APPENDIX A

SCOPING SUMMARY REPORT

GENERIC ENVIRONMENTAL IMPACT STATEMENT

FOR

IN-SITU LEACH URANIUM MILLING FACILITIES

SCOPING SUMMARY REPORT

JUNE 2008

U.S. Nuclear Regulatory Commission

Rockville, Maryland

1. INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) expects to receive a number of new license applications for uranium milling at sites in the states of Nebraska, South Dakota, Wyoming and New Mexico over the next several years. NRC anticipates that most of these potential license applications will involve uranium milling facilities that would use the in-situ leach (ISL) process. Because there are environmental issues common to ISL milling facilities, NRC has prepared a Generic Environmental Impact Statement (GEIS) to evaluate the potential environmental impacts associated with the construction, operation, aquifer restoration, and decommissioning at future ISL milling facilities in specific regions of interest within these four western states, where NRC is the licensing authority for uranium milling.

In the ISL process, a leaching agent, such as oxygen with sodium bicarbonate, is added to native ground water for injection through wells into the subsurface ore body to dissolve the uranium. The leach solution, containing the dissolved uranium, is pumped back to the surface and sent to a processing plant, where ion exchange is used to separate the uranium from the solution. The underground leaching of the uranium also frees other metals and minerals from the host rock. Operators of ISL facilities are required to restore the ground water affected by the leaching operations. The milling process concentrates the recovered uranium into the product known as "yellowcake" (U_3O_8). This yellowcake is then shipped to uranium conversion facilities for further processing in the overall uranium fuel cycle.

As part of its evaluation of a license application for uranium milling, NRC conducts an environmental review, as required by 10 CFR Part 51, to meet its obligations under the National Environmental Policy Act (NEPA) and publishes either an environmental assessment or environmental impact statement. NRC also regulates the radiological safety of ISL facilities, including the safe disposal of the waste materials associated with the milling process (these waste materials are regulated as "11e.(2) byproduct material" under the Atomic Energy Act). NRC documents the results of its safety review of a license application in a Safety Evaluation Report. The results of NRC's environmental and safety reviews form the bases for NRC's determination whether or not to issue a 10 CFR Part 40 source material license for uranium milling.

The NRC staff will use the GEIS in its review of site-specific ISL license applications. As part of its comprehensive site-specific review, the NRC staff will incorporate by reference appropriate background information from the GEIS and apply GEIS conclusions to the extent applicable. The GEIS will enhance the quality, consistency, and efficiency of NRC site-specific reviews of ISL license applications by allowing the NRC staff to focus on the issues unique to each proposed site.

The public scoping period for the GEIS opened on July 24, 2007, with the publication in the Federal Register of a Notice of Intent to prepare the GEIS and to conduct the scoping process (72 FR 40344). Scoping is an early and open public process designed to help determine the range of actions, alternatives, and potential impacts to be considered in the GEIS and to identify significant issues related to the proposed action. Input from the public is solicited to focus the analysis on the issues of genuine concern.

On August 7, 2007, August 9, 2007, and September 27, 2007, the NRC staff held public scoping meetings in Casper, WY; Albuquerque, NM; and Gallup, NM; respectively, to solicit both oral

and written comments from interested parties. At those meetings, the NRC staff provided an overview of NRC's mission and responsibilities and described both the *in*-situ leach process and NRC's regulatory process for the licensing of ISL facilities. Additionally, the NRC staff explained why the GEIS was being prepared, provided the schedule for the GEIS, and described how the public could participate in the development of the GEIS. After the NRC staff presentations, the remainder of the meeting time was set aside for members of the public to provide oral comments. Transcripts were prepared for all three meetings and are available online at the NRC Agencywide Documents Access and Management System (ADAMS), which is accessible at http://www.nrc.gov/reading-rm/adams.html or through the NRC website for the GEIS at http://www.nrc.gov/materials/fuel-cycle-fac/licensing/geis.html.

In addition to comments received at those three public meetings, interested members of the public also provided written scoping comments by regular mail and electronic mail to NRC. The public scoping period closed on November 30, 2007. Comments received by NRC are available for viewing online through ADAMS (http://www.nrc.gov/reading-rm/adams.html).

The public also will be invited to comment on the draft GEIS when it is made available. NRC will announce the availability of the draft GEIS in the Federal Register, on NRC's website (www.nrc.gov), and in the local news media. NRC's announcement also will provide the dates for the public comment period and information about public meetings. The NRC staff will consider the comments received on the draft GEIS and address them in the final GEIS.

This report summarizes the issues identified during the scoping process. Section 2 of this report summarizes the comments expressed, Section 3 identifies the issues to be considered in the GEIS, and Section 4 identifies those issues that are not within the scope of the GEIS.

2. ISSUES RAISED DURING THE SCOPING PROCESS

2.1 OVERVIEW

During the three public scoping meetings, 79 individuals offered comments. Not all commenters addressed the GEIS scope specifically, preferring instead to comment on the more general topic of uranium mining or milling; however, most expressed an opinion, either favorable or unfavorable, on either the GEIS or uranium mining or milling. Among the 79 commenters who spoke, roughly half of them expressed support for either the GEIS or for uranium mining or milling, while the other half neither supported the GEIS nor uranium mining or milling. The remaining individuals who spoke either expressed concerns or suggestions requesting NRC consider a particular topic of interest in the GEIS or provided information on local conditions.

Additionally, nearly 1400 individuals sent in written comments by electronic mail. Approximately 90 percent of these comments (1246) were sent as identical "form letters" opposing the GEIS. About two percent (28) of the e-mails were modified versions of the form letter (mostly opposing), and the remaining comments (123) were unique individual letters addressing a variety of topics. Five percent of the e-mail submittals (70) were from locations outside the US. Table 1 provides a list of individuals and entities that submitted scoping comments and a classification of the comments. Table 2 provides a list of individuals and entities that submitted duplicate scoping comments by email.

Finally, individuals and organizations provided written scoping comments by regular mail.

In addition to private citizens, commenters included:

- Members of the United States Congress
- Governor for the State of New Mexico
- Representatives of Native American governments
  - Navajo Nation Council
  - Navajo Nation Environmental Protection Agency
  - Eastern Navajo Agency
  - Navajo Attorney Generals Office
  - Pueblo of Acoma
- Members of the New Mexico State Senate
- Local Officials from Crook County in Wyoming; McKinley and Cibola counties in New Mexico; and the City of Grants, New Mexico
- Representatives from Federal agencies or organizations
  - Environmental Protection Agency, Office of Radiation and Indoor Air
  - Department of Interior, Bureau of Land Management
  - Department of Interior, Fish and Wildlife Service
- Representatives of State agencies or departments
  - State of Wyoming, Department of Environmental Quality
  - State of Wyoming, Department of Agriculture
  - State of New Mexico, Department of Fish and Game
  - Commonwealth of Virginia, Department of Mines, Minerals, and Energy
  - State of Colorado, Department of Public Health and Environment
- Representatives of the mining industry
  - National Mining Association
  - Alaska Miners Association

- New Mexico Mining Association
- Wyoming Mining Association

- Representatives of uranium mining companies
  - Energy Metals Corporation
  - Neutron Energy, Inc.
  - UR Energy USA
  - Uranerz Energy Corporation
  - Uranium Resources/HRI
- Representatives of other organizations, including:
  - Amigos Bravos
  - Blue Water Valley Down Stream Alliance
  - Biodiversity Conservation Alliance
  - Cebolleta Land Grant
  - Concerned Citizens for Nuclear Safety
  - Diocese of Gallup, New Mexico
  - Eastern Navajo Allottees Association
  - Eastern Navajo Dine Against Uranium Mining (ENDAUM)
  - Hunger Grow Away, Inc.
  - Juan Tafoya Land Grant Corporation
  - National Indian Council on Aging
  - New Mexico Environmental Law Center
  - Post 71 Uranium Committee
  - Powder River Basin Resource Council
  - Puerta Villa Land Grant Corporation
  - Powder State Chapter
  - Sierra Club

The following general topics categorize the comments received during the public scoping period:

- Purpose, need, and scope of the GEIS
- Scoping process for the GEIS
- Public involvement
- History and legacy of uranium mining
- Native American concerns
- Surface and ground water
- Land use
- Ecology
- Site-specific analyses
- Operational safety and emergency response
- Decommissioning and waste management
- Socioeconomics
- Environmental justice
- Historic and cultural resources
- Transportation
- Visual impacts and noise
- Surety
- Alternatives considered
- Cumulative impacts

- Monitoring programs
- Regulations and guidance
- National Environmental Policy Act
- Credibility of NRC

In addition to these comment topic areas, miscellaneous opinions and concerns were raised that dealt with issues such as national energy policy, reprocessing spent nuclear fuel, nuclear power, nuclear weapons, and pre-emptive war.

2.2 SUMMARY OF ISSUES RAISED

Section 2.2 provides a summary of the comments received during the public scoping period. As noted previously, comments were received on a variety of topic areas. The following discussion summarizes the public scoping comments by technical area and/or issues.

2.2.1 Purpose, Need, and Scope of GEIS

A number of comments received dealt with the purpose, need, and scope of the GEIS. Both general and specific comments regarding the content of the GEIS and whether to address both ISL and conventional milling technologies in the GEIS were received.

The majority of commenters questioned the usefulness of a GEIS given the unique site-specific conditions in the geographic areas where uranium recovery is by ISL extraction. These individuals commented that topics such as hydrology, water quality, geology, socioeconomics, and cultural diversity were examples of site-specific attributes that could not be adequately assessed in a GEIS.

Commenters were also concerned that NRC had not requested input on the decision to prepare a GEIS. A few commenters expressed the opinion that the GEIS process should initially assess whether uranium recovery operations should be expanded and then if the conclusion was affirmative, decide to prepare a GEIS. These commenters believed the current demand for uranium was based on market speculation rather than actual demand.

A few commenters thought the purpose for the GEIS was not sufficiently clear, noting that it should identify a specific federal action with all specific sites and locations identified. Another commenter noted that because there are no ISL permits in New Mexico, there was no need for a GEIS addressing ISL uranium recovery activities in New Mexico.

Specific comments regarding the content of the GEIS offered a wide variety of suggestions. A majority of commenters favored a rigorous environmental analysis, with a number of these commenters implying that the GEIS would not be rigorous because of its broader scope. These commenters suggested a site-specific environmental assessment to support a licensing review would also be a limited analysis. A few commenters requested that various topics be included in the GEIS such as:

- uncommon features among ISL facilities that should be considered in site-specific reviews;
- resource estimates for all site-specific license reviews;
- evaluation of the proposed action and all connected actions;

- documentation of the geographic extent of new extraction activity including the details of schedule and licensing process;
- consideration of each type of ISL technology;
- lists of companies that intend to pursue uranium recovery; and
- detailed discussions of air quality standards, implementing agencies, ambient conditions, monitoring requirements, enforcement, and potential air quality impacts including cumulative and indirect impacts.

One commenter suggested the scope of the GEIS should be limited to regional cumulative and synergistic impacts. Another requested the GEIS address "agency capture" and the Federal Advisory Committee Act.

An additional group of comments came from residents or officials of states with uranium deposits that were not identified in NRC's scoping notices. These commenters wanted their states to be included in the scope of the GEIS.

2.2.2 Scoping Process for the GEIS

Numerous commenters provided feedback on the scoping process. Many of these comments reflected concerns regarding public involvement (section 2.2.3). Other comments pertained to cooperation with other agencies. Some comments went beyond the scoping process and applied to the entire GEIS or licensing processes.

Comments from the U.S. Environmental Protection Agency (EPA) requested NRC designate EPA as a commenting rather than cooperating agency because they have statutory authority for various laws that apply to the operation of an ISL (for example, the Uranium Mill Tailings Radiation Control Act, the Safe Drinking Water Act, Clean Water Act, and Clean Air Act). The State of Wyoming requested cooperating agency status for the GEIS. Another comment recommended NRC enter into an MOU with the New Mexico Department of Environmental Quality for regulation of ISL facilities. A U.S. Bureau of Land Management (BLM) employee stressed the importance of communicating with local BLM staff during site-specific actions. The Governor of New Mexico expressed concern about the lack of prior consultation with respect to preparing the GEIS.

2.2.3 Public Involvement

Many commenters stressed the need for meaningful public participation in the GEIS and in the site-specific environmental reviews. One commenter recommended NRC expand the public outreach process for the preparation of both environmental assessments and environmental impact statements. Some individuals desired enhanced transparency, democracy, and sensitivity to potentially affected cultural groups.

Comments were also received on the GEIS scoping process (e.g., the number and location of scoping meetings, the short notice prior to the public scoping meetings, the limited time provided for public comment); the lack of public input on the need for a GEIS (e.g., preparation of the GEIS was a forgone conclusion); and the perception that public involvement could be limited by using a GEIS for site-specific licensing decisions when an environmental assessment is published.

Many commenters favored extending the comment period and having scoping meetings in all affected communities, including: Grants, Gallup, Crownpoint, and Church Rock in New Mexico, and in the states of Utah, Arizona, Colorado, and South Dakota. Other commenters wanted to include specific states and communities so that national interest groups could participate. Another commenter suggested that NRC hold public hearings in the affected areas for each site-specific license application.

2.2.4 History and Legacy of Uranium Mining

A number of individuals commented on the history and legacy of past uranium mining in western states. Some commenters recommended that the GEIS include discussion of both historic and current information on uranium recovery operations and also discuss environmental contamination remaining after the end of operations and remediation. Other commenters provided historical accounts of local public health and environmental problems associated with past uranium mining. Other commenters stressed the need to consider the impacts of existing contaminated "legacy" sites in site-specific assessments (e.g., local cumulative impacts of proposed operation with existing contamination). The need to avoid creation of additional "legacy" sites was also mentioned.

Some commenters expressed concern about remediating contamination after uranium milling is completed. These commenters cited past experience with ISL facilities in Texas where the ground water chemistry was unable to be restored to baseline conditions. Other commenters noted that conventional tailings sites in Utah and Colorado had complex and costly remediation issues.

A number of commenters linked local health problems to past uranium mining and expressed concerns regarding the lack of complete remediation and the limited compensation of workers and communities impacted by past mining activities. Commenters described past environmental contamination that resulted from abandoned conventional mines and unremediated tailings piles, breach of operational evaporation ponds, and ground water contamination. One commenter noted high radium concentrations in soils and the need to subsequently relocate families. Another commenter stated there were 150 abandoned mines in McKinley County (New Mexico) and 50 abandoned mines in Cibola County (New Mexico). A few commenters noted that NRC should not license new facilities until issues at formerly operating uranium recovery facilities had been resolved. A commenter asked who would be responsible for cleanup of legacy sites and feared a repeat of history. One commenter requested that NRC provide the public and other federal agencies with historical information on the existing legacy sites to inform the background characteristics of proposed sites.

2.2.5 Native American Concerns

Uranium ore deposits are located in or adjacent to some Native American communities. Commenters stressed that some of these communities have been impacted by past uranium mining activities and were therefore concerned about future uranium recovery activities in the same areas.

A number of commenters were concerned that the GEIS would undermine the sovereignty of indigenous peoples. Various commenters identified the Diné Natural Resources Protection Act of 2005, which prohibits uranium mining and processing on the Navajo Nation. Commenters stated that New Mexico sites overlapping Navajo Indian Country are subject to tribal law and

review. One commenter suggested that NRC consult with the Navajo Nation Environmental Protection Agency to ensure that water quality is protected and that drinking water standards are met. A commenter noted that that some lands have special cultural significance (e.g., Mt. Taylor in New Mexico). Another commenter described how Acoma Pueblo, Laguna Pueblo, and All Indian Pueblo Council have adopted resolutions opposing any new resource development (including uranium milling) that could negatively impact Pueblo sacred sites, lands, and water resources. The commenter suggested NRC not license uranium facilities on Pueblo land.

Other commenters noted the lack of formal consultation with Native American tribes by NRC prior to making decisions. They noted that consultation is necessary as both a federal legal requirement and to address Native American concerns. It was recommended that the GEIS describe the process for government-to-government consultation between NRC and potentially affected tribal governments and summarize issues identified and their resolution. Another commenter suggested that the GEIS include a section on Native American water rights and impacts that uranium milling may have on binding treaties between the U.S. government and Tribal governments.

Other commenters recommended that cultural resource and environmental justice evaluations in the GEIS include water supply, cultural, health, and other impacts on Native American tribes. The tribes identified included the Navajo, Sioux, Hopi, Yavapai-Apache, Shoshone, Northern Arapaho, Ute, and a number of Pueblo tribes. Some Navajo commenters indicated ongoing problems from past uranium mining including the lack of full monetary compensation to former Navajo uranium workers and families, the existence of un-remediated sites, and the lack of health studies in affected communities. Some commenters stated that NRC was insensitive to Native American concerns.

2.2.6 Surface and Ground Water

Surface Water: Some commenters expressed concerns about surface water. Specific issues identified in comments were changes to the chemistry of local surface water bodies from ISL surface water discharges and the potential to subsequent impact the chemistry of local ground water. One commenter recommended that the GEIS include information on surface water flows and the potential impact to local community surface water from proposed ISL operations. Commenters also recommended that surface water mitigation measures be described. Another commenter was concerned about the potential for mining interests to impact the Colorado River since the river is a key water resource for a number of western states.

Ground Water: A large number of commenters, both at the public scoping meetings and in written comments, expressed concerns about ground water contamination. In addition to general comments on ground water, commenters asked about ground water protection requirements and guidance, ground water restoration goals, restoration techniques, specific local ground water conditions, and ground water issues at existing milling sites.

A general ground water concern expressed by numerous commenters was contaminant migration away from the uranium recovery site during operations, and the mitigation measures taken once contaminant migration had been detected to control that migration. Some commenters noted that ISL operations are conducted only in portions of an aquifer that are exempted by EPA and therefore not considered to be suitable for use as drinking water due to poor water quality. One commenter was concerned about the criteria used to assess the

potability of water supplies. Another commenter noted that ISL operations are conducted between horizontal confining layers of rock to limit potential vertical migration of contaminants.

Other commenters were concerned about water use impacts given that water is a limited resource in western states. Some recommended that the GEIS estimate the quantity and quality of water used and the potential impact to local area users and natural resources. Another commenter noted that ISL operations are not large water consumers, particularly compared to conventional uranium milling. Still other commenters were concerned about the potential for increased water usage during the ground water restoration phase of the ISL lifecycle.

Some commenters noted that heavy metals and other minerals in addition to uranium are released from the ore body by the injection of lixiviant or other re-injection fluids. These commenters recommended that the GEIS evaluate impacts of the release of these metals and minerals, with one commenter recommending NRC consider the impacts from past and existing Superfund mining sites as a point of comparison for the analysis of impacts from ISL sites.

