

March 12, 1999

FOR: The Commissioners

FROM: William D. Travers /s/
Executive Director for Operations

SUBJECT: RECOMMENDATIONS ON WAYS TO IMPROVE THE EFFICIENCY OF NRC REGULATION AT *IN SITU* LEACH URANIUM RECOVERY FACILITIES

PURPOSE:

To obtain Commission approval of the staff's recommendations to withdraw from the active regulation of ground water and solar evaporation ponds at *in situ* leach (ISL) uranium recovery facilities, and to seek Commission direction on the approach to be taken in staff guidance documents regarding how to classify waste discharge from ISL facilities.

SUMMARY:

The U.S. Nuclear Regulatory Commission (NRC) has historically regulated operations at ISL facilities under the authority of the Atomic Energy Act of 1954, as amended (AEA). The uranium recovery industry, however, believes that NRC's regulation of ground water at these facilities is duplicative of the ground-water protection programs administered by the U.S. Environmental Protection Agency (EPA) or EPA authorized States under the Safe Drinking Water Act (SDWA). The industry also has raised concerns about staff guidance documents that it believes preclude the disposal of certain types of wastes generated at ISL facilities at uranium mill tailings impoundments. In this paper, the staff discusses the industry's concerns and provides recommendations to the Commission on ways to address the issues raised.

BACKGROUND:

The techniques of ISL uranium recovery were developed in the 1970s as the demand for uranium declined, resulting in a need for more cost-efficient extraction techniques so uranium mining companies could remain profitable in a less certain market. Currently, ISL extraction is the predominant method of uranium recovery in the United States. ISL techniques involve the use of wells to circulate local ground water, fortified with oxygen and carbon dioxide, to leach uranium at depth from the host rock. The liberated uranium is recovered in a central processing facility. Details of the ISL process are provided in [Attachment 1](#).

The staff has been engaged in discussions over the past several years with the uranium recovery industry regarding ways to eliminate what the industry perceives as dual regulation of ground water at ISL facilities. The National Mining Association (NMA), which represents a number of companies involved in uranium recovery, submitted the report, "Recommendations for a Coordinated Approach to Regulating the Uranium Recovery Industry" (hereafter White Paper), to the Commission in April 1998, expressing its concerns on several issues. Two issues raised by NMA, and addressed in the White Paper, are: (a) NRC's jurisdiction over ground-water protection at ISL facilities and (b) concerns over staff guidance on the discharge of liquid effluents from ISL facilities, both of which are addressed in this paper. The following paragraphs discuss the industry's positions in more detail, and provide staff's recommendations to the Commission on ways to address these concerns.

DISCUSSION:

Dual Regulation of Ground Water

Over the past several years, the industry has argued that NRC's regulation of ground water is duplicative of the ground-water protection programs required by the SDWA and administered by the EPA or EPA-authorized States. EPA and the States protect ground-water quality through the Underground Injection Control (UIC) program, under the SDWA. As presented in NMA's White Paper, the industry believes that NRC's review and licensing activities are another form of regulation covering the same issues.

Historically, NRC has imposed conditions on ISL operations to ensure that ground-water quality is maintained during licensed activities and that actions are taken to ensure the restoration of ground-water quality before the license is terminated. The specific conditions imposed in an ISL license have typically been the result of NRC's independent review, as documented in safety evaluation reports and appropriate environmental assessment reports. In February 1998, staff institutionalized its review process for ISLs, including a detailed evaluation of ground-water activities, in a draft Standard Review Plan for ISL facility license applications (SRP) that was published for public comment. Following the comment period, staff held a public workshop on the SRP to discuss the issues raised. At present, the SRP has been finalized but has not yet been published. As noted below, the staff intends, subject to Commission agreement, to publish the SRP and use it in licensing reviews until the rulemaking for new 10 CFR Part 41 (SECY 99-011 ) has been completed.

In addition to NRC's review, licensees must also obtain a UIC permit from the EPA or the EPA-authorized State before uranium recovery operations can begin. EPA or the authorized State conducts many of the same types of reviews as NRC. This is evidenced by NRC routinely incorporating ground-water protection limits from a State's permitting program into specific license requirements, and staff routinely accepting specific methodologies and guidance developed by EPA for ground-water monitoring programs and well construction.

