U.S. Nuclear Regulatory Commission Staff's Comments
on the U.S. Environmental Protection Agency's Proposed Rulemaking
for 40 CFR Part 192, 82 FR 7400

General Comments

The U.S. Nuclear Regulatory Commission (NRC) staff appreciates the opportunity to provide input to the U.S. Environmental Protection Agency (EPA) on the issues and questions posed by the Notice of Proposed Rulemaking for Title 40 of the *Code of Federal Regulations* (40 CFR) Part 192, published in the *Federal Register* (FR) on Thursday, January 19, 2017, under Docket ID No. EPA-HQ-OAR-2012-0788.[1]

As discussed in more detail in the specific comments below, the NRC staff is concerned that the proposed rule relies on arguments that are not fully supported, encroaches upon NRC's jurisdiction, and includes requirements that are not technically feasible or are unreasonably burdensome on both NRC and Agreement State licensees without providing any equivalent benefit. The NRC's current regulations, at 10 CFR Part 40, Appendix A, and those of the various Agreement States, as supplemented by site-specific license conditions, guidance documents (e.g., NRC's "Standard Review Plan for In Situ Leach Uranium Extraction License Applications," NUREG-1569), and the operational experience and technical expertise of the regulatory agency staff, constitute a comprehensive and effective regulatory program for uranium in situ recovery operations (ISR) facilities. The NRC and the various Agreement States (operating under authority discontinued by the NRC pursuant to section 274 of the Atomic Energy Act of 1954, as amended (AEA)) have been safely, securely, and successfully regulating ISR facilities since the 1970's.

The NRC regulations at 10 CFR Part 40, Appendix A were promulgated for conventional uranium milling and are not specific to ISR facilities. Nevertheless, the NRC staff has concluded that its application of the 10 CFR Part 40, Appendix A regulations to ISR facilities meets the AEA standard of "adequate protection" of public health and safety and the environment. The basis for this conclusion is the established safety record of the NRC licensed ISR facilities. The NRC staff began a rulemaking specific to ISR facilities in 2006 for the purpose of standardizing existing NRC regulatory practices to ensure consistency in the NRC staff's evaluation and approval of ISR license applications. This rulemaking would have amended 10 CFR Part 40, Appendix A by codifying proven license conditions and staff practices, as reflected in guidance documents, into the 10 CFR Part 40, Appendix A regulations. By revising NRC's regulations to specifically address ISRs, the NRC staff concluded that the ISR licensing process would be more effective, consistent, and transparent. This rulemaking has been in abeyance since 2010 as a result of EPA's stated intention to promulgate generally applicable standards.

The NRC staff did not believe in 2006, when it initiated its rulemaking, and does not believe now, that ISR uranium activities that are operated under the existing regulatory framework have

[1] 82 FR 7400.

caused, or are likely to cause, any contamination by listed hazardous constituents[2] of adjacent or nearby aquifers or the non-exempt portion of the aquifer that is the subject of the licensed uranium ISR extraction activity. The NRC, through its requirements for extensive testing of licensee monitoring and private wells in and around its licensed ISR sites, has not found evidence to challenge that finding.

In addition, the NRC staff believes that EPA's proposed rule exceeds its authority to promulgate generally applicable standards in many areas and that EPA's existing generally applicable standards in 40 CFR Part 192, Subpart D, can continue to be readily applied to ISRs without need for this rulemaking. Moreover, the NRC staff has concluded that some of the specific technical requirements would be impracticable or unnecessarily cost prohibitive to implement without providing any significant benefit.

Issue Specific Comments

A. No Health or Safety Justification for Rulemaking

1. Groundwater Monitoring

Issue: The preamble justifies the rule, in part, by asserting that there has only been "limited post-restoration monitoring" of potential contaminants and as such, there is not enough data to determine that ISR wellfields are not a source of contamination for non-exempt aquifers.[3] The NRC staff disagrees as there is sufficient post-restoration monitoring data that demonstrates that ISR wellfields are not a source of contamination for non-exempt aquifers.