Other commenters provided detailed technical comments in recommending that the GEIS include hydrologic flow data and assess the potential impacts on local communities where proposed facilities would be located. Another commenter recommended that the GEIS include hydrologic and biogeochemical information needed for site-specific conceptual models, data input requirements, model and parameter uncertainty, variability of interpretations, and risk assessments.

Ground Water Protection Requirements and Guidance: Some commenters questioned the requirements for restoring ground water after ISL operations end, noting that NRC discussed that restoration to pre-operational baseline conditions is required, but yet granted some sites approval of alternate concentration limits that were above baseline water quality conditions. Another commenter recommended that the GEIS describe the applicable standards (including the Navajo Nation's drinking water standards) and the agencies responsible for ensuring compliance with the restoration requirements. Other commenters noted that some NRC-approved alternate concentration limits were too high above baseline levels, while other commenters stated that NRC's authorizing of alternate concentration limits merely allowed the restoration of still contaminated sites.

A few commenters focused on the aquifer "class of use" designation (i.e., the use(s) to which the aquifer water could be put). One commenter recommended that the GEIS identify the "class of use" for each aquifer potentially impacted by ISL licensing, while another commenter was opposed to "class of use" cleanup goals in place of current regulations (noting this would abridge current standards). One commenter asked NRC to re-evaluate the practice of allowing applicants to average ground water quality within a proposed well field area to establish baseline water quality (suggesting that averaging the poorer ore zone waters with outlying cleaner water skews the average toward higher levels of contamination).

Restoration Goal: Some commenters recommended using pre-operational baseline water quality as the appropriate restoration goal (i.e., returning the water quality after operations to its pre-uranium extraction state). A commenter noted that the Wyoming Department of Environmental Quality standards require restoration to baseline. Another commenter recommended that the drinking water standards as the appropriate restoration goal. One commenter noted that at a NRC regulated facility, the uranium concentration following

restoration was 100 times the EPA drinking water standard for uranium. Some commenters stated it was not possible to restore ground water to baseline water quality conditions and claimed no ISL sites have been restored to baseline. One commenter referred to an NRC report that showed restoration at two ISL sites was not to baseline conditions. Another commenter recommended that the GEIS include site examples where ground water had been restored to baseline conditions.

Restoration Techniques: Comments were also received on the techniques of ground water restoration. One commenter recommended that the GEIS provide assurance that ground water can be restored. Another commenter suggested the GEIS discuss surface and ground water restoration procedures and include protocols to establish background concentrations for radioactive and hazardous constituents. One commenter suggested the use of bioremediation technologies be addressed in the GEIS. Another commenter noted that a recent Texas A&M seminar on uranium mining had concluded that the technology is not available to restore ground water to baseline conditions. Another commenter recommended that the GEIS describe past failures in ground water restoration.

A few commenters also identified geochemical issues. One commenter was concerned about increases in post-restoration ground water contaminant levels resulting from oxidation due to infiltrating oxygen-rich waters. Another commenter recommended that the GEIS include information on the variable rates of mineral oxidation/reduction to estimate the time required for aquifer conditions and dissolved mineral concentrations to return to baseline conditions. The same commenter stated the GEIS should consider changes in geochemical conditions, including issues such as carbon loss, pyrite oxidation, and other reactions.

Local Ground Water Conditions: Some commenters described local ground water conditions, focusing particularly on the water quality of local aquifers and the uses of these aquifers. A commenter expressed concern that uranium exploration wells located west of Mt. Taylor in New Mexico could potentially provide a pathway between contaminated and uncontaminated aquifers. Another commenter indicated that ISL milling could impact water supplies such that some communities might be forced to move their existing water supply wells as a result.

2.2.7 Land Use

Some commenters were concerned about land use. One commenter noted that ISL facilities typically are sited in remote areas where livestock grazing and oil and gas exploration occur. Another commenter recommended that the GEIS evaluate the impacts to ranching activities, livestock, and wildlife from both the operation of ISL facilities and of other local mining activities. Another commenter noted that unique land tenure circumstances (e.g., emphasizing split estate lands, public lands, and Native American lands) were not specifically addressed in NRC's notices of scoping. The impact of ISL facilities to local property values was also discussed by some commenters. A number of other commenters questioned the acquisition of uranium leases and how landowners with only surface rights (and no mineral rights) would be impacted. Another commenter suggested land use mitigation measures be described in the GEIS and it was suggested that land reclamation for surface disturbance include both topsoil specifications and re-vegetation success standards.

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.

Another commenter recommended that the GEIS clarify the environmental topics that would be resolved by the GEIS versus those that would be addressed in site-specific reviews. Other commenters provided opinions on topics they believed were site specific and, therefore, could not be analyzed in a GEIS. These topics included: transportation, geology, water resources, hydrology, local water quality, geochemistry, ecology, special status ecological species, critical habitat, socioeconomics, agricultural impacts, cultural properties, and cumulative impacts. Still other commenters were unclear as to whether any site-specific NEPA analyses would be done. One commenter suggested that preparation of the GEIS would eliminate the requirement for NEPA studies on individual ISL projects. A few commenters felt that preparing the GEIS would limit both the preparation of site-specific EISs and the public participation associated with this process; while another commenter disagreed, claiming that the GEIS would not preclude preparing site-specific EISs. Still another commenter expressed their opinion that, with the GEIS, EAs would be sufficient for site-specific ISL licensing. Finally, one commenter strongly recommended that NRC prepare individual EISs for all applications for uranium milling in NM.

2.2.10 Operational Safety and Emergency Response

A number of the individual written comment letters expressed general concerns about public safety at ISL facilities, environmental impacts, and worker safety. Some commenters requested that the GEIS consider specific types of operational impacts including the potential contamination of soil, surface water, air, ground water; the release of radon gas; the potential for either well field or other spills; the potential risk to children, and the potential risk associated with exposure to various processing solutions and processing resins. One commenter recommended that ISL facilities be required to install leak detection systems in injection and production wells. Another commenter questioned how NRC will ensure that ISL plants are constructed in a sound manner and not prone to failure.

Other commenters offered opinions on operational conditions at ISL facilities. One commenter recommended that the GEIS not assume that ISL facilities would be in remote areas, noting that experience in Colorado was contrary to this assumption. Another commenter noted that in Wyoming ISL facilities were typically located away from high population areas and designed to reduce risks. The commenter also noted that ISL facilities neither have ore stockpiles nor tailings impoundments, which reduces airborne emissions compared to conventional milling facilities, and that because of the common use of rotary vacuum dryers at ISL facilities for yellowcake drying operations, there were no particulate uranium emissions.

Safeguards and security concerns were also raised by a few commenters. Some commenters were concerned about the inclusion of credible accident scenarios, including sabotage and terrorism, in the GEIS and the evaluation of the emergency response to such scenarios. Another commenter was concerned about how information would be disseminated to local communities in the event of ISL facility contamination or release incidents.

2.2.11 Decommissioning and Waste Management

Some commenters were concerned about decommissioning and waste management. Some of the topics discussed in this section were also identified as issues discussed in Section 2.2.4 (History and legacy of uranium mining).

One commenter suggested that the availability of NRC licensed sites for the disposal of ISL radioactive wastes is limited and that the GEIS should include a discussion of this concern.

Another commenter recommended that the GEIS also identify and discuss the disposition of wastes generated by construction, operation, and decommissioning, and explain the handling and disposal practices for such waste, including: annual waste volumes generated, disposal location, transportation routes to disposal locations, regulatory requirements for storage and disposal, and discussing whether the waste would be classified as hazardous under federal or tribal law. Another commenter noted that wastes produced by ISL facilities are considered 11e(2) byproduct material and produced in smaller quantities as compared to the amounts produced by a conventional uranium mill.

Other commenters had specific concerns with particular waste treatment or disposal methods. One commenter stated the GEIS should evaluate the potential impact to surface and ground water from discharges from an ISL facility; identify specific discharges and needed National Pollutant Discharge Elimination System (NPDES) permits; and also consider the impact to both current and future water users. Another commenter recommended that the GEIS include information concerning the risk to the public and the environment from the use and availability of Underground Injection Control (UIC) deep well injection of waste waters in relation to the depth and location of public water supply wells.

2.2.12 Socioeconomics

A few comments on potential socioeconomic impacts were received. One commenter recommended that the GEIS evaluate social and economic impacts to communities both during operations and after decommissioning. Another person commented on the cost-benefit of ISL facilities with respect to creating jobs. Another commenter noted that ISL facilities are not large employers and that their operation would not have the same magnitude of impact as coal bed methane operations or oil and gas operations in the State of Wyoming. Another commenter stated the GEIS should assess impacts to overburdened communities already affected by oil, gas, and coal development, noting in particular the potential impact on the infrastructure such as roads, police, emergency response, the effect on housing costs and labor supply, and the effect on crime and drugs use. A few commenters noted that ISL milling would bring economic stimulus to the region by expanding the tax base for communities.

2.2.13 Environmental Justice

Comments related to the topic of environmental justice generally pertained to whether the issue should be analyzed in the GEIS. Additionally, commenters provided views on how the environmental justice analysis should be done, and discussed the potential consequences of assessing environmental justice in the GEIS.

Some commenters believed environmental justice should be analyzed in the GEIS, while other commenters stated it should be assessed for each license application on a site-specific basis. One commenter stated that environmental justice could not be evaluated generically and that if it were analyzed in the GEIS, this would eliminate the need for further site-specific environmental justice reviews. The commenter further stated that NRC's environmental justice policy indicates meaningful analysis would be unlikely in the GEIS, even though NRC's public scoping notices identifies the issue of environmental justice as being addressed in the GEIS. Another commenter noted that since an environmental justice analysis is not required for an NRC environmental assessment, the analysis in the GEIS could be the only one performed to support site-specific licensing reviews. Another commenter stated that the concept of

environmental justice assumes there is a choice for locating facilities; however, uranium recovery facilities must be located where the ore deposits occur.

A number of commenters provided recommendations regarding how to conduct an environmental justice evaluation in the GEIS. One commenter advised following the Council on Environmental Quality's guidance on environmental justice. Another commenter suggested that NRC provide opportunities for affected communities to participate in the NEPA process. It was further suggested that information and materials on the GEIS be provided in the Navajo language. Another commenter recommended that the GEIS document the existing health and environmental risks to affected communities. One commenter stated that an environmental justice analysis should consider the rights of indigenous groups under international law, impacts on lifestyle, economy, and disruption to property and cultural practices. Another commenter suggested the GEIS consider environmental justice impacts to Navajo people and ranchers. Commenters also stated that the GEIS needed to consider potential environmental justice mitigation measures for community disruption (including those communities that could be displaced or relocated), changes in existing transportation routes, and changes to water access. One commenter noted that a past NRC environmental justice evaluation for a particular site had not considered impacts from past contamination.

2.2.14 Historic and Cultural Resources

Comments relating to the issue of historic and cultural resources recommended that the GEIS comply with the requirements of the National Historic Preservation Act to protect historic properties located on tribal lands. Another commenter stated the GEIS should describe the notification process for local communities in the event that historical or cultural artifacts were found at an ISL facility. A commenter wondered how tribal cultural sensitivity would be considered in the NEPA process, what recourse local communities would have in that process related to cultural matters, and what importance any feedback from these communities would have in the NEPA process.

Other cultural resources comments are described in section 2.2.5 Native American Concerns.

2.2.15 Transportation

Transportation comments were related to the safety of transporting uranium from mill sites. Comments related to safeguards, security, and terrorism during transportation of yellowcake uranium was identified as a concern. Another commenter stated the GEIS should describe all proposed uranium facilities and the miles of new road that would be required to support them. Dust generation from increased road use was also discussed, and the use of speed limits and dust suppression methods were identified as mitigation measures, along with the suggestion for ISL companies to work with local governments on solutions. Another commenter recommended that the GEIS not assume processing facilities would be located near well fields, citing a Colorado site that ships uranium solutions 250 miles for processing, and another company which proposed to ship uranium-loaded ion exchange resin beads from Colorado to Wyoming for further processing.

2.2.16 Visual and Noise Impacts

A few commenters expressed concern over the potential for visual impacts from ISL facilities, and also noted that noise impacts were low at ISL facilities.

2.2.17 Bonding / Surety

A range of comments were provided on the topic of financial assurance and bonding. A few commenters suggested the GEIS should describe and assess bonding for the complete restoration of ground water and land. Another commenter recommended that the GEIS describe the NRC formula used to calculate ground water restoration costs, which include ground water sweep, reverse osmosis, and other methods to return ground water to baseline conditions. A few commenters were concerned about past regulation of bonding (surety) for the clean up of sites and provided examples where the cleanup costs exceeded estimates. One commenter stated NRC should reconsider its policy of allowing the surety amounts for ground water restoration to be phased to match well field development. Another commenter recommended that the bonding analysis be based on either the greater of the worst case or 150 percent of the estimated clean-up costs. A bonded evaluation period for reclamation was also recommended. The role of state programs in restoration and avoiding duplication of effort were also mentioned as a cost factor. One commenter asked whether background checks are conducted to ensure that "bad companies" do not manage an ISL facility.

2.2.18 Alternatives Considered

Opinions on the alternatives included in the scoping notice for the GEIS were provided, however, most comments recommended additional alternatives for consideration in the GEIS.

One commenter stated that comparing ISL milling and conventional uranium milling as alternatives is flawed, because both are not usually applicable alternatives for a given site or for the type of uranium ore deposit to be exploited. Additionally, the commenter stated that both methods are not mutually exclusive alternatives since the uranium-rich lixiviant from the ISL facility can be processed at a conventional mill. The commenter recommended separate evaluations for each milling method (ISL and conventional mill). A few commenters supported analysis of conventional mills in the GEIS. Another commenter suggested that additional alternatives be included in the GEIS analysis, noting that NEPA requires a reasonable range of alternatives to be considered (even those outside the jurisdiction of the lead agency) and that rationales be provided for those considered but not evaluated in detail.

Recommendations for considering other alternatives in the GEIS included a variety of suggestions. A commenter recommended that alternative sources of uranium processed at ISL facilities be considered in the GEIS, including reprocessed spent fuel, drinking water treatment residuals, and uranium in sea water and phosphates. Another commenter suggested the use of government stockpiles of uranium to meet the nation's needs rather than milling as an alternative.

Other commenters recommended that the GEIS analyze variations in the ISL process. These variations touched on

- alternative leaching solutions (e.g., the use of sulfuric acid or hydrogen peroxide lixiviants) based on local mineralogy or other geologic factors,
- alternative ISL techniques of uranium recovery, such as the artificial flooding of unsaturated zones
- well field restoration methods,
- transportation modes and routes,
- well field sizes, configurations and access methods,

- locations and types of processing facilities, and
- treatment and disposal of process-related waste water.

Commenters also recommended that the GEIS consider establishing limitations on where ISL milling would be allowed (e.g., based on the types of aquifers and geology involved). A related comment recommended not allowing ISL operations in aquifers that are used or possibly could be used as a source of public drinking water.

A few commenters also recommended that the GEIS include consideration of alternative energy sources that they considered are less damaging to the environment, as well as alternatives to nuclear power that creates the demand for uranium and uranium milling.

2.2.19 Cumulative Impacts

Commenters also suggested topics that should be included in the GEIS analysis of cumulative impacts. The assessment of cumulative impacts involves assessment of the incremental impacts from the current action when added to those from past, present, and reasonably foreseeable future actions.

A commenter stated the GEIS should consider the environmental impacts from both licensed and non-licensed activities from all past uranium recovery activities. Other commenters suggested the GEIS analysis of cumulative impacts should include the impacts from past uranium mining and milling legacy sites and the existing contamination in the vicinity of proposed ISL operations. Other commenters stated the GEIS analysis of cumulative impacts should consider the combined impacts from both proposed ISL facilities and proposed conventional mills.

Some commenters noted that the locations of ISL facilities in Wyoming would be near to existing and planned oil and gas development, coal mining, and coal bed methane operations (including aquifer dewatering), and these activities should be considered in the analysis of cumulative impacts. Other commenters noted past problems with types of mining other than uranium mining (e.g., oil and gas, copper). Still other commenters identified specific nuclear and non-nuclear facilities that they felt should be included in the evaluation of cumulative impacts. A few commenters expressed concern over the cumulative impacts to the quantity and quality of locally available ground and surface water, and to air quality.

2.2.20 Monitoring programs

A commenter recommended that the GEIS discuss the environmental monitoring programs that are designed to assess impacts from facility operations and the effectiveness of waste disposal technologies, including methods used and requirements for monitoring disposal and waste management plans. The commenter suggested that this discussion describe how monitoring would ensure that impacts are addressed and mitigated once the impacts are identified. The commenter further recommended that the GEIS discuss the use of adaptive management as incorporated into the monitoring protocols for each facility's environmental measures.

Another commenter expressed a concern that monitoring requirements are needed for the whole ISL mill process to limit the potential for ground water contamination from operations by helping to mitigate and prevent spills and ground water contamination before they happen. A commenter recommended that the time limits on restoration monitoring be extended to 20 years

to ensure that there are no long-term impacts to the ground water. A few commenters recommended that the distance between ground water monitoring wells for an ISL well field reflect the geometry of the ore deposit so as to more effectively to detect the movement of the leaching solution from the well field during operations. Other commenters stated that there is a need for additional checks and balances on monitoring, and suggested the use of a third party to monitor and gather baseline ground water data so that local residents could be reassured that their water quality is not being impacted. A commenter also recommended that sampling requirements be established for monitoring oxidation-reduction conditions in the ore-bearing aquifer before, during, and after ISL operations.

2.2.21 Regulations and Guidance

A number of comments were provided that pertained to regulatory topics, including: comments on existing regulations, agencies involved in regulating uranium recovery facilities, existing guidance and practice, agreement state issues, and rulemaking activities.

Some commenters suggested that existing regulations and guidance are either outdated or should be improved and provided recommendations for making revisions. These included a suggestion to revise 10 CFR Part 40 and to proceed with a 10 CFR Part 41 rulemaking to address issues such as requirements for compliance location, ground water monitoring, compliance demonstration, surety, limiting excursions, remediation following excursion, and establishing pre-operational baseline ground water conditions. Other commenters recommended similar changes to regulations, but focused on single areas of interest such as monitoring, baseline conditions, or restoration. One commenter noted that the GEIS should clarify how any new ISL ground water restoration standards and the existing 10 CFR Part 40 will meet the Uranium Mill Tailings Radiation Control Act and 40 CFR Part 192 for a demonstration of how onsite or offsite water resources will be protected. Another commenter recommended that climate change be added to updated regulations, including consideration of impacts to ISL facilities from increases in storm events, changes in precipitation, and consideration of "carbon footprint" issues. One commenter expressed the opinion that current environmental standards for air, water, soil and waste are adequate.

