to raptor use of the area.

Raptor mortality has been documented due to wind energy development. Mortality may be heavy if the wind farms and meteorological tower facilities are not designed properly. Habitat loss from road construction and development of various forms of energy would also affect these species.

If the project proponents limit disturbance within sagebrush habitats, cumulative impacts to these species would be reduced.

Alternative II - No Action Alternative

Selection of the No Action Alternative would reduce the long-term disturbance of approximately 11 acres of mixed sagebrush grassland habitat suitable for nesting and brood rearing for these species within the cumulative effects analysis area.

4.2.8.3 Reptiles and Amphibians

Alternative I – Proposed Action

The most common impacts to reptiles and amphibians are activities that cause displacement from habitat, habitat fragmentation, or loss of habitat. Reasonably foreseeable activities occurring across the cumulative effects analysis area, including oil and gas operations, lignite and ISR mining, highway and road construction, rural real estate development activity, and wind energy development displace animals from their habitat or damage or otherwise reduce the quality of their preferred habitat. These impacts are not long-term as reptiles and amphibians are expected to repopulate reclaimed or modified areas. In the alternative, most of these activities could also create escape/cover habitat for these species.

Alternative II – No Action Alternative

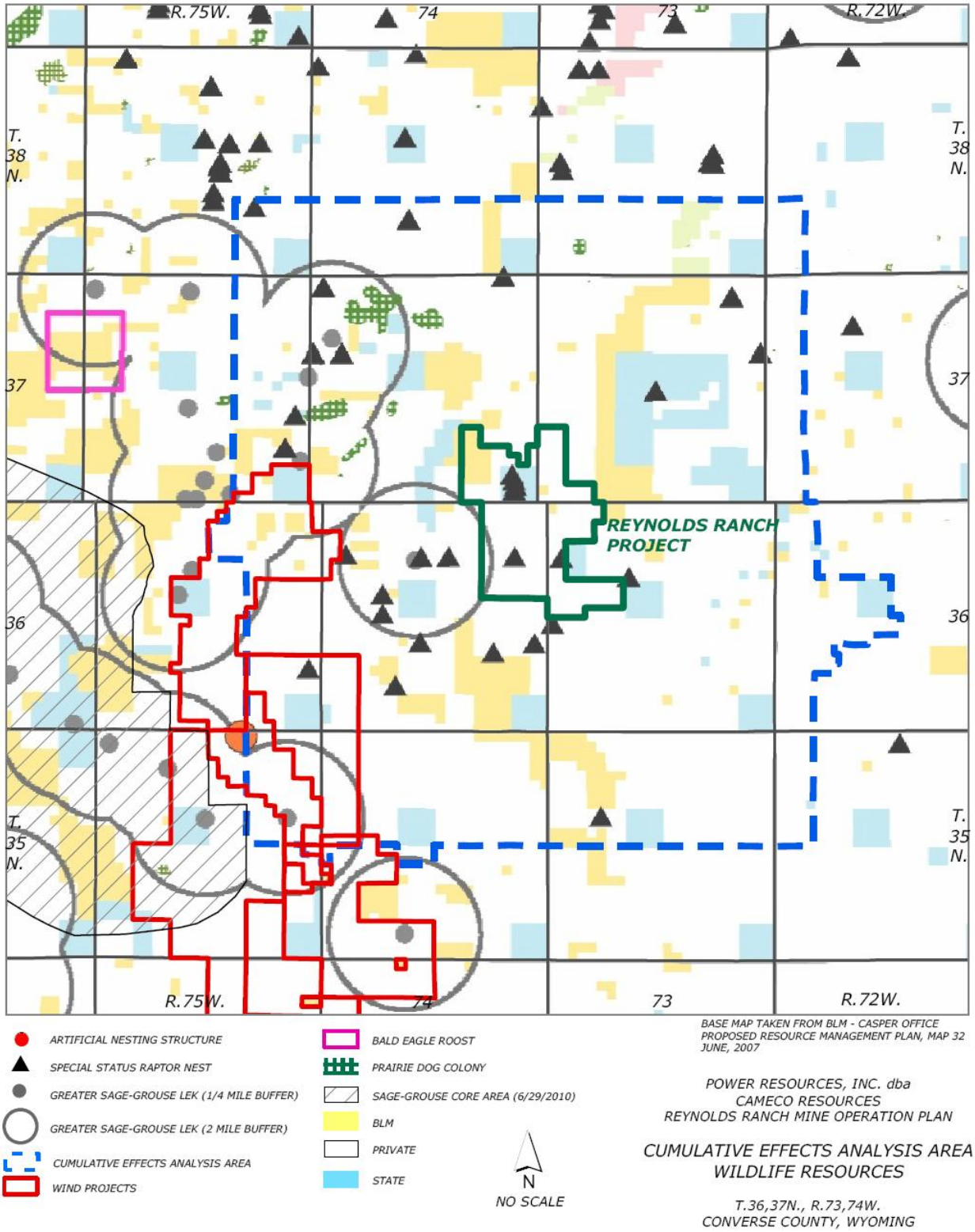
Selection of the No Action Alternative would avoid the disturbance of approximately 45.6 acres of mixed sagebrush grassland habitat suitable for reptiles and amphibians within the cumulative effects analysis area.

