EXECUTIVE SUMMARY (continued)

Surface Water Impacts

CONSTRUCTION—Impacts to surface waters and related habitats from construction (road crossings, filling, erosion, runoff, spills or leaks of fuels and lubricants for construction equipment) would be mitigated through proper planning, design, construction methods, and best management practices. Some impacts directly related to the construction activities would be temporary and limited to the duration of the construction period. U.S. Army Corps of Engineers permits may be required when filling and crossing of wetlands. Temporary changes to spring and stream flow from grading and changes in topography and natural drainage patterns could be mitigated or restored after the construction phase. Impacts from incidental spills of drilling fluids into local streams could occur, but would be temporary due to the use of mitigation measures. Impacts from roads, parking areas, and buildings on recharge to shallow aquifers would be SMALL, owing to the limited area of impervious surfaces proposed. Impacts from infiltration of drilling fluids into the local aquifer would be localized, small, and temporary—SMALL to MODERATE depending on site-specific characteristics.

OPERATION—Through permitting processes, federal and state agencies regulate the discharge of storm water runoff and the discharge of process water. Impacts from these discharges would be mitigated as licensees would operate within the conditions of their permits. Expansion of facilities or pipelines during operations would generate impacts similar to construction—SMALL to MODERATE depending on site-specific characteristics.

AQUIFER RESTORATION—Impacts from aquifer restoration would be similar to impacts from operations due to use of the same (in-place) infrastructure and similar activities conducted (e.g., well field operation, transfer of fluids, water treatment, storm water runoff)—SMALL to MODERATE depending on site-specific characteristics.

DECOMMISSIONING—Impacts from decommissioning would be similar to impacts from construction. Activities to clean up, recontour, and reclaim disturbed lands during decommissioning would mitigate long-term impacts to surface waters—SMALL to MODERATE depending on site-specific characteristics.

Groundwater Impacts

CONSTRUCTION—Water use impacts would be limited by the small volumes of groundwater used for routine activities such as dust suppression, mixing cements, and drilling support over short and intermittent periods. Contamination of groundwater from construction activities would be mitigated by best management practices—SMALL.

OPERATION—Potential impacts to shallow aquifers can occur from leaks or spills from surface facilities and equipment. Shallow aquifers are important sources of drinking water in some areas of the four uranium milling regions. Potential impacts to the ore-bearing and surrounding aquifers include consumptive water use and degradation of water quality (from normal production activities, off-normal excursion events, and deep well injection disposal practices). Consumptive use impacts from withdrawal of groundwater would occur because approximately 1 to 3 percent of pumped groundwater is not returned to the aquifer (e.g., process bleed). That amount of water lost could be reduced substantially by available treatment methods (e.g., reverse osmosis, brine concentration). Effects of water withdrawal on groundwater would be expected to be SMALL as the ore zone normally occurs in a confined aquifer. Estimated drawdown effects vary depending on site conditions and water treatment technology applied. Excursions of lixiviant and mobilized chemical constituents could occur from failure of well seals or other operational conditions that result in incomplete recovery of lixiviant. Well-seal-related

excursions would be detected by the groundwater monitoring system, and periodic well mechanical integrity testing, and impacts would be expected to be mitigated during operation or aquifer restoration. Other excursions could result in plumes of mobilized uranium and heavy metals extending beyond the mineralization zone. The magnitude of potential impacts from vertical excursions would vary depending on site-specific conditions. To reduce the likelihood and consequences of potential excursions at ISL facilities, NRC requires licensees to take preventative measures prior to starting operations, including well tests, monitoring, and development of procedures that include excursion response measures and reporting requirements. Impacts from the alterations of ore body aquifer chemistry would be SMALL, because the aquifer would (1) be confined, (2) not be a potential drinking water source, and (3) be expected to be restored during the restoration period. Potential environmental impacts to confined deep aquifers below the production aquifers from deep well injection of processing wastes would be addressed by the underground injection permitting process regulated by the states and NRC's approval process—SMALL to LARGE, depending on site-specific conditions.

