

Table of Contents

5.0	CUMULATIVE IMPACTS.....	5-1
5.1	Introduction	5-1
5.1.1	Physical and Temporal Limits.....	5-2
5.1.2	Historic, Current, and Planned Projects	5-4
5.1.2.1	Uranium Exploration and Production.....	5-4
5.1.2.2	Oil and Natural Gas Exploration and Extraction.....	5-7
5.1.2.3	Coal-Related Development.....	5-9
5.1.2.4	Wind Power Generation	5-9
5.1.2.5	Transmission Line Projects.....	5-10
5.2	Cumulative Impacts for Land Use	5-11
5.3	Cumulative Impacts for Transportation	5-11
5.4	Cumulative Impacts for Geology.....	5-12
5.5	Cumulative Impacts for Soil	5-13
5.6	Cumulative Impacts for Surface Water.....	5-14
5.7	Cumulative Impacts for Groundwater.....	5-14
5.8	Cumulative Impacts for Vegetation	5-16
5.9	Cumulative Impacts for Wildlife	5-17
5.10	Cumulative Impacts for Wild Horses.....	5-18
5.11	Cumulative Impacts for Air Quality	5-19
5.12	Cumulative Impacts for Noise	5-20
5.13	Cumulative Impacts for Historic and Cultural Resources.....	5-20
5.14	Cumulative Impacts for Visual and Scenic Resource	5-21
5.15	Cumulative Impacts for Socioeconomics.....	5-22
5.16	Cumulative Impacts for Environmental Justice	5-23
5.17	Cumulative Impacts for Public and Occupational Health.....	5-23
5.17.1	Radiological Impacts.....	5-23
5.17.2	Non-Radiological Impacts.....	5-24
5.18	Cumulative Impacts for Waste Disposal.....	5-24

List of Figures

Figure 5.1-1	Locations of Projects in the Eastern Great Divide Basin.....	5-3
--------------	--	-----

List of Tables

Table 5.1-1	Current and Planned Uranium Projects – North Central Portion of the Great Divide Basin	5-5
-------------	--	-----

This page intentionally left blank

5.0 CUMULATIVE IMPACTS

5.1 Introduction

NEPA requires an assessment of potential cumulative impacts. Federal regulations (40 CFR 1500-1508) define cumulative impacts 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 impacts can result from individually minor but collectively significant actions taking place over a period of time."

Potential cumulative impacts are assessed at the resource level. The assessment assumes Project development, operation, groundwater restoration, and surface reclamation are conducted in accordance with the provisions of the NRC License and the WDEQ-LQD Permit to Mine and successful implementation of the environmental protection measures discussed in this EIS, as well as compliance with the Rawlins RMP and all other applicable federal, state, and local regulations and permit requirements. The analysis of cumulative impacts addresses both potential negative and positive impacts and is applicable to all alternatives.

Carbon, Fremont, and Sweetwater Counties are experiencing considerable natural resource development. Past, present, and reasonably foreseeable actions include:

- Uranium exploration and extraction;
- Oil and natural gas exploration and extraction;
- Coal-related development;
- Wind power generation; and
- Transmission line construction;

along with dispersed activities, including:

- Livestock grazing;
- Wildlife habitat; and
- Dispersed recreation (e.g., hunting and camping).

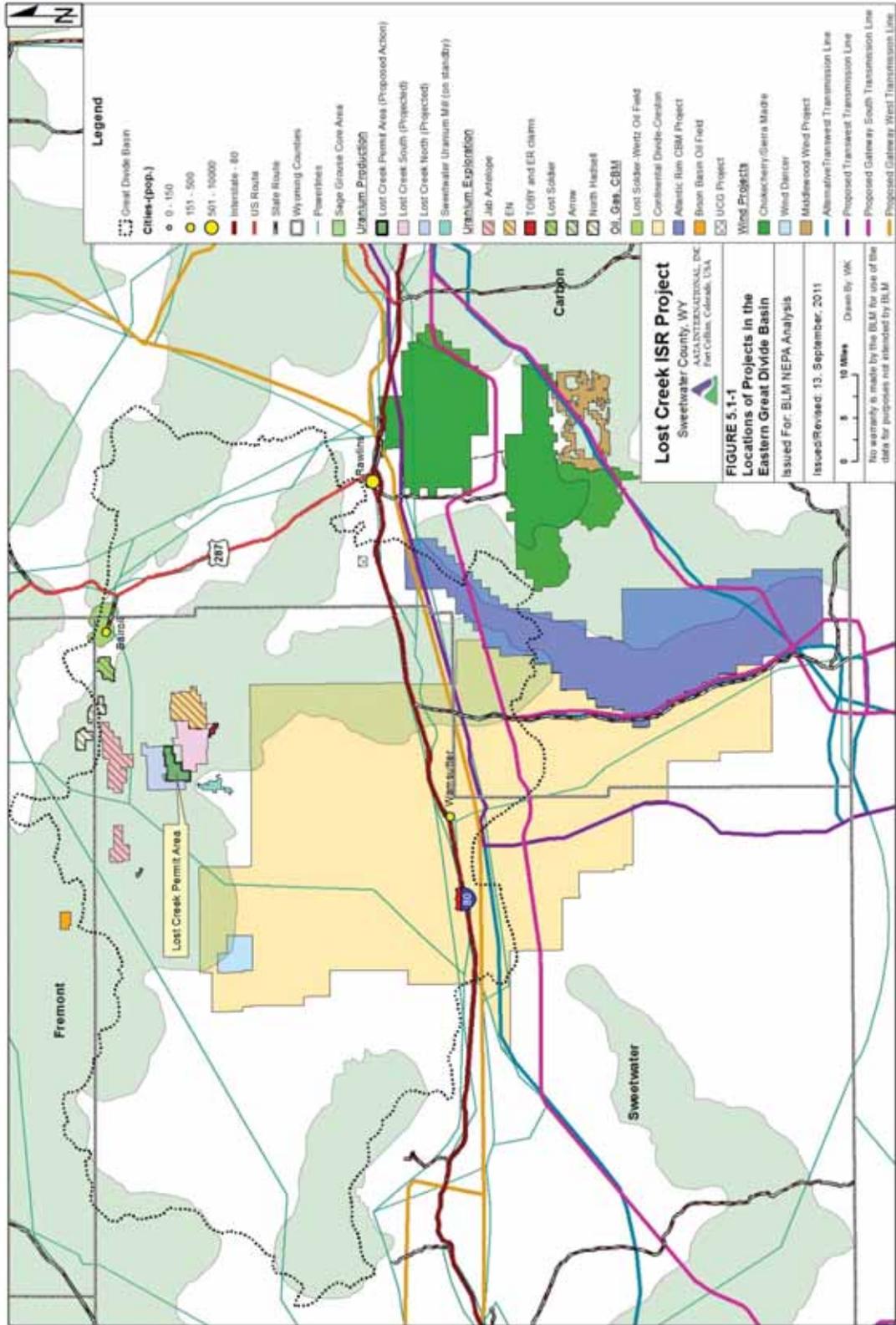
No projects are currently active or planned within the Permit Area other than the Proposed Action; although, several projects are proposed along the eastern margin of the Great Divide Basin and adjacent areas (**Figure 5.1-1**). While several projects have been identified for this EIS, the scale and specifics of the dispersed activities listed above could not be identified in all cases and thus their contribution to cumulative impacts could not be evaluated.