A few commenters expressed confusion regarding the authorities and responsibilities of various local, state, and federal regulatory agencies in regulating uranium recovery facilities. They recommended that the GEIS clarify the roles of each agency. A few commenters asked who would be responsible for providing clean water to communities if ground water is contaminated by ISL operations and who would be responsible for the clean up of contamination once operations stopped. Another commenter recommended that the GEIS recognize the U.S. EPA role in regulating aspects of uranium extraction activities, including underground injection control. A commenter recommended that the GEIS include procedures for how licensing actions that span two states are addressed.

Others provided comments on existing regulatory guidance or practices. One commenter requested NRC identify and remedy any past regulatory assumptions or practices that have contributed to adverse environmental impacts from uranium recovery activities. A number of commenters expressed the opinion that the 1980 GEIS on conventional uranium milling was out of date and needed to be revised. Detailed suggestions were provided by a few commenters on how NRC should revise the 1980 GEIS, including using documents identified by the commenters in any update to that GEIS. Another commenter recommended that NRC amend its environmental justice policy to require a supplemental environmental impact statement

analyzing environmental justice in every instance where an ISL operation is proposed in or near an environmental justice community. The commenter felt that this would to ensure that environmental justice is considered when a site-specific environmental assessment was prepared. One commenter stated that NRC's guidance concerning the disposal of certain materials in a conventional uranium mill's tailings impoundment was not final nor enforceable, because the definition of "ore" in the guidance was too broad and allowed particular materials that were not similar to uranium ore or tailings to be disposed in the impoundment.

Additional comments provided recommendations to change past or current regulatory practices. One commenter suggested the NRC position that pre-1978 tailings are outside the authority of the Uranium Mill Tailings Radiation Control Act should be clarified, perhaps by a rulemaking on conventional milling standards. Another commenter suggested the NRC policy of performance-based licensing has evolved into industry self-regulation (e.g., allowing major changes without appropriate oversight) and that the policy needed to be reconsidered. One commenter stated that the NRC practice of characterizing radiation from conventional mine waste on or near an ISL site as background radiation for the purpose of calculating ISL operational air impacts violates the plain language and intent of NRC regulations and ignores cumulative impacts from past and current milling activities. Another commenter recommended that NRC address problems with its fee-based regulatory structure. One commenter suggested that radiation dose standards be set for the most vulnerable individuals (e.g., women and children), while another mentioned that "reference man" standard used in the dose calculation was not representative of most people in New Mexico. Regarding the practice of limiting the number of waste sites by disposing of ISL wastes in existing conventional mill tailings impoundments, one commenter recommended that if such sites are not available, NRC should allow ISL sites to join together to construct a common 11e.(2) byproduct material disposal site that meets 10 CFR Part 40, Appendix A requirements. Another commenter recommended establishing laws and penalties for a licensee's corruption.

A few commenters expressed concerns regarding how NRC agreement states might be impacted by publication of the GEIS. One recommended that NRC recognize the effectiveness of non-agreement state regulations and recommended that NRC enter into a memorandum of understanding with non-agreement states so as to limit dual regulation of ISL facilities.

2.2.22 National Environmental Policy Act

A number of commenters expressed opinions about the GEIS in the context of the intent and requirements of the National Environmental Policy Act (NEPA). One commenter recommended that NRC explain how a GEIS meets the requirements of NEPA, which requires a site-specific analysis considering local impacts, mitigation measures, and public participation. The commenter further requested that NRC discuss examples of other GEIS's. Another commenter suggested that since the licensing of an ISL facility was a major federal action, an environmental impact statement was required. Other commenters claimed that the GEIS was inconsistent with the intent of NEPA, noting that a GEIS is similar to a programmatic environmental impact statement, which is only applicable to broad and similar actions. Another commenter noted that the GEIS is applicable due to similarities among ISL recovery processes among sites, and still another suggested the GEIS would allow consideration of redundant issues in ISL licensing.

One commenter suggested that NRC's approach in applying a generic, and therefore abstract, approach to the analysis of environmental impacts in the GEIS fails to meet the required "hard look" standard in NEPA concerning the review of individual licensing actions and their potential

impacts. Another commenter claimed the language of the scoping notice that indicated NRC's intent to tier site-specific environmental assessments (EAs) to the GEIS actually pre-determined the outcome of the NEPA process (i.e., an EA and finding of no significant impact) and therefore indicates NRC's intent to avoid preparing site-specific environmental impact statements (EISs). Still another commenter recommended that NRC use tiering to examine program level decisions and apply the "hard look" review to site-specific actions, preparing an EA or EIS as necessary and allowing public participation in either case. One commenter recommended that the GEIS include the levels of coordination, analysis, and public outreach required for completion of the NEPA process for individual licensing decisions.

One commenter mentioned that NRC had not listed a number of potentially related actions to the GEIS in the scoping notice, and thus being inconsistent with an open decision-making process. The actions identified by the commenter included various uranium recovery rulemakings; the perceived "blanket approval" of pending ISL license applications and conventional mill restarts; and the establishment of a national radioactive source tracking system. Other commenters stated that the GEIS was unlawful in the context of NEPA, because the description of the proposed action in NRC's scoping notice failed to identify the specific licensing actions or rulemakings at issue, and therefore the proposed action to be evaluated was not clear.

2.2.23 Credibility of NRC

Some commenters questioned the credibility of NRC in its regulation of uranium milling, its execution of the scoping process, and in publishing a GEIS.

Some commenters mentioned that the way in which the scoping meetings were announced, it appeared that NRC was not interested in seeking public comment in good faith (e.g., "hoped no one would notice"). Another mentioned the NRC decision to develop a GEIS without public comment suggested that NRC was indifferent to the communities most affected by the decision. A number of other commenters claimed that NRC was more concerned about satisfying the uranium milling industry or lobbyists (one referred to NRC as "corporate lapdogs"). Several other commenters suggested that since NRC has failed to enforce regulations to ensure safety in the past, it could not be trusted for ensuring safety now.

2.2.24 Miscellaneous

A number of comments conveyed either general support for or opposition to the GEIS, to uranium milling, to nuclear power, to nuclear weapons, and to alternative energy sources.

3. SCOPE OF GEIS AND SUMMARY OF ISSUES TO BE ADDRESSED

The scoping process and the comments received during the public scoping period for the GEIS were used by NRC to aid in determining the scope of the GEIS. The following topical areas and issues will be analyzed in the GEIS:

- *Proposed Action and Alternatives.* The proposed action for the GEIS is the construction, operation, and decommissioning of and ground water restoration at ISL uranium milling facilities in regions of four western states where NRC is the licensing authority for uranium milling. These four states are Nebraska, South Dakota, Wyoming, and New Mexico. The boundaries of the regions were based on the presence of (1) uranium ore amenable to the ISL process, (2) ISL facilities previously licensed by NRC, and (3) potential future ISL facilities as identified to NRC by uranium milling companies. The GEIS will also address the no-action alternative to the proposed action. The no-action alternative is to not license additional ISL facilities in the identified milling regions.

- *Applicable Statutes, Regulations and Agencies.* Various applicable statutes, regulations, and implementing agencies at the federal, state, and local levels involved in regulating ISL facilities will be identified and discussed in the GEIS. The roles of the various agencies involved in ISL regulation will also be described.

- *Purpose of the GEIS and Use in Site-Specific Licensing Reviews.* The GEIS will provide a statement of purpose and include a description of the NRC licensing process and how NRC intends to use the GEIS to aid in its evaluation of potential environmental impacts in site-specific licensing reviews.

- *Opportunities for Public Involvement.* As part of the description of the NRC licensing process, the GEIS will include description of opportunities for public involvement in site-specific ISL reviews.

- *Applicable Rulemaking Activities.* The GEIS will be based on the existing regulations in effect at the time the GEIS is written. As appropriate, any applicable ongoing or planned rulemaking activities applicable to ISL facility licensing will be described.

- *Land Use.* The GEIS will discuss the potential impacts to existing land uses in the ISL milling regions associated with the construction, operation, decommissioning, and ground water restoration of ISL facilities. This will include potential impacts to ranching, grazing, recreation, industrial, and cultural activities.

- *Transportation.* The GEIS will discuss potential radiological and non-radiological impacts from ISL transportation activities during construction, operation, ground water restoration, and decommissioning. This includes shipment of supplies, yellowcake product, and wastes associated with each phase of the ISL facility lifecycle. Normal transportation and accident conditions will be considered. Potential non-radiological impacts to be evaluated include dust generation and impacts to infrastructure, such as roads and local traffic conditions. Potential radiological impacts considered will include direct radiation and potential release of radioactive material from accidents during shipment.

- *Geology and Soils.* The GEIS will describe the geology and the soils of the ISL milling regions. These descriptions will be used in support of the evaluation of potential impacts to surface and ground water from ISL activities. The GEIS will also address the potential impacts to the geology and soils from the different phases of the ISL facility's lifecycle.

- *Water Resources.* Potential impacts to surface water, wetlands, and ground water from construction, operation, ground water restoration and decommissioning will be assessed in the GEIS. The potential for ground water impacts, in particular, is noted as a key concern that historically has been a key area of focus in ISL licensing. The GEIS will address the potential impacts to surface and ground water quality and availability in the vicinity of an ISL facility, and this will include discussion of the requirements for and the process of operational ground water monitoring, the management of liquid wastes from the ISL process, and the methods used in ground water restoration.

- *Ecology.* The GEIS will assess the potential impacts of proposed ISL facility operations, construction, decommissioning and ground water restoration to ecology in the ISL milling regions. This will include consideration of potential impacts to terrestrial, aquatic, and threatened and endangered species from all phases of the ISL facility lifecycle.

- *Meteorology, Climatology, and Air Quality.* The GEIS will consider the potential impacts of proposed ISL facility construction, operations, ground water restoration, and decommissioning to local and regional air quality from both radiological and non-radiological emissions. Radiological emissions will include radon from well field, processing, and waste treatment operations and the potential for uranium particulate emissions from yellowcake drying operations. Non-radiological emissions include combustion engine exhausts from trucking and well drilling operations and fugitive dusts from a variety of activities.

- *Noise.* Potential noise impacts from proposed ISL facility construction, operations, ground water restoration, and decommissioning will be assessed in the GEIS. This includes noise from well field development, uranium processing activities, and trucking activities associated with all phases of the ISL facility lifecycle.

- *Historic and Cultural Resources.* The GEIS will discuss potential impacts from proposed ISL facility construction, operations, ground water restoration, and decommissioning to historical and cultural resources. Local and regional historic and cultural properties in ISL milling regions will be addressed. The process for consultations concerning historic and cultural resources will be discussed in the GEIS.

- *Visual Resources.* Potential impacts to visual resources in uranium milling regions from proposed ISL facility construction, operations, ground water restoration, and decommissioning will be assessed in the GEIS. Assessments will consider scenic vistas and how the ISL facility lifecycle could impact these resources.

- *Socioeconomics.* The GEIS will address the potential impacts of proposed ISL facility construction, operations, ground water restoration, and decommissioning to socioeconomic conditions in uranium milling regions. Local and regional characteristics pertaining to demographics, income, housing, employment, finances, and education will be considered.

- *Public and Occupational Health.* Potential impacts to public and occupational health from proposed ISL facility construction, operations, ground water restoration, and decommissioning will be assessed in the GEIS. This assessment will include both non-radiological (including chemical) and radiological effluents and releases under normal (routine) and accident conditions.

- *Waste Management.* The GEIS will consider impacts from waste management activities of proposed ISL facility construction, operations, ground water restoration, and decommissioning. Generation, handling, treatment, and disposal of process-related wastes and municipal wastes will be addressed.

- *Ground Water Restoration.* The restoration of the uranium ore-bearing ground water aquifer(s) following operations will be assessed in the GEIS. Hydrologic conditions in uranium milling regions will be considered as well as available restoration technologies and methods. Available data from aquifer restoration efforts at past and current ISL sites will inform the analysis. A discussion of regulatory requirements and the roles of various federal, state, and local agencies regarding ground water restoration will also be included in the GEIS.

- *Decontamination, Decommissioning, and Reclamation.* The GEIS will assess the potential impacts to the environment following the end of ISL operations, including removal of facilities and equipment, disposal of waste materials, cleanup of contaminated areas, and reclamation of lands to their pre-ISL facility condition.

- *Accidents.* Potential accident conditions will be addressed in the GEIS. This will include consideration of a range of possible accidents and estimation of their consequences, including: well field leaks and spills, excursions of the leaching solution beyond the well field, processing chemical spills, and ion exchange resin and yellowcake transportation accidents.

- *Environmental Justice.* The GEIS will discuss the potential for disproportionately high and adverse impacts on minority and low income populations from future ISL licensing in the uranium milling regions.

- *Cumulative Impacts.* The GEIS will discuss the cumulative impact of adding the potential environmental impacts from proposed ISL facility construction, operations, ground water restoration, and decommissioning to other past, present, and reasonably foreseeable future actions in the uranium milling regions.

- *Monitoring.* The GEIS will discuss various monitoring requirements and techniques used to detect and mitigate the spread of radiological and non-radiological contaminants beyond boundaries of the ISL facility.

- *Financial Assurance.* The GEIS will describe the requirements and practices designed to ensure that companies engaged in ISL uranium recovery will have sufficient funds set aside to close down operations, restore affected ground water, decontaminate and decommission facilities and reclaim lands.

4. ISSUES CONSIDERED OUTSIDE THE SCOPE OF THE GEIS

Some issues and concerns raised during the scoping process were not directly related to the assessment in the GEIS of potential environmental impacts from the ISL process, and for that reason, these issues and concerns will not be specifically addressed in the GEIS. However, the lack of in-depth discussion in the GEIS does not mean that an issue or concern lacks value. Issues beyond the scope of the GEIS either may not yet be ripe for resolution or are more appropriately discussed and decided in other venues.

Categories of issues outside the scope and therefore not analyzed in detail in the GEIS include:

- NRC's licensing process and the decision to prepare the GEIS
- General support or opposition for GEIS or uranium milling
- Requests for cooperation or agreements
- Matters that are regulated by agreement states
- Impacts associated with conventional uranium milling past or present
- Requests for compensation for past mining impacts
- Recommendations for changes to regulations or guidance
- Resolution of dual regulation issues
- Consideration of human induced climate change
- Analysis of all variations of ISL technology
- Alternate sources of uranium feed material
- Energy debate
- Expanded cumulative impact analysis
- NRC credibility

4.1 NRC's Licensing Process and the Decision to Prepare the GEIS

A number of commenters raised issues that involved NRC's process for licensing ISL milling facilities and NRC's decision to prepare the GEIS. These issues included (1) concerns about the lack of public input in the decision to prepare the GEIS; (2) comments on the scoping process for the GEIS that included the location and number of public meetings, the comment period duration, and the notice for the meetings; and (3) recommendations for types of analyses be done instead of the GEIS (e.g., an evaluation of deficiencies in the ISL licensing process, an evaluation of ISL milling performance and compliance by an independent third party).

NRC considers feedback on the scoping process important and made efforts to respond to public concerns by extending the public comment period several times and by adding a third public scoping meeting. NRC did not request public comment on the need for a GEIS, because NRC considers this to be an internal agency decision. The NRC staff was directed by the Commission to prepare the GEIS. Given the large number of expected ISL license applications, the NRC determined that the preparation of a generic EIS (other federal agencies use the term "programmatic EIS") was the most efficient use of agency resources. Additionally, while other types of analyses may be informative, NRC considers the GEIS to be the appropriate NEPA document to be prepared at this time.

4.2 General Support for or Opposition to the GEIS or to Uranium Milling

Some commenters stated general support for or opposition to the GEIS or to uranium milling activities in general. These types of comments are useful for understanding public opinions on the GEIS, but by themselves, do not impact the scope of the document.

4.3 Requests for Cooperation or Agreements

Some commenters representing federal or state agencies expressed requests for cooperation or specific cooperative agreements regarding the regulation of ISL facilities. These types of requests will be considered and addressed, as necessary, by NRC on a case-by-case basis. These are separate actions that do not relate to the scope of the GEIS.

4.4 ISL Licensing Regulated by NRC Agreement States

A number of comments were received pertaining to current or future uranium milling activities in NRC agreement states. These included requests that potential future ISL milling in states such as Colorado, Utah, and Texas be addressed in the GEIS. ISL licensing actions in NRC agreement states are outside the scope of the GEIS, because the licensing authority for such actions is the agreement state, and the purpose of the GEIS is to support NRC's licensing review for ISL facilities. This point will be further clarified in the GEIS.

4.5 Impacts Associated with Conventional Uranium Milling Past or Present

A number of commenters addressed conventional uranium milling topics. These topics included: (1) the GEIS on conventional milling (NRC,1980), (2) the legacy of past conventional milling activities, and (3) conventional mill waste management practices.

Because the need for the GEIS is to address NRC's licensing reviews for ISL facilities, topics related to conventional milling will not be addressed in the GEIS. The legacy of past conventional uranium milling will be identified in terms of cumulative impacts in the GEIS; however, a detailed cumulative impacts analysis is a site-specific evaluation.

4.6 Requests for Compensation for Past Milling Impacts

Some scoping comments requested the issue of compensation for past uranium milling impacts be addressed in the GEIS, including injured workers involved in uranium milling prior to 1971 and Navajo workers and families. Such compensations claims are outside the purpose and scope of the GEIS.

4.7 Recommendations for Changes to Regulations or Guidance

A number of commenters recommended changes to existing regulations or guidance. Public input on changes to regulations or guidance are outside the scope of the GEIS and are addressed in other NRC forums, such as comment periods associated with proposed rules and draft guidance documents or petitions for rulemaking.

4.8 Resolution of Dual Regulation Issues

Some scoping comments requested NRC resolve issues related to dual regulation of ISL recovery well fields. The GEIS will be based on the current regulations, authorities, and practices. Changes to regulatory jurisdiction or practice are addressed by other means and are outside the scope of the GEIS.

4.9 Consideration of Human-Induced Climate Change

One comment suggested NRC should include climate change in the GEIS. Natural climate variation is within the scope of the GEIS to the degree that it applies to the potential environmental impacts of the ISL facility lifecycle. Human-induced climate change is not considered in the GEIS because of the imprecise state of the science for making human-induced climate predictions and the relatively short time frame of the ISL facility lifecycle.

4.10 Analysis of All Variations of ISL Technology

One comment recommended that the GEIS assess impacts from each type of ISL technology. For practical reasons, the GEIS will emphasize commonly used technologies (including some variants) but all possible variants of ISL technology will not be addressed. Proposals to use technologies not addressed in the GEIS will be evaluated by NRC in a site-specific licensing review.