AQUIFER RESTORATION—Potential impacts would be from consumptive use and potential deep disposal of brine slurries after reverse osmosis, if applicable. The volume of water removed from the aquifer and related impacts would be dependent on site-specific conditions and the type of water treatment technology the facility uses. In some cases, groundwater consumptive use for the aquifer restoration has been reported to be less than groundwater use during the ISL operation, and drawdowns due to aquifer restorations have been smaller than drawdown caused by ISL operations. Potential environmental impacts associated with water consumption during aquifer restorations are determined by (1) the restoration techniques chosen, (2) the volume of water to be used, (3) the severity and extent of the contamination, and (4) the current and future use of the production and surrounding aquifers near the ISL facility or at the regional scale—SMALL to MODERATE, depending on site-specific conditions.

DECOMMISSIONING—Potential impacts from decommissioning would be similar to construction (water use, spills) with an additional potential to mobilize contaminants during demolition and cleanup activities. Contamination of groundwater from decommissioning activities would be mitigated by implementation of an NRC-approved decommissioning plan and use of best management practices—SMALL.

Terrestrial Ecology Impacts

CONSTRUCTION—Potential terrestrial ecology impacts would include the removal of vegetation from the well fields and the milling site, the modification of existing vegetative communities, the loss of sensitive plants and habitats from clearing and grading, and the potential spread of invasive species and noxious weed populations. These impacts would be expected to be temporary because restoration and reseeding occur rapidly after the end of construction. Introduction of invasive species and noxious weeds would be mitigated by restoration and reseeding after construction. Shrub and tree removal and loss would take longer to restore. Construction noise could affect reproductive success of sage-grouse leks by interfering with mating calls. Temporary displacement of some animal species would also occur. Critical wintering and year-long ranges are important to survival of both big game and sage-grouse. Raptors breeding onsite may be impacted by construction activities or milling operations, depending on the time of year construction occurs. Wildlife habitat fragmentation, temporary displacement of animal species, and direct or indirect mortalities would be possible. Implementation of wildlife surveys and mitigation measures following established guidelines would limit impacts. The magnitude of impacts depends on whether a new facility is being licensed or an existing facility is being extended—SMALL to MODERATE, depending on site-specific habitat conditions.

1.8.3 NRC's Site-Specific Environmental Review

To meet its NEPA obligations related to a site-specific license application, the NRC staff will conduct an independent, detailed, comprehensive evaluation of the potential environmental impacts of the applicant's proposed action for construction, operation, aquifer restoration, and decommissioning of an ISL facility. This site-specific evaluation will make use of the discussion and conclusions reached in the GEIS to the extent applicable to the specific site.

As the basis for its independent evaluation, the NRC staff will rely initially on the applicant's detailed environmental report for information on the proposed action. The applicant's environmental report would include detailed information about the potential ISL facility location, the extent of proposed operations and schedule, and the surrounding local and regional affected environment. The NRC staff will confirm important attributes of these descriptions through visits to the proposed site location and vicinity, independent research activities, and consultations with appropriate federal, tribal, state, and/or local agencies. Additionally, the NRC staff typically requests additional information from the applicant. These requests require the applicant to provide the information and data the NRC staff considers necessary to determine the potential environmental impacts.

The NRC Safety Review

In addition to meeting its responsibilities under the Atomic Energy Act of 1954, as amended, NRC prepares a Safety Evaluation Report to analyze the safety of the proposed action and assess its compliance with applicable NRC regulations.

The safety and environmental reviews are conducted in parallel (Figure 1.7-1). Although there is some overlap between the content of a Safety Evaluation Report and the environmental review document, the intent of the documents is different.

To aid in the decision process, the environmental review document summarizes the more detailed analyses included in the Safety Evaluation Report. For example, the environmental review document would not address how accidents are prevented but the environmental impacts that would result if an accident occurred.

Much of the information describing the affected environment in the environmental review document also is applicable to the Safety Evaluation Report (e.g., demographics, geology, and meteorology) (NRC, 2003b).