The industry's preferred approach for addressing dual regulation in the wellfield is for NRC to determine that it does not have jurisdiction in the wellfield. NRC's position on its authority and jurisdiction over ISL operations is that NRC does have jurisdiction over ground water in the wellfield. However, to

address the industry's dual regulation concerns, staff requested that the Office of the General Counsel (OGC) determine whether NRC could rely on the actual (or expected) existence of a permit, issued by EPA or an EPA-authorized State under the UIC program, as a basis for NRC to withdraw from active regulation of the ground water at ISL facilities currently under its jurisdiction. OGC concluded that the Commission could exercise its discretion and rely on the UIC permit for the protection of ground water. NRC would still retain jurisdiction over the wellfield and ground water, under the Agency's AEA authority; but would simply defer active regulation to EPA or the EPA-authorized State, not unlike the way transportation issues are addressed with the Department of Transportation.

OGC recommended that the Commission adopt a rulemaking to codify the approach above, and consider the development of a Memorandum of Understanding (MOU) with EPA or the EPA-authorized States. Further, OGC has advised the staff that completing a rulemaking before changing the Agency's practice would provide the technical and legal rationale for the Agency's change in its previous practice and guidance.

Staff implementation of these actions would be pursued as part of a rulemaking for a new Part 41, as presented in SECY 99-011. Staff considers that public health and safety and the environment will be adequately protected by relying on the EPA UIC program as the sole active regulatory authority for ground-water issues at ISL facilities. As noted earlier, this is based on the fact that many aspects of the staff's review rely on EPA standards, methodologies, and guidance. The staff will look to the Commission for direction on the timing of the rulemaking, as well as on whether to pursue an MOU with EPA or the EPA-authorized States. Consideration should be given to the fact that if NRC chooses to pursue an MOU with EPA, the cost of such an MOU would be passed on to licensees through increased 10 CFR Part 171 fees.

It should be noted that the staff did receive some comments on this subject during its August 1998 public meetings which were held to gather information to support the staff's evaluation of the uranium recovery program and the need to develop a new Part 41. The Southwest Research Information Center (SRIC), an environmental organization currently intervening in the Hydro Resources, Inc., Crownpoint application, recommended that NRC not eliminate its review of ground-water protection at ISL facilities, because, in SRIC's view, NRC regulation was complementary, and not duplicative, of the UIC program. The State of Wyoming expressed its opinion that NRC's efforts on ISL ground-water issues were not needed. Industry representatives advocated that NRC adopt the position in the NMA White Paper.

In adopting this approach to regulating ground water at ISLs, staff estimates that a savings of 1.5 full time equivalents (FTE) per year could be realized. These savings would come from a reduction in licensing reviews and inspection support in the ISL ground-water area. These savings would not be realized, however, until NRC completed the Part 41 Rulemaking which, if pursued, could not be completed before early Calendar Year 2001.

Disposal of Solar Evaporation Pond Sludges

Before 1995, the staff practice for addressing the disposal of evaporation ponds sludges relied upon a broad reading of the definition of 11e.(2) byproduct material. This broad reading only addressed discrete surface wastes capable of controlled disposal and did not distinguish between wastes generated at various phases of an ISL operation.

The staff issued two guidance documents in 1995 to address issues in the uranium recovery program. The first, "Staff Technical Position on Effluent Disposal at Licensed Uranium Recovery Facilities" (hereinafter, the effluent guidance), was intended to provide uranium recovery licensees with flexibility regarding the disposal of various types of liquid effluents generated during the operation of their facilities. In issuing this guidance, the staff took a more narrow view of the definition of 11e.(2) byproduct material. It differentiated between the various waste waters generated during ISL operations on the basis of their origin and whether uranium was extracted for its source material content during that phase of the operation. Waste waters and the associated solids produced during the uranium extraction phase of site operations, called "production bleed" (see Figure 7 in [Attachment 1](#)) were classified as AEA section 11e.(2) byproduct material and therefore subject to regulation by NRC. Conversely, waste waters and the resulting solids produced after uranium extraction (i.e., during ground-water restoration activities) are classified as "mine waste waters" (see Figure 8 in [Attachment 1](#)), and therefore are subject to regulation by individual States under their applicable mining programs. These wastes are considered naturally occurring radioactive material (NORM). However, because licensees often dispose of waste waters from uranium extraction and post-extraction activities in the same evaporation ponds, the resulting solids are a commingled waste consisting of 11e.(2) byproduct material and sludges derived from mine waste water.