Comment: In almost 40 years of operational experience, the NRC staff is aware of no documented instance of an ISR wellfield being the source of contamination of an adjacent or nearby aquifer, or of the non-exempt portion of the same aquifer in which ISR activities are being conducted.

The NRC requires that its licensees, through license conditions, monitor a series of wells that surround and lie above and below the wellfield every two weeks during operations and throughout restoration to ensure that no undetected excursions occur. In addition, the NRC requires that its licensees monitor private wells located within one to two kilometers of each ISR wellfield (both those that are in an operating status as well as those undergoing restoration). These private wells can be located in aquifers above, under and around, but not within the ore zone aquifer of an ISR wellfield within the monitoring well ring. The private wells monitored include drinking water wells and livestock watering wells. Each licensee is required to sample the private wells on a quarterly basis for various radionuclides, including natural uranium and radium-226, both prior to and during wellfield operation. This data is provided to the NRC staff as part of a semi-annual report and is publicly available.

In December 2008, the Commission tasked the NRC staff with preparing a report that assessed the environmental impacts to groundwater from ISR wellfields. The NRC staff submitted its report to the Commission in July 2009 (NRC, 2009).[4] The report examined licensee monitoring

[2] Criterion 13 of 10 CFR Part 40, Appendix A lists the hazardous constituents that are subject to NRC's regulation. Other than Nitrate (as N), all of the constituents listed in proposed Table 1 to Subpart F are also listed in Criterion 13.
[3] 82 FR at 7404.
[4] NRC SECY-2009-016, "Staff Assessment of Groundwater Impacts from Previously Licensed In-Situ Uranium Recovery Facilities," July 10, 2009, available in NRC's Agencywide Documents Access and

data from private wells within and near the licensed boundaries of an ISR facility. Private wells are typically interspersed throughout and outside the licensed area of the ISR facility. The NRC staff notes that the external licensed boundaries of a typical ISR facility encompass an area of several square miles and usually includes several discrete wellfields, some of which are operating, while others may be undergoing restoration or are already in an approved, restored status. It is not uncommon for an operating wellfield to lie within a relatively close proximity to one or more restored wellfields or wellfields undergoing restoration.

The 2009 report analyzed the private well data (comprised of 44 wells across three ISR facilities) available and found that,

> Based on a review of historical licensing documentation, data from the [private well] monitoring at all existing ISR facilities indicate that no impacts attributable to an ISR facility were observed at the regional monitoring locations. In addition, the staff is unaware of any situation indicating that: (1) the quality of groundwater at a nearby water supply well has been degraded; (2) the use of a water supply well has been discontinued; or, (3) a well has been relocated because of environmental impacts attributed to an ISR facility.[5]

This report, together with continued private well monitoring data that has been provided semi-annually to the NRC staff since 2009, have shown no evidence of contamination at nearby private wells.

In addition, with respect to NRC-approved aquifer restorations at ISR wellfields, the NRC staff found that,

> The impacts to groundwater in the exempted aquifer met all regulatory standards for the state or EPA's underground injection control (UIC) program, met the quality designated for its class of use prior to ISR operations, have been shown to decrease in the future due to natural attenuation processes, and have been shown to meet drinking water standards at the perimeter of the exempted aquifer. Therefore, the impacts to the exempted aquifer for each of the approved restorations do not pose a threat to human health or the environment.[6]

More recently, the Crow Butte ISR facility in Crawford, Nebraska, was the subject of litigation before the NRC's Atomic Safety and Licensing Board (ASLB) when the licensee applied to renew its operating license. In a December 2016 decision, the ASLB found that,

> Despite the fact that excursions have occurred at the Crow Butte facility, we find that there is no evidence that those excursions resulted in the transport of contaminants outside of the License Area. This finding is supported by operational monitoring data

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Management System (ADAMS), #ML091770402. The report, entitled "Data on Groundwater Impacts at the Existing ISR Facilities," is an enclosure to SECY-2009-0016.