The NRC staff will focus on the applicant's assessment of potential environmental impacts from the proposed action and the identified alternatives. In its site-specific environmental review document, NRC will evaluate a reasonable range of alternatives to the applicant's proposal, including the "no-action" alternative. This range of alternatives may include alternatives not identified by the applicant, as well as those outside NRC's jurisdiction. The NRC staff will independently evaluate the applicant's analysis of the potential impacts to each resource area identified in NRC (2003b) (e.g., air quality, transportation, groundwater). As needed, the NRC staff will independently confirm and verify essential aspects of the analysis. Confirmatory analyses could involve the use of computer codes and other verification techniques.

The GEIS is intended to improve the efficiency of the licensing process by (1) providing an evaluation of the types of environmental impacts that may occur from ISL uranium milling facilities, (2) identifying and assessing impacts that are expected to be generic (the same or similar) at all ISL facilities (or those with specified facility or site characteristics), and (3) identifying the scope of environmental impacts that need to be addressed in site-specific environmental reviews. The GEIS also provides information that will aid in the preparation of site-specific environmental documents.

First, the NRC staff will compare the applicant's description of the proposed facility, ISL process, and affected environment to those in the GEIS. The NRC staff will then summarize and

Some SMALL impacts to wildlife would be expected to occur from direct conflict with vehicular traffic and the presence of onsite personnel. Generally these would be SMALL impacts that would not affect the total population of a species. However, proximity to crucial wintering ranges and active sage-grouse leks or raptor nests have the potential to have a MODERATE to LARGE impact. Seasonal guidelines with respect to noise, vehicular traffic, human proximity, and operational timing have been established by the Wyoming Game and Fish Department (Wyoming Game and Fish, 2004).

Potential impacts to migratory birds and other wildlife from exposure to selenium concentrations and radioactive materials in the evaporation ponds may occur. Past experience at NRC-licensed ISL facilities has not identified impacts to wildlife from evaporation ponds. Typically, evaporation ponds are lined with a synthetic liner that inhibits the growth of aquatic vegetation which might otherwise serve as a potential source of exposure to radioactive materials via a food pathway. Such vegetation could also potentially provide habitat for wildlife (NRC, 2004). Mitigative measures including perimeter fencing and surface netting would limit potential impacts to wildlife from evaporation ponds to SMALL.

Impacts to the aquatic resources and vegetation from facility operations resulting from spills around well heads and leaks from pipelines would be SMALL and would be handled using best management practices (NRC, 2007). Leak detection systems and spill response plans to remove affected soils and capture release fluids would be expected to reduce the impact to aquatic systems.

Impacts to federal threatened and endangered species beyond those that occurred during construction would be SMALL. The potential exists for mobile species to experience conflicts with vehicles during facility operations.

Potential impacts to vegetation may occur as a result of land application of wastewater generated from the operation. These impacts could range from increased vegetation growth due to the increase of available water and/or the destruction of vegetation from the build-up of salts in the soils. Additional details related to waste disposal operation are described in Section 4.2.12.2. At NRC-licensed ISL facilities, the licensee is required to monitor and control irrigation areas, if used, to maintain levels of radioactive and other constituents (e.g., arsenic, selenium, molybdenum) within allowable release standards. The licensee uses its environmental monitoring program (see Chapter 8) to identify soil impacts caused by land application of treated process water. Monitoring includes analyzing water before it is applied to land to ensure release limits would be met and soil sampling to establish background and to monitor for uranium, radium, and other metals. The impacts from land application of treated wastewater would be SMALL.

4.2.5.3 Aquifer Restoration Impacts to Ecological Resources

Because the existing infrastructure is already in place, aquifer restoration activities would produce potential ecological impacts similar to facility operations, and therefore potential impacts would be SMALL.

4.2.5.4 Decommissioning Impacts to Ecological Resources

Impacts from decommissioning would, in part, be similar to those discussed for construction of the facility. However, these impacts would be temporary (12–18 months) and reduce with time

operations ensures disposal capacity is available to accept evaporation pond waste when an ISL facility is eventually decommissioned. As a result, impacts from the use of ponds would be SMALL.

