Development of the First Three Supplemental Environmental Impact Statements Tiered from the Generic Environmental Impact Statement for In-situ Uranium Recovery Facilities - 11617

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ABSTRACT

In May 2009, the U.S. Nuclear Regulatory Commission (NRC) issued NUREG-1910, "*Generic Environmental Impact Statement for In-Situ leach Uranium Milling Facilities*" (GEIS). In the GEIS, NRC assessed the potential environmental impacts from the construction, operation, aquifer restoration, and decommissioning of an In-Situ Uranium Recovery (ISR) facility located in four specified geographic regions of the western United States. The purpose of GEIS is to improve the efficiency of NRC's environmental reviews for these ISR license applications required under the National Environmental Policy Act of 1969, as amended (NEPA). In December 2009, NRC issued draft Supplemental Environmental Impact Statements (SEISs) for three proposed uranium recovery facilities in Wyoming for public comment. The draft SEISs were the first three issued by the NRC under the GEIS. The SEIS for each facility examines site-specific impacts unique to that proposed facility and its location, incorporating relevant discussion and conclusions from the GEIS, and using information from the applicant's license application and other independent sources. At the end of the public comment period in early March 2010, NRC had received approximately 60 documents (i.e., email, mail, and facsimiles) on the three draft SEISs. Among them, one of the primary concerns from the U.S. Environmental Protection Agency (EPA) Region 8 was on the wastewater disposal alternatives considered in the SEISs and areas related to waste management impacts. This paper addresses challenges and lessons learned associated with the development of the three SEISs, interactions with EPA Region 8 to address their comments on the three SEISs, and the path forward.

INTRODUCTION

The Atomic Energy Act of 1954 and the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) authorize the NRC to issue licenses for the possession and use of source material and byproduct material. The statutes require NRC to license facilities that meet NRC regulatory requirements that were developed to protect public health and safety from radiological hazards. ISR facilities must meet NRC regulatory requirements in order to obtain a license to operate.

NRC designed the licensing process to assure the safe operation of ISR facilities. In addition to information for a safety evaluation review, license applicants must submit an environmental report as part of their license application. The NRC's detailed technical review of a license application is comprised of both a safety review and an environmental review. These two reviews are conducted in parallel. The focus of the safety review is to assess compliance with the applicable regulatory requirements in 10 CFR Part 20, Part 40, and Part 40, Appendix A. The environmental review is conducted in accordance with the regulations in 10 CFR Part 51, which implement the National Environmental Policy Act of 1969 (NEPA). Issuance of a license to possess and use source material for new ISR facilities requires an environmental impact statement (EIS) or a supplement to an EIS.

NRC prepared the Generic Environmental Impact Statement for *In-Situ* Leach Uranium Milling Facilities (GEIS) to help fulfill this requirement. The GEIS was prepared to assess the potential environmental impacts associated with the construction, operation, aquifer restoration, and decommissioning of an ISR facility. NRC developed the GEIS based on its experience in licensing and regulating ISR facilities gained during the past 30 years. In the GEIS, NRC does not consider specific facilities, but rather provides an assessment of potential environmental impacts associated with ISR facilities that might be located in four

regions of the western United States. These regions are used as a framework for discussions in the GEIS and were identified based on several considerations, including: (1) past and existing uranium milling sites are located within States where NRC has regulatory authority over uranium recovery; (2) potential new sites are identified based on NRC's understanding of where the uranium recovery industry has plans to develop uranium deposits using ISR technology; and (3) locations of previously identified uranium deposits within portions of Wyoming, Nebraska, South Dakota, and New Mexico.

Using these criteria, four geographic regions were identified (Figure 1). These regions are (1) Wyoming West Uranium Milling Region; (2) Wyoming East Uranium Milling Region; (3) Nebraska-South Dakota-Wyoming Uranium Milling Region; and (4) Northwestern New Mexico Uranium Milling Region.

The intent of the GEIS is to determine which impacts would be essentially the same for all ISR facilities and which ones would result in varying levels of impacts for different facilities, thus requiring further site-specific information to determine the potential impacts. As such, the GEIS provides a starting point for NRC's NEPA analyses on site-specific license applications for new ISR facilities, as well as for applications to amend or renew existing ISR licenses.