In the second guidance document, "Final Revised Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments" (hereinafter, the disposal guidance), the staff identified 10 criteria that licensees should meet before NRC could authorize the disposal of AEA material other than 11e.(2) byproduct material in tailings impoundments. One of these criteria prohibits the disposal of radioactive material not covered by the AEA, including NORM. This criterion was intended to avoid the possibility of dual regulation of the radioactive constituents in the impoundments, since individual States are responsible for radioactive materials not covered by the AEA. These two guidance documents were subsumed in the draft SRP and would remain incorporated in the yet-to-be published final SRP.

The industry is concerned that, taken together, these two guidance documents leave no option for the disposal of radioactively contaminated sludges from ISL evaporation ponds. The reason for this concern is that the 11e.(2) byproduct material is commingled with a NORM waste, and is prohibited from disposal in a tailings impoundment by the disposal guidance. The industry contends that the staff's waste classification, based on the origin of the waste water (i.e., from the extraction or restoration phase) at an ISL facility, makes the disposal of such sludges in a mill tailings impoundment, as required under Criterion 2 of 10 CFR Part 40, Appendix A, impossible; even though the sludges derived from waste waters produced throughout a facility's life cycle are physically, chemically, and radiologically identical.

Options

The staff identified four options for addressing the industry's concerns related to the disposal of evaporation pond sludges generated at ISL facilities. Each option impacts the extent of NRC regulation of ISL facilities, but will still provide for the adequate protection of public health and safety and the

environment.

1. Maintain Current Distinction Between Waste Waters.

Under this option, the staff would retain its current narrow view of the classification of 11e.(2) byproduct material. This approach distinguishes between waste waters produced during uranium extraction and those generated after extraction during ground-water restoration, as described in the effluent guidance. Evaporation pond sludges associated with uranium extraction waste waters would continue to be classified as 11e.(2) byproduct material. Those associated with waste waters resulting from post-extraction activities would continue to be classified as a mine waste and subject to State regulation. Public health and safety and the environment will continue to be protected under this option, because the handling and disposal of the sludges would be evaluated and approved by regulatory agencies with health, safety and environmental responsibilities, either the NRC or a relevant State agency.

The principal advantage of this option is that characterization of post-extraction liquid effluents in this manner is more consistent with how EPA views such waste under 40 CFR Part 440, which addresses, in part, effluent discharges from uranium mining operations.

This option has several disadvantages. First, to avoid sending non-AEA material to tailings impoundments licensed to receive 11e.(2) byproduct material for disposal, licensees must physically separate contaminated wastes before disposal at uranium mill tailings sites. Alternatively, licensees can construct separate evaporation ponds to avoid commingling extraction and post-extraction waste waters. Licensees are also required to determine accurately (and support with acceptable documentation) the origins and percentages of waste waters disposed of in evaporation ponds. Such determinations will be essential in determining the extent of NRC's jurisdiction over the pond sludges.

In addition, radioactively contaminated material not regulated by NRC would likely be disposed onsite at ISL facilities, thus creating numerous small waste disposal sites in the western United States. Although these wastes will pose long-term hazards comparable to 11e.(2) byproduct material waste, the disposal sites would not be subject to the long-term care provisions of the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA). The States would review and approve the disposal of this material under their existing mining regulations. NRC still would be required to consider the environmental impacts of onsite disposal under the National Environmental Policy Act of 1969 (NEPA), as amended, when licensing new ISL operations and reviewing closure of existing ISL facilities. Under this option, there would be no change in staff resources.