4.11 Alternate Sources of Uranium Feed Material

Some commenters suggested various options for alternative sources for uranium feed material, including reprocessing spent fuel from nuclear power plants, recovery of uranium from drinking water treatment residuals, extraction of uranium from sea water, and use of government stockpiles of uranium.

These alternatives are considered outside the scope of the GEIS, because the GEIS is focused on ISL facility licensing and is not intended to address the broader issues of how to meet the US demand for uranium or what sources of uranium should be used.

4.12 Energy Debate

Some commenters focused on the broader energy debate, including support for or opposition to nuclear energy, and suggestions to promote renewable energy sources, such as wind, solar, and tidal energy. The GEIS is focused on ISL facility licensing and is not intended to address the broader issues of what source of energy should be pursued.

4.13 Expanded Cumulative Impact Analysis

Another commenter suggested the scope of the cumulative impact analysis in the GEIS should include: nuclear testing, nuclear war, disposal of warheads, nuclear winter, proliferation, pre-emptive war, terrorist diversion, use of weapons in foreign conflicts, nuclear power and associated radioactive waste disposal, and mishandling of materials by other countries. These concerns are outside the scope of the GEIS, because they deal with topics unrelated to uranium recovery and to NRC's licensing reviews of ISL license applications.

4.14 NRC Credibility

Scoping comments that questioned NRC credibility are considered important and taken seriously by the staff. Therefore, these comments are incorporated into the GEIS in the documentation of concerns raised during the scoping period. However, the comments do not change the scope or content of the GEIS.

5. REFERENCES

NRC. NUREG-0706, Vol. 1, "Final Generic Environmental Impact Statement on Uranium Milling." Washington DC: NRC. September, 1980.

NRC. NUREG-1748. "Environmental Review Guidance for Licensing Actions Associated with Office of Nuclear Material Safety and Safeguards (NMSS) Programs, Final Report." Washington DC: NRC. August, 2003.

Table 1. Classification of Scoping Comments

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Marilyn Musgrave, United States House of Representatives, Colorado's Fourth Congressional District	X	X	X			X	X	X																
Jason Johnson, Governor, Pueblo of Acoma					X																			
Bill Richardson, Governor of New Mexico	X	X	X		X				X													X		
Lynda Lovejoy, District 22 State Senator New Mexico	X	X	X	X	X	X	X		X		X	X												X
Anne Norton Miller, United States Environmental Protection Agency	X	X	X	X	X	X				X		X	X	X	X		X	X	X	X	X			
Mike Stempel, Department of the Interior, Fish and Wildlife Service						X	X	X																X
Robert Specht, Department of Interior, Bureau of Land Management						X	X															X		X
Omar Bradley, Department of the Interior, Bureau of Indian Affairs Regional Director, Navajo Region	X	X	X		X	X		X			X		X	X	X			X	X					
Connie Young-Dubovsky, NEPA Coordinator Region 6																								X
Conrad Spangler, Commonwealth of Virginia, Department of Mines, Minerals and Energy, Division of Mineral Mining	X																							X

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Matthew Wunder, State of Mexico Department of Fish and Game	X					X	X	X	X						X									
Richard A. Chancellor, State of Wyoming, Department of Environmental Quality		X				X					X							X			X			X
John Etchepare, Wyoming Department of Agriculture							X	X				X			X				X					
Martha Rudolph, Colorado Department of Public Health and Enviornment	X		X	X		X						X			X									X
David Taylor, Navajo Nation Department of Justice	X	X		X	X	X	X		X			X	X	X										X
Eric D. Jantz, New Mexico Environmental Law Center on behalf of: Eastern Navajo Dine Against Uranium Mining, Southwest Research and Information Center, Bluewater Valley Downstream Alliance and the Haaku Water Office of the Acoma Pueblo	X		X			X		X	X			X	X	X					X			X	X	X
James W. Zion, on behalf of National Indian Youth Council and The Forgotten People													X											
Benjamin A. House, Eastern Navajo Allottee Association	X																							X
Leona Morgan, ENDAUM					X																			

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Eastern Navajo Dine Against Uranium Mining, Concerned Citizens of Tiistsooz Nideeshgizh and Southwest Research and Information Center					X																			
Rita Whitehorse Larson, Navajo Nation Environmental Protection Agency	X			X	X	X	X	X	X		X		X			X								
David Schneck, San Miguel County, CO-Environmental Health Director																						X		
Kelly B. Dennis, Crook County Land Use Planning and Zone Commission						X									X									
Michael Daly, McKinley County Water Board					X	X						X					X							
Katie Sweeney, National Mining Association	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X
Steven C. Borell, Alaska Miners Association	X					X	X														X	X		X
Marion Loomis, Wyoming Mining Association	X	X	X																		X			X
Elizabeth Cumberland, South Texas Opposes Pollution			X			X																X		
Carol Geiger, Public Citizen-Texas Office			X																			X		
Geoffrey H. Fettus, Natural Resources Defense Council	X		X	X	X	X	X		X		X	X	X	X								X	X	

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Chad Kamard, Colorado Environmental Coalition	X		X	X	X	X	X		X		X	X	X	X								X	X	
William J. Snape III, Center for Biological Diversity	X		X	X	X	X	X		X		X	X	X	X								X	X	
Ryan Demmy Bidwell, Colorado Wild	X		X	X	X	X	X		X		X	X	X	X								X	X	
Megan Corrigan, Center for Native Ecosystems	X		X	X	X	X	X		X		X	X	X	X								X	X	
Dusty Horwitt, Environmental Working Group	X		X	X	X	X	X		X		X	X	X	X								X	X	
Jim Riccio, Greenpeace	X		X	X	X	X	X		X		X	X	X	X								X	X	
Richard A. Parrish, Southern Environmental Law Center	X		X	X	X	X	X		X		X	X	X	X								X	X	
Betsy Loyless, National Audubon Society	X		X	X	X	X	X		X		X	X	X	X								X	X	
Mike Petersen, The Lands Council	X		X	X	X	X	X		X		X	X	X	X								X	X	
Velma Smith, National Environmental Trust	X		X	X	X	X	X		X		X	X	X	X								X	X	
Nada Culver, The Wilderness Society	X		X	X	X	X	X		X		X	X	X	X								X	X	
Tyson Slocum, Public Citizen's Energy Program	X		X	X	X	X	X		X		X	X	X	X								X	X	
Anna Aurilio, U.S. Public Interest Research Group	X		X	X	X	X	X		X		X	X	X	X								X	X	
Dave Hamilton, Sierra Club	X		X	X	X	X	X		X		X	X	X	X								X	X	
Cyrus Reed, Sierra Club-Lone Star Chapter	X		X	X		X	X	X																

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Post '71 Exposure Committee				X	X	X																	X	
Rebecca A. Miller, MWH Americas, Inc.	X					X																		
Cecilia Ann Miller, One Sisters of Providence						X																		
James G. Martinez, Juan Tafoya Land Grant Corp.																								X
Donna Jackson, Top End Aboriginal Conservation Alliance	X		X	X	X	X		X	X										X					
Shirley McNall, San Juan Citizens Alliance			X	X		X	X			X	X		X											X
Nancy Hilding, Prairie Hills Audubon Society		X	X		X	X				X	X	X	X		X	X	X	X	X	X	X			
Jihan R. Gearon, Indigenous Environmental Network Native Energy and Climate Campaign					X																			
Travis Stills, Energy Minerals Law Center	X	X	X	X	X				X						X		X				X	X	X	X
Oscar Paulson, Kennecott Uranium Company	X	X	X			X	X	X		X	X	X	X			X		X	X		X			X
Steven H. Brown, CHP	X		X	X					X	X	X													X
Robert Tohe, Sierra Club Environmental Justice			X	X		X	X	X	X		X								X					
George Byers, Neutron Energy Inc.						X																		X

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Michael Jensen, Amigos Bravos	X	X	X	X	X																			
Sister Rose Marie Cecchini, Office of Peace, Justice and Creation Stewardship	X			X	X	X			X		X		X											X
Paul Gunter, Beyond Nuclear			X																			X	X	
Mary Varson Cromer, Southern Environmental Law Center	X																							X
JK August, Core Inc.										X		X								X	X			X
Kay Cumbow, Citizens for Alternatives to Chemical Contamination	X		X						X			X	X					X				X		
Jill Morrison, Powder River Basin Resource Council	X	X			X	X	X	X	X	X	X	X	X		X	X	X	X			X	X		X
Geoffrey Fettus, Natural Resources Defense Council	X		X			X							X				X							
Steve Cone, Electors Concerned about Animas Water	X	X	X			X	X	X	X														X	X
Don Steuter, Sierra Club-Grand Canyon Chapter			X			X			X													X		
Donna Wichers, Energy Metals Corporation																						X		X
Glen Catchpole, Uranerz	X								X															X
Wayne Heili, Ur-Energy USA Inc.	X																							X
Geoffrey Fettus and Christopher E. Paine, Natural	X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	X	X

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Resources Defense Council																								
Sarah Fields, Sierra Club-Glen Canyon Group	X	X	X	X		X	X		X									X				X	X	X
Sharyn Cunningham, Colorado Citizens Against Toxic Waste, Inc.	X		X	X		X	X				X											X		
Rebecca A. Miller																								X
Donna Hoffman			X			X																X		
Lindsey Reed			X																			X		
Rose Sparkman				X		X							X							X	X			
Philip V. Egidi	X	X		X		X					X	X	X		X			X	X		X			
Harold One Feather		X	X	X	X	X				X							X			X	X			X
Karen B. Maute	X		X																					
Cole Crocker-Bedford						X																		X
Dick Artley	X								X													X		
Charles Jacobs																								X
Marcus Higi					X	X																		
Mary Ann Gutzwiller																		X						
Teresa Bessett			X																					
Penny Lynn and James E. Dunn																								X
Gerard Rohlf											X													
Tami Rund						X																		

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Lydia Perry											X													
Patricia Layden																								X
Charles Gillard												X	X											
Elizabeth Barger						X																		
Mallory Sanders																								X
Ian Cree			X			X																		X
Betty Walters						X																		
Kunda Lee Wicce																								X
Sharon Young						X																		
Rochelle Becker			X																					
Mary Barreda						X																		
Ward Hodge			X															X						
Rose Chilcoat												X										X		
Emilie Pechuzal						X					X													
Larry Bernard						X																		
Jade Lai																		X						X
Joan Parr									X															X
Nancy Freeman						X			X															
Nancy Florsheim			X			X																		
K Dixon					X	X																		
Mel Langdon	X		X																			X		

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Dusty Miller																						X		
Rosemary Blandchard, California State University Sacramento			X		X	X																		X
Nathan Smith						X			X															
JG McCue			X																				X	X
Jim M									X															
Ellen Heath																								X
Teresa Foster and Steven Jakobs	X					X	X		X												X			
Joanne Barstow									X															
Paul Rizzo	X			X					X															
Jeffrey Means		X									X													
Robyn Jackson					X																			
Natalia Yazzie					X																			
Roland Begay					X																			
Shannon Rawls					X																			
Ambrose Teasyatwho					X																			
William L. Dam	X		X	X		X			X	X							X	X						
Hazel James			X	X		X	X	X	X		X								X					
Sharon Gross									X															
Teo Saenz						X			X		X													X
Perry H. Rahn						X					X													

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
B. Geary			X						X															
Elizabeth Hudetz						X																		
Randy Brich	X																							X
Paul James Poppe	X		X			X	X		X															
Jerry Ellinghuysen	X		X						X															
Philip Barr	X					X			X															
Paula Gottlieb			X						X															
Jake Culver																								X
Karen Lee-Thompson			X										X											
Mary Beath and Christopher French	X			X	X				X				X	X						X				
Randy Kind and Robin Davis						X																		
Robert John Pennyfather	X					X			X															X
D. Viggiano						X																		
Jeffrey Christian																							X	X
William Gross, University of New Mexico	X		X			X			X															X
Arnold Frogel	X					X																		
John Allison	X																							
Carl Hansen	X		X			X	X					X		X										
Catherine Ralston			X																					
Nancy Seewald			X																					

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Sue Small			X			X							X											
Tom Budlong	X		X			X																X		X
Patricia L. Kutzner	X		X			X			X															
Gladys Brodie					X																			
David Wyatt	X		X		X	X																		
Sally Greywolf																								X
Wendell Harris						X																		
Ian Ford						X						X	X											
Sidney J. Goodman			X																					
Sheldon Chee, St. Michael High School	X				X	X																		
Teddy Nez			X	X	X				X			X		X										
Allison Clough				X	X		X				X			X	X									X
Denise Arthur						X	X																	
Douglas Stambler, Western Coalition for Sustainable Living	X																							X
Various Individuals and Entities, 1246 Form Letters	X	X	X			X	X		X			X		X								X		X

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Casper, Wyoming Scoping Meeting																								
Nancy Hunter on behalf of Marilyn Musgrave, House of Representatives, Colorado's Fourth Congressional District						X																		
Richard A. Chancellor, State of Wyoming, Department of Environmental Quality						X															X			X
Wayne Heili, Ur-Energy USA Inc.	X								X															X
Suzanne Lewis, Biodiversity Conservation Alliance	X		X	X		X			X					X					X					
Donna Wichers, Energy Metals Corporation	X																							X
Mike O' Brien, Cook County Land Use and Zoning Commission						X											X			X				
Glen Catchpole, Uranerz Energy Corporation	X	X									X													
Jill Morrison, Powder River Basin Resource Council	X	X	X	X		X	X	X									X			X	X			X
Marion Loomis, Wyoming Mining Association	X								X															X
Linda Layman										X														X
Echo Moore-Klaproth						X	X								X									
Dustin Bleizeffer, Casper Star Tribune			X						X															
Deidre Elder						X														X				

Table 1. Classification of Scoping Comments (continued)

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Bill Kunerth						X												X						
Enoch Baumgardner															X									X
Albuquerque, New Mexico Scoping Meeting																								
David Ulibarri, New Mexico State Senator										X														X
Sandy Brewer, Bluewater Valley Downstream Alliance	X					X			X															
George Byers, Neutron Energy Inc.	X		X						X	X		X												
Ernest Becenti, McKinley County Commissioner	X																							X
Paul Robinson, Southwest Research and Information Center	X	X	X	X		X			X											X	X			
Cassandra Bloedel, Navajo Nation Environmental Protection Agency				X	X	X															X			X
Robert Tohe, Sierra Club	X	X	X		X	X	X		X															
Alvin Rafelito, National Indian Council on Aging	X			X		X														X	X			
Loren Setlow, US Environmental Protection Agency			X	X	X	X					X	X	X	X				X						
James Martinez, Juan Tafoya Land Grant Corp.						X																		

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Jerry Slim, Eastern Navajo Allottee Association	X											X												X
Mel Stairs, Independent Miner										X										X	X			
Tomi Jill Folk, Hunger Grow Away						X	X																	
Mike Bowen, New Mexico Mining Association	X																							X
Rosamund Evans		X	X	X		X						X												
Cynthia Ardito, INTERA, Inc.	X																							X
Floy Barret, Staffer for Governor Richardson	X	X	X		X																X			
Chris Shuey	X		X		X	X	X		X														X	X
Eric D. Jantz, New Mexico Environmental Law Center	X	X	X		X	X	X	X	X				X	X										
Joni Arends, Concerned Citizens for Nuclear Safety		X	X			X														X	X			X
Michael Jensen, Amigos Bravos				X								X												X
Ruth Armijo, Juan Tafoya Land Grant Corp.																								X
Melvin Capitan, HRI Energy					X																			X
Rosemary Blanchard, on behalf of Nation Indian Youth Council			X			X							X											X
Benjamin A. House, Eastern Navajo Allottee Association	X				X		X					X												X
Danny Charley, Allottee				X								X												X

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Steve Cabaniss						X																	X	
Paul Frye, Navajo Nation Attorney General's Office	X			X	X	X	X	X	X		X	X	X					X					X	
Leona Morgan, ENDAUM	X	X		X	X	X	X	X	X				X	X				X						X
Hildegarde Adams					X																			X
Shrayas Jatkar, Center for Economic Justice	X					X							X					X	X					X
Laura Watchempino, Pueblo Acoma					X	X							X	X								X		
Esther Yazzie-Lewis						X																		X
Annie Sorrell, Crownpoint Allottee					X	X						X												X
Anna Frazier, Dine CARE	X	X	X	X	X	X											X							
Amadeo Martinez, Juan Tafoya Land Grant Corp.	X					X	X	X																X
Jim Greenslade						X				X		X												X
Gallup, New Mexico Scoping Meeting																								
George Arthur, Navajo Nation Council					X																			X
Joe Murrietta, Mayor of the City of Grants												X												
Danny Charley, Allottee					X	X						X											X	X
Jay Charley																								X
Rick Van Horn, HRI	X			X					X															X

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	Decommissioning and Waste Management	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
George Byers, Neutron Energy Inc.				X		X	X	X				X												
Cal Curley on behalf of Congressman Tom Udall				X	X	X				X				X						X				
Larry King	X				X	X							X											
Stephen Etsitty, Navajo Nation Environmental Protection Agency			X	X	X	X			X				X					X						X
James Martinez, Puerta Villa Land Corp.	X											X												X
Benjamin A. House, Eastern Navajo Allottee Association	X				X					X								X						
Chee Smith Jr., ENDAUM board					X	X								X										
Art Gebeau, Blue Water Valley Down Stream Alliance						X														X				X
Rhilla Vasquez, Blue Water Down Stream Alliance	X					X																		X
Jay Tonny Bowman					X							X												X
Chuck Wade																		X						
Teddy Nez						X																		X
Derrith Watchman–Moore, State of New Mexico, Office of Governor Bill Richardson and the New Mexico Environment Department		X	X		X				X					X										
Annie Sorrell, Crownpoint Allottee												X												

Table 1. Classification of Scoping Comments (continued)

Commenter and Affiliation (if given)	Need for GEIS and Scope	Scoping Process	Public Involvement	History and Legacy of Uranium	Native American Concerns	Groundwater and Surface Water	Land Use	Ecology	Site-specific Analyses	Operational Safety and Emergency Response	*Decommissioning and Waste Management*	Socioeconomics	Environmental Justice	Historic and Cultural Resources	Transportation	Visual Impacts and Noise	Surety	Alternatives Considered	Cumulative Impacts	Monitoring Programs	Regulations and Guidance	NEPA	Credibility of NRC	Miscellaneous
Michael Daly, McKinley County Water Board						X																		
Eric Jantz, New Mexico Environmental Law Center					X	X																		
Jerry Pohl, Cebolleta Land Grant						X						X												
Terry Fletcher, New Mexico Mining Association President	X											X												X
Rose Marie Cocchini, Office of Peace, Justice, and Creations Stewardship for the Diocese of Gallup				X		X	X	X										X						
Melvin Capitan, HRI Energy	X				X							X												X
Sarah Nemio-Adeky, Eastern Navajo Agency Allottee					X		X							X										
Chris Kenny					X													X						
Phil Harrison, Navajo Nation Council Red Valley co-chapter					X																			X
Leona Morgan, ENDAUM				X	X		X		X					X				X						
Linda Evers, Post 71 Uranium Committee						X																	X	X