In December 2009, the NRC issued three draft Supplemental Environmental Impact Statements (SEISs) for public comment. The draft SEISs are the first issued by the NRC under its GEIS. The SEIS for each facility examines site-specific impacts unique to that proposed facility and its location, incorporating relevant discussion and conclusions from the GEIS. The three draft SEISs cover license applications for the Moore Ranch Project, proposed by Uranium One in Campbell County, Wyoming, which is in the Wyoming East Uranium Milling Region; the Lost Creek Project, proposed by Lost Creek ISR,LLC, for Sweetwater County, Wyoming, which is in the Wyoming West Uranium Milling Region; and the Nichols Ranch Project, proposed by Uranerz Energy Corp. in Campbell and Johnson counties, Wyoming, which is in the Wyoming East Uranium Milling Region. These draft SEISs were coordinated with the State of Wyoming, the U.S. Environmental Protection Agency, and the U.S. Bureau of Land Management, as well as potentially affected Native American tribes.

In addition to the notice and comment process for the draft SEISs, potential parties can seek admission of environmental contentions into the NRC's hearing process. The NRC hearing process (10 CFR Part 2) applies to proposed licensing actions and offers stakeholders a separate opportunity to raise concerns associated with the proposed action. These are adjudicatory hearings held before independent Boards within NRC with appeal opportunities for decisions to the full Commission in its adjudicatory capacity. This provides additional public disclosure and opportunity for involvement of the public in NRC's licensing process. NRC published a Notice of Opportunity for Hearing in the *Federal Register* related to each of the three ISR license applications. No requests for a hearing were received on any of the license applications.

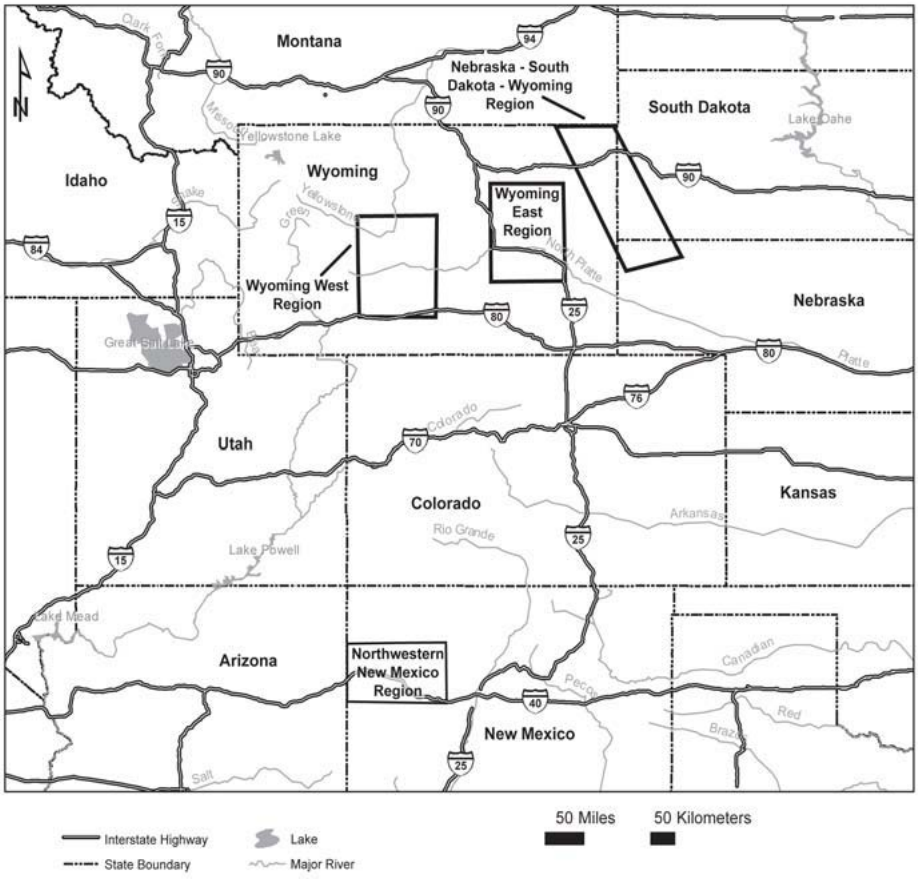

Figure 1. Location of Four Geographic Regions Used as a Framework for the Analyses Presented in the GEIS (NRC, 2009)