Finally, commingled evaporation sludges may have already been disposed at uranium mill tailings impoundments. Consequently, the disposal of these sludges would have to be "grandfathered" as acceptable to avoid NRC/State dual regulation of the radioactive constituents in the tailings impoundments, which is discouraged in the disposal guidance.

2. Classify All Liquid Effluents as 11e.(2) Byproduct Material.

Under this option, the NRC would take the broad view that any waste water generated during or after the uranium extraction phase of site operations, and all evaporation pond sludges derived from such waste waters, would be classified as 11e.(2) byproduct material. The staff would make no legal distinction among the waste waters produced at different stages in a facility's life cycle. Public health and safety and the environment will continue to be protected under this option, because the handling and disposal of the sludges would be evaluated and approved by a regulatory agency with health, safety and environmental responsibilities, the NRC.

The principal advantage of this option is that NRC's regulatory authority over various aspects and phases of the ISL extraction and post-extraction (i.e., ground-water restoration) operations would be unambiguous. All radioactively contaminated materials generated at ISL facilities would be 11e.(2) byproduct material and, therefore, under NRC jurisdiction. In addition, all radioactively contaminated materials would be transported for offsite disposal, as required by Criterion 2 of Part 40, Appendix A. This would include evaporation pond sludges, wellfield piping, and central facility storage and processing tanks. Therefore, previous NRC conclusions made in environmental assessments and impact statements concerning the offsite disposal of radioactive materials would remain unchanged.

Staffing resources in uranium recovery would increase slightly with Option 2 [less than 0.5 FTE per year] to accommodate (1) the need to review the designs for evaporation ponds currently used solely to impound post-production waste waters against Criterion 5A of Part 40, Appendix A, and (2) the possible inclusion of such ponds under NRC's Dam Safety Program (DSP). Additional increases in staffing resources may be necessary if more ISL facilities commence operation in response to some future rise in the demand for uranium.

3. Classify Only Post-Ion Exchange Wastes as 11e.(2) Byproduct Material.

Under this option, NRC would take a narrow view of the definition of 11e.(2) byproduct material. Staff would regulate only discrete surface wastes and effluents resulting from the production of yellowcake occurring after the ion-exchange (IX) portion of the uranium extraction process at the resin elution column, and at the precipitation tanks (see Figure 7 of Attachment 1). All other waste waters generated throughout the life of ISL operations would be classified as "mine waste waters." They would be outside NRC's authority, and therefore not subject to NRC regulation. The other waste waters generated to protect ground water during uranium extraction (see "Production Bleed" in Figure 7 of Attachment 1) and those produced during ground-water restoration activities after uranium extraction would not be subject to NRC regulation (see Figure 8 of Attachment 1). Wastes generated from "mine waste waters" would be regulated by the State.

The view presented in the NMA White Paper is that the production bleed is generated primarily from a mining activity that is not subject to NRC regulation. The White Paper view is that NRC authority does not start until the mining solutions reach the elution stage of the facilities, where uranium is concentrated. Although the production bleed also aids in the concentration of uranium, it is not primarily associated with uranium extraction. Rather, its primary purpose is to ensure the flow of ground water towards the wellfield, thus helping protect the ground water outside of the mining area. Because

of this, the NMA asserts that the production bleed can be reclassified as a "mine waste water." The waste waters generated from the IX portion of the uranium recovery process at the resin elution column would be classified as 11e.(2) byproduct material. This waste would have to be disposed of off-site in uranium mill tailings impoundments licensed to receive 11e.(2) byproduct material or an 11e.(2) disposal facility consistent with Criterion 2 of Part 40, Appendix A. The volume of this waste would likely be small and would not require management in an evaporation pond.