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail

Aaron Frank	Abels Kevin	Abraham Eric	Adamson William
Adelsman Stephen	Aderhold Steven	Adkisson Holly	Aeschliman Daniel
Alderson Steven	Alfred Lynda	Alinement Internatural	Almazan Annette
Alonso Raquel	Altman Tim	Alvarado Greta	Alvarez Ana
Anderholm Jon	Anderson M	Anulis Inga	Aranguren Ana Belen
Arcure Barbara	Arena Eileen	Arenas Bianca	Arenas Mauricio
Arevalo Eric	Argani Sholey	Armstrong Alice	Armstrong James
Arnold Marge	Arribas Raul	Arrigo Diane D	Asselin Neil
Attas Mel	Audenaert Bart	Augenstern Joy	Austin Donna F
Ayer Jude	Bagozzi Jennifer	Bailey Charmaine	Baker Niklas
Baker Rachel	Baker Steve	Balder James	Balint C
Bammert E J	Bandy Christopher	Banks Jerry	Barkley-Edwards D P
Barnes Kathryn	Barnett Eli	Barr Deb	Barrett James
Bartell Ann	Bartter Martha	Bastron Malcolm	Bauer Lyndsey
Bayon Israel Garcia	Be Maya	Beadman Hannah	Beavers Nancy
Beckham David	Bedendo Emanuela	Beegle Margaret	Belaski Anthony
Belisle Joseph	Belleau Cindy	Belling Teri	Bennett LeeAnn
Bennigson Barbara	Benya Lilo	Berg Kurt	Berg Ricardo U
Berger Leah	Berggren Richard	Berkowitz Henry	Bernard Doris
Bernikoff Sarah	Bernikoff Vance	Bernstein Marcia	Bernstein Scott
Bescript Ruth	Beves Peter	Bevilacqua Elaine	Bignell Rachel
Bishop Melissa	Black Daryl	Blackwood Jean	Blair William

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Blake Seana	Bleckinger Dana	Bloch Julie Hagan	Blochwitz Angelika
Bloomer Jerry	Blubaugh Kim	Blumenfeld Jacob	Boccagna Emilia
Boen Randy	Bohler Judith	Bollag Sascha	Bonilla-Jones Carmen
Bonner James	Bonner Patrick	Booth Richard	BorskeCindy
Bosworth Donald	Boulan Cassidy	Boulter Wyndham	Boutcher Amanda
Bouwman Stuart	Bower JC	Bowling Beth	Bowman Florine
Bowman Jason	Boyd P W	Boyne Hal	Bradburn-Ruster Michael
Bradley JoAnn	Bradshaw Sara	Bragonier Emily	Bramstadt Jason
Brandariz Anita	Brast Dave	Bratvold Gretchen	Brautigan Julie
Brennan Ingrid	Bressack Celia	Briggs Jini Coolen	Brinker Erica
Brisbane Lucinda	Brockway Donald	Broder Carley	Brokaw Colleen
Bronk Gabriel	Brookstone Jon	Broudy David	Brower Diane
Brown James	Brown Louise	Brown Mary	Brown Sandra
Brown Vera	Brownell Deirdre	Brumson April	Bryant Sally
Budlong Tom	Buller Brian	Bundt Phyllis	Burbridge Scott
Burch David Paul Xavier	Burns Cecilia	Burwell Julia	Buschbaum Aviva
Bushnell Martha W	Buslot Chantal	Buswell Colby	Byington Ruth
Cabello María Josefa	Cadora Eric	Calabro Richard A	Callen Peter
Callicott Burton	Calvillo Lucy	Cameron Janet	Cameron-Wolfe Carmen
Cangemi Sandra	Capizzi Liz	Carafa Missy	Cardella Richard
Cardella Sylvia	Cardiff Scott	Carey Thomas	Carlson Cheri
Carnahan Marge	Carter James	Casey Mary	Casilli Christopher

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Cayford David	Cecil Jon	Chadwick Jeanne	Chambers Donald
Chastain David	Checa Michael	Cheeseman Ted	Cheever Jenell
Chen Aluna	Chen Dan	Chen Tony	Chesnut Patricia
Chilcote Marilyn	Chischilly Jane	Chitwood Melissa	Chrostowski Lenny
Ciavarella Theresa	Cinquemani Dorothy	Ciocan Robert	Claparols Javier M
Clark Loralee	Clark Louise	Clark Pamela	Clark Rick
Clay Metric	Clemens Kimberly	Clifford Angela	Clifton Brian
Clymer Bill	Coakley John Paul	Cobb Sandra	Cockerill Joanne
Coco Joseph	Coebergh Philip	Cofran Sandra	Cohen Bruce
Cohen Howard	Cohen Sydney	Colburn Matt	Cole Kathleen
Cole Mark	Collier Fran	Collins Stefanie	Colon Juana M
Connelley Dorian	Connor Thomas V	Conrad Kristie	Cook David & Sara
Cook Ginger	Cook Marylou	Cooke Samuel	Coolidge Joanna
Corbin James	Cordeau Stephanie	Cordes John	Cording Carl
Corrales Ana	Corrales Ana	Cortijo Monica	Corzine Virginia
Cosgriff Mark	Costa Francisco	Coulter Sara & Will	Countryman Chuck
Courter Matthew R	Coveny Richard	Coviello Gina	Cowen Helen
Cozens Michael	Craig Kristin	Cramer Mary Ann	Crane Elisabeth
Crawford David	Crespi Daniele	Cresseveur Jessica	Creswell Richard
Croll Tamara	Cronin Chris	Cross Alfred	Cruz Ara
Cruz Marian	Curley Joanna	Curnow Connie	Curotto John
Curtis Charles	Cushing Catherine	Dahl Kristiana	D'Ambra John
Daniels J Scott	Daniels Joan	Dankanyin Dorothy	Danny Asher
Danu Sandra	Das Anita	Daskarolis Kaymaria	Davis Todd

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Day Charlie	De Jesus Monique	De Robbio Elisabetta	De Sart Marci
de Souza Philip Neri	De Trinis Bonita	Dean Mary	DeAntoni Carol
Degorce Pascale	Delker Jennifer	Delles Susan	Dellinger Kay
DeMartin Renee	Dengel Julia	Denny Rachael	DePauw Donna
Desreuisseau Judy	Detmers Peggy	DeTora Danny	Di Cecco Adriana
di Mdina Owanza	di Poppa Francesca	Dick M	Dimock Wynne
Dishman Benjamin	Disque Melinda	Dix Shirley	Dlugosz Janice
Dlugosz Janice	Dodson Paula	Doft David	Doherty Killian
Doinakis Dimitrios	Dolney Renee	Dolney Renee	Doman Geoffrey
Domnick Renate	Donald Meghan	Donnelly Stephen	Doubet David
Doucet Lisha	Draper Glen	Driss Irene	Drucker Beverly
Dudley Julie	Duffey Michael	Dunkleberger David	Dwyer Prudence
Dykoski William Skip	Eagle Diane	Eaton Lecia	Eby Therese
Edwards Barbara	Edwards Michael	Egger Mark	Elgin Elizabeth
Elias Kyle	Ellison Shawn	Emerson Bartt	Emmerich Leah
Emmert David	Erwin Jeffrey	Estes Douglas	Esteve Gregory
Evans Alma	Evans Dinda	Evans Michael W	Everett Theresa
Evilsizer Susan	Ewing Barbara E	Fairchild Stephanie	Faith-Smith Bonnie
Faria Adriana	Fenske Jill	Ferguson Joanne	Ferguson Tom
Ferhani Laurie	Fields Nicole	Filocamo Kevin	Fiore Mark J
Fiscella Paul	Fischer Cynthia Knuth	Fischer Kimberly	Fisk William & Donna
Fitze Charles & Kathleen	Flinchbaugh Betty	Flowers Bobbie	Foisy Mark
Foley Erin	Fong Christina	Foppe Paul	Ford Julie

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Foskett MaryAnna	Foss Janice	Foster Willis	Fotos Janet
Fowler Juli	Fox John	Fox Kristi	Fox Robert
Frame Laura	Franco Paige	Frang Robert	Frank Harriette
Franken Kevin	Fraser William	Frazier Sabrina	Frederick Roger
French Robert	Friar Christopher	Friswell Jessica	Frost Chris
Frost Vicki	Frutchey Karen	Fuller Roy	Fulmer Amanda
Fulmer N J	Fung Anita	Gairo Regina	Galati Fabio
Galdamez Alicia	Gamboa Margerite	Gambocorto M Sharon	Gandhi Vishal
Garces Laurence	Garcia Jeffery	Garcia Yolanda	Garden Rebecca
Garner Michael	Garner Patrick	Gartin Courtney	Gary Lene
Gausman Jennifer	Gauthier Donald	Gay Nancy	Gazzola Linda
Gebhard Mary Frances	Gedicks Al	Geiger Laura	Geiger Maureen
Geno Debbie	Gerbasi Joyce	Gibbons Brian	Gilbert Vivian
Giller Geoff	Gilmore Timothy	Gindele Abigail	Ginder Hannah
Giuliani Rachelle	Glass Suzanne	Glazer Steve	Gleason Christina
Glendinning Garrett	Glock-Molloy Victoria	Glum Karen	Glynn Martin & Lavonne
Goad Jacob	Goitein Ernest	Golden Jay'me	Gomez Maria
Gong Sherry	Gonzales Greg	Good Caroline	Goodman Laura
Gordon Terri	Gorringe Richard	Gorsline Sally Marie	Gotterer Rebecca
Gottlieb Maryke	Gowell Michael	Grady Anne	Graham Kimberley
Grant David	Grant Gordon	Grassi Catherine	Grathwohl Harrison
Gravel A Joan	Gray Gail	Greco Claudia	Greene David
Greene Howard	Gregor Alex	Gregory Claire	Grenard Mark Hayduke

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Grier Rosemary	Griffin-Lewin Anne	Grigg Jamin	Griggs Brenda
Grindle Kathryn	Grindle Russell	Grisco Mary	Grover Ravi
Grueschow Jr Kenneth	Gunter Karlene	Guyette Caitlin	Ha Gerhard
Hadda` Ilse	Hadley Virginia	Hahn Todd	Haltenhoff Ken
Haltom Aubrey	Hamilton Traci	Hamze Jill	Hance Maria
Hansen Ken & Val	Hanson Art	Hanson Natalie	Harbutt Alberta
Harding Kevin	Hargesheimer Linda	Harkins Hugh	Harris Jennifer
Harris Paul	Harris Zoe	Hart James	Hart Katrina
Haslett Dora	Hassan Khadija	Hatziavramidis Ted	Hauck Molly
Havens Pauline	Havercamp PhD Michael	Hays John	Head Jim
Hefferon Michael	Hegeman E	Heidebroek Francoise	Hein Gary
Heller-Gutwillig Annie	Henderson Holly	Henri Lyn	Henry Norma
Herman Shawn	Hibshman Steve	Hickey Mary	Hiestand Nancy
Hilgartner C A	Hill Anna	Hill Robert	Hills Sally
Hirsch Catherine	Hittmeyer Gary	Hoare Danny	Hodes Elizabeth
Hoffman Lilli	Holt Amy	Holt Rhonda	Holt Robert & Joan
Holzweiler Deirdre	Hoover Susan	Hopkinson Patty	Houseworth Bradley
Howe Linda	Howenstein David	Hoyt Jennifer	Hoyt Linda
Huculak Danielle	Hudgens Raymond	Hudgins William	Hudyma Tom
Huerta Ernest	Hughes Brendan	Hulett Mark	Hult Philip
Hunt Dee	Hunt Jim	Huston Ed	Hyers Jocelyn
Ickes Henry	Inouye Laura	Inskeep Mona	Isaacs Susan
Ishii Jeanine	Izikoff Rose	Jackson Robert	Jacobs Patricia

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Jacobson Russell	Janicki Joyce	Janusko Robert	Janzen Gayle
Jazzborne September	Jebens Britta	Johnson Kim	Johnson Kim
Johnson Michael	Johnson Richard Earl	Johnston Denise	Johnstone Penelope
Jones David H	Jones Roslyn	Jones Vickie	Joos Sandra
Jordan Michelle	Jordan Michelle	Jordan Susan	Jorgensen James H
Jorgensen Lesley	Joyce Mary Anne	Judd Martin	Kaehler Linda
Kaehn Max	Kaeser Anne	Kaggen Marilyn	Kahney Pauline
Kaplan Brittany	Kazak Ilene	Keeling Raymond	Kefauver Lee
Kegle Jennifer	Keiser Robert	Kelly Wayne	Kemmerer Carol
Kemmerer David	Kennedy Katya	Kennedy Nellis	Kesselman Barry
Key Lynda	Kile Beverly	Kilgore John	Kimpston Charles R
Kingsley Susan	Kinney Carleton	Kirschenheiter Aicia	Kiver Eugene
Kleinau Siegfried	Kliegman David	Knabe Kari	Kochert Marlene
Kohn Carolyn	Kohn Marilyn	Kolb Marcia	Koper Marie
Koplik Mark	Kopp Helen	Koross Laurence	Kosiorek Kylie
Kostmayer Martha Ferris	Kovarik Dina	Kowalczyk John	Kozlovsky Thomas
Kraan Aletta	Krawisz Bruce	Kreib Brian	Kreiss Kevin
Kreneck Jim	Kring Juli	Kruse Katherine	Krush Aileen
Kuhns Betty	Kulesa Tamara	Kulik Mariellen	Kunkel Michael
Kunz Kevin	Kutnyak Cary	Kyrala Judith	La Zarr Mailie
LaCognata Dale	Lafollette Doug	Lahey Daniel	Lahren Rodney
Lambeth Larry	Lang Sophia	Langley Tom	Larson Monty
Larson William	Laser Gemma	Lauchlan Susan	Law Patricia

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Lee Courtney	Lehmkuhl Kimberly	Lemke Melissa	Lenz Dennis J
Leonard Richard	Leslie-Dennis Donna	Letterly Elizabeth	Levin Brian
Levin Ilana	Lewis Anne	Light Lillian	Linarez Karen
Linarez Karen	Lindsay Tammy	Lippel Wolfgang	Litel Alex
Little Larry	Livesay Corinne	Lloyd Susan	Lochner Jan
Lockkhart Mary Ann	Lockwood Peter	Loew Brenda	Logue Terrence
Lopez Gina	Lopez Maria	Love Margaret	Loyd Joy
Lu Yi-Mei	Lubofsky Nicholas	Lyle Ferris	Lyon Suzanne
M Stacey	MacDonald Myra	Mackanic Janice	MacKenzie Meghan
Mackey Bill	Maddock V	Maddux Carolyn	Maffey Shanti
Magnuson Paul	Mahmood Nicholas	Maki Jessica	Makortoff Kalyeena
Mallardi Nicholas	Maloney Ken	Mann Jason	Mannsfeld Bjoern
Marcus Paul	Maria Feleki	Marshall Katherine	Martinez Candace
Martinez Rodrigo	Mastascusa Noreen	Matthes Barb	Matthew Elaine
Mattingly Michele	Mattozzi Dave	Mayerat Robin	Mazar Laura
Mazzetti Michael	McAleer Janice	McCabe Eileen	McCannon Bryan
McCarthy Elizabeth	McCool Melissa	McCullagh Lenore	McDowell Malcolm
McDuffie Holly	McFarland Mary Ann	McGettigan Timothy	McGill Ann C
McGovern Donlon	McGowan Cathy	McGowan Susan	McGuinness Susan
McIntosh James	McKnight Vanessa	McLean Alex	McMahon Mary
McMullen Penelope	McMullin William	McPhelin Eileen	McTague Melissa
McVan Kevin	Mead Cythia	Medina Arcelia	Mehrotra Siddharth
Meier D	Meier Felisa	Mejia Manuel	Meldrum David
Mendieta Vince	Mesman Peggy	Meyer Bonnie	Meyer Chris

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Meyer Laurie	Michalets Ellen	Michel Thomas Andreas	Micou Johnny
Mier W	Mika Damian	Mikalson Claire	Miller Betsy
Miller Ruth	Mills Ashea	Mitchell Joan	Moeller Elke
Moldenhauer Lenore	Monson Ronald	Mont-Eton Jean	Moodie David
Moon Giles	Mooney Kimberly	Moore Jacinda	Moore Yolanda
Moriarty Paula	Morris Kathleen	Morrison Carol	Mosimann Ed
Moss Mikasa	Moss Paul	Mourant Wanda	Moylan Carrie Lynn
Moynihan Kathryn	Mullikin George	Murphy Bonnie	Myers Robert
Nair Rajesh	Nam S	Nash Barbara	Naughton Mark
Nava Margarita	Nealy Carol	Necker Adam	Neff Rachel
Neidell Merle	Nelson Beth	Nelson Jennifer	Nelson Patricia
Nichols Nick	Nickels Oliver	Nickerson Nancy	Nicol Laura
Niemi Scott	Nigrosh Ellen	Nissen Ida	Nissen John
Nolan Sherril	Nooyen Fleur	Norris Glenda	Novak Peter
Nylander Susanna	O'Brien Leanne	O'Broin Steven	O'Connor Maura
O'Donnell Kelly	O'Sullivan Joseph	O'Flynn Katie	Ofshinsky David
Olney-Rattel Wendy	Olsen Corey E	O'Neill Robert	Orich Suzanne
Ortiz C	Oser Wendy	Ostoich Julie	Ostrowski Steffanie
Ottenbrite Shelley	Ouellette Tracy	Overbeck Bob	Owen Alison
Oxyer Jim	Paape PhD Joyce	Pacic Thomas	Pacifico Chris
Pagel Lyn	Pandit Sudhir	Panemangalore Myna	Parent Stacey
Parker Cindy	Parker Erika	Patch Frances	Paton Peter
Patrick A A	Patsis Elizabeth	Patsis John	Paul Gloria
Pavao Jennifer	Paven Melissa	Payne Lisa	Payne Lisa