IN-SITU URANIUM RECOVERY PROCESS

During the ISR process, an oxidant-charged solution, called a lixiviant, is injected into the production zone aquifer (uranium ore body) through injection wells (Figure 2). The production zone is that portion of the aquifer that has been exempted by EPA for potable water use. A lixiviant uses native ground water (from the production zone aquifer), carbon dioxide, and sodium carbonate/bicarbonate, with an oxygen or hydrogen peroxide oxidant. As it circulates though the production zone, the lixiviant oxidizes and dissolves the mineralized uranium, which is present in a reduced chemical state. The resulting uranium-rich solution is drawn to recover wells by pumping, and then transferred to a processing facility via a network of pipes buried just below the ground surface. At the processing facility, the uranium is leached from the solution. The resulting barren solution is then recharged with the oxidant and re-injected to recover more uranium from the well field. The uranium that is recovered from the solution would be processed, dried into yellowcake, and packaged into NRC and U.S. Department of Transportation approved steel drums, and trucked offsite to a licensed uranium conversion facility.

Liquid wastes from ISR facilities are generated during all phases of uranium recovery. Liquid wastes may contain elevated concentrations of radioactive and chemical constituents. Liquid waste streams are

predominantly production bleed and aquifer restoration water (NRC, 1997). Additional liquid waste streams are generated from well development, flushing of depleted eluant to limit impurities, resin transfer wash, filter washing, uranium precipitation process wastes (brine), and plant wash down water. Liquid effluent disposal practices that NRC previously has approved for use at specific sites include evaporation ponds, land application, deep well injection, and surface water discharge.

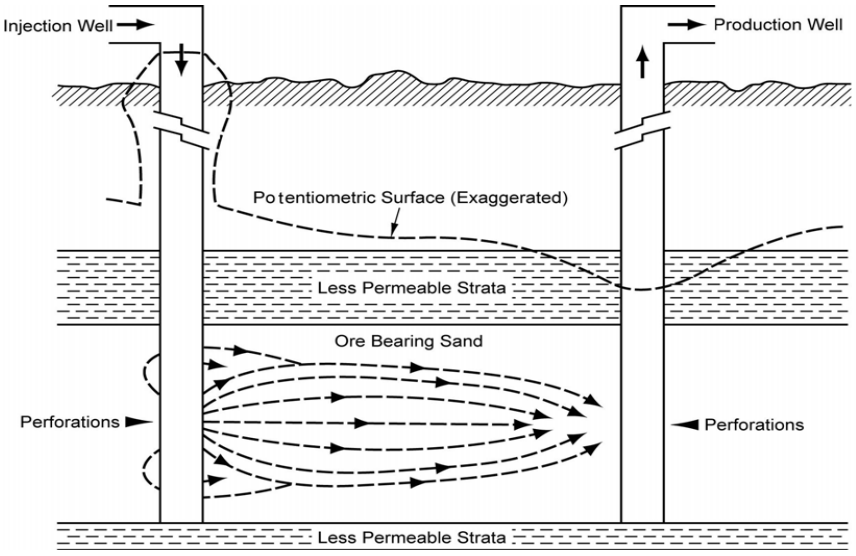

Figure 2. Idealized Schematic Cross Section to Illustrate Ore-Zone Geology and Lixiviant Migration from an Injection Well to a Production Well (From NRC, 1997a)

COMMENTS ON THE FIRST THREE DRAFT SEISs

In December 2009, the NRC staff published three draft SEISs to evaluate the potential environmental impacts from each applicant to construct, operate, conduct aquifer restoration, and decommission an ISR uranium milling facility. Each SEIS describes the environment potentially affected by applicant's proposed site activities, presents the potential environmental impacts resulting from reasonable alternatives to the proposed action, and describes applicant's environmental monitoring program and proposed mitigation measures. In conducting its analysis in each SEIS, the NRC staff evaluated site specific data and information to determine whether the applicant's proposed activities and site characteristics were consistent with those evaluated in the GEIS. NRC staff then determined relevant sections, findings and conclusions in the GEIS that could be incorporated by reference, and areas that needed additional analysis.