[5] *Id*., Enclosure at 5. The report used the term "regional monitoring" to refer to the "private well monitoring."

[6] *Id*., Enclosure at 3.

> collected during Crow Butte's mining operations that span more than 20 years. The total effect of: (1) the close proximity of the monitoring wells, (2) the low flow rate from the well field, and (3) the use of bleed water that removes more liquid from the aquifer than is reinjected, make it unlikely that there will be an undetected excursion.[7]
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> In regards to overall impacts on private wells from excursions, we find that the water quality monitoring data from private wells shows the groundwater contamination has not exceeded radiological background levels. This data, in conjunction with the fact that all but one of the private wells are placed in the Upper Brule Aquifer, also demonstrates that vertical excursions, spills, leaks and Crow Butte operations in general, have not adversely impacted the Upper Brule Aquifer.[8]

The Crowe Butte decision is illustrative. Based upon its operational experience, the NRC staff is aware of no contamination from an ISR wellfield, including restored wellfields, to a non-exempt aquifer.

Private well monitoring continues to be conducted at the three ISR facilities in which 11 wellfields were approved for restoration by NRC in the 2003-2006 timeframe, as there are operating wellfields or wellfields undergoing restoration in close proximity to these restored wellfields. To date, this private well monitoring data has shown no evidence of radiological contamination and as such, provides no technical basis to establish significant risk from operating or restored wellfields to groundwater.

In addition, long-term monitoring (2005-2015) of a restored wellfield has been conducted by Power Resources, Inc. in two perimeter ring monitoring wells at its ISR wellfield, Highlands Mine Unit (MU)-A in Wyoming. This monitoring was required for the approval of the MU-A restoration by the Wyoming Department of Environmental Quality (NRC, 2004).[9] The NRC staff's review of this perimeter ring well monitoring data has shown no increase in hazardous constituents (radium-226, uranium, selenium) or non-hazardous constituents (chloride, total dissolved solids, total alkalinity, potential of hydrogen (pH), iron, manganese), which were monitored over the 10 year period. Based upon the 2009 report and the available 10 year monitoring data at a restored ISR wellfield, the NRC staff disagrees with the preamble statement and finds that there is significant and consistent data, including post-wellfield restoration monitoring data, which demonstrates that no contamination of a non-exempt aquifer has occurred.

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[7] *Crow Butte Resources, Inc.* (License Renewal for the In Situ Leach Facility, Crawford, Nebraska), LBP-16-13, __ NRC __, __ (December 6, 2016), (slip op. at 113).

[8] *Id*.

[9] NRC Technical Evaluation Report, "Review of Power Resources Inc.'s A-Wellfield Ground Water Restoration Report for the Smith Ranch-Highland Uranium Project," June 29, 2004, available in ADAMS, #ML0418404701.

2. Excursion vs. Contamination

Issue: The proposed rule defines the term "excursion" as

> The movement of fluids containing lixiviant or uranium byproduct materials from the production zone into surrounding groundwater. An excursion is considered to have occurred when two indicator parameters (e.g., chloride, conductivity, total alkalinity) exceed their respective upper control limits in any excursion monitoring well, or, as determined by the regulatory agency, when one indicator parameter significantly exceeds its upper control limit in any excursion monitoring well.[10]

Comment: The definition of the term "excursion" should be revised by deleting the sentence that states "[t]he movement of fluids containing lixiviant or uranium byproduct materials from the production zone into surrounding groundwater." The term "excursion," as characterized by the NRC staff is the early detection of unplanned lixiviant migration from the wellfield production zone. Specifically, an excursion is the detection within an ISR wellfield monitoring well of the presence of certain lixiviant constituents which are identified as early indicator parameters (e.g., chloride, alkalinity, conductivity) because they are present in large concentrations in the lixiviant and move at or near the same speed as the groundwater. Excursions are not hazardous by themselves nor are they evidence of actual or likely contamination of the non-exempt portion of the aquifer subject to ISR extraction or of an adjacent or nearby aquifer by hazardous constituents. If an excursion is detected, then under the current regulatory regime and the conditions of the ISR license, the licensee must take the appropriate actions to regain control over the groundwater flow (e.g., by adjusting the extraction and injection rates). By promptly taking corrective action to maintain the groundwater flow within the wellfield, the licensee will prevent much slower moving, and hazardous lixiviant constituents, such as uranium, radium, arsenic, and selenium, from contaminating the non-exempt portion of the subject aquifer or an adjacent or nearby aquifer.