This option would be a change in how NRC has previously classified the waste waters produced during uranium extraction. As discussed in Option 1, under the current distinction between waste waters, the staff has classified all waste waters produced during uranium extraction as 11e.(2) byproduct material and those produced during ground-water restoration activities as "mine waste waters." Under Option 3, NRC would no longer classify "production bleed" as 11e.(2) byproduct material. This waste is generated as part of ensuring both the protection of ground water and as an aid in extracting uranium. Consequently, a clear distinction must be made whether the waste is produced directly from the processing of ore for its uranium content or primarily for the protection of ground water in order to determine how the waste is regulated. By taking a view that 11e.(2) byproduct material is only associated with those portions of the operation which concentrate uranium to levels of source material, NRC would relinquish authority over the portions of the operations that deal with uranium extraction, such as the wellfield. Some litigation risk may be associated with revising NRC's opinion of its authority and its past practices. OGC has advised the staff that completing a rulemaking before changing the Agency's practice would provide the technical and legal rationale for the Agency's change in its previous practice and guidance.

Public health and safety and the environment will continue to be protected under this option, because the handling and disposal of the vast majority of the sludges would be evaluated and approved by regulatory agencies with health, safety and environmental responsibilities. Essentially, these would be the relevant State agencies, under existing mine lands reclamation programs. NRC would continue to evaluate and approve the sludge disposal from waste waters generated after the IX process. The design and safety monitoring of evaporation pond structures would be performed by the State, under its existing DSP.

The principal advantage of this option is that NRC's regulatory program over various aspects and phases of the ISL mining process would be limited to radiation protection issues in the central processing plant and satellite facilities. This results in a savings of less than 0.5 FTE per year for the licensing of new ISL facilities and NRC's DSP.

Evaporation pond designs would not need to be reviewed against Criterion 5A of Part 40, Appendix A, because the ponds would not contain materials subject to NRC jurisdiction. In addition, ISL ponds would no longer be covered under NRC's DSP, since such ponds would not be regulated by NRC nor related to NRC's health and safety mission.

An additional advantage is the unambiguous regulatory landscape for radioactively contaminated evaporation pond sludges. The appropriate State agencies would be the sole regulators for these materials, which would likely be classified as Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) .

However, as with Option 1, radioactively contaminated material no longer subject to NRC regulation could be disposed onsite at ISL facilities. This would create numerous small waste disposal sites in the western United States not subject to the long-term care provisions of UMTRCA, even though the waste contained in these disposal sites will pose the same long-term risks as 11e.(2) byproduct material of the same volume. However, the disposal of this material would be reviewed and approved by the States under their existing mining regulations, consistent with what is done today for that portion of ISL waste not classified as 11e.(2) byproduct material. NRC still would be required to consider the environmental impacts of onsite disposal under NEPA, when licensing new ISL operations and reviewing closure of existing ISL facilities.

Additionally, the previous disposals of commingled evaporation sludges in tailings impoundments would have to be "grandfathered" as acceptable to avoid NRC/State dual regulation of the radioactive constituents in the impoundments, as discouraged in the disposal guidance. Any future disposal of commingled sludges in tailings impoundments would also have to be precluded to avoid similar potential for dual regulation.

4. Clarify the Classification of Wastes at ISL facilities by Legislative Initiative

Because Option 3 involves changing the NRC's standing opinion of its authority and past practice, a clarification from Congress through a legislative initiative to amend the UMTRCA may be desirable. Under Option 4, staff would work with the Office of Congressional Affairs and OGC to develop a legislative package that would explicitly prescribe NRC's authority pertaining to 11e.(2) byproduct material at ISL facilities as those wastes associated with the portions of the process that result in the concentration of uranium for its source material content. The legislative initiative would also be coordinated with the Agreement States, since this change would impact the Agreement State programs.

The advantages and disadvantages for Option 4 are the same as Option 3, with the exception that litigative risk associated with NRC redefining its authority and practice would be eliminated.

Summary of Regulatory Impact of Options

The regulatory oversight of the various waste-water streams under each of the four previously described options is summarized in the following table.