At the end of public comment period in March 2010, NRC received approximately 60 documents (i.e., email, mail, and facsimiles) for the three draft SEISs including a comment letter (EPA, 2010a) from EPA Region 8 on the three draft SEISs. After review of these documents, NRC staff identified a total of approximately 1,800 individual comments. EPA's review and comments were provided in accordance with their responsibilities under Section 102(2)(C) of NEPA, and Section 309 of the Clean Air Act. In the letter, EPA expressed two primary concerns with the draft SEISs: (1) the narrow range of the wastewater disposal alternatives considered in the SEISs along with the limited discussion regarding waste management impacts; and (2) the lack of information regarding potential air emissions. In addition, EPA also raised concerns regarding the potential establishment of alternative concentration limits as

groundwater restoration targets prior to completion of groundwater restoration, and the consideration of climate change and greenhouse gas emissions in the SEISs.

Based on EPA's review of the draft SEISs, they rated each of the draft SEISs as "Inadequate." EPA believed that these draft SEISs did not meet the purpose of NEPA and should be formally revised and made available for public comment in a supplemental or revised SEIS. If their concerns were not resolved, this matter would be a candidate for referral to the Council on Environmental Quality for resolution.

From March through August 2010, the NRC met with EPA staff, and participated in multiple teleconferences with EPA to better understand their concerns and to share NRC's approach to address issues identified in the EPA letter (EPA, 2010a). In August 2010, the NRC responded to the EPA letter (NRC, 2010) indicating that issues raised by the EPA have been adequately addressed in all three final SEISs and that the revised draft SEISs need not be made available for public comment. NRC subsequently published the Moore Ranch final SEIS in August 2010.

ADDRESSING COMMENTS ON WASTEWATER DISPOSAL ANALYSIS AND WASTE MANAGEMENT

EPA commented that for each of the three ISR projects, deep Class I injection well disposal is the only wastewater disposal analyzed in the draft SEIS (EPA, 2010a). Wastewater disposal alternatives that EPA believed need to be analyzed include (1) treatment and disposal via a Class V injection well; (2) treatment and discharge to surface waters under a National Pollutant Discharge Elimination System permit; and (3) other potential methods such as land disposal and evaporation ponds.

NRC staff believed that a range of wastewater disposal alternatives were discussed in the GEIS (NRC, 2009). Wastewater disposal practices that the NRC has previously licensed at specific sites include evaporation ponds, land application, deep well injection and surface water discharge. The GEIS concluded that the combination of state permitting actions, NRC license conditions and NRC inspections ensure that proper practices would be used to comply with safety requirements to protect workers and the public.

The NRC staff's site-specific review of deep well injection as a wastewater disposal method is limited to ensuring that the radiological dose requirements in 10 CFR Part 20 (20.2002) are met. An Underground Injection Control (UIC) permit from EPA or the appropriate State agency, and an aquifer exemption from EPA are required for a licensee to use this wastewater disposal method at a specific site. The NRC's review of this wastewater disposal method is to ensure compliance with the dose limits in 10 CFR Part 20.

The NRC staff believed that the State of Wyoming's review and approval process for the UIC permit verifies that site specific and regional aquifer characteristics limit the potential to contaminate underground sources of drinking water. A State UIC permit will not be issued if the discharge will either cause or contribute to the violation of State water quality standards. For each of the three proposed ISR projects in Wyoming, if granted, an NRC license condition will require the licensee or applicant to obtain a State Class I UIC injection well permit before operations begin. If the State does not grant a permit to the licensee (or applicant), the licensee (or applicant) would be required to submit a license amendment request for NRC review and approval of a different wastewater disposal method before beginning operation. NRC would perform both safety and environmental reviews of the applicant's new wastewater disposal proposal. The final SEISs clarify this point.