Moreover, the phrase "into the surrounding groundwater," as used in the definition of "excursion" and in other preamble passages,[11] is vague and suggests that contamination has crossed into the non-exempt portion of the subject aquifer or into an adjacent or nearby aquifers. The NRC staff considers the boundary of an ISR wellfield to be the outer ring of monitoring wells surrounding the production zone. This outer monitoring well ring encompasses the production zone as well as portions of the wellfield that are not part of the production zone (typically, the edge of the production zone is 300 to 500 feet from the outer monitoring well ring). The boundaries of the exempt aquifer, as approved by EPA under the Safe Drinking Water Act, fully encompass the wellfield (i.e., the outer monitoring well ring) and extend beyond it, currently by a distance of 100 to 180 feet. Thus, the "surrounding groundwater" referred to in the proposed rule's definition is within both the wellfield and the exempt aquifer. As such, the NRC staff recommends that the phrase "surrounding groundwater" be deleted in the definition of excursion and in other preamble passages.

The NRC staff acknowledges that its operational experience with licensing and regulating uranium ISR facilities shows that excursions have occurred at ISR wellfields. This operational experience, however, has shown no evidence that contamination has crossed into the non-exempt portion of the subject aquifer or into adjacent or nearby aquifers. Thus an ISR wellfield

[10] 82 FR at 7427.
[11] *E.g.*, 82 FR at 7420.

monitoring well that detects an "excursion," is therefore not synonymous with actual or likely "contamination" of a non-exempt aquifer and the definition of "excursion" should be revised accordingly.

3. No Evidence of Contamination Detection beyond the Exempt Aquifer Boundary

Issue: The preamble states that EPA's UIC Program has received and evaluated data for "at least one ISR facility" that is "consistent with an excursion beyond the boundary of the exempt aquifer, leading to elevated uranium levels outside the ISR facility."[12] The statement incorrectly suggests that operations at an ISR wellfield resulted in uranium contamination in an adjacent or nearby aquifer.

Comment: The NRC staff is aware of no documented instance of an ISR wellfield being the source of uranium or other contamination of an adjacent or nearby aquifer, or of the non-exempt portion of the same aquifer in which ISR activities are being conducted (NRC, 2009).[13] According to one of the technical documents supporting the proposed rule, the Background Information Document (BID),[14] the ISR facility referred to in the preamble is the Uranium Resources, Inc. (URI) Kingsville Dome ISR facility located approximately eight miles southeast of Kingsville, Texas. The Kingsville Dome ISR facility is licensed by the State of Texas, as Texas is an Agreement State under section 274 of the AEA. The Texas Commission on Environmental Quality (TCEQ) is the applicable Texas Agreement State regulatory agency.

In August 2014, TCEQ received a complaint alleging that ISR activities at Kingsville Dome contaminated a nearby, privately-owned water well and TCEQ's Critical Infrastructure Division, Office of Compliance and Enforcement subsequently investigated the complaint. Although the well, identified by TCEQ as water well (WW)-24, had samples showing high levels of uranium, TCEQ stated that no excursions were detected in the Kingsville Dome monitoring wells nearest the facility's mining unit closest to WW-24.[15] TCEQ also stated it was not able to conclude "that high levels of uranium concentration in water collected from these sources are caused by URI's mining activities."[16] TCEQ states that naturally occurring uranium located in a sand approximately 700 to 745 feet below ground level, identified as the "AA" layer, was the likely cause for fluctuation of uranium values in WW-24 and the other nearby private wells that were sampled.[17] In this regard, the TCEQ report stated that WW-24 likely drew water from the "highly mineralized 'AA' sand."[18] The TCEQ report further noted that the AA layer is so deep that URI has not mined it "due to economic constraints."[19] In a letter to URI, dated October 13, 2015, TCEQ stated that "[t]he investigation included groundwater sampling and records review. No violations were found as a result of the investigation."[20]