5.1.1 Physical and Temporal Limits

The analyses of the cumulative impacts were based on publicly available information on existing and proposed projects, general knowledge of the conditions in Wyoming, and reasonably foreseeable changes to existing conditions. The physical and temporal limits of the cumulative impact assessment for each resource vary depending on the physical extent of the impacts and the time frame of the projects generating the impact. For the majority of the resources, the appropriate Cumulative Impact Assessment Area (CIAA) is the north central portion of the Great Divide Basin, roughly a 10-mile perimeter around the Permit Area. The regional landscape within this CIAA is relatively uniform, consisting of rolling plains with some draws, rock outcroppings, ridges, bluffs and some isolated mountainous areas. Vegetation is primarily sagebrush and rabbitbrush. The area is sparsely populated, and the closest residence is approximately 15 miles from the Permit Area boundary. This CIAA contains all of the major drainages in the Permit Area. Furthermore, this CIAA contains the majority of the potential uranium projects, which would, if developed, tend to impact resources in a similar manner as the Lost Creek Project. For a few of the resources, however, this CIAA was not appropriate. For example, air quality impacts must be considered on a larger scale, due to the possibility of long-range dispersion, and must also take into account the impacts on any Class I areas in the Permit Area. Cumulative impacts to public and occupational health were also assessed at this extent. Additionally, cumulative impacts on transportation, socioeconomics, environmental justice, and waste disposal were assessed at a larger scale, based on the counties or communities affected. Visual and cultural resources were based on the maximum viewshed extent. The CIAAs for the individual resources are discussed in more detail in the sections that follow.

For this EIS, it was assumed that there would be no long-term changes within the north central portion of the Great Divide Basin over the next 20 years, with the following exceptions:

- the possible restart of the Sweetwater Mill (refitted to process ISR materials) sometime within the next 20 years;
- for uranium exploration over the next 20 years, the installation (and subsequent reclamation) of a total about 500 randomly spaced drill pads, each occupying about one acre with associated road, in the areas shown on **Figure 5.1-1**;
- for uranium production, the installation (and subsequent reclamation) of a total of about 5,000 wells, each occupying an average area of about 0.1 acres with supporting facilities. The wells would be installed (and reclaimed) in successive mine units in the Lost Creek North and South properties over the next 20 years (**Figure 5.1-1**); and
- the use (and subsequent reclamation) of a total of 50 drill pads (each occupying about 5 acres with associated roads) for oil and gas development over the next 20 years (within 10 miles of the Permit Area).



The Proposed Action includes continued use of the Plant over the next 20 years for other LCI projects, including the deeper KM Horizon in the Lost Creek Permit Area, Lost Creek South and Lost Creek North. If another operator develops an ISR project in the north central portion of the Great Divide Basin, such as the JAB-Antelope Project, that operator could potentially request a toll milling arrangement with LCI to use the LCI Plant. This would depend on Plant capacity and would require revision of both the NRC License and WDEQ-LQD Permit to Mine, as well as BLM project approval. Most other uranium operators interested in projects in this part of Wyoming already have plants established elsewhere. Therefore, until the Lost Creek Plant became available for toll milling, those operators could be reasonably expected to use their existing plants rather than building another new Plant in the eastern portion of the Great Divide Basin.

It was also assumed that similar requirements for minimizing operational footprints and other environmental protection measures (e.g., using existing roads if possible and reseeding with a native seed mix) would be required of all energy-related operations.

5.1.2 Historic, Current, and Planned Projects

5.1.2.1 Uranium Exploration and Production

Uranium projects located in the north central portion of the Great Divide Basin are listed in **Table 5.1-1**. Currently, there are no operating uranium mines in the southwest part of Wyoming. The projects listed in **Table 5.1-1** include those in the permitting process for uranium production. The table also lists those projects for which permit applications are likely to be submitted and those in exploration, for which continued development is speculative. The Sweetwater Project is included, because even though the mine is reclaimed, the mill is currently on standby. Historic projects are also discussed in this section.

Table 5.1-1 Current and Planned Uranium Projects – North Central Portion of the Great Divide Basin

Site Name	Company/ Owner	Type	County	Approximate Distance from Lost Creek (miles)	Direction from Lost Creek Project
In Permitting Process					
Lost Creek	UR-Energy Corp.	ISR	Sweetwater	0	--
Submittal of Permit Application Reasonably Foreseeable					
Lost Creek (deeper KM)	UR-Energy Corp.	ISR	Sweetwater	0.3	S
Lost Creek North	UR-Energy Corp.	ISR	Sweetwater	0.6	N
Lost Creek South	UR-Energy Corp.	ISR	Sweetwater	0.6	SSE
In Exploration (Submittal of Permit Application Speculative)					
JAB & Antelope	Uranium One	ISR	Fremont	13	NNW
EN	UR-Energy Corp.	ISR	Sweetwater	5	ESE
Toby & ER	UR-Energy Corp.	ISR	Sweetwater	6	SE
North Hadsell	UR-Energy Corp.	ISR	Sweetwater & Fremont	10	NNE
Arrow	UR-Energy Corp.	ISR	Sweetwater	12.5	WNW
RS	UR-Energy Corp.	ISR	Freemont	13	N
Lost Soldier	UR-Energy Corp.	ISR	Sweetwater	14	NE
On Standby					
Sweetwater Mill	Kennecott	?	Sweetwater	1	SSW

Uranium Production

For those projects in the permitting process or those for which permit applications are likely to be submitted, the impact assessments include the whole project, although time frames can only be estimated until the permitting process is complete. Within the next 20 years, LCI is currently planning to develop the deeper uranium deposits (the KM Horizon), which underlie the HJ Horizon within the current Lost Creek Permit Area, and the Lost Creek North and Lost Creek South properties. LCI plans to use the infrastructure in the Lost Creek Permit Area (e.g., the Plant and UIC Class I wells) to the extent possible for those projects. For the purposes of the cumulative impacts assessment, it has been assumed that these projects would be similar in scale to the Lost Creek Project and that they would be developed successively. It should be noted that regulatory approval from NRC and WDEQ-LQD for developing the deeper deposits and for the North and South properties must also be obtained.

One source of information on other potential uranium projects are the 'letters of intent' from potential operators to the NRC, which were of critical importance to the NRC in the mid-2000s for their planning purposes (e.g., determining appropriate staffing levels). However, the letters are subject to change by the operators, and many projects have been delayed or put on hold. For example, in August 2009, the NRC issued a Notice of Intent to Prepare a Supplemental Environmental Impact Statement for the JAB-Antelope project (74 FR 41174, 14 August 2009). However, in October 2009, Uranium One, Inc. requested deferral of the NRC review (Uranium One, Inc., 2010), and the projected submittal date is NRC's 2013 fiscal year (NRC, 2012). As another example, plans to redevelop a previous ISR project, the Bison Basin Project, about 25 miles northwest of the Permit Area, were deferred indefinitely (Wildhorse Energy, 2010).