Land application of treated wastewater (Section 2.7.2) could potentially impact soils by allowing accumulation of residual radiological or chemical constituents in the irrigated soils that were not removed from the water during treatment. For example, the salinity of the treated wastewater could increase the salinity of soils (soil salination) and reduce the permeability of soils in the irrigation area. At NRC-licensed ISL facilities, the licensee is required to monitor and control irrigation areas, if used, to maintain levels of radioactive and other constituents (e.g., arsenic, selenium, molybdenum) within allowable release standards. The licensee uses its environmental monitoring program (see Chapter 8) to identify soil impacts caused by land application of treated process water. Monitoring includes analyzing water before it is applied to land to ensure release limits would be met and soil sampling to establish background and monitor for uranium, radium, and other metals. Land that is used for irrigation is also included in decommissioning surveys to ensure potentially impacted (contaminated) areas would be appropriately characterized and remediated, as necessary, in accordance with NRC regulations. Because of the NRC review of site-specific conditions prior to approval, the routine monitoring program, and the inclusion of irrigated areas in decommissioning surveys, the impacts from land application of treated wastewater would be SMALL.

Solid wastes generated from operations that are classified as 11e.(2) byproduct wastes can be sent to a licensed facility for disposal. Contaminated materials, equipment, and buildings would be similarly disposed or decontaminated and released for unrestricted use according to NRC requirements. Nonradioactive hazardous wastes would be segregated and disposed of at a hazardous waste disposal facility. Nonradiological uncontaminated wastes are disposed of as ordinary solid waste at a municipal solid waste facility. Disposal impacts would be SMALL for radioactive wastes as a result of required preoperational disposal agreements. Impacts for hazardous and municipal waste would also be expected to be SMALL, assuming the amount of contaminated soil is SMALL. For remote areas with limited available disposal capacity, such wastes may need to be shipped greater distances to facilities that have capacity; however, the number of such shipments would still be low (Section 2.8).

4.2.12.3 Aquifer Restoration Impacts to Waste Management

Waste management activities during aquifer restoration utilize the same treatment and disposal options implemented for operations; therefore, impacts associated with aquifer restoration would be similar to the operational impacts discussed in Section 4.2.12.2. Additional wastewater volume and the associated volume of water treatment wastes may be generated during aquifer restoration; however, this would be offset to some degree by the reduction in production capacity from the removal of a well field from production activities. While the amount of wastewater generated during aquifer restoration is dependent on site-specific conditions, Section 2.5.2 provides an illustrative estimate of water volume per pore volume and Section 2.11.5 provides experience regarding the number of pore volumes required for aquifer restoration in past efforts. Furthermore, the NRC review of future ISL facility licensing would verify that sufficient water treatment and disposal capacity (and the associated agreement for disposal of byproduct material discussed in Section 4.2.12) are addressed. As a result, waste management impacts from aquifer restoration would be SMALL.

2.2.8 Ecology

Some commenters were concerned about potential ecological impacts and how they would be considered in the GEIS. One commenter recommended that the GEIS consider surface disturbance impacts to wildlife and vegetation, including sensitive and endangered species. A few commenters were concerned about the potential harm to wildlife from uranium and other metal concentrations in the water extracted during ISL operations. Another commenter suggested that the GEIS analyze habitat fragmentation on the sage grouse and other species of concern from ISL operations. One commenter noted that ISL operations are minimally intrusive, have a small surface footprint, and therefore would result in small disturbances to ecology.

Other commenters provided examples of protective measures that could be taken to protect wildlife. These included ensuring that open water bodies (e.g., pits, ponds, tanks, lagoons) that could attract wildlife were covered, screened, or netted; that coverless impoundments include escape ramps operable at any water level; and that fences, roads, overhead power lines, and trenched piping be constructed to minimize adverse impacts to wildlife.

Other commenters expressed concern about the concentrations of selenium in wastewater from ISL operations and the potential impact of selenium on waterfowl using evaporation ponds, as well as concerns about the bioaccumulation of chemical constituents in biota from the land application of treated waste waters. A commenter noted that selenium co-exists with uranium deposits and could be mobilized by lixiviant from ISL operations. Technical information was provided on those metal concentrations associated with wildlife impacts.