4.2.9 Threatened, Endangered and Special Status Species

4.2.9.1 Federally Listed Threatened or Endangered Plant and Animal Species

There are no ESA- listed animal species or their habitats present within the Reynolds Ranch project area or the cumulative effects analysis area. Table 3-13 contains a listing of potential federally listed species and their status within the analysis area. If a sensitive species or its

Figure 4-4: Cumulative Effects Analysis Area for BLM Special Status Wildlife Species



habitat is not known to occur within the project area or would not be impacted by the Proposed Action cumulative effects are not analyzed.

4.2.9.2 BLM Wyoming Special Status Species

Cumulative effects analysis area activities most likely to affect individual or populations of the BLM special status species are ISR development, livestock grazing, road construction and maintenance by the county or state, proposed, and active wind energy projects, transmission lines, rural real estate development activity, and oil and gas operations. If a sensitive species or its habitat is not known to occur within the project area or would not be impacted by the Proposed Action cumulative effects are not analyzed. The Casper RMP special status wildlife species map was used as a reference for potential species occurrence in the cumulative effects analysis area (figure 4-4).

4.2.9.2.1 BLM Wyoming Special Status Plant Species

The Proposed Action would not affect special status plant species; therefore, cumulative effects are not analyzed relative to these species.

4.2.9.2.2 BLM Wyoming Special Status Avian Species

Bald Eagle

The Proposed Action would not affect the bald eagle; therefore, cumulative effects are not analyzed relative to the species.

Greater Sage Grouse

Alternative I - Proposed Action

The Sage-Grouse Core Breeding Areas Version 3 Map (WGFD 2010) identified the north Glenrock core area immediately to the west of the cumulative effects analysis area (figure 4-4). Activities in the cumulative effects analysis area, such as road maintenance and construction, ISR development, wind energy and electrical transmission, rural real estate development activity, and oil and gas operations are not likely to affect the viability of sage grouse in the area. The project development area is not within the designated core area. Therefore, cumulative impacts to greater sage grouse would not increase because of the limited suitable habitat within the project area.

Alternative II - No Action Alternative

Selection of the No Action Alternative would result in development of the REY project as described in the 2006 NRC EA and the 2009 POO but would not include the 45.6 acres of BLM-administered surface and minerals. The project area is not within the designated core area. Therefore, cumulative impacts to greater sage grouse would not increase because of the limited suitable habitat within the project area.

Cumulative effects under the No Action Alternative on greater sage grouse would be similar to those discussed under the Proposed Action.

Ferruginous Hawk

Alternative I - Proposed Action

Ferruginous hawks are both level I MBHFI and BLM special status species. Activities associated with the development of the Reynolds Ranch project, or any of the other activities that occur within the CEAA, have the potential to affect this species through additional noise and activity within a region with little prior human activity. Activities, such as road construction and maintenance, wind energy and electrical transmission, rural real estate development activity, and oil and gas operations would affect nesting habitat, prey-species availability and migratory routes. These activities in conjunction with the development and production activities needed for the life of the Proposed Action, would not contribute to the loss of species viability, nor cause a trend toward federal listing.

Ferruginous hawks could abandon the four nests located within the proposed project boundary due to development activity occurring adjacent to these nests. Loss of habitat for forage species could affect this hawk as well. To avoid these impacts, if the nests are determined to be active, PRI should avoid development and production activities within ½ mile of the nests or until the juveniles have fledged. Topography and other site-specific features would determine the avoidance buffer. Power lines also cause mortality to large raptors. Construction and development planning should incorporate designs that avoid impacts to forage species habitats and populations, and minimize the extent of power lines. This should include decreasing the area impacted by roads, pipelines, overhead lines and well fields, and consolidation of all facilities.

Alternative II - No Action Alternative

Selection of the No Action Alternative would not change the long-term stability and viability of the species. Cumulative effects under this alternative on ferruginous hawks would be similar to those discussed under the Proposed Action.

Mountain Plover

Alternative I - Proposed Action

Scattered mountain plover habitat likely exists within the cumulative effects analysis area (figure 4-4), and activities occurring within this area may impact individuals. Conversely, ISR development, road maintenance and construction activities, wind energy and electrical transmission, rural real estate development activity, and oil and gas operations create bare ground and may increase potential mountain plover habitat.

Alternative II - No Action Alternative

Selection of the No Action Alternative would not add to or subtract from the cumulative effects that the project would have on the mountain plover.

Burrowing Owl

Alternative I - Proposed Action

Burrowing owl habitat, in the form of prairie dog towns, occurs in the west half of T.37 N., R. 74 W., and rarely within the remainder of the cumulative effects analysis area (figure 4-4). Activities occurring within this area may affect individuals. The Proposed Action would not cause additional cumulative impacts to burrowing owls, as their habitat is limited in the project area, and they have not been observed in the area.

Alternative II - No Action Alternative

Selection of the No Action Alternative would add no positive or negative cumulative effect on the long-term stability of the burrowing owl.