Uranium Exploration

For those projects in exploration it is unclear at this time whether production license and permit applications will ever be filed for these properties or what the actual scale of the projects would be. Without more specific information on the projects, including production horizon and schedule, impact assessment would be speculative. Therefore, the impact assessment includes the exploration impacts, but not production impacts, for these properties.

It should be noted that exploration permits may not have been filed with BLM or WDEQ for some of these projects because no exploration is planned in the immediate future; however, they are included because of general knowledge of the projects.

Historic Uranium Activities

Previous uranium exploration drill sites are of the most concern to future projects because historic reclamation requirements were limited. In particular, future operators expend considerable effort to ensure improperly abandoned drill holes from historic exploration (including uranium, oil, and gas) are located to prevent interference with mining. Within the Lost Creek Permit Area, LCI has made a concerted attempt, including record review, site inspection, and pump tests, to find old drill holes and properly abandon them. Some old drill holes have been repurposed, although information about the holes may be limited. For example, one of the BLM wells near the Permit Area, the Battle Springs Draw Well No. 4551 (**Section 3.6.3.1**), was an exploration hole.

Within 25 miles of the Lost Creek Project, the Sweetwater Project was the only historic uranium project brought into production. The Sweetwater Project consists of a surface uranium mine and conventional mill. Mining began in the early 1980s and ended shortly thereafter due to a decline in uranium prices. Reclamation, including a pit lake, was completed in the late 1990s. The mine, which targeted a different ore zone than the proposed action, was reclaimed in accordance with WDEQ-LQD requirements. The mill, which is under NRC jurisdiction, was put on standby in the event uranium production became economic again. Leakage from the original tailings impoundment resulted in creation of a shallow, contaminated water table aquifer, which is under corrective action per NRC requirements. Eventually, the mill tailings area must be turned over to the State or DOE for long-term care in accordance with the requirements of the Uranium Mill Tailings Radiation Control Act (UMTRCA). Because of the different ore depths and mining and ore processing methods, the distance between the sites, and the mine reclamation, no overlapping impacts are anticipated between the Sweetwater and LCI Projects. Also, because LCI is using different mining and ore processing methods, none of the Lost Creek Permit Area will require long-term care under UMTRCA.

5.1.2.2 Oil and Natural Gas Exploration and Extraction

Most of Wyoming's current oil production is from old oil fields with declining production and the level of exploration drilling to discover new fields has been low (WSGS, 2002, as cited in BLM, 2008b). Natural gas production, on the other hand, has been increasing in Wyoming. The Rawlins RMP summarized oil and gas development projects previously or currently subject to NEPA analysis in Southwestern Wyoming: 6,469 producing wells and 8,030 wells that can still be drilled/produced, encompassing approximately 300,000 acres of land (BLM, 2008a). Carbon County currently has 47 gas production units (13 active, 34 inactive), while Sweetwater County currently has 26 gas production units (23 inactive, 3 active). Three existing and planned oil and gas projects are identified in the Project region that have potential to contribute to cumulative impacts (**Figure 5.1-1**).

5.0 CUMULATIVE IMPACTS

The Lost Soldier-Wertz Oil Fields near Bairoil were discovered in the early 1900s and continue to be produced. The closest portion of these fields is located 16 miles northeast of the Permit Area, and is the primary source for oil and gas extraction in the northeast portion of the Great Divide Basin. The oil fields are in their final stage of production, under carbon dioxide injection (enhanced oil recovery) since 1989. Although no additional drilling is planned and the area is outside the CIAA for most resources, the fields are included for socioeconomic impacts which must be evaluated over a much larger area, e.g., 100 miles, because of the limited number of population centers, all of which are small, in this part of Wyoming.

The most extensive development in the region relates to the Continental Divide and Creston Blue Gap gas fields and subsequent infill projects (**Figure 5.1-1**). The development is on the checkerboard pattern of private and federal surface and mineral ownership that resulted from historic land grants from the federal government for railroad development. One infill project is the Wind Dancer Natural Gas Development Project (WDNGDP), which encompasses about 6,400 acres 18 miles southwest of the Permit Area. The WDNGDP consists of the drilling, completion, and operation of up to 12 natural gas wells and associated facilities (access roads, pipelines, utility corridors). The WDNGDP started in 2004 with an anticipated life of 30 years. Another infill project, the approximately 1.1-million-acre Continental Divide – Creston Project involves drilling and development of about 9,000 wells with associated facilities (roads, pipelines, compressor stations, power system) by numerous companies to further develop natural gas resources within the existing Continental Divide and Creston Blue Gap natural gas fields. The anticipated duration of the project is 15 years for construction and 30 to 40 years of project development and operation. The northern boundary of the proposed project is about seven miles south of the Permit Area. The BLM published a Scoping Notice in April 2006 (BLM, 2006), and work on the Draft EIS is on-going. Even though specifics, such as well locations, are not yet known, it was assumed that some of the drilling would be in the CIAAs for the Lost Creek Project.

The Atlantic Rim coal bed methane and natural gas development project covers 270,080 acres, located approximately 31 miles south of the Permit Area (**Figure 5.1-1**). The northern portion of this project is in the checkerboard ownership pattern. In March 2007, the BLM published a Record of Decision regarding the Final Environmental Impact Statement for this project (BLM, 2007a). Work began that year on the 1,800 coal bed methane wells and 200 natural gas wells to be drilled over a 20-year period and to be in production for 30 to 50 years. Although the Atlantic Rim Project is outside the Lost Creek CIAAs for most resources, the project is included for socioeconomic impacts which must be evaluated over a much larger area, e.g., 100 miles, because of the limited number of population centers, all of which are small, in this part of Wyoming.

Oil and gas leases also exist on properties in the north central portion of the Great Divide Basin and adjacent areas, including within the Lost Creek Permit Area [Section 3.1.3]. An oil and gas lease grants the lessee the “right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits” in the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3100-11, Lease for Oil and Gas). The Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, and to accomplish this requirement, restrictions are imposed on the lease terms. Therefore, drilling on existing leases might be allowed would only occur after any proposed well locations, road and/or pipeline alignments, and/or other facilities/infrastructure have gone through a permitting process and NEPA analysis. At present, there are no definitive plans to develop existing leases in the eastern portion of the Great Divide Basin other than those outlined in the previous paragraphs.

5.1.2.3 Coal-Related Development

There are no operating surface or underground coal mines or coal gasification projects in the north central portion of the Great Divide Basin. The nearest planned coal bed methane project is the Atlantic Rim coal bed methane and natural gas development project, as discussed in Section 5.1.2.2.

No coal-related projects are within the CIAA for most of the resources. However, the Atlantic Rim Project is included in the CIAA for socioeconomic impacts which must be evaluated over a much larger area, e.g., 100 miles, because of the limited number of population centers, all of which are small, in this part of Wyoming.

5.1.2.4 Wind Power Generation

The nearest wind energy project is the Chokecherry and Sierra Madre Wind Energy Project in Carbon County (Figure 5.1-1). It is located 39 miles south-southeast of the Permit Area. This 1,000-turbine wind farm is proposed by the Power Company of Wyoming and construction of the project is anticipated to begin in 2012 (Power Company of Wyoming, 2011). The BLM published a draft Environmental Impact Statement in July 2011. This wind project is not within the CIAA for most of the resources. However, it is included in the CIAA for socioeconomic impacts which must be evaluated over a much larger area, e.g., 100 miles, because of the limited number of population centers, all of which are small, in this part of Wyoming.