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Peets Jehu	Peirce Sumner	Pelleg Joshua	Pena Debra
Pendergast Jerry	Perez Martha	Perez-Lockett Katharine	Perlman Frances
Pernot Pamela	Person Amy	Pescott Oliver	Pestel Niki
Peters Sarah	Peterson Kimberly	Petruccelli Rita	Pflug Maria A
Phillips Patricia	Phillips Scot	Phoenix Susan	Pic Sara
Pickering Amy	Pistor Christiane	Plummer John	Plyler Billy
Policht Veronica	Polski Michael	Ponza Jennifer	Pooler Kristi
Poos Carin	Poos Sebastiaan	Poplawski Terry	Popolizio Carlo
Porter Alisa	Porter Melody	Powers Brendan	Prentiss Jillian
Press Roland	Priest Maxine	Probola Eric	Proctor David
Proenza Lynn	Provenzano James	Pruitt Dykes	Puca Laurie
Puetz Dan	Pulliam Pat	Purkaystha Mohsena	Pusel Joyce
Quinn Michael	Quitiquit Wanda	Raab W Arthur	Radany Molly
Rakocy Elizabeth	Ramaker Julianne	Ramsey Laverne	Rancher John
Randazzo Andrew	Randrup Ross	Ransom Jill	Ratliff Margaret
Read Magie	Redish Maryellen	Reed Herbert	Reed Lorna
Reed Mary S	Rees Hannah	Rees Janet	Register James
Reichert Christina	Resotko Karen	Reynolds Dolores	Rhoads Kirk
Rhys Victoria	Rice Ann	Rice Daryl	Ricevuto Chuck
Rich Nathan	Richardson Don	Richardson Roberta	Richman Beth
Rieckmann Evelyn	Riggar Karen	Riley Kelly	Rindfuss Allen
Rio Robert	RisvoldCindy	Robbins Mary	Roberts Barbara & Frank
Roberts Cristina Abeja	Roberts James	Robertson John Mark	Robinson George

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

RoccoPeter	Rochel Christof	Rockwell Beth	Rodack Soretta
Rodgers Julie	Rodin Nick	Rodrigue Jim	Rodrigues Lannette
Rojas Jessica	Rolnick Adeline	Root Charlene	Rorvick Shelley
Rosen Judith	Rosenstein Richard and Carolyn	Rosenwinkel Earl	Ross Adrienne
Ross Susan	Rossi Patricia	Roth David	Rouhana Alexander
Rowe Richard	Royer Erica	Rubin Marc	Rudnick Iris
Rush Charlene	Ryan Elizabeth	Ryder Samantha	Ryk Jon
Saia Chris	Sakoda Fumiko	Salamon Mark	Salter James
Sams Donna	Sanborn Hugh	Sanders Richard	Sands Arthur
Sands Pamela	Sands Weston	Santarelli Mark	Saperia David
Saslow Randi	Saundra	Savage John & Patricia	Scaff Beverly
Scalise Janet	Schafer Laura	Schaktman H	Schall Donna
Scheffert Rick	Schmeisser Bernadette	Schmittauer John	Schmitz Gladys
Schneider Greg	Schneider Lynn	Schochet Gordon	Schreiber Lori
Schulsinger Herb	Schulte Helen	Schultz-Ahearn Melissa	Schumann Barbara
Schumann Larisa	Schussler Bob	Schustereit Kenneth	Schwartz Tamar
Schwarz Kurt	Scott Lloyd	Searfos Polly	Seeliger Ruth
Seeman Joan	Segal Evalyn F	Sell Angie	Selnes Carl & Georgia
Sena Isabel	Sessine Linda	Severn Percy	Sewall Christopher
Seymour Stephanie	Shafchuk Patsy	Shafransky Paula	Shalley Sheldon
Shanabarger Paul	Shanker Vidhya	Shapiro Milton	Sharkey-Miller Kerry
Sheline Jonathan	Shelly Charles	Shepard Dodie	Sherwood Anne

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Shivar Marcia	Shively Daniel	Shively Daniel	Shmigelsky Matthew
Shohan Doug	Shomer Forest	Shpiller Natasha	Shulman Joseph
Sickafoose Jim	Siddens Gianna	Siefken Josie	Siegel Karen
Siemion Bob	Silan Sheila	Silveira Luciano	Silverman Ruth
Silverman Seth	Simon Tomas	Simpson Sally	Singer Barbara
Siri Patricia	Sitomer Joan	Sively Susan	Skidmore Mike
Slater Stephanie	Sloan Adam	Slominski Jeanne	Smerbeck Audrey
Smith Cynthia	Smith Deborah	Smith Julie	Smith Michele
Smith Robert	Smith Sharon	Smolinski Barbara	Sneeringer Rosemary
Snider Marilyn J	Snider Ronda	Snyder Amy	Snyder Steve
Sobel Scott	Sorochan Bill	Sotos Mary	Souza Michael
Soyama Takuji	Spar Jon	Spears Jesse	Spears Nancy
Spector Loren	Spotts Richard	Stahl Charlotte	Stallybrass Samantha
Stark Carol	Start Jeremy	Stefenel Rudy	Steinbrecher Klaus
Steiner Lauren	Stembridge Megan	Sterner Elizabeth	Stevens Donald
Stewart Cynthia	Stewart Frances	Stewart Janet	Stewart Scott
Stoffel Patrick	Story Nicola	Strauss Arthur	Strebeck Robert
Stuart Norberto A	Stucker Patricia	Studer Madeline	Stuhldreher Christy
Summers Jessica R	Summers Steve	Sutton Christina	Szymanowski Paul
Tabib Michael	Talmadge Tammy	Tan Frances	Tansley Denise
Tapp Elizabeth	Taranowski Heath Ashli	Tashjian Randy	Tate Pamela
Tatum Beth	Taylor Diane	Taylor Sarah	Teolis Simon
Terry Terelle	TeSelle Eugene	Thaler Gary	Thomas Ben

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

Thomas Deborah	Thomas Dennis	Thomas Kat	Thomas Leslie
Thompson Caroline	Thompson Chad	Thompson Nina	Thomsen Zack
Thomson Arran	Thorbjornsen Brian	Thorbjornsen Dylan	Thorbjornsen Richard
Todak Paul	Tondro-smith Dondi	Torres Paola	Towers Terry
Tracy Kyle	Tran Thu Ha	Travis Ed	Trent Joseph
Triplett Tia	Trumbull Terry	Tucker Barbara	Tully Maryann
Turek Gabriella	Turner Mike	Turnipseed Dale	Turnoy David
Tyndall Carl	Ulmer Gene	Ulrey Timothy	Units Jessica
Urist Daniel	Van de Grift Julia	Van Deelen Gerard	Van Der Leest Felieke
van Nifterik Ellen	Vandervest Sister Martin	Vandiver Toby	Vandivere Stephen
VanEtten Margot	Varellas Barb	Varney C Jean	Vassilakidis Sophia
Vertova Livia	Vesely Sakura	Vetter Allison	Vicioso Francina Grillo
Viglia II Peter	Vonderplanitz Aajonus	Voorhies Bill & Marilyn	Vosk Elizabeth
Wade Norman	Wagner Bernadette	Wagner Jim & Virginia	Wagner Sandra
Wahosi M	Walder E Gail	Waldrop Catherine	Walker Lynn
Walker Tatjana	Wallace Jeremy	Wallon Linda	Walter Sandrea
Walther Regina	Walton Peggy	Wang-Helmreich Hanna	Ward Sheila
Watchempino L	Waterman Glenna	Watson Chris	Webb Brad
Webb Pat	Wedow Nancy	Weiner Judi	Weinstock Jonathan
Welke Margaret	West Alice	West Angela	West Eric
West Mary	Wheeler Jeanne	Whetstone Joe	White A E

Table 2 Names of Individuals and Entities Submitting Duplicate Scoping Comments Via E-Mail (continued)

White D	White Jodie	White Lonnie	White Sharlene
Whitmore Rosemary	Wickline Glenna	Wiessbuch Brian Wie	Wiles Jeffrey
Wiley Andrea	Wilkens Patricia	Williams Charlie	Williams Diane
Williams Holly	Williams Lora Marie	Williams Mary	Wilsnack Jonathan
Wilson Ellery	Wilson Jerry	Wilson John	Wilson Michael
Winer Shirley	Winkle Celeste	Winter Michael	Winters Nicholas
Wishart Tiffany	Wolcott Betty	Wolf Rachel	Wolf Robert
Wolfe Ellen	Wolfe Jody	Won Alex	Woodman Jean
Woods Terry	Wright Alan	Wroblewski Kathleen	Wyatt Aimee
Wynn Patricia	Yeager Will	Young Betty	Young Marvin
Youngson Paticia	Yu Edward	Zaber Pamela	Zack Albert
Zai III Robert	Zimmer Sister Dianne	Zurcher Naomi	

APPENDIX B

POTENTIALLY APPLICABLE FEDERAL STATUTES, REGULATIONS, AND EXECUTIVE ORDERS

B. POTENTIALLY APPLICABLE FEDERAL STATUTES, REGULATIONS, AND EXECUTIVE ORDERS

B1.1 Federal Statutes and Regulations

Numerous Federal statutes and the implementing regulations for different Federal agencies may be applicable to environmental reviews of the construction, operation, decommissioning and groundwater restoration of an *in-situ* leach (ISL) milling facility. The following list is not intended to be exhaustive, but it provides a general overview of the kinds of statutes and regulations that should be considered in subsequent environmental reviews tiered from this generic environmental impact statement (GEIS). Specific details on the federal and state permitting processes are included in Chapter 1 of this GEIS.

B1.1.1 The American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)

This Act reaffirms American Indian religious freedom under the First Amendment and establishes the policy to protect and preserve the inherent and constitutional right of American Indians to believe, express, and exercise their traditional religions. This law ensures the protection of sacred locations and access of American Indians to those sacred locations and traditional resources that are integral to the practice of their religions.

B1.1.2 The Archaeological Resources Protection Act, as Amended (16 U.S.C. §470aa et seq.)

This Act requires a permit to excavate or remove archaeological resources from publicly held or American Indian lands. Excavations must further archaeological knowledge in the public interest, and the removed resources are to remain the property of the United States. If a resource is discovered on land that an American Indian tribe owns, the tribe must give its consent before a permit is issued, and the permit must contain terms or conditions the tribe requests.

B1.1.3 The Atomic Energy Act of 1954, as Amended (42 U.S.C. §2011 et seq.)

This Act gives the U.S. Nuclear Regulatory Commission (NRC) authority to license and regulate possession, use, storage, and transfer of byproduct and special nuclear materials to protect public health and safety and the common defense and security.

B1.1.4 The Bald Eagle Protection Act (16 U.S.C. § 668, 668 note, 668a-668d)

This Act prohibits wantonly possessing, selling, transporting, or trading of bald or golden eagles or eagle parts, alive or dead. The statute authorizes searches, seizures, and arrests for enforcement purposes. The Secretary of the Interior can issue a permit for taking, possessing, and transporting bald and golden eagles for scientific, exhibition, and religious purposes, and may permit the taking of golden eagle nests if they interfere with resource development or recovery operations [916 U.S.C. 668(a)]. Opportunities to protect bald and golden eagles may be possible as part of ecosystem restoration initiatives or as part of natural resource management initiatives, including mitigation planning

B1.1.5 The Clean Air Act, as Amended (42 U.S.C. §7506 et seq.)

This Act establishes regulations to ensure air quality and authorizes individual states to manage permits. Nonradiological emissions requirements are described in 40 CFR Part 52. Radiological emissions to the air are regulated directly through the U.S. Environmental Protection Agency (EPA) National Emission Standards for Hazardous Air Pollutants requirements in 40 CFR Part 61.

B1.1.6 The Clean Water Act, as Amended (33 U.S.C. §344 et seq.), Section 402(a)

This Act establishes water quality standards for contaminants in surface waters. The Clean Water Act requires a National Pollutant Discharge Elimination System (NPDES) permit before discharging any point source pollutant into U.S. waters. EPA can delegate permitting, administration, and enforcement of the NPDES program to individual states.

B1.1.7 The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as Amended by the Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. §§ 9901–9675)

This Act provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and cleanup of inactive hazardous substance disposal sites. Parties responsible for the contamination of sites are liable for all costs incurred in the cleanup and remediation process. In addition, CERCLA and related regulations at 40 CFR Part 302 encompass spills of reportable quantities of hazardous substances.

B1.1.8 The Endangered Species Act, as Amended (16 U.S.C. §1531 et seq.)

This Act is intended to prevent the further decline of endangered and threatened species and to restore these species and their habitats. The Act is jointly administered by the U.S. Departments of Commerce and the Interior. Section 7 of the Act requires consultation with the U.S. Fish and Wildlife Service to determine whether endangered and threatened species or their critical habitats are known to be in the vicinity of the proposed action. NRC will consult with the U.S. Fish and Wildlife Service as part of supplemental site-specific environmental reviews.

B1.1.9 The Farmland Protection Policy Act (7 U.S.C. §§ 4201 et seq.)

This Act amended the Agriculture and Food Act of 1981. This Act minimizes the extent to which federal programs (including license approvals) contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses and assures that federal programs are administered in a manner that will be compatible with state, local government, and private programs and policies protecting farmland. The Act instructs the Department of Agriculture, in cooperation with other departments, agencies, independent commissions, and other units of the federal government, to develop criteria for identifying the effects of federal programs on the conversion of farmland to nonagricultural uses. Minimizing impacts on prime and unique farmlands is especially emphasized. Contact with the Natural Resources Conservation Service (NRCS) to identify prime or unique farmland that might be affected is required.

B1.1.10 The Federal Land Policy and Management Act of 1976 (43 U.S.C. § 1701 et seq.)

This Act establishes the public land policy and guidelines for the administration of public lands by the U.S. Department of the Interior through the Bureau of Land Management (BLM) and gives the BLM mission statement. The Act directs other agencies that undertake activities that would result in the "withdrawal" of such public lands. As paraphrased from the Act, "withdrawal" means withholding an area of federal land from settlement, sale, or entry, for the purpose of limiting activities or reserving the area for a particular purpose or program (43 U.S.C. 1702).

B1.1.11 The Hazardous Materials Transportation Act of 1974 (49 U.S.C. §§ 1801–1819)

This is the federal legislation that governs the transportation of hazardous materials in the nation. It was last amended in November 1990. Congressional policy is to improve the regulatory and enforcement authority of the Secretary of Transportation to adequately protect the nation against the risks to life and property that are inherent in the commercial transportation of hazardous materials. Accordingly, the transportation of hazardous materials, including, but not limited to, solvents, asbestos, polychlorinated biphenyls, paints, pesticides, hazardous wastes, and more, is addressed by this legislation. Persons transporting hazardous materials, including hazardous wastes, must comply with the U.S. Department of Transportation requirements for shipping papers, container marking and labeling, vehicle placarding, record keeping, and all other requirements associated with the safe transportation of hazardous materials.

B1.1.12 The Migratory Bird Conservation Act (16 U.S.C. § 715 to 715s)

This Act established the Migratory Bird Conservation Commission consisting of the Secretary of the U.S. Department of the Interior, the Secretary of Agriculture, two members of the Senate, and two members of the House of Representatives (16 U.S.C. 715a). The committee is authorized to consider purchasing or renting land, water, or transitional areas that the Secretary of the Interior has determined are necessary for migratory bird conservation (sanctuaries, preservations, refuges). The Secretary of the Interior must consult with the county or local government and the Governor of the state where the property is located (16 U.S.C. 715c). The Migratory Bird Conservation Fund was established to acquire lands for conservation, to maintain acquired lands for habitat preservation, and for any expenses necessary for the administration, development, and maintenance of such areas including constructing dams, dikes, ditches, spillways, and flumes for improving habitat and mitigating pollution threats to waterfowl and migratory birds (16 U.S.C. 715k).

B1.1.13 The National Historic Preservation Act of 1966, as Amended (16 U.S.C. §470 et seq.), Section 106

This Act places sites with significant national historic value on the National Register of Historic Places. No permits or certifications are required. The Act and its implementing regulations in 36 CFR Part 800 protect cultural and historic resources. If a particular federal activity may affect historic properties, NRC must consult with the State Historic Preservation Officer to ensure that potentially significant sites are properly identified and appropriate mitigative actions

implemented. NRC will conduct such consultations as part of supplemental site-specific environmental review.

B1.1.14 The National Trails System Act (16 U.S.C. 1241–1251)

This Act acknowledges the increasing popularity of outdoor recreation and the need to promote access to and enjoyment of outdoor areas of the nation, both near urban areas and in more remote scenic areas. It established the National Trails System, composed of recreation trails, scenic trails, historic trails, connecting or side trails, and uniform markers. National historic trails generally follow original trails or travel routes that are significant to our nation's history. They can include land and water components as well as historic artifacts. Recreation and connecting and side trails can be established by the Secretary of the Interior or the Secretary of Agriculture with the consent of the federal agency, state, or political subdivision that has jurisdiction over the lands involved. National scenic trails are extended trails specifically located to conserve nationally significant scenic, historic, natural, or cultural qualities of certain areas and allow citizens to enjoy these areas.

B1.1.15 The Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001)

Through this Act, the Secretary of the Interior guides the return of federal archaeological collections and collections that are culturally affiliated with American Indian tribes and held by museums that receive federal funding. Major provisions of this law include (1) establishing a review committee with monitoring and policymaking responsibilities, (2) developing regulations for repatriation that include procedures for identifying lineal descent or cultural affiliation needed for claims, (3) overseeing museum programs to meet the inventory requirements and deadlines of this law, and (4) developing procedures to handle unexpected discoveries of graves or grave artifacts during activities on federal or tribal land.

B1.1.16 The Noise Control Act of 1972 (42 U.S.C. 4901–4918)

This Act established a national policy to promote an environment free from noise that jeopardizes Americans' health and welfare. The Act provides a way to coordinate federal research and activities in noise control, authorizes the establishment of federal noise emissions standards for commercially distributed products, and provides public information about noise emissions and noise reduction characteristics of such products. The Act authorizes federal agencies, to the fullest extent of their authority under the federal laws they administer, to carry out the programs within their control in a way that furthers the policy in 42 U.S.C. 4901.

B1.1.17 The Occupational Safety and Health Act of 1970, as Amended (29 U.S.C. §651 et seq.)

The purpose of this Act is to enhance safe and healthy workplaces throughout the United States. It is administered and enforced by the Occupational Safety and Health Administration, a U.S. Department of Labor agency. The Occupational Safety and Health Administration jurisdiction is limited to safety and health conditions that exist in the workplace environment (published in Title 29 of the U.S. Code of Federal Regulations). According to the Act, each employer must furnish all employees with a workplace free of hazards that could

cause death or serious physical harm. Employees have a duty to comply with the occupational safety and health standards and all rules, regulations, and orders issued according to the Act.