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[12] *Id*., at 7404.
[13] *See also Crow Butte Resources, Inc.* (License Renewal for the In Situ Leach Facility, Crawford, Nebraska), LBP-16-13, __ NRC at __, (December 6, 2016), (slip op. at 113).
[14] 82 FR at 7404.
[15] TCEQ, Investigation Report (September 14, 2015), at 12. The thirteen page report itself is untitled but in two October 13, 2015 transmittal letters to both the complainant and URI, TCEQ identifies the report as an "Investigation Report."
[16] *Id*.
[17] *Id*., at 3 and 12.
[18] *Id*., at 4 and 12.
[19] *Id*., at 3. Above the "AA" layer are, from the deepest, the "A," "B," and "C" layers of sand, all of which have been the subject of URI's ISR activities. *Id*.
[20] TCEQ letter, "Complaint Investigation, Kingsville Dome Facility, Kleberg County, Texas, TCEQ Permit No. UR02827, Regulated Entity Number: RN102380763," October 13, 2015.

4. Cost and Benefit Analysis

Issue: Under the described "summary of costs and benefits" in section I.D of the proposed rule, EPA describes the purported benefits of the rule as being the avoidance of potential costs through earlier detection of contamination plumes. As part of the discussion in the preamble, EPA assumes the likelihood that the proposed rule would prevent contamination, but that current requirements would not, range from 20 to 80 percent. The NRC staff believes these costs to be overstated and that EPA does not provide sufficient credit for the existing NRC regulatory framework.

Comment: The NRC staff agrees with the general theme that the costs of an undetected contamination event could be considerable and should be avoided. EPA estimates the benefit of avoided costs from their rule would range from $23.7 million to $608 million based upon the size of the plume. Calculation of these benefits are discussed in greater detail in EPA's supporting draft document "Economic Analysis: Proposed Revisions to the Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings Rule (40 CFR Part192)," dated December 2016. However, EPA states that it is unable to quantify the number or characteristics of contamination episodes that could occur in the absence of the proposed rule, therefore the EPA is unable to estimate the nationwide cost savings.

The NRC staff disagrees that EPA's proposed rule would result in significantly greater detection of contamination nor would the avoided costs be as high as identified by EPA. As stated earlier, in almost 40 years of operational experience, the NRC staff is aware of no documented instance of an ISR wellfield being the source of contamination of an adjacent or nearby aquifer, or of the non-exempt portion of the same aquifer in which ISR activities are being conducted. Although many wellfields have been restored, these restored wellfields are in close proximity to operating wellfields under the control of the same ISR licensee. As such, the NRC has continued to collect excursion monitoring data and radiological data in and around the licensed site (e.g. from private wells). To date, the NRC has not identified any instances of contamination moving past the exempt aquifer area. As a result the NRC staff has no reason to conclude that contamination of a non-exempt aquifer, whether detected or undetected, is likely to occur. Similarly, the NRC staff concludes that the EPA's economic analysis lacks sufficient data to demonstrate that the proposed rule's requirements would prevent the likelihood of contamination by a range of 20 to 80 percent when compared to the likelihood of contamination under existing regulatory programs. In short, the economic analysis fails to give proper credit to the existing NRC regulatory regime, which to date, has been successful in preventing contamination of a non-exempt aquifer.

Issue: The modeling of contaminant plumes provided by EPA are worst case scenarios based upon unrealistic assumptions.