Under the new Greater sage-grouse guidelines developed by the Governor’s Sage-Grouse Implementation Team (Mead, 2011), no new wind projects would be allowed in the core areas for greater sage-grouse breeding and nesting. Much of the Great Divide Basin is covered by core areas (Figure 5.1-1). In addition, the wind generation potential in the Great Divide Basin is classified as only Fair by

the Wyoming State Geological Survey (WSGS, 2011) based on information developed by the National Renewable Energy Laboratory. Therefore, it is unlikely that any wind energy projects will be developed in the Basin closer to the proposed action in the foreseeable future.

5.1.2.5 Transmission Line Projects

Three large proposed transmission projects of the Project region are the TransWest Express Transmission Project, the Gateway West Transmission Project, and the Gateway South Transmission Project (**Figure 5.1-1**). The TransWest Express Transmission Project includes a 600-kilovolt direct-current transmission system that will extend about 725 miles from south-central Wyoming, through northwestern Colorado and central Utah, to southern Nevada. The Western Area Power Administration and TransWest Express LLC would be joint owners of the extra-high-voltage line designed to carry renewable power generated in Wyoming to the Desert Southwest. This project is anticipated to begin construction in 2013 (Transwest Express LLC, 2011). The transmission line would be as close as about 30 miles directly south of the Permit Area, although an alternate route could be closer.

The Gateway West Transmission Project is a collaborative effort between Idaho Power Company and Rocky Mountain Power to construct and operate 230- and 500-kilovolt transmission lines from Glenrock, Wyoming to Melba, Idaho. This project is composed of 11 transmission line segments with a total length of approximately 1,000 miles across southern Wyoming and southern Idaho. This proposed project crosses approximately 500 miles of public land managed by the BLM, including 200 miles in Wyoming. This project is scheduled for line segments to be completed in phases between 2014 and 2018 (Idaho Power Company and Rocky Mountain Power, 2011). The transmission line would be as close as 30 miles south of the Permit Area.

PacificCorp's Gateway South Project would add more than 1,900 miles of new transmission lines and would be comprised of four segments of high-voltage alternating current (AC) transmission lines that would run between existing, planned, and proposed substations. The Gateway South Project would follow the Transwest Express Transmission Project through Wyoming and Colorado. A proposed double-circuit 500kV transmission line or two parallel single-circuit 500 kilovolt (kV) transmission lines (on the same right-of-way) approximately 350 miles in length would begin at the planned Aeolus Substation near Medicine Bow, Wyoming, continuing southwest near Saratoga, Wyoming, and then continuing southwest near Baggs, Wyoming. From the Baggs area, the transmission line would continue into northwestern Colorado in a southwesterly direction towards the Utah border near the town of Rangely, Colorado. From that point, the route would west-through Utah and Nevada, terminating at the existing Crystal Substation near Glendale, Nevada.

These transmission line projects are outside the CIAA for most of the resources, e.g., surface water. However, socioeconomic impacts must be evaluated over a much larger area, e.g., 100 miles, because of the limited number of population centers, all of which are small, in this part of Wyoming. Therefore, these projects are included in the CIAA for socioeconomic impacts.

5.2 Cumulative Impacts for Land Use

The cumulative impacts for land use were assessed within the north-central portion of the Great Divide Basin, roughly a 10-mile perimeter around the Permit Area. The regional landscape within this area is relatively uniform, consisting of rolling plains with some draws, rock outcroppings, ridges, bluffs and some isolated mountainous areas. Vegetation is primarily sagebrush and rabbitbrush. The area is sparsely populated, and the closest residence is approximately 15 miles from the Permit Area boundary. This area fully encompasses all three grazing allotments potentially impacted by the Project.

Two projects several miles to the south-southeast of the Project could affect land use on the regional scale, specifically the Continental Divide - Creston Natural Gas Project and the Chokecherry – Sierra Madre Wind Energy Project. Although the Continental Divide – Creston Project will be operating within the existing Continental Divide and Creston Blue Gap natural gas fields, it could still impact the land use due to its scale (9,000 wells and associated facilities). The Chokecherry – Sierra Madre Wind Energy Project could also impact land use due to safety considerations. However, both projects were planned with consideration for existing and other potential land uses [BLM, 2006b and BLM, 2011a].

According to Section 5.2 of the NRC SEIS, the potential future projects (oil, gas, coal, and uranium development) could add to the land use impacts from through construction of new roads and infrastructure that could limit the recreational and grazing use of the land. While the impacts associated with the Lost Creek Project are expected to be small, the cumulative impacts of past, present and future projects could be slightly larger (NRC, 2011a).

5.3 Cumulative Impacts for Transportation

Sweetwater, Fremont, Natrona, and Carbon Counties were considered for the cumulative effects because the major transportation routes serving the Permit Area pass through these four counties. The cumulative impacts for transportation in the north central portion of the Great Divide Basin and adjacent areas are minor. If the Sweetwater Mill were restarted for processing ISR materials, the distribution of the transportation impacts would probably be similar to that for the Project. During preparation and upgrading of the existing mill facilities for new operations, the work force would be larger and there would be more deliveries than during actual operations. If another ISR project were developed, it is anticipated that the overall traffic volume would be less than for the proposed

5.0 CUMULATIVE IMPACTS

action because another plant would not be built; the ore processing would occur at the Lost Creek Plant. The ore-laden fluids from the mine unit(s) at the other ISR project could be transported via truck or pipeline, depending on distance from the Plant and fluid volumes.

Exploration activities for uranium, oil, and gas would progress sequentially over a multi-year period and would probably occur primarily during the summer and fall, so only a limited number of rigs would be active at any one time. While the rig crews might commute to Rawlins or other nearby town, the rigs and associated vehicles (e.g., water trucks) would probably be left on-site whenever possible. Installation of a transmission line in the area would result in a short-term increase in traffic as the installation progressed, and the number of commuting vehicles would be limited (e.g., five per day).

Larger projects to the south of the Project, such as the Continental Divide-Creston Project will impact transportation primarily because of the scale of the projects. One difference is that these larger projects generally use the I-80 corridor and roads to the south of the interstate for access. Transportation to and from the north central portion of the Great Divide Basin may be more dispersed as personnel and equipment travel to the north, toward Casper and Lander, as well as along the I-80 corridor and roads north of the interstate.

Section 5.3 of the NRC SEIS discusses the cumulative impacts to transportation in the area. The potential for future projects (oil, gas, coal, and uranium development) could add to the impacts from transportation through construction of new roads and the increase in traffic associated with the project. The impacts associated with the Lost Creek project are expected to be small, with the potential to impact smaller towns and roads to a slightly greater extent. The cumulative impacts of past, present and future projects could be slightly larger, with a moderate impact on the region (NRC, 2011a).

5.4 Cumulative Impacts for Geology

The cumulative impacts for mineral resources were assessed within the north-central portion of the Great Divide Basin. This area contains the majority of the potential uranium projects, which would, if developed, tend to impact mineral resources in a similar manner as the LCI Project. There is no other natural resource development project (e.g., oil and gas, coal or coal bed methane) planned within the Permit Area in the foreseeable future. Uranium extraction from the deeper sand horizon (KM Horizon) within the Permit Area would not generate cumulative impact on the geology of the current target sand units. Therefore, no cumulative impact on geology is expected from the proposed action and all of the alternatives.