B1.1.18 The Resource Conservation and Recovery Act (RCRA), as Amended (42 U.S.C. §692 et seq.)

This Act requires EPA to establish standards for hazardous waste generators. As noted in 40 CFR Part 272, the 10 states considered in the GEIS comply with the state requirements for permission, administration, and enforcement of RCRA.

B1.1.19 The Safe Drinking Water Act, as Amended [42 U.S.C. §300 (F) et seq.]

The purpose of this Act is to protect the quality of the public water supplies and sources of drinking water. The implementing regulations, administered by the EPA unless delegated to the states, establish public water system standards. Other programs established by the Safe Drinking Water Act include the Sole Source Aquifer Program, the Wellhead Protection Program, and the Underground Injection Control (UIC) Program. The UIC Program is addressed in this GEIS.

B1.1.20 The Soil and Water Resources Conservation Act of 1977 (16 U.S.C. 2001–2009)

This Act directs the Department of Agriculture to develop a National Soil and Water Conservation Program and to appraise the nation's soil, water, and related resources every 5 years. The Soil and Water Conservation Program and the appraisals cover activities and resources under the jurisdiction of the Soil Conservation Service, now called the NRCS. The appraisals involve compiling data on the quantity and quality of soil and water, state and federal laws regarding development and use of these resources, and costs and benefits of alternative conservation techniques. The Soil and Water Conservation Program is a guide for carrying out NRCS activities, taking into account current and future needs of the nation, landowners, and land users.

B1.1.21 The Solid Waste Disposal Act (42 U.S.C. 3251 et seq. 6901 et seq.)

This Act initiated national research and development programs for new and improved methods of solid waste disposal, with provisions for recovery and recycling. Technical and financial assistance are provided to state and local governments in the development of these programs. This Act was amended by the Resource Recovery Act of 1970 (Public Law 91-512) and later by RCRA (42 U.S.C. 6901, et seq.). Subtitle D of RCRA, as last amended in November 1984 by 42 U.S.C. 69-41-6949a, established federal standards and requirements for state and regional authorities regarding solid waste disposal. Current federal requirements for solid waste management are found in RCRA, Subtitle D, Sections 4001–4010.

B1.1.22 The Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201–1328; 18 U.S.C. 1114)

This Act established a nationwide program to protect society and the environment from the adverse effects of surface coal mining operations and to set forth reclamation guidelines for surface coal mining areas. Under Title V, Section 502 (30 U.S.C. 1253), states with surface

coal mining operations on non-federal lands must develop programs that provide environmental regulations, establish permit programs, and enforce state program requirements. In conjunction with the states, similar programs are to be developed by the U.S. Department of the Interior for surface mining operations on federal lands (30 U.S.C. 1273). For permits issued to surface mining operations, environmental performance standards are required to maximize utilization and conservation of the resources recovered and minimize future land disturbance from surface mining (30 U.S.C. 1265). The standards also include requirements for restoring the affected land (30 U.S.C. 1265), including surface area stabilization/erosion control, revegetation, creating impoundments for water quality, minimizing disturbance to original hydrologic balances, and proper disposal of mine waste products. There are also standards and criteria for regulating the design, location, construction, operation, maintenance, enlargement, modification, removal, and abandonment of new and existing coal mine waste piles when used as dams or embankments (30 U.S.C. 1265(f)).

B1.1.23 The Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. §7901 et seq.)

This Act established programs to stabilize and control mill tailings at uranium or thorium mill sites, both active and inactive, to prevent or minimize, among other things, the diffusion of radon into the environment. Title II of the Act gave NRC regulatory authority over uranium mill tailings at sites licensed by NRC on or after January 1, 1978. Currently, NRC does not have a specific regulation for ISL milling facilities; however, NRC regulation 10 CFR Part 40, Domestic Licensing of Source Material, applies broadly to all facilities that receive title to, receive, possess, use, transfer, or deliver source or byproduct material. ISL technology, for the most part, evolved after 10 CFR Part 40 was enacted. The ISL process produces wastes that 10 CFR Part 40 classifies as byproduct material. Appendix A to 10 CFR Part 40 provides criteria for conventional uranium mill operation and for disposal of mills' tailings and waste. The final stages of the ISL process produce yellowcake using the same drying process as conventional recovery and milling. However, other aspects of the ISL process are substantially different from conventional uranium ore processing. The regulatory requirements at 10 CFR Part 40 address yellowcake drying and the wastes produced from ISL operation but do not govern other aspects of the ISL process, including the aquifer restoration. In practice, NRC license conditions for ISL facilities have established the requirements necessary to protect public health and safety and the environment.

B1.1.24 The Watershed Protection and Flood Prevention Act (16 U.S.C. 1001 et seq.; 33 U.S.C. 701b)

This Act authorized the Secretary of Agriculture to cooperate with states and other public agencies in work that involves flood prevention and soil conservation, as well as the conservation, development, utilization, and disposal of water. It established the Small Watershed Program through which the NRCS constructs dams and implements other measures in upstream watersheds for a variety of purposes, including flood control.

B1.1.25 The Wild and Scenic Rivers Act (16 U.S.C. 1271 et seq.)

In accordance with this Act, certain national rivers and their immediate environments that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition; these rivers and

their immediate environments shall be protected for the benefit and enjoyment of present and future generations (16 U.S.C. 1271). The Act both identifies specific river reaches for designation as wild or scenic and provides criteria to classify additional river reaches (16 U.S.C. 1272). The National Wild and Scenic River System was established to protect the environmental values of free-flowing streams from any activities, including water resources projects, that may harm them. The system is jointly administered by the U.S. Forest Service, the Department of Agriculture, the National Park Service, and the U.S. Department of the Interior.

B1.1.26 The Wilderness Act (16 U.S.C. 1131 et seq.)

This Act established a National Wilderness Preservation System composed of federally owned areas designated by Congress as "wilderness areas." These are to be managed in a manner that will leave them unimpaired for future use and enjoyment as wilderness and will protect them and preserve their wilderness character. With certain exceptions, the Act prohibits motorized equipment, structures, installations, roads, commercial enterprises, aircraft landings, and mechanical transport. The Act permits mining on valid claims, access to private lands, fire control, insect and disease control, grazing, water-resource structures (upon the approval of the President), and visitor use (16 U.S.C. 1133). Except as otherwise provided in this Act, each agency administering any designated wilderness area shall be responsible for preserving the wilderness character of the area.

B1.1.27 EPA Regulations

10 CFR Part 40, Appendix A, implements EPA regulations at 40 CFR Part 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings. Dual regulation of groundwater at ISL facilities will continue until such a time that NRC can defer to the EPA UIC Program. See EPA requirements for Class III injection wells found in 40 CFR Part 146.

B2 EXECUTIVE ORDERS

B2.1 Executive Order 11514—Protection and Enhancement of Environmental Quality (as Amended)

This Order directs federal agencies to continuously monitor and control their activities to protect and enhance the quality of the environment. It also requires procedures to ensure that federal plans and programs with potential environmental impacts are presented to the public in a timely and understandable way and that the views of interested parties are obtained.

B2.2 Executive Order 11988—Floodplain Management

According to this Order, federal agencies must establish procedures to ensure that the potential effects of flood hazards and floodplain management are considered before any action is undertaken in a floodplain and that floodplain impacts should be avoided to the extent practicable.

B2.3 Executive Order 11990—Protection of Wetlands (May 24, 1977)

This Order states that each federal agency shall provide leadership; take action to minimize the destruction, loss, or degradation of wetlands; and preserve and enhance the natural and beneficial values of wetlands. Agencies must follow these guidelines when (1) acquiring, managing, and disposing of federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; or (3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

B2.4 Executive Order 12898—Environmental Justice

This Order directs federal agencies to achieve environmental justice by identifying and addressing, as appropriate, programs, policies, and activities that have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations in the United States, its territories, and possessions. The Order creates an Interagency Working Group on Environmental Justice and directs each federal agency to develop strategies (within certain time limits) that identify and address environmental justice concerns. The Order further states that each federal agency must collect, maintain, and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites that are expected to substantially affect the environment, human health, or economy of surrounding populations. This information is required when such facilities or sites become the subject of a substantial federal environmental administrative or judicial action, and these federal agencies must make such information publicly available.

B2.5 Executive Order 13007—Indian Sacred Sites

Federal agencies, to the extent permitted by law and consistent with agency missions, are required by this Order to avoid adverse effects to sacred sites and to provide access to those sites to American Indians for religious practices. The Executive Order directs agencies to plan projects that protect and allow access to sacred sites in a way that is compatible with the projects.

B2.6 Executive Order 13084—Consultation and Coordination With Indian Tribal Governments (May 14, 1998)

This Order recognizes that the United States continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, trust resources, and Indian tribal treaty and other rights. Accordingly, the Order establishes regular and meaningful consultation and collaboration with Indian tribal governments to develop regulatory practices on federal matters that significantly or uniquely affect these communities, reduces the imposition of unfunded mandates upon Indian tribal governments, and streamlines the application process for and increases the availability of waivers to Indian tribal governments.

B2.7 Executive Order 13175—Consultation and Coordination With Indian Tribal Governments

This Order further directs federal agencies to have regular and meaningful consultation and collaboration with American Indian tribal governments in developing federal policies that have

tribal implications, to strengthen United States government-to-government relationships with tribes, and to reduce the imposition of unfunded mandates on tribal governments.

B2.8 Executive Order 13186—Responsibilities of Federal Agencies to Protect Migratory Birds (January 10, 2001)

This Order recognizes that migratory birds are of great ecological and economic value to this country and to other countries and that they contribute to biological diversity and bring tremendous enjoyment to millions of Americans who study, watch, feed, or hunt these birds throughout the United States and other countries. Each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations has two years to develop and implement a Memorandum of Understanding with the U.S. Fish and Wildlife Service to promote the conservation of migratory bird populations. Further, each agency shall ensure that environmental analyses of federal actions that National Environmental Policy Act or other established environmental review processes require must evaluate the effects of actions and agency plans on migratory birds, emphasizing species of concern.

B2.9 Executive Order 13195—Trails for America in the 21st Century (January 18, 2001)

This Order directs federal agencies to protect, connect, promote, and assist development of trails of all types throughout the United States to the extent permitted by law and where practicable and in cooperation with tribes, states, local governments, and interested citizen groups.

APPENDIX C

SUMMARY OF CONVENTIONAL URANIUM MILLING TECHNOLOGIES

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C1.1 Conventional Mills

Uranium milling techniques have evolved over the years, but the basic requirements are similar to those described in NUREG–0706 (NRC, 1980, Appendix B). Although located in an Agreement State and not regulated by the U.S. Nuclear Regulatory Commission (NRC), recent licensing actions related to conventional mill sites in Utah (White Mesa near Blanding and Shootaring Canyon near Ticaboo) can also provide some updated information [Denison Mines (USA) Corporation, 2007; Plateau Resources, Ltd., 2006]. These facilities have a maximum capacity of about 900–1,800 metric tons [1,000–2,000 short tons] of ore per day. Many of the chemical processes are similar to those used to process ISL solutions; unlike ISL uranium processing, however, additional steps are necessary to prepare the solid uranium ore for recovery and manage solid waste disposal.

In traditional conventional milling operations, the uranium ore is mined from a deposit by surface or underground mining techniques and transported to the mill site for processing (Figure C1.1–1). Depending on economic conditions and license requirements, a conventional mill may also process alternate materials such as contaminated soils for their uranium content [Denison Mines (USA) Corporation, 2007]. The conventional uranium milling process involves several basic steps (Figure C1.1–2).

C1.1.1 Ore Handling and Preparation

This stage of the milling process includes ore blending to ensure uniform physical and chemical characteristics, crushing and grinding, and possibly drying or roasting to improve ore handling and solubility properties.

Ore is trucked to the processing facility. The incoming ore is weighed and analyzed for moisture and uranium content. The ore may be stockpiled to manage the feed into the circuit. Ore is initially screened through a large mesh grizzly and transported by conveyer belt into the grinding stage, usually by discharge into a semiautogenous grinding mill. Water is added to the ore to produce a slurry containing approximately 70 percent solids. The slurry is then pumped through screens into large surge tanks to maintain feed into the leach circuit. Oversize material is recycled back into the semiautogenous grinding mill, and undersize material flows to a storage sump.

C1.1.2 Mill Concentration

This stage of the milling processing includes physical (e.g., washing) or chemical techniques to leach uranium from the slurry, followed by further uranium concentration using techniques such as ion exchange or solvent recovery.

The leaching circuit dissolves uranium minerals from sandstone grains. A two-stage leaching circuit is typically used (Plateau Resources, Ltd., 2006). The ore slurry is pumped from the surge tanks to the first-stage leach circuit where the ore is mixed and agitated with a sulfuric acid or alkaline leach solution, and an oxidant and passed through a series of leach tanks in

APPENDIX D

CULTURAL AND HISTORICAL RESOURCE MANAGEMENT PROCESSES

D. CULTURAL AND HISTORICAL RESOURCE MANAGEMENT PROCESSES

D1.1 CULTURAL RESOURCES

Cultural resources are historic properties that include archaeological sites and historical-period structures and features protected under the NHPA of 1966, as amended (16 U.S.C. 470). Cultural resources further include traditional cultural properties that significantly define community practices and beliefs that are important to maintaining community identity. According to Section 106 of the NHPA, federal agencies must account for effects to historic properties that may result from the agencies' undertakings. 36 CFR Part 800 defines the process by which federal agencies comply with the NHPA, as amended. The National Register of Historic Places (NRHP) is a register of historic buildings, objects, sites, and districts as well as archaeological resources. Archaeological resources consist of prehistoric and historical-period sites that contain evidence of past human lifeways and adaptations. Traditional cultural properties, cultural landscapes, ethnographic landscapes, rural historic landscapes, and historic mining landscapes can also be evaluated for listing in the NRHP.

The federal government established the NRHP and devised the way historic properties are eligible and can be nominated to be listed in the NRHP; this process preserves significant historic properties. The listing of a historic property in the NRHP ensures that a property is protected under provisions of the NHPA. In addition, properties deemed potentially eligible for inclusion in the NRHP are given this same protection.

In the context of a federal undertaking, the significance of a cultural resource is judged according to NRHP eligibility criteria. These criteria are defined in Title 36, Part 60, of the Code of Federal Regulations (36 CFR Part 60), which states that

> "The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and;
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that have yielded, or may be likely to yield, information important in pre-history or history."

In addition to these four criteria, there is a general stipulation that the property be 50 or more years old (for exceptions, see 36 CFR 60.4, Criteria Considerations a–g). The importance of this historic information is measured by its relevance to identified research questions that can be addressed through the analysis of particular types (National Park Service, 1991). In addition to research potential, both Native American and Euroamerican cultural resources may possess

APPENDIX E

HAZARDOUS CHEMICALS

E. HAZARDOUS CHEMICALS

E1.1 Accident Analysis for Ammonia

In uranium *in-situ* leach (ISL) facilities ammonia is used for pH adjustment during the precipitation of uranium as an insoluble uranyl peroxide compound. Large capacity outdoor tanks are typically employed for storage of ammonia at ISL facilities. The ammonia is piped from the tank to the main plant for use in the processing circuit. Mackin, et al. (2001) identifies an ammonia leak in the plant as a significant hazard. If a leak were to occur, the resultant fumes are estimated to be far in excess of the immediately dangerous to life and health value of 300 ppm for ammonia, and the plant ventilation system is not able to sufficiently dilute the concentration to safer levels.

In addition, the spray of liquid ammonia under pressure emanating at the pipe rupture point could also pose an additional hazard to the skin and eyes of any personnel in the immediate vicinity of the pipe break. Further, if at the time of the spill, plant personnel are in an inaccessible location such as on an elevated catwalk, there could be a delay in exiting the spill location. Finally, ammonia can react vigorously with water as well as with sulfuric acid and hydrochloric acid, two strong acids used in ISL uranium recovery.

Other potential hazards associated with ammonia include a major leak in the outdoor storage tank and associated piping and accidental contact with process wastes, sulfuric or hydrochloric acid, or water.

To minimize the risk of an accidental release, ammonia system design and operating procedures should be consistent with American National Standards Institute, Safety Requirements for the Storage and Handling of Anhydrous Ammonia (American National Standards Institute, 1989) or any future revision or update thereof. Following are examples of recommendations that provide safe handling of ammonia consistent with this pamphlet.

- Ammonia system supply piping should include an excess flow valve that closes automatically if flow rate exceeds a specific value. The valve should be located as close to the storage tank as possible

- All nonrefrigerated ammonia piping should conform to the applicable sections of the American National Standards Institute/American Society of Material Evaluation standard code for pressure piping

- Positive pressure, self-contained, full face respirators should be readily available in the immediate vicinity of ammonia piping and process operations

Prudent design would also ensure that ammonia piping is placed so as to minimize impact from vehicles or other objects that might cause ruptures.

E1.2 Accident Analysis for Sodium Hydroxide

At uranium ISL facilities, sodium hydroxide (NaOH) is used for pH control in the radium removal process from the barren lixiviant bleed stream using a conventional barium/radium sulfate co-precipitation process. Sodium hydroxide is typically stored as a 50-percent solution in 208-L [55-gal] drums, and is pumped to the bleed neutralization and precipitation tanks.

Sodium hydroxide is a corrosive irritant to the skin, eyes, and mucous membranes. It can cause burns and deep ulceration. Mists, vapors, and dusts containing sodium hydroxide from an accidental release can cause small burns, and contact with the eyes rapidly causes severe damage. Inhalation of the dust or mist from an accidental release can cause damage to the upper respiratory tract and to lung tissue. Sodium hydroxide ingestion causes serious damage to the mucous membranes or other tissues contacted. (Lewis, 1993).

As noted in NUREG/CR–6733 (Mackin, et al. 2001), sodium hydroxide is not volatile. A spill of 50-percent sodium hydroxide solution in a uranium ISL facility will not pose a significant inhalation hazard to workers. The immediately dangerous to life and health concentration for dust and mists of sodium hydroxide is 10 mg/m^3. This limit applies to sodium hydroxide as an airborne contaminant such as a dust or mist. Since uranium ISL facilities typically do not employ sodium hydroxide in solid form, dust is not a concern. However, mists and sprays from leaks in drums and piping systems need to be avoided, as these could cause harm through contact with the skin or through inhalation.

Other hazards associated with sodium hydroxide include a major leak in the outdoor storage tank and associated piping and accidental contact with sulfuric acid, hydrochloric acid, or water.

Standards such as Process Safety Management or Risk Management Program should be employed to reduce risk of accidents to acceptable levels.