Sagebrush Obligate and Song Birds

Alternative I - Proposed Action

Sagebrush obligate and neo-tropical song birds occur seasonally throughout the cumulative effects analysis area. Activities occurring within this area may impact individuals of these species. Songbird mortality has been documented due to wind energy development. Mortality may be heavy if the wind energy projects and associated meteorological tower facilities are not designed properly. Habitat loss due to road construction, ISR development, oil and gas development, and rural real estate actions would further impact these species. This project would not contribute to the loss of species viability, nor cause a trend toward federal listing.

Alternative II - No Action Alternative

Selection of the No Action Alternative would reduce by approximately 45.6 acres the disturbance of mixed sagebrush grassland habitat suitable for nesting and brood rearing for these species within the cumulative effects analysis area.

4.2.9.2.3 BLM Wyoming Special Status Mammalian Species

Black-tailed prairie dog

Alternative I - Proposed Action

Prairie dog towns occur in the west half of T. 37 N., R. 74 W., and rarely within the remainder of the cumulative effects analysis area (figure 4-4); however, activities occurring within this area

may affect individuals of this species. The Proposed Action would not cause additional cumulative impacts to black-tailed prairie dogs, as their habitat is limited in the project area, and they have not been observed in the area.

Alternative II - No Action Alternative

The No Action Alternative would not increase or decrease cumulative effects to black-tailed prairie dogs due to their limited distribution in the CEAA.

Swift fox

Alternative I - Proposed Action

Swift fox habitat exists throughout the cumulative effects analysis area. Road construction, ISR development, wind energy projects, transmission lines, oil and gas operations, and real estate actions would increase land disturbance and change the quality and quantity of swift fox habitat. Activities within the CEAA could affect individuals, but they are not expected to threaten the survival of the species.

Alternative II - No Action Alternative

Selection of the No Action Alternative would not increase or decrease cumulative effects to swift fox in the analysis area.

4.2.10 Recreation Resources

Alternative I - Proposed Action

Selection of this alternative would not affect recreational use of the area as BLM-administered surface is a very small percentage of the total area within the CEAA. The general landownership and public access situation is the same for any of the activities taking place in the CEAA. Ongoing ISR activities at SR-HUP, oil and gas development (including CBNG), wind energy, livestock grazing, and lignite recovery operations would continue in the cumulative effects analysis area and would have little or no impact on the ability of the public to access the area for recreational purposes.

Alternative II - No Action Alternative

Under the No Action Alternative, ISR mining activities would occur on state and private surface lands within the project area. No additional disturbance/development would occur on BLM-administered lands beyond those activities already approved by the BLM. Ongoing ISR activities at SR-HUP, oil and gas development (including CBNG), wind energy, livestock grazing, and lignite recovery operations would continue in the cumulative effects analysis area and would have little or no impact on the ability of the public to access the area for recreational purposes. As the vast majority of the lands within the cumulative effects analysis area are

private, the ability of the public to access lands for recreational purposes would not likely change.

4.2.11 Cultural and Historical Resources

4.2.11.1 Cultural and Historical Resources

Alternative I - Proposed Action

All state and federal permitted activities in the cumulative effects analysis area contain requirements for avoiding cultural and historic features. These permits also provide for the notification of the appropriate agency and the State Historic Preservation Office (SHPO) in the event artifacts or important features are discovered. Operator committed mitigation and avoidance minimizes the potential impact to the Holdup Hollow segment of the Bozeman Trail.

Alternative II - No Action Alternative

Selection of the No Action Alternative would not change the outcome relative to historical or cultural resources in the cumulative effects analysis area. ISR development is likely to occur on state and private surface and mineral claims, regardless of a BLM decision to deny the project. As stated above, all state and federal permitted activities in the cumulative effects analysis area contain requirements for avoiding cultural and historic features and notifying the appropriate agency and the SHPO in the event artifacts or important features are discovered. Operator committed mitigation and avoidance minimizes the potential to affect the Holdup Hollow segment of the Bozeman Trail.

4.2.11.2 Native American Religious Concerns

Based on current information available, there are no sites of Native American religious concern located in the cumulative effects analysis area. However, previously recorded and other yet unidentified sites of Native American concern could suffer effects thereby affecting their physical integrity or by interfering with their ceremonial use. Native American groups historically associated with this area consider prehistoric rock alignment, cairn, stone circle, rock art, and potential funerary sites highly sensitive. These sites are specially managed by BLM via the use of buffer zones. Project-related cultural resource inventories have not identified sites of these types within the project area. With implementation of the mitigation measures described above and in section 4.3.11.1, the project should cause no impact to Native American religious concern.

4.2.12 Visual Resources

Cumulative effects from the Proposed Action or the No Action Alternative would be similar. Driving from the Ross Road at its junction with Wyoming Highway 95 to the project area is approximately 7 miles. Existing SR-HUP, wellfields through this area are visible at various locations and draw little to moderate attention; they are not “dominant” on the landscape. Header houses and satellite facilities are more visible and, at some vistas, dominant. The REY

project would extend the intermittent visual attraction of wellfields as viewed from Ross Road. Future development between Ross Road and the proposed ISR facilities would very likely present a substantial visual intrusion that may be incompatible with the current VRM objectives. However, the wind energy turbines to the west of Ross Road already compromise these vistas.