The cumulative impact on geologic hazards was assessed within the Project region, to include any faults in the area and any potentially impacted receptors.

Incremental effects of the proposed project on geologic hazards that could potentially occur in the Project region are difficult to quantify because of varying site conditions and characteristics of different kinds of projects. However, given appropriate design or avoidance, the contribution of the proposed project to the cumulative impacts on geologic hazards is expected to be minimal, if any.

Section 5.4 of the NRC SEIS discusses the cumulative impacts from the disturbances to the geology of the region. Since the projects are expected to be distributed throughout the region, without a significant amount of activity in one location, the cumulative impact to the region's geology is expected to be minimal (NRC, 2011a).

5.5 Cumulative Impacts for Soil

The cumulative impact for soils were assessed within the north-central portion of the Great Divide Basin, as the regional landscape within this area is relatively uniform and this area adequately covers the extent of possible cumulative erosion and nutrient depletion impacts. The impacts to soil were estimated using the assumptions described in **Section 5.1** about other activities in the north-central portion of the Great Divide Basin, and assuming similar requirements for minimizing operational footprints and other environmental protection measures.

If the Sweetwater Mill were restarted for processing ISR materials, little, if any, additional disturbance beyond the existing footprint would occur.

Over the next 20 years, the uranium exploration and extraction would result in surface disturbance of about 1,000 acres within the north central portion of the Great Divide Basin, and oil and gas exploration would result in surface disturbance of about 250 acres in that area. Given the similarity of the soils in this part of the Basin, this acreage percentage is small, and the disturbance and subsequent reclamation would be progressive; therefore, with appropriate environmental protection measures, some impacts could be reclaimed before others occur and erosion and compaction could be minimized. In particular, permitting of any new ISR operations would require Level 1 and Level 3 soils surveys, such as those conducted for the Lost Creek Project, to identify specific soil types, topsoil stripping depths, and any special protective measures that might be necessary for any unique soil type.

If the Plant were permitted for use by another ISR operation, that would extend the time frame prior to Final Reclamation of the Plant and associated facilities, i.e., about 85 acres would remain disturbed beyond the anticipated time frame. Adding a dryer circuit to the Plant is not expected to increase the area of disturbance generated from the current proposed action.

Soils impacts for the other energy development projects in the north central portion of the Great Divide Basin and adjacent areas could include compaction

5.0 CUMULATIVE IMPACTS

and erosion of soil due to two-track roads, well pad construction, and activities similar to those for the Lost Creek Project. Environmental protection measures, including reclamation requirements, for these projects would reduce the potential for long-term soils impacts, such as those that resulted from previous exploration and development activities.

Section 5.4 of the NRC SEIS discusses the cumulative impacts from the disturbances to the soil of the region. Since the projects are expected to be distributed throughout the region, without a significant amount of activity in one location, the cumulative impact to the region's soils is expected to be minimal. Localized erosion could become an issue, but with the topography of the land, this is expected to be minimal (NRC, 2011a).

5.6 Cumulative Impacts for Surface Water

The cumulative impacts for surface water were assessed within the north-central portion of the Great Divide Basin, as this area contains all the major drainages in the Permit Area. Surface water impacts related to the Project are minimal, such that even if combined with surface water impacts from other energy-related projects within the north central portion of the Great Divide Basin, the impact would be negligible.

Section 5.5.1 of the NRC SEIS discusses the cumulative impacts to the surface water in the region, specifically referencing ephemeral streams. Due to the temporary nature of these streams, and the proper protection and clean-up efforts after leaks and spills enforced in the area, the impacts to surface water would be small (NRC, 2011a).

5.7 Cumulative Impacts for Groundwater

The cumulative impact for groundwater was assessed within the north-central portion of the Great Divide Basin. This area is considered adequate for evaluating the cumulative impact to groundwater quantity as the maximum estimated extent of drawdown from the LCI Project is on the order of three miles outside the Permit Area. Potential impacts on groundwater quality would occur on a much smaller scale, i.e., within the mine units. Impacts to groundwater from the Project include changes to water levels on- and off-site and to groundwater quality on-site. Environmental protection measures and systematic monitoring (**Section 4.7.1** and **Section 4.7.2**) would be performed at the Project to ensure actual changes in water levels and water quality are in line with the anticipated changes, and should an excursion occur, it would be readily detected, stopped, and remediated. The water levels are projected to recharge rapidly within the first couple of years after groundwater extraction stops and essentially completely within 10 to 15 years. In addition, groundwater restoration would allow for the same water uses after ISR as before. To alert any future groundwater users or others interested in subsurface activities after Reclamation, a deed notice and/or

physical marker of well locations is required per the WDEQ-LQD NonCoal Rules, Chapter 11, Section 8(h) (WDEQ, 2005b).

If the Sweetwater Mill were restarted for processing ISR materials, the impacts during updating and refurbishment of the mill would probably be similar to those during Construction of the Project's surface facilities. In particular, water supply wells would be needed for dust suppression and employee use. The impacts during mill operation are much more difficult to anticipate without more detailed information on the mill design and operation. For example, groundwater corrective action has been required for the tailings ponds that were used when the mill was in production. Therefore, any future mill operations would need to take this action into account.

Drilling of uranium and oil and gas exploration holes would not be anticipated to have any groundwater impacts except as a result of a spill or other accidental release. Any groundwater pumping for drilling fluid or well testing would be of limited duration and quantity compared to the Project.

If the deeper KM Horizons in the Lost Creek Permit Area or Lost Creek North or South are developed, the development would generally be progressive, with mine units being brought on-line and then restored in succession. Therefore, the cumulative impacts to groundwater levels are expected to be minimal due to the water quality restoration requirements and the time lag between the Project and the other projects, allowing time for water level recovery. One concern would be the cumulative drawdown if the Project's Mine Unit Production and Restoration overlapped with that of a new nearby project producing from the same horizon. If the mines are producing from the same horizon the drawdowns would be additive and can be readily estimated. In addition, each operation would be required to conduct water level measurements, so the impacts of the individual operations could be differentiated. Water level recoveries after production could also take longer if more than one operation in close proximity to another mine were underway. With respect to water quality, the same level of baseline monitoring, and commitment to operational and post-restoration monitoring, would be required to obtain the necessary NRC License and WDEQ Permit to Mine for any future ISR operation. It is likely each ISR uranium mine would be required to have an aquifer exemption based on current knowledge of the water quality in the north central portion of the Great Divide Basin. Even with an exemption, WDEQ-LQD requires groundwater restoration after mining so the water would be suitable for the same uses as prior to mining. In addition, excursions and leaks require timely remediation, so cumulative impacts to groundwater from future excursions or leaks are not expected to be significant.

One existing, and continuing activity, in the Great Divide Basin for which water sources are essential is grazing. Because of the requirements for identification of all existing water rights in the vicinity of a proposed ISR operations and assessment of any potential impacts from the ISR operation on those rights, there

5.0 CUMULATIVE IMPACTS

should not be any conflicts between development of water resources for grazing and for uranium development. One concern that has been identified during the Lost Creek baseline data collection effort is the relatively high, naturally occurring levels of uranium and radium in groundwater. These elevated levels are not necessarily in areas where the uranium ore is sufficiently concentrated for mining, but the potential for them to occur should be a factor to consider in citing water supply wells for grazing or similar activities.