When the impacts of waste disposal alternatives are similar, the NRC does not mandate, nor would the environmental analysis dictate, the particular type of wastewater disposal method utilized at an ISR facility. However, the NRC requires the license application to propose a wastewater disposal option for NRC's evaluation of the licensing request. If Class I UIC disposal is the proposed disposal option, then NRC conditions the license to require the licensee to obtain a UIC injection well permit before deep well injection and well field operations commence. By conditioning the license on the applicant getting necessary permits, the NRC can assure that the use of the selected option falls within the evaluation of environmental impacts for wastewater disposal options included in the GEIS.

In response to EPA comments, NRC has provided additional information on wastewater disposal options (e.g. evaporation ponds, land application, surface water discharge and Class V injection wells) in the final SEISs. Certain sections of the final SEIS have also been revised to include a description of potential environmental impacts from implementing the alternative wastewater disposal options and a chart that compares the potential impacts and requirements.

In addition, EPA comments indicate that potential impacts from disposal of non-radioactive constituents (barium, cadmium, mercury, selenium) in liquid wastes were not adequately addressed, given the anticipated volumes and available methods. EPA commented that additional analysis was needed, including the potential cost to remove these other potentially harmful non-radioactive constituents, to address this concern.

NRC staff believed that under the Uranium Mill Tailings Radiation Control Act of 1978 and NRC implementing regulations, 11e.(2) byproduct material consists of either the tailings or wastes associated with the extraction of uranium or thorium for its source material content (NRC, 2010). These wastes include both radiological and associated nonradiological constituents. Therefore, the non-radiological constituents are components of the liquid 11e.(2) byproduct material to be disposed of via deep well injection or by other methods and therefore, separate remediation plans and costs for the non-radiological constituents are not required.

CONTINUING EFFORTS ON COMMENT RESOLUTIONS AND THE PATHFORWARD

In September 2010, NRC received a comment letter from EPA (EPA, 2010b) on their review of the Moore Ranch final SEIS. EPA acknowledged NRC's attempt to be responsive to EPA's comments in the wastewater disposal alternative areas. However, EPA continues to have concerns that the discussion regarding potential environmental impacts associated with waste management in the final SEIS remains very general and offers mostly presumptive reliance upon State-permitting programs for environmental impact assessment and mitigation. EPA is aware of NRC's position that it has no authority or regulatory control over an applicant's selection of any particular technology to be used at a site and that if the NRC decides to grant the license request, an applicant must comply with the license and other relevant requirements. However, EPA believes that an agency's regulatory authority, or lack of such authority, should not preclude full disclosure, under NEPA, of potential constraints and environmental impacts associated with all reasonable alternatives to a proposed action.

NRC plans to continue to interact with EPA to address these issues. The Nichols Ranch and Lost Creek final SEISs are expected to be issued in early 2011.

LESSONS LEARNED

1. The draft SEISs are the first three completed under the GEIS and were published at the same time for public comment. Originally, NRC staff planed to finalize all three of the SEISs at or around the same time frame. Staff decided to finalize them in sequence due to the fact that staff received many comments

and it requires significant amount of resources including contractor support to address those comments and finalize the SEISs. In the future, NRC staff plans to publish draft SEISs in sequence so that staff can finalize the final SEIS on schedule in case staff receives significant number of comments.

2. NRC staff plans to enhance our communication with EPA before the draft SEISs are published to ensure that any concerns identified are addressed earlier in the process.

3. Based on the experience from the three SEISs, NRC staff plans to update relevant guidance documents to guide applicants to submit all the necessary information in the application including good quality and appropriate size figures that can be incorporated in the SEIS as appropriate.

4. NRC staff plans to initiate regularly scheduled periodic meetings or teleconferences between NRC and applicant senior managers to discuss the status of projects and any issues or concerns that could affect the completion of the staff review.

5. NRC staff plans to start the National Historic Preservation Act, Section 106 consultation process and interface with the Bureau of Land Management on their NEPA review process as early as possible when reviewing the license applications.

REFERENCES

EPA Region 8 March 2010. “Subject: NUREG-1910, Supplements 1, 2, and 3 Draft SEIS for three Wyoming Uranium ISR Projects. Lost Creek ISR Project CEQ# 20090425; Moore Ranch ISR Project CEQ# 20090421; Nichols Ranch ISR Project CEQ# 20090423. EPA 2010a.

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