Regulatory Oversight of Waste-Water Streams Under Various Options				
Solids from Waste-water Streams	Option 1	Option 2	Option 3	Option 4
Production Bleed	NRC	NRC	State/EPA	State/EPA

Discrete Processing Wastes	NRC	NRC	NRC	NRC
Restoration Waste Waters	State/EPA	NRC	State/EPA	State/EPA

The staff considers that Options 1, 2, 3 and 4 are all properly protective of public health and safety and the environment. However, Option 1 would not simplify the regulation of the evaporation pond sludges, nor reduce the NRC regulatory burden on licensees. By contrast, Options 2, 3, and 4 are equally consistent with the goal of eliminating dual regulation and clarifying the regulatory landscape for evaporation pond sludges. The staff has a preference for Option 4 or Option 3 on the basis that they maintain regulatory oversight of the material through the appropriate State agencies, but reduce the regulatory burden of licensees by removing duplicative NRC oversight. Option 2 would not allow a reduction in NRC's regulatory burden on licensees, and could lead to an increase in staff resources, if the demand for uranium increases.

[Attachments 2 and 3](#) are differing professional views [(DPVs); as allowed under Management Directive (MD) 10.159]] on this recommendation, submitted by staff members on October 20, and November 19, 1998. The DPVs express the opinions that NRC should not relinquish authority over liquid effluent releases from ISL facilities nor relinquish the regulation of sludges from processing or wellfield activities. Additionally, such a relinquishing of authority, according to the DPVs, may not comport with a plain English reading of the definitions in the AEA. Thus, the DPVs advocate adopting Option 2 as the soundest regulatory approach. A panel reviewed these DPVs in accordance with the procedures in MD 10.159. The findings from the panel were:

- (1) Revise this paper to incorporate the panel's findings;
- (2) Consider the arguments in the DPVs in any future rulemaking; and
- (3) Reevaluate whether Option 1 in this paper should be continued.

Overall, the staff has made changes to incorporate issues from the panel report. As noted below, the staff had already planned to incorporate this issue into any future rulemaking. With respect to recommendation (3), the staff has determined that Option 4 or Option 3 is still the preferred option. In either case, the staff will continue with the current approach, Option 1, until the option selected by the Commission can be implemented. Also, subject to Commission agreement, the staff intends to publish its final SRP and use it in licensing reviews until the rulemaking for new Part 41 (SECY 99-011) has been completed. A copy of the panel's report without the attachments is provided in [Attachment 4](#).

RESOURCES:

If the dual regulation of ground water is eliminated by relying on the existing UIC program and Option 4 or Option 3, as recommended above, is implemented, the staff would be able to reallocate a total of 2.0 FTE (1.5 FTE to eliminate dual regulation and 0.5 FTE for Option 4 or Option 3) per year from the uranium recovery program to other high-priority work in the Office of Nuclear Material Safety and Safeguards. As noted earlier, these savings would not be realized until the FY 2002 budget, which is the first following the projected completion of Part 41.

RECOMMENDATIONS:

That the Commission:

1. Approve the staff's recommendation for NRC to rely on the EPA UIC program, thus removing NRC from the review of ground-water protection issues at ISL facilities;
2. Select an option for prescribing the extent of NRC's regulatory control at ISL facilities and the regulatory position of what constitutes 11e.(2) byproduct material at ISL facilities;
3. Note that if the Commission approves a rulemaking plan for a new Part 41 (SECY 99-011), the changes in items 1 and 2 above would be codified as part of that rulemaking;
4. Agree to the staff's publication of the final SRP for ISL facility license applications, which includes the current staff practices of reviewing ground-water activities at ISLs and the approach outlined in Option 1, for use in licensing reviews until the rulemaking for the new Part 41 (SECY 99-011) has been completed;
5. Provide direction on whether staff should pursue development of an MOU with EPA or the EPA authorized States to formalize the basis on which NRC would withdraw from active regulation of the ground water at ISL facilities; and
6. Provide direction for staff to initiate coordination with the Agreement States if the legislative alternative is pursued under Option 4, or if NRC's opinion of its authority is changed under Option 3.

COORDINATION:

The Office of the General Counsel has reviewed this Commission Paper and has no legal objections. The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objection.

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Attachments:

1. Outline of ISL Mining Process
2. DPV dated October 20, 1998
3. DPV dated November 19, 1998
4. DPV Panel Report dated December 21, 1998
5. DPV Follow up dated January 20, 1999