The SR-HUP central processing plant is not visible to persons traveling Ross Road; neither are the historical open pit mining areas. The Glenrock Rolling Hills wind energy project is located to the west of the SR-HUP and REY project areas. The wind turbines are dominant on the landscape and attract the eye. Existing oil and gas development, including CBNG, is highly scattered and generally not visible to visitors along Ross Road. The Black Hills lignite operating area is not visible from Ross Road.

4.2.13 Socioeconomics

Cumulative effects from the Proposed Action or the No Action Alternative would be similar. The NRC license (SUA-1548) for resin transportation and processing at SR-HUP also includes the processing of resin from proposed remote satellite facilities at Reynolds Ranch, Ruth, North Butte, and Gas Hills (NRC 2009c). ISR activities have not been initiated yet at the remote satellite facilities (NRC 2009c). In addition, PRI has received approval from the NRC to accept third party ion exchange resin for processing at the SR-HUP CPP (NRC 2009c). Should third party resin be transported to the area, it could result in a minimal increase in the number of tanker truckloads of uranium-rich resin on Wyoming highways 93 and 95. Upon analysis, the NRC staff determined, ~~t~~the transportation and processing of third party ion exchange resin at SR-HUP would not significantly affect the quality of the human environment (NRC 2009c)."

The Glenrock–Rolling Hills Wind Energy Project is located within the cumulative effects analysis area. At least one additional wind energy project is proposed in the area (Duke 2009). The specialized workforce needed to construct and develop wind energy projects is generally imported and short term; therefore, no additional pressure for labor or associated services (housing, medical, schools) is anticipated. The workforce required for wind energy operations is relatively small and in place. Additional employees needed for wind energy operations could come from the under-employed local workforce. No negative cumulative effects on local socioeconomics are anticipated because of contemporaneous operation of the wind energy projects and the Reynolds Ranch project. The positive effect of continued stable employment is anticipated.

The Black Hills Lignite mine is also located within the cumulative effects analysis area 4.5 miles west of the proposed Reynolds Ranch project. The mine operates under an active permit from the WDEQ (Permit 585). The project is seasonal and sporadic with approximately three to four pieces of heavy equipment on site for about two to four weeks each year. During periods of active mining, only four to five employees are onsite working 10 hours per day, five days per week. Mining occurs during daylight only. During the remaining portion of the year, the only heavy equipment on the site consists of a front-end loader, which is operated only when loading belly-dump trucks with lignite (BLM 2007).

Conventional oil and gas development is occurring at the Hornbuckle Field northeast of the REY project. The workforce (dirt contractors, drilling crews, specialized contractors, and production

staff) needed to develop this field is in place and assimilated into the local economies and does not add to cumulative effects within the designated area. Proposed CBNG and conventional oil and gas development in the project and cumulative effects analysis area is expected to compete with the development of other energy resources in the area. Oil and gas development or ISR wellfield development may be deferred on a case-by-case basis if location conflicts are anticipated (NRC 2009).

4.2.13.1 Environmental Justice

Neither the Proposed Action nor the No Action Alternative, in conjunction with other permitted projects in the cumulative effects analysis area, would disproportionately affect minority or low income people. The various energy-related projects in the area provide employment opportunities for the majority of the families in Converse and Natrona counties and contribute to the long-term stability of the local economies.

4.2.14 Health, Waste Management and Safety

Cumulative effects from the Proposed Action or the No Action Alternative would be similar. As mentioned in the NRC EA (2006), open pit and underground mining for uranium has occurred in the past near the Reynolds Ranch project area. However, these mines have been reclaimed, and no further activities are expected.

ISR mining at Smith Ranch-Highland, operated by PRI, is the only currently permitted and operating ISR facility in the area. Other than the Proposed Action, no other ISR projects are planned in the CEAA (NRC 2008). SR–HUP wellfield operations use a variety of hazardous materials. During extraction and processing of uranium ore into yellowcake at the Smith Ranch CPP, hazardous chemicals are concentrated and when coupled with certain accident scenarios could pose significant risks to workers (EPA 2008). Extraction and processing activities would not occur at Reynolds Ranch. PRI has numerous SOPs, response plans, and protocols in place to reduce the risk of human contact and spills. These measures provide protocols and employee training to deal with these events should they occur at either Smith Ranch–Highland or Reynolds Ranch.

Hazardous materials used and generated during drilling and production of oil and gas activities could be released into the environment causing a risk to human health and the environment. In the event that were to occur in the project area there is a remote risk of a combined hazardous materials threat capable of posing a danger to workers, the public, and the environment. This risk is not limited to potential oil and gas operations, but it could apply to any projects within the cumulative effects analysis area. Surface and groundwater could also be affected as a result of fuel or process chemical-related spills or leaks. All operators are required to comply with all appropriate state, federal, and local rules and regulations including developing programs such as HAZCOM, SPCC, and the SWPPP. If all operators fully comply with these programs, cumulative effects from potential hazardous materials releases would be minimized.

Under the No Action Alternative, ISR mining activities, as described in the 2009 POO and NRC EA (2006), would occur on state and private surface and mineral claims within the project area

regardless of approval by BLM. No additional disturbance/development would occur on BLM lands beyond those activities already approved. Hazardous materials releases could still occur from approved activities within the cumulative effects analysis area, but as noted above, appropriate plans developed by each operator would minimize these opportunities and their effects.