Comment: EPA's supporting draft document "Economic Analysis: Proposed Revisions to the Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings Rule (40 CFR Part 192)," dated December 2016 bases its cost analysis on numerical groundwater flow and fate and transport models of contaminant plumes described in a second supporting document, "Ground Water Modeling Studies at In-Situ Leaching Facilities and Evaluation of Doses and Risks to Off-Site Receptors from Contaminated Ground Water." This modeling effort provided the bases for estimating economic costs to clean up a contamination plume discovered after license termination by simulating the remobilization of uranium (Appendix C of the report) after restoration. As described in the "Economic Analysis: Proposed Revisions to the Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings Rule (40 CFR Part 192)" report, the economic analysis is based on a plume entirely within the exempted

aquifer, whereas the preamble to the proposed rule suggests plume migration to the surrounding underground sources of drinking water (USDWs).[21] Furthermore, EPA used the uranium maximum contaminant level (MCL) as the remediation standard for the plume. The proposed groundwater constituent concentration standards, however, are the *highest* level of the pre-operational background or health based levels; or an alternate concentration level.[22] Using the MCL unrealistically forced a higher remediation cost. Finally, in the economic analysis, EPA bases their costs in part on the benefit of using a 30 year monitoring period which is no longer part of the re-proposed rule.

B. Jurisdictional Issues

1. Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) Does Not Provide Express Authority to Preserve Future Uses of Groundwater

Issue: As set forth in its preamble, the proposed rule's purpose is to preserve groundwater resources, particularly for future uses. The preamble identifies a range of multiple, future groundwater uses, including human drinking water, water for livestock, irrigation, and wildlife support. The preamble states that section 275 of the AEA (42 U.S.C. § 2022) is the applicable authority under which EPA would promulgate this rule. The preamble indicates that EPA is relying upon UMTRCA as the statutory basis to preserve these future potential uses of groundwater.[23]

Comment: The NRC staff believes that the appropriate statutory vehicle to preserve future potential uses of groundwater is the Safe Drinking Water Act (SDWA), not UMTRCA. In accordance with its SDWA UIC regulations, EPA has sole authority to exempt an aquifer from the protections of the SDWA—under current law, no other agency of the United States government nor any State or local government can exempt an aquifer from SDWA protection.[24] EPA's exemption of the aquifer from the SDWA must be granted before the injection of lixiviant under the EPA UIC Class III injection well permit[25] can occur.[26] UMTRCA (or more specifically, the AEA, as amended by UMTRCA) provides no authority to protect groundwater for any use before this injection of lixiviant occurs. UMTRCA only becomes relevant after the EPA has made an affirmative determination to exempt an aquifer from SDWA protection followed by the EPA or State approval of a Class III injection permit for the uranium ISR extraction.

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[21] 82 FR at 7424.
[22] *Id*. at 7428 (proposed 40 CFR 192.52(c)(1)).
[23] The preamble states "UMTRCA provides authority that can be used to protect aquifers during and after uranium recovery operations, regardless of whether the aquifer meets the definition of an underground source of drinking water [USDW] as defined in the EPA's UIC regulations or is exempted from the protections of SDWA because it meets the existing regulatory criteria for exemption." *Id*., at 7403.
[24] 40 CFR 144.7(b)(2) ("No designation of an exempted aquifer submitted as part of a UIC program shall be final until approved by the Administrator as part of a UIC program"); *see also* Office of Water, EPA Memorandum, "Enhancing Coordination and Communication with States on Review and Approval of Aquifer Exemptions Requests Under SDWA," July 24, 2014, p. 1 ("EPA is responsible for the final review and approval of all aquifer exemption requests, based on the regulatory criteria in 40 CFR 146.4").
[25] Wells used for uranium ISR extraction are categorized as Class III wells per 40 CFR 144.6(c)(2).
[26] 40 CFR 144.31 ("Unless an underground injection well is authorized by rule under subpart C of this part, *all injection activities including construction of an injection well are prohibited until the owner or operator is authorized by permit*. An owner or operator of a well currently authorized by rule must apply for a permit under this section unless well authorization by rule was for the life of the well or project") (emphasis added).