The New Mexico Department of Fish and Game provided construction guidelines which they recommended be included in the GEIS. A commenter recommended that NRC work with both the Navajo Department of Fish and Game and the U.S. Fish and Wildlife Service to assess potential impacts to wildlife. Another commenter stated that native plants and trees should be restored in compliance with Executive Order 13112 on invasive species.

2.2.9 Site-Specific Analyses

A number of comments addressed either the relationship between the GEIS and the performance of site-specific licensing reviews or requested clarification of what topics would be addressed generically in the GEIS and which would need to be considered in site-specific reviews.

Over 90 percent of the written comment letters expressed a concern that site-specific issues could only be addressed by a site-specific environmental impact statement. These commenters were concerned about the usefulness of a GEIS given the site-specific nature of ISL operations. These commenters were also concerned that because of the GEIS, the site-specific NEPA review documents would be environmental assessments (EAs), which would have the effect of limiting public participation in the NEPA process by those potentially affected. These commenters also stated that the preparation of an EA involves less stringent environmental analyses and public participation requirements than would occur if an environmental impact statement (EIS) were prepared. One commenter requested that the GEIS clearly state the form of the site-specific analysis and associated public participation that would be conducted for any site-specific NEPA reviews tiered from the GEIS. Another commenter recommended that the GEIS include the decision-making criteria for preparing a site-specific EA versus an EIS.

G5.26.2 Climatology and Meteorology

Comment: 010-001
One commenter stated that the referenced climatic data was from the National Climatic Data Center and it would be helpful to provide a reference for climatic data in the STAR format needed to run MILDOS.

Response: The information presented in this section of the GEIS was intended to present general climatic information for the various regions. Information concerning radiation doses associated with ISL activities is located in GEIS Section 4.2.11.2. If appropriate, STAR-formatted climatic data supporting radiation dose calculations would be incorporated at the site-specific environmental review level. Because STAR-formatted climatic data was not considered essential for the GEIS, no changes were made to the GEIS beyond the information provided in this response.

Comment: 028-012
One commenter stated that the pan evaporation rate in the Wyoming West Uranium Milling Region can exceed 127 cm [50 in] per year. Draft GEIS Section 3.2.6.1 states that the pan evaporation rates for this region range from about 76 to 127 cm [30 to 50 in]. The commenter stated that the average annual evaporation rate at the Sweetwater Uranium Project for 1984 to 1992 was 154 cm [60.66 in].

Response: The pan evaporation rate information in the GEIS is from the National Weather Service and represents a range of what can be expected for each region. The NRC staff recognizes that particular locations within each region may experience values outside this range. If applicable, pan evaporation rate information relevant to the location of the proposed site would be incorporated in the description of the affected environment at the site-specific environmental review level. Because pan evaporation rate information was addressed in the GEIS and considered adequate for the regional-level characterization, no changes were made to the GEIS beyond the information provided in this response.

Comment: 042-002; 061-022
Two commenters expressed that sudden weather events are not evenly distributed within a uranium milling region. One commenter stated that the Black Hills are unique because of sudden weather events. Another commenter stated that both the Wyoming East and the Nebraska-South Dakota-Wyoming Uranium Milling Regions have areas that are more subject to tornadoes than other areas and requested that the GEIS include information on tornadoes.

Response: The discussion on climate in GEIS Sections 3.2.6.1, 3.3.6.1, 3.4.6.1, and 3.5.6.1 includes sudden weather events such as rainstorms, hailstorms, and flooding. The NRC staff recognizes that the sudden weather events may not be uniformly distributed throughout a uranium milling region or between regions. If applicable, sudden weather events relevant to the location of a proposed site would be incorporated in the description of the affected environment at the site-specific environmental review level. Because sudden weather events were addressed in the GEIS and considered adequate for the regional level characterization, no changes were made to the GEIS beyond the information provided in this response.

Comment: 50-082
One commenter requested that the GEIS include average wind speeds including a wind rose graphic for all three Wyoming descriptions.