4.2.15 Noise

While each permitted activity within the cumulative effects analysis area generates noise, the projects are spaced such that the noise does not become cumulative. Some projects may cause displacement of wildlife, such as those that generate noise in the upwind direction of a sage grouse lek. Some activities, such as wind energy development, may result in displacement of wildlife, but these effects are not yet quantified. Field experience has demonstrated that pronghorn and mule deer acclimate to the noise and human activity related to ISR production operations. Given the 255 square miles within the analysis area and the lack of critical seasonal habitat, small-scale displacement by these species would be tolerated.

4.3 MITIGATION MEASURES CONSIDERED

The Wyoming BLM has adopted a standard set of guidelines and (COAs) that apply, where applicable and appropriate, to all surface-disturbing activities on federal lands in Wyoming. These mitigation guidelines are found in the Casper RMP (appendix I). With the exception of specific mitigations excluded from the No Action Alternative (chapter 2), standard Wyoming BLM mitigation guidelines would be applied to the Proposed action and any alternatives analyzed in this EA.

4.3.1 Air Quality

- Fugitive dust would be controlled on access roads, as needed. If field conditions are dry, water or magnesium chloride water or some other form of dust control approved by the authorized officer would be applied to the access road during periods of high vehicle traffic especially during wellfield development operations to reduce the amount of air-borne dust.

- Soil stabilization and reclamation would be timely, as per BLM permit requirements and WDEQ/LQD permit to mine.

- WDEQ/AQD permits to construct and operate would be complied with.

- The NRC license would be complied with.

4.3.2 Geology, Minerals and Energy Resources

4.3.2.1 Geological Resources

None recommended.

4.3.2.2 Energy Resources

- Competing project development elements would be coordinated.
- Activities that cannot be intermixed with ISR operations would be delayed or deferred.
- Competing projects would be relocated.
- Directional drilling from offset locations would be used to develop deep formation targets.
- ~~If~~ there are oil, gas, coal bed methane, or other production layers near the ISL facility, and if NRC determines that there could be potential for cross contamination between the ISL production zone and other production layers based on environmental impact assessments, NRC may require the licensee to expand the monitoring well ring for detection of potential contamination between the ISL production zone and other mineral production layers. If excursions are detected, the monitoring well is placed on excursion status and reported to the NRC. Corrective actions are taken, and the well is placed on a more frequent monitoring schedule until the well is found to no longer be in excursion."

4.3.3 Paleontological Resources

- The permittee would stop work and immediately notify the BLM authorized officer of any paleontological resources discovered as a result of operations under this authorization. The permittee would suspend all activities in the vicinity of such discovery until notified to proceed by the authorized officer and would protect the discovery from damage or looting. The permittee may not be required to suspend all operations if activities can be adjusted to avoid further impacts to a discovered locality or be continued elsewhere. The authorized officer would evaluate, or would have evaluated, such discoveries as soon as possible, but not later than 10 working days after being notified. Appropriate measures to mitigate adverse effects to significant paleontological resources would be determined by the authorized officer after consulting with the operator. Within 10 days, the operator would be allowed to continue construction through the site, or would be given the choice of either (1) following the authorized officer's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (2) following the authorized officer's instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area (BLM 2009).
- As stated in the NRC EA and the WDEQ/LQD permit to mine (appendix D-3), ~~If~~ during mining operations any cultural or significant paleontological evidence are exposed during any excavation or other installation work in the amendment area, such activities will be delayed until the appropriate state office has been notified and a qualified person has examined the evidence."

4.3.4 Soils Resources

- PRI would follow the BLM permit requirements and WDEQ/LQD guideline 4 (in-situ mining), and attachment III of that guidance, which is specific to topsoil and subsoil management in ISR operations.

- The WDEQ/LQD and BLM would annually review the seed mix used and the surface reclamation mitigation measures applied.

- Storm water runoff impacts would be mitigated through the implementation of the WDEQ/WQD required SWPPP.

- Operator-committed mitigation in section 5.2 of the plan of operations would be referred to.

4.3.5 Water Resources

4.3.5.1 Surface Water

- SWPPPs would be required on all projects that disturb one acre or more.

- Within 500 feet of water wells, springs, or artesian and flowing wells CSU would be applied.

- WDEQ/LQD non-coal rules and regulations (chapter 2, section S (I)) standards would be implemented. Vehicles should remain on roads and other areas designated for vehicle use, thereby minimizing disturbance of native soil and vegetation. Non-designated off road travel should be discouraged.

- Reclamation would include removal of culverts, borrow ditches and water kickouts. Roaded areas would be recontoured to match native ground, topsoil would be replaced and disturbed areas would be reseeded with a native seed mix.

- Road construction and maintenance impacts would be mitigated through the use of BMPs.

- A regular maintenance program would include, but is not limited to grading, repairing, and maintaining the road surface, ditches, culverts, sediment ponds, and cattle guards during operations.

4.3.5.2 Wetlands

- In the event that any development were to occur that might impact the function of the wetlands identified in the project area, a wetlands delineation would be submitted to the COE. The COE may request a 404 permit application, which includes the total area of wetlands proposed for disturbance and the wetland mitigation plan. The COE 404 permit would be awarded based on the wetland delineation, plan of action and mitigation plan prior to any wetland disturbance.