Other potential projects in the north central portion of the Great Divide Basin, e.g., the Wind Dancer Gas Project, are not dependent on water production from shallow aquifers, (e.g., less than 1,000 feet deep) except for water supply for dust control or for workers. Other projects may produce poor quality water from deeper formations, e.g., on the order of several thousand feet deep, and these projects may also have deep disposal wells similar to those in the Lost Creek Permit Area. However, permitting of these wells requires identification of the injection interval and confining units, permeability and water quality testing, monitoring during use, and proper abandonment. Therefore, impacts are isolated to the project areas within the Basin.

Section 5.5.2 of the NRC SEIS discusses the cumulative impacts to groundwater in the region, specifically the water usage of past, present and future projects in the region. The NRC assumes that the water usage for future projects would be similar to the Lost Creek Project, which is a fairly low usage for select purposes. The addition of future projects could result in local changes to the groundwater level and groundwater quality (though within the same class of use); however, the entirety of the Great Divide Basin would be unaffected (NRC, 2011a).

5.8 Cumulative Impacts for Vegetation

The cumulative impacts for vegetation were assessed within the north-central portion of the Great Divide Basin. The regional landscape within this area is relatively uniform, supporting primarily sagebrush and rabbit brush vegetative communities. Using the assumptions described in **Section 5.1** about other activities in the area, and assuming similar requirements for minimizing operational footprints and environmental protection, the impacts to vegetation were evaluated.

If the Sweetwater Mill were restarted for processing ISR materials, little, if any, additional disturbance beyond the existing footprint would occur. Additional deep disposal wells might be installed if regulatory approval were obtained.

Over the next 20 years, the uranium exploration and extraction would result in surface disturbance of about 1,000 acres within the north-central portion of the Great Divide Basin, and oil and gas exploration would result in surface disturbance of about 250 acres of that area. Given the similarity of the vegetation cover in this part of the Basin, this acreage percentage is small, and the

disturbance and subsequent reclamation would be progressive; therefore, with appropriate environmental protection measures, some impacts could be reclaimed before others occur and erosion and compaction could be minimized. In particular, permitting of any new ISR operations would require vegetation surveys, such as those conducted for the Lost Creek Project, to identify specific vegetation types, distribution, any areas of rare or endangered species, and any weedy areas.

If the Plant were permitted for use by another ISR operation, that would extend the time frame prior to Final Reclamation of the Plant and associated facilities, i.e., about 85 acres would remain disturbed beyond the anticipated time frame. Adding a dryer circuit to the Plant is not expected to increase the area of disturbance generated from the current proposed action.

Vegetation impacts for the other energy development projects in the north-central portion of the Great Divide Basin and adjacent areas could include compaction and erosion of top soils due to two-track roads, vegetation and top soil removal for well pad and mine unit construction, and activities similar to those for the Lost Creek Project. Environmental protection measures, including reclamation requirements, for these projects would reduce the potential for long-term vegetation impacts, such as the still-visible sites of previous exploration and development activities.

Section 5.6 of the NRC SEIS discusses cumulative impacts to Ecological Resources, including vegetation. Present and future resource development in the region and livestock grazing activities could lead to changes in the community structure in the vegetation or the introduction of invasive species. As more projects are added to the region, the impacts are expected to become more severe; however, they are not expected to alter ecosystem function (NRC, 2011a).

5.9 Cumulative Impacts for Wildlife

The cumulative impacts for wildlife were assessed within the north-central portion of the Great Divide Basin. This area accounts for potential cumulative impacts on less mobile and to range wildlife. Using the assumptions described in **Section 5.1** regarding other activities in the area, and assuming similar requirements for minimizing operational footprints and for environmental protection measures, the impacts to wildlife were estimated.

Over the next 20 years, the uranium exploration and production would result in surface disturbance of about 1,000 acres within the north central portion of the Great Divide Basin, and oil and gas exploration would result in surface disturbance of about 250 acres of that area (**Section 5.1.1**). Given the similarity in wildlife habitat in this part of the Basin, this acreage percentage is small, and the disturbance is projected to occur over a long time frame; therefore, with

5.0 CUMULATIVE IMPACTS

appropriate environmental protection measures, some impacts could be reclaimed before others occur.

If the Lost Creek Plant were permitted for use by another operation, that would extend the time frame prior to Final Reclamation of the Plant and associated facilities, i.e., about 85 acres would remain disturbed beyond the anticipated time frame. So would the disruptive activities such as delivery trucks in and out of the Plant, which could impact wildlife habitat and migration.

If the Sweetwater Mill were restarted for processing ISR materials, little, if any, additional disturbance beyond the existing footprint would occur. Additional deep disposal wells might be installed if regulatory approval were obtained.

These activities could have temporary cumulative impacts to wildlife at the Permit Area, in that wildlife displaced from the Permit Area during Construction and Operation of the Proposed Action may be also affected by other projects in the broader area. However, long-term cumulative effects of the Project are expected to be minimal due to the planned revegetation. Ultimately, the disturbed areas would be reclaimed to their pre-operational contours and vegetation to support the wildlife habitat.

Section 5.6 of the NRC SEIS discusses cumulative impacts to Ecological Resources, including impacts to wildlife. Present and future resource development in the region activities could lead to changes in the habitat and direct/indirect wildlife fatalities from project activities. As more projects are added to the region, the impacts are expected to become more prevalent and widespread, but due to the mobility of wildlife, impacts are still expected to be small (NRC, 2011a).

5.10 Cumulative Impacts for Wild Horses

The cumulative impacts for wild horses were assessed within the north-central portion of the Great Divide Basin. Using the assumptions described in **Section 5.1** regarding other activities in the area, and assuming similar requirements for minimizing operational footprints and environmental protection measures, the impacts to wild horses were estimated.

Over the next 20 years, the uranium exploration and production would result in surface disturbance of about 1,000 acres within the north central portion of the Great Divide Basin, and oil and gas exploration would result in surface disturbance of about 250 acres of that area (**Section 5.1.1**). Given the similarity in wild horse habitat in this part of the Basin, this acreage percentage is small, and the disturbance is projected to occur over a long time frame; therefore, with appropriate environmental protection measures, some impacts could be reclaimed before others occur.

If the Lost Creek Plant were permitted for use by another operation, that would extend the time frame prior to Final Reclamation of the Plant and associated facilities, i.e., about 85 acres would remain disturbed beyond the anticipated time frame. So would the disruptive activities such as delivery trucks in and out of the Plant, which could impact wild horse habitat and migration. Additionally, a small acreage would remain fenced to keep out cattle and wild horses. Fencing would be constructed according to BLM and WGFD (2004b) guidelines to minimize potential mortality or injury to wild horses and wildlife. This fencing could have gates with pitless cattle guards, to avoid the entry of horses into the fenced areas even if gates were accidentally left open, or automatic gates.

If the Sweetwater Mill were restarted for processing ISR materials, little, if any, additional disturbance beyond the existing footprint would occur. Additional deep disposal wells might be installed if regulatory approval were obtained.