E1.3 Accident Analysis for Sulfuric Acid

Sulfuric acid (H_2SO_4) is extremely irritating, corrosive, and toxic to tissue, resulting in rapid destruction of the tissue and causing severe burns (Lewis, 1993). In uranium ISL facilities, sulfuric acid is used to split the uranyl carbonate complex from rich eluate into carbon dioxide gas and uranyl ions in preparation for their precipitation. The sulfuric acid is usually stored in a tank located outdoors and in some cases may be piped to a much smaller day tank in the main plant for use in the processing circuit. The day tank is normally bermed for spill containment. The risk analysis performed in Mackin, et al. (2001) identifies a spill of 93 percent sulfuric acid in the plant not to be a significant inhalation hazard to workers as long as the plant ventilation system is functioning to provide adequate dilution air. However, the formation of mists and sprays, such as from a leak in the piping system, should be avoided, as these could cause harm through contact with the skin or through inhalation.

Other hazards associated with sulfuric acid include a major leak in the outdoor storage tank and associated piping and accidental contact with ammonia, sodium carbonate, sodium hydroxide and water, all of which are present at uranium ISL facilities. Suitable pre-cautions should therefore be taken to ensure that leaks and accidental contact with these chemicals are prevented. At some facilities, the sulfuric acid day tank is situated close to other eluate processing tanks, such that a simultaneous leak in more than one tank system could cause a vigorous reaction between the acid and the water in the eluate solutions. ISL facility design should ensure that this situation is avoided. It is recommended that uranium ISL facility operators follow industry best practices and design and operating practices published in accepted codes and standards that govern sulfuric acid systems and include this in the license application.

E1.4 Accident Analysis for Hydrochloric Acid

Hydrochloric acid is a corrosive irritant to the skin, eyes, and mucous membranes. A concentration of 35 ppm causes irritation of the throat after short exposure (Lewis, 1993). In uranium ISL facilities, hydrochloric acid (HCl) is used for pH control during radium removal from the barren lixiviant bleed stream via a conventional barium/radium sulfate co-precipitation process. The hydrochloric acid is usually stored in a tank located outdoors and is piped to the main plant for use in the processing circuit.

The risk analysis performed in NUREG/CR–6733 (Mackin, et al. 2001) indicates a spill of 30 percent hydrochloric acid in the plant is a significant inhalation hazard to workers, especially if the heating, ventilation, and air conditioning system is not functioning properly. In such a case, any person entering or already present within the facility would have a very short time to exit before injury. The formation of mists and sprays, such as from a leak in the piping system, should be avoided, as these could cause harm through contact with the skin or through inhalation.

Other hazards associated with hydrochloric acid include a major leak in the outdoor storage tank and associated piping and accidental contact with sodium hydroxide, ammonia, water, sodium carbonate, and sulfuric acid. Precautions should therefore be taken to ensure that accidental contact of hydrochloric acid with these chemicals is prevented. Standards such as Process Safety Management or Risk Management Program should be explained in the license application and employed to reduce risk of accidents to acceptable levels.

E1.5 Accident Analysis for Oxygen

In uranium ISL facilities, oxygen (O_2) is added to the barren lixiviant prior to the injection of the lixiviant into the ground. The oxygen may be fed into the barren lixiviant header via a common connection or via multiple connections to each individual injection well pipe. As joints are susceptible to leaks, the common header system is inherently safer. Solenoids that automatically shut off the oxygen supply in case of power failure (normally closed solenoids) may be employed at some locations. Most well header houses are also equipped with an exhaust ventilation system. The normally closed solenoids and the exhaust ventilation reduce the risk of oxygen leaks in the lixiviant injection piping and buildup in the header house.

Fire and explosion are the main hazards associated with the storage and use of oxygen. Materials that are flammable in air burn more vigorously in oxygen. If ignited, combustibles such as oil and grease will burn with nearly explosive violence in oxygen. All oil, grease, and other combustible material must be removed from piping systems and containers before putting them into oxygen service. Cleaning Equipment for Oxygen Service (Compressed Gas Association, Inc., 1996a), CGA G4–1, and the Handbook of Compressed Gases, Chapter 11 (Compressed Gas Association, Inc., 2000) describe cleaning methods used by manufacturers of oxygen equipment. To the extent possible, sources of ignition should be eliminated. Sudden opening of valves can result in ignition, and is to be avoided. ASTM G–88, Standard Guide for Designing Systems for Oxygen Service (ASTM International, 1997) discusses safety measures, including providing system isolation and barriers. Liquid oxygen piping systems must include pressure relief devices to prevent the buildup of excessive pressure due to vaporization when liquid is trapped between valves in piping. CGA G–4.4, Industrial Practices for Gaseous Oxygen Transmission and Distribution Piping Systems (Compressed Gas Association, Inc., 1993a) provides a detailed discussion on the design and installation of gaseous oxygen piping systems. Requirements for both underground and above-ground piping, as well as material

specifications, velocity restrictions, location and specifications for valves, and the design and specification of metering stations and filters are included in this publication.

Oxygen can be shipped as a gas, at pressures of 13,887 kPa (2,000 psig) or above, or as a cryogenic liquid at pressures below 1,480 kPa (200 psig) and temperatures below -147 °C [-232 °F]. Ordinary carbon steels and most alloy steels lose their ductility at the temperature of liquid oxygen and are considered unsuitable for use. Austenitic stainless steels such as Types 304 and 316, nickel-chrome alloys, nickel, Monel 400, copper brasses, bronzes, and aluminum alloys are more suitable for use in liquid oxygen service. To effectively isolate them from fires and accidents in other systems, the oxygen storage facilities should be located a safe distance away from other storage tanks and process facilities. Standards to ensure safety with oxygen systems at user sites are detailed in National Fire Prevention Association publications such as NFPA–50, Standard for bulk Oxygen Systems at Consumer Sites (National Fire Prevention Association, 1996).

Oxygen presents a substantial fire and explosion hazard. Accordingly, uranium ISL facility licensees should comply with accepted industry standards for handling this material. General pre-cautions for safe handling of gaseous oxygen are contained in CGA–4, Oxygen (Compressed Gas Association, Inc., 1996b). A thorough discussion of necessary pre-cautions to be used for liquid oxygen can be found in CGA P–12, Safe Handling of Cryogenic Liquids (Compressed Gas Association, Inc., 1993b) and in the Handbook of Compressed Gases, in Chapter 2 (Compressed Gas Association, 2000).

E1.6 Accident Analysis for Hydrogen Peroxide

In the uranium ISL process, a hydrogen peroxide (H_2O_2) solution (typically of 50-percent strength) is added to an acidified uranium-rich solution to form an insoluble uranyl peroxide precipitate, which is then typically fed to a thickener for further processing into yellowcake. The 50-percent hydrogen peroxide solution is normally stored in a large capacity outdoor tank and is piped to the main plant for use in the precipitation process.

Hydrogen peroxide is a strong oxidizer and a reactive, easily decomposable compound. Its hazardous decomposition products include oxygen and hydrogen gas, heat, and steam. Decomposition can be caused by mechanical shock, light, ignition sources, excess heat, combustible materials, incompatible materials, strong oxidants, rust, dust, and pH > 4.0. Incompatible materials include alkalies, oxidizable materials, finely divided metals (e.g., magnesium, iron), alcohols, and permanganates. Although many mixtures of hydrogen peroxide and organic materials do not explode upon contact, the resultant combinations can be detonable either upon catching fire or from impact. In addition, when sealed in strong containers, even a gradual decomposition of hydrogen peroxide can cause excessive pressure to build up which may then cause the container to burst explosively (Lewis, 1993).

Solutions, vapors, and mists of hydrogen peroxide are irritating to body tissue. The eyes are particularly sensitive to this material, and a 50-percent solution will cause blistering of the skin. Inhalation of the vapors can burn the respiratory tract.

The risk analysis performed in NUREG/CR–6733 (Mackin, et al. 2001) indicates that a piping system leak in the process building can potentially result in localized vapor concentrations in excess of the immediately dangerous to life and health value of 75 ppm within minutes. A leak in a confined space such as a piping trench can potentially generate lethal vapor concentrations at an even faster rate.

E1.7 Accident Analysis for Carbon Dioxide

Carbon dioxide (CO_2) is added to the lixiviant at uranium ISL facilities either upstream or downstream of the ion exchange resin vessels to maintain the carbon dioxide concentration in the lixiviant. The carbon dioxide is typically delivered by truck and is stored on site under pressure in a tank in liquid form. The carbon dioxide is allowed to evaporate and the gas is then transported by pipe to the process flow stream where it is introduced into the lixiviant piping under pressure.

The primary hazard associated with carbon dioxide is leakage in a confined space, because it will displace oxygen and could lead to asphyxiation. Carbon dioxide concentrations of 10 percent or more can produce unconsciousness or death. The American Conference of Governmental Industrial Hygienists (1995) recommended that the time-weighted average for carbon dioxide is 5,000 ppm [9,000 mg/m^3], and the short-term exposure limit is 30,000 ppm [54,000 mg/m^3]. Since gaseous carbon dioxide is one and one-half times heavier than air, it can accumulate in low or confined areas. Appropriate warning signs should be posted outside such areas. When entering low or confined areas where high concentrations of carbon dioxide gas may be present, a self-contained breathing apparatus should be used. Floor level positive ventilation systems with carbon dioxide monitoring at low points are recommended in both satellite and central processing plants.

Carbon dioxide is typically stored outdoors onsite in insulated, mechanically refrigerated tanks. The carbon dioxide is maintained at low temperatures and under pressure in these tanks. Insulated carbon dioxide bulk storage systems must be designed to safely contain the required pressure and to meet applicable federal, state, and local regulations. Further information regarding the safe handling and use of carbon dioxide can be found in the following publications of the Compressed Gas Association: Handbook of Compressed Gases (2000); CGA–6, Carbon Dioxide (1997); CGA G–6.1, Standard for Low Pressure Carbon Dioxide Systems at Consumer Sites (1995); and CGA G–6.5, Standard for Small Stationary Low Pressure Carbon Dioxide Systems (1992).

The primary problems associated with carbon dioxide piping are ruptures from elevated pressure or from the loss of piping ductility at low temperature. Rapid depressurization will cause the liquid to autorefrigerate. If temperatures are allowed to decrease to −78.5 °C [−109.3 °F], dry ice will form in the lines. In addition, the rapid discharge of liquid carbon dioxide through a line that is not grounded can result in a buildup of static electricity which may be dangerous to operating personnel. Safe operation of carbon dioxide piping and systems is discussed in some detail in Mackin, et al. (2001).

E1.8 Accident Analysis for Sodium Carbonate and Sodium Chloride

Sodium carbonate (Na_2CO_3) and sodium chloride (NaCl) are used at ISL facilities for regeneration of the ion exchange resin. The loaded resin is typically contacted with a solution containing sodium chloride and sodium carbonate (soda ash) in a sequence that regenerates the resin by removing the uranyl dicarbonate ions from the resin and converting them to uranyl tricarbonate.

A concentrated solution of sodium carbonate is typically prepared in a commercially available saturator by passing warm water through a bed of soda ash. The saturated solution is stored in an indoor tank. A saturated solution of sodium chloride is similarly prepared using a

commercially available brine generator, and is also stored in indoor tanks. Using a multistage elution circuit, the eluate solution containing the sodium chloride and sodium carbonate is used to contact the resin.

Both sodium chloride and sodium carbonate can be skin and eye irritants. Sodium carbonate is also moderately toxic by inhalation. In addition, sodium carbonate will react vigorously with sulfuric acid (Lewis, 1993) and with hydrochloric acid, typically present at uranium ISL facilities.

As indicated in NUREG/CR–6733 (Mackin, et al., 2001), sodium carbonate is not volatile, and a spill of saturated sodium carbonate solution in a uranium ISL facility will not pose a significant inhalation hazard to workers. Since several tons of sodium carbonate salt will be used as feed in the saturator, pre-cautions should be taken to ensure that inhalation of the dust is avoided. The formation of a sodium carbonate solution mist from a piping system leak should also be avoided as an inhalation hazard. Finally, pre-cautions should be taken to prevent accidental contact of sodium carbonate salt or solution with sulfuric or hydrochloric acid.

E1.9 Accident Analysis for Hydrogen Sulfide and Sodium Sulfide

In the uranium ISL process, hydrogen sulfide (H_2S) is used to immobilize heavy metals during groundwater restoration.

Fire and leakage in a confined space are the two main hazards associated with hydrogen sulfide. Because it is a flammable gas normally transported and stored in liquid form, the amount of flammable material is much greater per unit volume, making it a dangerous fire hazard when exposed to heat, flame, or oxidizers (Lewis, 1993). Hydrogen sulfide is a poison and a severe irritant to the eyes and mucous membranes. The immediately dangerous to life and health limit is 100 ppm [National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards (National Institute for Occupational Safety and Health, 2005)]. For maximum safety, indoor storage should be avoided and indoor areas should have positive ventilation with at least six volumes of air change per hour—Handbook of Compressed Gases (Compressed Gas Association, 2000).

Hydrogen sulfide is added to injection well headers. Header houses should therefore be equipped with adequate ventilation. To prevent injection during abnormal or unsafe process conditions, safety interlocks should be included in the design of instrumentation and control systems. In addition, the design should include adequate pre-cautions to ensure personnel safety when entering a confined space such as a piping trench carrying a hydrogen sulfide line.

Hydrogen sulfide storage sites should be located far away from other storage tanks, oxidizing materials, acids, and process facilities so that they are effectively isolated from fire and accidents.

Detailed information on the pre-cautions required for the safe handling of hydrogen sulfide and for the procedures and equipment for its use may be found in CGA G–12, Hydrogen Sulfide (Compressed Gas Association, 1996c) as well as in the Handbook of Compressed Gases (Compressed Gas Association, 2000). Standards such as Process Safety Management or Risk Management Program should be employed to drive down risk of accidents to acceptable levels. Sodium sulfide (Na_2S) may be used instead of hydrogen sulfide for the *in-situ* precipitation of heavy metals during groundwater restoration operations. Sodium sulfide is corrosive and will cause severe eye and skin burns. Under certain conditions, sodium sulfide can react violently with water to liberate hydrogen sulfide and free alkali (Lewis, 1993). Contact with heat, flame,

or other sources of ignition should be avoided as sodium sulfide can be flammable. Materials to avoid include strong oxidizing agents, strong acids, and most common metals.

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APPENDIX F

DESCRIPTION OF PROCESSES FOR REVIEW OF CUMULATIVE EFFECTS

F. DESCRIPTION OF PROCESSES FOR REVIEW OF CUMULATIVE EFFECTS

F1 GENERAL DESCRIPTION OF THE COUNCIL ON ENVIRONMENTAL QUALITY 11-STEP PROCESS

An example for analyzing potential cumulative effects process can be based on applying the Council on Environmental Quality's (CEQ) 11-step process to the 12 identified resource areas (CEQ, 1997):

- Step 1: Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals. This step is based on identifying typical incremental impacts associated with the construction, operation, aquifer restoration, and decommissioning phases associated with the ISL project.

- Step 2: Establish the geographic scope for the analysis. The scope for the four identified cumulative effects issues and related resource areas consists of the local and regional areas around the proposed ISL project. The specific spatial boundaries are place based and vary with each resource area.

- Step 3: Establish the timeframe for the analysis. The selected timeframe is typically from the initiation of area energy development projects (e.g., 1960s) to the future point in time when the proposed ISL project will have extracted the useable uranium.

- Step 4: Identify other actions affecting the resources, ecosystems, and human communities of concern. As noted in the earlier definition, other actions include past, present, and reasonably foreseeable future actions (RFFAs) that have, or would be expected to have, impacts on the four identified resource areas. Identifying past actions will typically involve reviewing local and regional energy and industrial development projects and various land use activities and changes (e.g., from agricultural usage to residential usage). Present actions may include current planning and license applications related to ISL projects, other energy and industrial development projects, and/or activities leading to land use changes. The RFFAs, which may include the continued operation or expansion of past and present actions, can be defined as

  > Actions identified by analysis of formal plans and proposals by public and private entities that have primary (direct) or secondary (indirect) impacts on the four resource areas. RFFAs also include potential actions that are beyond mere speculation when incorporated in plans or documents by credible private or public entities. RFFAs may also include events forecasted by trends, probable occurrences, policies, regulations, or other credible data that may have bearing on the four resource areas.

- Each identified RFFA should be defined by its anticipated time period of occurrence, probability of occurrence, and geographical location relative to the proposed ISL facility.

- Step 5: Define the pertinent resource areas identified during scoping in terms of how they will respond to change and ability to withstand stresses. In this case, scoping refer

NRC FORM 335 (9-2004) NRCMD 3.7

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER (Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)

NUREG-1910, Vol. 2

2. TITLE AND SUBTITLE

Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities
Chapters 5 through 12 and Appendices A through F

Draft Report for Comment

3. DATE REPORT PUBLISHED

MONTH	YEAR
July	2008

4. FIN OR GRANT NUMBER

5. AUTHOR(S)

6. TYPE OF REPORT

Technical

7. PERIOD COVERED *(Inclusive Dates)*

8. PERFORMING ORGANIZATION - NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Programs
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

9. SPONSORING ORGANIZATION - NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

Wyoming Department of Environmental Quality, Land Quality Division (Cooperating Agency)
122 West 25th Street, Herschler Building
Cheyenne, Wyoming 82002

10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

This Draft Generic Environmental Impact Statement (Draft GEIS) was prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 and NRC regulations for implementing NEPA found at Title 10, "Energy," of the U.S. Code of Federal Regulations (CFR) Part 51 (10 CFR Part 51). This Draft GEIS evaluates on a programmatic basis, the potential environmental impacts associated with the construction, operation, ground water restoration, and decommissioning of uranium milling facilities employing the in-situ leach (ISL) process.

In the ISL process, a leaching agent, such as oxygen with sodium bicarbonate, is added to native ground water for injection through wells into the subsurface ore body to dissolve the uranium. The leach solution, containing the dissolved uranium, is pumped back to the surface and sent to the processing plant, where ion exchange is used to separate the uranium from the solution. The underground leaching of the uranium also frees other metals and minerals from the host rock. Operators of ISL facilities are required to restore the ground water affected by the leaching operations. The milling process concentrates the recovered uranium into the product known as "yellowcake" (U_3O_8). This yellowcake is then shipped to uranium conversion facilities for further processing in the overall uranium fuel cycle.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

Uranium Recovery
In-Situ Leach Process
Uranium
Environmental Impact Statement

13. AVAILABILITY STATEMENT

unlimited

14. SECURITY CLASSIFICATION

(This Page)

unclassified

(This Report)

unclassified

15. NUMBER OF PAGES

16. PRICE

PRINTED ON RECYCLED PAPER

Federal Recycling Program

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

OFFICIAL BUSINESS