4.3.5.3 Groundwater

- Consultation with FWS would be initiated if greater than 0.1 acre feet of water for operations in Reynolds Ranch were to be obtained from the North Platte River drainage system portions of SR-HUP.

4.3.6 Vegetation and Invasive Non-native Species

- PRI would use the BLM recommended seed mix detailed in table 4-1.

- The seed mixture would be planted in the amounts specified in pounds of pure live seed (pls)/acre. Seed would be tested and the viability testing of seed would be done in accordance with state law(s) and within nine months prior to purchase. Commercial seed would be certified weed free. The seed mixture container would be tagged in accordance with State law(s) and available for inspection by the BLM authorized officer. Primary and secondary noxious weed seed content in the seed mixture would comply with federal and state laws. For BLM lands, no more than 0.5 percent by weight of other weed seeds, including cheatgrass, would be present in the seed lab results. Since seeds are of different sizes and require different planting depths, the operator would use the appropriate equipment to ensure that the seed mixture is correctly and uniformly planted over the disturbed area. Seed would be broadcast if drilling is not possible. When broadcasting the seed, the pounds per acre are to be doubled.

- Seeding should be done preferably in the fall after September 15, until the soil is frozen, or conditions prevent effective seeding operations. Seeding may also be done as early as possible the following spring (between spring thaw and April 15) to take advantage of available ground moisture.

- Evaluation of growth would not be made before completion of the third growing season after seeding. Reclaimed areas that do not have at least 30% of pre-disturbance vegetative cover three growing seasons after final reclamation would be re-treated. Reclaimed areas that do not have at least 50% of pre-disturbance vegetative cover five growing seasons after final reclamation would be re-treated. The seeding would be repeated until a satisfactory stand is established as determined by the WDEQ/LQD and BLM.

- BLM and WDEQ/LQD would jointly determined adequacy of reclamation on BLM surface Reclamation would be considered successful when the following criteria are met:

    - The vegetation species of the reclaimed land would be self-renewing under natural conditions prevailing at the site.

    - The total vegetation cover of perennial species (excluding noxious weed species) and any species in the approved seed mix would be at least equal to the total vegetation cover of perennial species (excluding noxious weeds species) on the area before mining.

    - No noxious weeds would be present in the seeding.

- The species diversity and composition would be suitable for the approved post-mining land use.

- The requirements in a), b), and d) would be achieved during one growing season, no earlier than the fifth full growing season on the reclaimed lands.

- Erosion features would be equal to or less than surrounding area.

- The operator would be responsible for noxious weed control, as designated by the state of Wyoming, on disturbed areas within the project boundaries. The control methods would be in accordance with guidelines established by the BLM, state, and local authorities.

- Prior to the use of pesticides, the operator would obtain written approval from the BLM authorized officer (meaning an approved pesticide use proposal form--showing the type and quantity of material(s) to be used, pest(s) to be controlled, method of application, etc.).

- PRI would follow the WDEQ/LQD guideline 4 (in-situ mining), and attachment III of that guidance, which is specific to topsoil and subsoil management in ISR operations.

- Storm water runoff impacts would be mitigated through the implementation of the SWPPP and application of BMPs.

- Operator committed mitigation in section 5.2 of the plan of operations would be referred to.

4.3.7 Range Management and Livestock Grazing

- Range improvements such as fencing or reservoirs within the project lands would not be disturbed or, where disturbance is necessary and approved, they would be left in the original or better condition as determined by the BLM authorized officer.

- Authorized grazing users would have access to the area for grazing purposes.

- The seed mix used and the surface reclamation mitigation measures applied would be reviewed by WDEQ/LQD and BLM annually.

- Implementation of the same weed management system used at SR-HUP would be used to document and control noxious weeds identified at Reynolds Ranch.

- Impacts from storm water runoff would be mitigated through the implementation of the SWPPP.

- Operator committed mitigation in section 5.2 of the plan of operations would be referred to.

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4.3.8 Fish and Wildlife Resources

4.3.8.1. Mammals

Big Game

- Roads would be constructed below ridges.
- Speed limits on access and secondary roads should be kept to a minimum.
- Noise-dampening techniques should be used in buildings.
- Shrublands should be avoided during parturition periods to limit impacts to big game.
- The area impacted by roads, pipelines, and well fields should be kept to a minimum, and all facilities should be consolidated as much as possible..
- Field employees should be trained about minimizing impacts to wildlife and made aware of the WGFD rules and regulations to reduce potential impacts to big game wildlife.
- Construction and development planning should incorporate designs that minimize the impact to big game habitats and populations.
- The use of browse species in the reclamation seed mix should be used to benefit the species in the long-term.

Small Mammals

- To minimize impacts to these species habitats, ground disturbance would be limited and sagebrush or cover habitats would be avoided.
- Avoid unnecessary vegetation and soil disturbances to reduce the surface impacts to the land.
- Design buildings and other facilities to reduce noise and blend in with the landscape.
- Design roads to minimize impacts to habitats and mammal populations.
- Forage and cover species removed during development activities, such as range grasses and shrubs, especially sagebrush, and winter fat should be replaced during reclamation.