These activities could have temporary cumulative impacts to wild horses at the Permit Area, in that wild horses displaced from the Permit Area during Construction and Operation of the Proposed Action may be also affected by other projects in the broader area. However, long-term cumulative effects of the Project are expected to be minimal due to the planned revegetation. Ultimately, the disturbed areas would be reclaimed to their pre-operational contours and vegetation to support the wild horse habitat.

5.11 Cumulative Impacts for Air Quality

The area evaluated for cumulative impacts includes the Permit Area plus 10 miles around that area, the north central portion of the Great Divide Basin. The evaluation also includes any Class I areas within 100 km of the project boundary. This evaluation area was chosen to include areas that are likely to be affected by emissions from the proposed project and was chosen to be large enough to address concerns by USEPA and other stakeholders regarding impacts related to regional ozone formation, visibility in Class I areas, and climate change. The air quality impacts from other potential activities within the north central portion of the Great Divide Basin are similar to the activities of the Project, including dust, emissions from combustion engines, and greenhouse gases; and thus contribute to the cumulative impacts on air quality of the region. However, because all the production projects would not be developed at the same time, the impact would be similar over time, e.g., Lost Creek South would start in succession with Lost Creek. Extended operation of the Plant after the current proposed Lost Creek Project would generate additional dusts, emissions from combustion engines, and greenhouse gases.

If the Sweetwater Mill were refitted for processing ISR materials, then construction related to refitting and upgrading the existing equipment would be expected, and the emissions would be similar to those from the Project. Drilling

of oil and gas exploration holes would be similar to the drilling of the UIC Class I wells. Drilling of uranium exploration holes and development of another ISR project would be similar to the mine unit drilling. Presuming these activities took place over the next ten years, the cumulative impact would essentially be double the impact from the Project.

Section 5.7 of the NRC SEIS discusses the cumulative impacts on air quality, including emissions and fugitive dust. As more projects are developed in the area, more emissions and dust would be generated. This would have a moderate impact on the local air quality, but only a small impact farther away from the present and future project sites (NRC, 2011a).

5.12 Cumulative Impacts for Noise

Overall noise levels are considered in this section; impacts on wildlife are discussed in **Section 5.9**. On-site noise sources would not be audible by off-site receptors; therefore, the contribution to cumulative off-site noise impacts would relate to off-site transport of materials and yellowcake slurry. Additional traffic resulting from this transport is proportionally small compared to the current traffic load, and the current traffic load is not expected to increase substantially during the life of the Project.

Noise generated from the activities considered for the cumulative impacts (**Section 5.1**) are generally similar to those for this Project and are generally short-term. Drilling of oil and gas wells would be the potential exception with respect to noise level, due to the substantially larger equipment size that is often used, but the impacts from such drilling would be short-term. Because of the rapid dissipation nature of the noise, unless sources are located very close to each other and generating noise at the same time, no cumulative impacts on individual receptors are expected.

Section 5.8 of the NRC SEIS addresses the cumulative impacts to noise in the area. The potential impacts are more significant in smaller towns and roads that would be affected by increase traffic noise, but impacts to the region are expected to be small. Noise generation of future projects would largely depend on the increased traffic, and construction and processing equipment used in the future projects (NRC, 2011a).

5.13 Cumulative Impacts for Historic and Cultural Resources

Cumulative impacts for cultural and historic resources were assessed within a radius of about 12 miles of the Permit Area, which is the same extent used for the visual resources cumulative evaluation (**Section 5.14**). Impacts to historic and cultural resources are site specific but cumulative. Any disturbance to identified historic and cultural sites would result in the reduction of the resource inventory.

The majority of the lands within the north-central portion of the Great Divide Basin are managed by the BLM. Therefore, future actions such as uranium or oil and gas exploration or development of other ISR operations would require agency consultation to determine the level of survey needed and, depending on survey results, the need for avoidance or mitigation of sites.

Restart of the Sweetwater Mill would not be expected to result in any impacts to historic and cultural resources because disturbance of new lands would be limited relative to the current size of the property and the prior extent of the associated mine permit area.

Section 5.9 of the NRC SEIS discusses potential cumulative impacts on historical and cultural resources of the area. Current development projections in the region suggest that the impacts to the cultural resources would be noticeable, i.e., more sites may be inadvertently damaged or disturbance to them may need to be mitigated. However, the impacts would not completely degrade the cultural resources important to the region (NRC, 2011a).

5.14 Cumulative Impacts for Visual and Scenic Resource

Cumulative impacts for visual and scenic resources were assessed within a radius of about 12 miles of the Permit Area. This distance was chosen as the geographic boundary for the analysis of potential cumulative impacts because it represents the maximum line of sight (taking into account the curvature of the earth) on a flat plain for a structure with a height of about 100 feet above the surroundings (Section 5.10 of the NRC SEIS [2011a]). With the exception of the restart of the Sweetwater Mill and other ISR operations, all of the impacts would be short-term in the north-central portion of the Great Divide Basin. For most uranium exploration drilling, the rig mast would be the most visible feature from a distance; however, most exploration holes generally require only a few days to drill. Rig masts for oil and gas drilling are generally taller, the drilling takes longer, and there may be more equipment at the drill site. Even so, the impacts would not last more than a season. Uranium exploration seldom occurs at night, but oil and gas exploration may occur around the clock, which would result in visible lights on the rig masts from a distance. However, this is not an uncommon site in many western states. Assuming similar requirements for environmental protection measures (e.g., infrastructure paint color, reclamation and revegetation) for all new drilling activities, the well sites visual impacts would be consistent with the VRM Class III and Class IV objectives in the regions.

The Sweetwater Mill, is within a visual inventory Class IV area because the mill has impacted the viewshed. No additional buildings are anticipated as part of the restart of the Sweetwater Mill, although there could be additional equipment on-site temporarily.

5.0 CUMULATIVE IMPACTS

The Project would increase the number of buildings that are visible while the Project is in operation, but the buildings would be removed as part of the reclamation. The visual impact of one of the buildings, the Plant, could last several years after the Lost Creek Project if use of the Plant for additional development (e.g., Lost Creek North and South) were approved. However, the Plant would be removed eventually, so there would be no residual impact from the Project. The Permit Area is within a visual inventory Class III area, as discussed in **Section 4.14**, so the effects of the project on the visual resources in the area are limited.

Elsewhere along the northeastern edge of the Great Divide Basin and adjacent areas, visual impact depends on the type of project. The Continental Divide – Creston Project will be operating within the existing Continental Divide and Creston Blue Gap natural gas fields. Most of the additional facilities, if not all, will be infill structures and thus impacts to visual and scenic resources are expected to be insignificant.

The NRC SEIS discusses cumulative impacts to visual resources in Section 5.10. While the Lost Creek project would not significantly impact this resource in the long-term, as more energy-related projects such as wind farms are developed in the region, the potential for more significant impacts is increased (NRC, 2011a).