4.3.8.2 Avian Species

Migratory Bird Species

- Design parameters that lessen the impact to grassland/sagebrush habitats, including minimizing the removal of sagebrush impacted by roads, pipelines, wellfields, and installation of support facilities should be incorporated.

- Avoid any ground clearing activity, including removal of vegetation, topsoil, and subsoil during nesting periods for the ground nesting species discussed in section 3.9.1.2. Time period limitation should be May 15 to July 15. If ground clearing is needed within this period, a nest survey should be completed prior to the work, to avoid destroying an active nest.

Raptor Species

- Design parameters that lessen the impact to grassland/sagebrush habitats, including minimizing the removal of sagebrush impacted by roads, pipelines, wellfields, and installation of support facilities should be incorporated.

- Rock piles should be developed as replacement prey base habitat by relocating removed rock.

- Surface disturbance or occupancy within a ½-mile buffer of raptor nests, except for the species listed below, for which a ¼-mile buffer would be required (table 4-2) would be avoided.

Red-tailed hawk	Swainson's hawk	American kestrel
Osprey	Great horned owl	Long-eared owl
Northern saw-whet owl	Common barn owl	Western screech owl

  The seasonal restriction would be February 1 to July 31, or until young birds have fledged (TLS). The authorized officer, on a case-by-case basis, may grant exceptions to seasonal stipulations.

4.3.9 Threatened, Endangered and Special Status Species

4.3.9.1 BLM Wyoming Special Status Species

4.3.9.2.1 BLM Wyoming Special Status Avian Species

Greater sage grouse

- To reduce the opportunity for unnecessary and undue degradation of sage grouse habitat resources, PRI would be required to comply with any state requirements regarding sage grouse mitigation.

- Design parameters that lessen the impact to sage grouse habitats, including minimizing the removal of sagebrush impacted by roads, pipelines, wellfields and installation of support facilities should be incorporated.

Ferruginous hawk

- The Casper RMP provides a timing limitation precluding activity within ½ mile of active raptor nests from February 1 to July 31 or until the juveniles have fledged, to protect rearing

and fledging of young. To protect special status raptor nesting habitats, activities or surface use would not be allowed from February 1 through July 31 within certain areas (TLS). The BLM authorized officer, who would consider topography and special status raptor prey (excluding bald eagles) habitats surrounding the nest site, would determine the size of a buffer zone on a case-by-case basis. Usually the buffer zone would be ¼ to ½ mile (BLM 2007).

Mountain plover

- Activities should avoid removing a nest.
- Activities should avoid nesting areas if identified.

Sagebrush Obligate and Song Birds

- Design parameters that lessen the impact to sage grouse habitats, including minimizing the removal of sagebrush impacted by roads, pipelines, and well fields, and consolidation of facilities.
- Any ground clearing activity, including removal of vegetation, topsoil and subsoil should be avoided during nesting periods for the ground nesting species discussed in section 3.9.1.2. Time period limitation should be late March to early July. If ground clearing is needed within this period, a nest survey should be completed prior to the work, to avoid destroying an active nest.

4.3.10 Recreation Resources

None recommended

4.3.11 Cultural and Historical Resources

4.3.11.1 Cultural and Historical Resources

- Should mining operations expose any cultural materials, within federal jurisdiction, during site operations, work in the area would cease and the exposed cultural materials would be left intact until the BLM authorized officer is notified and a qualified archaeologist can evaluate the find.
- PRI would be responsible for informing all persons associated with this project that they would be subject to prosecution for damaging, altering, excavating or removing any archaeological or historical objects on-site. If archaeological or historical materials were discovered, the operator would suspend all operations that further disturb such materials and immediately contact the authorized officer. Operations would not resume until written authorization to proceed is issued by the authorized officer.

- Within five working days, the authorized officer would evaluate the discovery and inform PRI of actions that would be necessary to prevent loss of significant cultural or scientific values.

- PRI would be responsible for the cost of any mitigation required by the authorized officer. The authorized officer would provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the authorized officer that the required mitigation has been completed, the operator would be allowed to resume operations.

4.3.11.2 Native American Religious Concerns

Should unidentified sensitive sites of Native American concern, as defined by Executive Order 13007, be located, appropriate tribes would be consulted and recommendations solicited regarding measures necessary to eliminate potential effects of the mineral material sale. Implementation of the following measures should ensure that there would be no impact to Native American sacred sites:

1. Native American sites including but not limited to rock art, cairns, and stone circles would be avoided by a minimum of ¼ mile or visual horizon whichever is less, unless closer activities are approved through completion of consultation with the affected tribes and written permission is given by the authorized officer.

2. Native American funerary sites would be evaluated on a case-by-case basis for site-specific avoidance and mitigation measures. All pertinent provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) and the National Historic Preservation Act (NHPA) would be applied to sites in federal jurisdiction.

3. If PRI personnel identify any additional sites of potential Native American religious concern (e.g. rock art, vision quest structures, human burial sites, prehistoric cairns, stone circles) regardless of surface ownership, the BLM CFO Archaeologist would be notified promptly. The BLM CFO would determine the need for special mitigation measures and/or additional Native American consultation per regulations under the NHPA or NAGPRA as needed.

4. The following protective/mitigation measure would be implemented to mitigate effects to Native American religious concerns under the Proposed Action:

   In addition to the stipulations for the protection of Cultural Resources, if new information is brought forward, any site-specific Native American mitigation measures suggested during previous notification/consultation would be considered during the implementation of the Proposed Action. If new information is provided by Native Americans during the EA process, additional or edited terms and conditions for mitigation may be negotiated or enforced to protect resource values.

4.3.12 Visual Resources

- Placement of access roads should always follow the natural line created by the landforms.

- Screen wells and header houses using topographical features.
- Native grasses and forbs should be used for interim and final vegetation reclamation.
- The minimum number of roads necessary should be used.
- Paint facilities and well houses with low contrast, environmentally neutral colors.
- Roads should follow natural contour.
- If roads are surfaced, gravel should match or approximate the natural soil color.
- Assure edges of any vegetation stripping are curved/irregular rather than straight.
- Subsurface utilities should be considered.
- Skylining facilities should be avoided.
- BMPs for fluid minerals can be used where applicable.

4.3.13 Socioeconomics

None recommended

4.3.14 Health, Waste Management and Safety

- The mitigation and monitoring requirements contained in the WDEQ/LQD permit to mine and the SR-HUP NRC license SUA-1548 should be complied with
- Operating facilities at the Reynolds Ranch area would be manned 24 hours per day, 7 days per week, with surveillance maintained through the presence of both on-site operators and remote surveillance systems.
- All visitors would be required to check and sign in at the main office before being allowed to enter the controlled access areas at Reynolds Ranch.
- Reynolds Ranch would be controlled using gated access and limited authorization.
- The operator would be responsible for the prevention and suppression of fires on public lands caused by its employees, contractors, or subcontractors. During conditions of extreme fire danger, surface use operations may be either limited or suspended in specific areas, or the BLM authorized officer may require additional measures.
- Hazardous materials would not be stored during periods of inactivity on BLM-administered land. Additionally, no hazardous waste would be disposed of on federal land. The term

hazardous material means: 1) any substance, pollutant, or contaminant that is listed as hazardous under the CERCLA of 1980, as amended, 42 USC 9601 et seq., and the regulations issued under CERCLA, 2) any hazardous waste as defined in the RCRA of 1976, as amended, and 3) any nuclear or nuclear byproduct as defined by the Atomic Energy Act of 1954, as amended, 42 USC 2011 et seq.

- The operator would place all tanks holding liquid hydrocarbons within containment areas. Capacity of the containment area would be 110% of the largest tank.

- Hazardous or oil materials would be handled, located, stored, treated, and disposed of in an environmentally safe manner. Contamination of soil, water, or other sensitive resources by hazardous materials and oil material should be ensured not to occur. Fueling or maintaining equipment should be done at least 500 feet away from riparian or other open water areas. All oil, diesel, or hydraulic fuel spills, including contaminated soils, should be cleaned up. Spill-related material would be handled according to WYDEQ standards.

- All state and local laws and regulations pertaining to disposal of human and solid wastes would be complied with by the operator.

- Trash and other solid waste would not be allowed to accumulate at the site. Trash must be removed from the site and disposed of in accordance with applicable state and federal regulations.

4.3.15 Noise

None recommended

4.3.16 Monitoring and Reporting

- A copy of the annual report required by the WYDEQ-LQD) would be submitted to the authorized officer at the same time it is submitted to the state of Wyoming.

- Prior to final reclamation, a joint inspection of the disturbed area would be held to review the existing reclamation plan or agree to a new updated reclamation plan as approved by WYDEQ-LQD and BLM.

4.3.17 Miscellaneous

- Drill holes would be plugged and abandoned as directed by the WDEQ.

- All survey monuments found in the area of operations would be protected. Survey monuments include, but are not limited to, GLO and BLM Cadastral Survey Corners, reference corners, witness points, U.S. Coastal and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the operator would immediately report the incident, in writing, to the BLM authorized officer and the

respective installing authority, if known. Where GLO or BLM right-of-way monuments or references are obliterated during operations, the operator would secure the services of a registered land surveyor or a Bureau cadastral surveyor to restore the disturbed monuments and references using surveying procedures found in the ~~"~~*Manual of Surveying Instructions for the Survey of the Public Lands in the United States*," latest edition. The operator would record such survey in the appropriate county and send a copy to the BLM authorized officer. If the Bureau cadastral surveyors or other federal surveyors are used to restore the disturbed survey monument, the operator would be responsible for the survey cost.

4.4 RESIDUAL EFFECTS

The BLM NEPA Handbook (BLM 2008) defines residual effects as ~~"a~~ny adverse impacts that remain after mitigation measures have been applied."

At Reynolds Ranch implementation of either the Proposed Action or the No Action Alternative would likely result in foreseeable impacts, after the LOP and after proposed mitigation measures are applied, on two resources. These residual effects are:

- Potential residual impacts on the landscape even after final reclamation at the end of the life of the project because of the time it takes for reclaimed areas to return to pre-disturbance vegetative conditions and because some improved roads would likely be left in place, and

- Potential residual impacts on the groundwater resource even after final groundwater restoration has been completed because of the time it takes to achieve the last increment of pre-mining water chemistry, following bond release.

No adverse impacts were identified relative to any of the other resources analyzed in this EA, for either alternative.