5.15 Cumulative Impacts for Socioeconomics

The socioeconomic CIAA includes portions of counties near the Permit Area as well as communities near the Permit Area. Since the Permit Area is situated in a remote area near the corners of four counties, the CIAA includes the northeast portion of Sweetwater County, the northwest portion of Carbon County, the southeast portion of Fremont County, and (to be inclusive of Casper, where employees and contractors may reside) the southern portion of Natrona County. The nearby communities include Rawlins, Casper, Bairoil, Jeffrey City, and Wamsutter. At the present time, cumulative adverse socioeconomic impacts from the Project and other developing projects in the region are anticipated to be minimal due to current demographics, economic trends and characteristics, and existing infrastructure and services. The start of additional projects would increase the number of people in the workforce and thus help the recovery of local and regional economy from the economic downturn which began in 2007.

If the Sweetwater Mill were restarted, it is not anticipated that the workforce would be significantly larger than that needed for the Project. If another ISR operation started, the workforce would probably be smaller than that for the Project, because the Plant at the Project would be used.

The NRC SEIS (Section 5.11) suggests that the incremental impacts of the Lost Creek project would not have a significant impact on the region's socioeconomic resources. The report also discusses that as more workers move to the region for

future projects, there would be a higher demand for housing, education, and health services, but also more employment opportunities and more tax revenues (NRC, 2011a).

5.16 Cumulative Impacts for Environmental Justice

The evaluation of cumulative environmental justice impacts included Sweetwater, and Carbon Counties, as these are the counties in which the largest projects near the Proposed Action, e.g., the Continental Divide - Creston Project and the Chokecherry - Sierra Madre Wind Energy Projects. Cumulative environmental justice impacts are not anticipated because of the low minority, low-income, and Tribal populations in these counties, as well as in the region.

The NRC SEIS (Section 5.12) also finds that cumulative environmental justice impacts are not expected due to the lack of a significant minority or low-income population in the region and the lack of activities that would disproportionately impact these populations (NRC, 2011a).

5.17 Cumulative Impacts for Public and Occupational Health

As long-range health impacts would most likely result from air quality impacts, the CIAA used to assess air quality impacts was also used for assessing cumulative impacts on public and occupational health.

5.17.1 Radiological Impacts

For a restart of the Sweetwater Mill or development of other ISR operations, radiological monitoring programs and protections, similar to those required for LCI, would be required. If a proposed uranium project could not demonstrate that the potential public exposures at the respective project boundaries were not within specified criteria, NRC would not approve the project. For a restart of the Sweetwater Mill, upgrades to existing equipment and procedures could be required by NRC. The potential impacts of another ISR operation would be less than that of the Project, presuming the Plant at the Permit Area would be used for processing the ore from the other operation (i.e., another plant would not be built).

For pipeline installation and other drilling projects, the potential for radiological impacts are minimal, similar to those during the Construction phase of the Project. During drilling for any resource in most western states, the potential for encountering naturally occurring uranium deposits exists. The potential would be slightly higher for uranium exploration, as the purpose is to locate ore, but the exploration is intended to locate and outline the deposits on widely-spaced drilling locations, in contrast to the closely-spaced drilling locations for mine unit development once a project is underway.

Section 5.13 of the NRC SEIS discusses potential health impacts. Radiological impacts are expected to be moderate for workers, however proper protection measures, monitoring, and management can reduce this potential. The general public is not expected to be influenced because even with the addition of future projects, the exposure is expected to be below the accepted levels (NRC, 2011a).

5.17.2 Non-Radiological Impacts

For a restart of the Sweetwater Mill or development of other ISR operations, standard industry health and safety practices and procedures, similar to those required for LCI, would be necessary. As noted above, use of the Plant for ore processing from another ISR operation would reduce the potential for additional non-radiological impacts. For exploration drilling and pipeline installation, availability of skilled workers for drilling and excavating helps reduce the potential for industrial accidents. As both of these activities are not uncommon in this part of Wyoming, and given the current economic conditions, skilled workers should be available.

In Section 5.13 of the NRC SEIS discusses that the workers of current and future projects are more likely to be impacted by non-radiological health effects. However, due to the management practices, low exposure time, and low concentrations, the impacts are not expected to be significant (NRC, 2011a).

5.18 Cumulative Impacts for Waste Disposal

The cumulative impacts for waste disposal were assessed on the same scale as the socioeconomic resources, as waste disposal may impact the demand of services at the community and county level. Waste disposal impacts are generally considered as part of the overall socioeconomic impacts (e.g., landfill capacity for non-hazardous solid wastes), unless impacts to specific resources are anticipated (e.g., potential impacts to water resources from disposal of produced water [Section 4.4.3.1 of the Atlantic Rim FEIS (BLM, 2006a)]. However, because of the regulatory requirements for disposal of 11(e)(2) byproduct material associated with uranium projects, the cumulative impacts for those projects are evaluated separately.

With respect to quantities of waste generated, other than 11(e)(2) byproduct material, the quantities of waste from the other ISR operations and the Sweetwater Mill (if restarted) are not anticipated to differ significantly from the Project. Because the development of those operations would be successive, over a 20-year period, waste disposal needs would similar over time. If the environmental protection and monitoring practices are similar for all the projects, the existing waste disposal facilities have the capacity for all of the other potential uranium projects. Given the relative scale of the potential uranium projects compared to other energy development projects in the region, and the less

seasonal/periodic nature of the projects, the relative additional impact of the uranium operations is anticipated to be minor.

With respect to solid 11(e)(2) byproduct material, the disposal options are more limited because of the limited number of facilities licensed to accept such wastes. If the Sweetwater Mill, which has a uranium mill tailings impoundment, were restarted, it could be a potential disposal site for solid 11(e)(2) materials from the Project. As other ISR operations are developed, the amounts of solid 11(e)(2) materials are expected to be less than that from the Project, as it is likely the other operations would use the Plant for ore processing, if at all possible, rather than building another processing facility. Because the majority of the anticipated amounts of solid 11(e)(2) byproduct materials come from the decommissioning of the Plant and associated facilities, the amount of solid 11(e)(2) byproduct materials from each of the other ISR operations could be about one-fourth of the estimated amount from the Project.

With respect to liquid 11(e)(2) byproduct material, the UIC Class I wells at the Project could provide for disposal of liquid wastes from other ISR projects, based on both the excess capacity of the disposal wells and the fact that the other projects would not start at the same time as the Project. If the Sweetwater Mill were restarted, the NRC requirements for restarting the mill would presumably address upgrading or replacement of the existing tailings impoundment or finding a replacement option. Because conventional mill practices have improved, it is likely the amount of water used in the mill would be less than that used previously. However, without details on the mill operations, it is not clear that the UIC Class I wells of the Project would have any capacity for disposal of liquid 11(e)(2) wastes from the mill.

Other energy development projects in the Great Divide Basin may also use injection wells for disposal of produced fluids (e.g., Section 4.4.3.1 of the Atlantic Rim FEIS [BLM 2005]). However, these wells are completed in different formations, and permitting requirements include identification of the area of influence of the wells and other wells in the vicinity. No other injection wells, other than the five permitted by LCI, were identified within the area of influence of the LCI wells and in the vicinity (UIC Class I Application, Attachment ADJ-2, WDEQ-LQD Permit to Mine [LCI, 2011b]).

The NRC SEIS (Section 5.14) finds that waste management impacts are expected to be minimal. Due to the well-managed waste management in the region and the assumption that future projects would adhere to rules and regulations put in place for any wastes generated, future projects are not expected to significantly add to these impacts (NRC, 2011a).