Under EPA regulations, one of the requirements for exempting an aquifer is that the aquifer "cannot now and *will not in the future serve* as a source of drinking water."[27] If EPA determines that a given aquifer has the potential to be used as a future source of drinking water, it cannot, by its own regulation, exempt that aquifer. Thus, unless EPA changes its SDWA regulations, or provides an exemption to the current SDWA regulations for a specific application, an aquifer, once exempt, can never be used as a drinking water source. Any suggestion in the preamble to the contrary should be clarified. For example, the preamble states

> By altering the chemical composition of groundwater, ISR creates reasons to be concerned about impacts to groundwater, *which may be used for human drinking water,* as well as for other purposes, such as livestock watering, crop irrigation and wildlife support.[28]

This and similar statements contravene EPA's 40 CFR 146.4 and other SDWA regulations and as such, should be deleted or otherwise clarified.

Issue: The other groundwater uses listed in the preamble, namely, water for livestock, irrigation, and wildlife support, are typically regulated by State and local authorities under State law. The proposed rule's preamble, however, states

> [s]ince UMTRCA provides authority that can be used to protect aquifers during and after uranium recovery operations, regardless of whether the aquifer meets the definition of an USDW as defined in EPA's UIC regulations or is exempted from the protections of the SDWA, the scope of UMTRCA's protection should be reflected in the regulatory text of these standards rather than relying on the SDWA UIC exemption regulations.[29]

Comment: Contrary to this and similar statements in the preamble, it is the NRC staff's view that UMTRCA provides no express authority to preserve the groundwater targeted for ISR Class III injection as a USDW or for the other potential purposes described in the preamble. Other than the statement that UMTRCA provides such authority and references to the general statutory language of AEA section 275,[30] there is no explanation in the preamble, either by reference to the statutory language, legislative history, or case law that shows how UMTRCA provides any such authority. The NRC staff suggests that if EPA's intent is to preserve groundwater as a resource for the uses listed in the preamble, then EPA's easiest course and one which does not involve rulemaking, is to simply not grant any aquifer exemptions under its SDWA UIC authority.

If the purpose of this rulemaking is to preserve groundwater for such future uses, then UMTRCA is not the appropriate vehicle. Although UMTRCA provides authority to protect the general environment and public health and safety from the radiological and non-radiological hazards arising from processing 11(e)(2) byproduct material, it was never intended or designed to preserve potential future uses of an aquifer properly exempted from the protections of the SDWA by EPA. The preamble also does not explain why UMTRCA should be construed as a

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[27] 40 CFR 146.4 (emphasis added).
[28] 82 FR at 7403 (emphasis added).
[29] *Id*., at 7413.
[30] *E.g., id*., at 7403.

"complement"[31] for, or an extension of, the SDWA, or as a land use or a resource preservation or protection statute. As EPA states in the preamble,

> The SDWA *does not prevent recovery and use of the water within exempted aquifers (including where ISR operations were previously conducted)* for private drinking water supply, public water supply, or other uses.[32]

Certainly, if the SDWA does not prevent "recovery and use of the water within exempted aquifers," then UMTRCA surely does not. With respect to active, UMTRCA Title II sites, the stated purpose of UMTRCA is to provide "a program to regulate mill tailings during uranium or thorium ore processing at active mill operations and after termination of such operations in order to stabilize and control such tailings in a safe and environmentally sound manner and to minimize or eliminate radiation health hazards to the public."[33] If UMTRCA were intended to preserve future uses of groundwater, the NRC staff believes that the statutory language and the legislative history would have so indicated and, perhaps, have provided a mechanism for preservation. In this regard, UMTRCA does not have language that is typically found in Federal land use or resource protection statutes, such as the Clean Water Act, which has the statutory charge to "*to restore and maintain* the chemical, physical, and biological integrity of the Nation's waters,"[34] or the Federal Land Policy and Management Act of 1976, which states, "the national interest will be best realized if the public lands and their resources are periodically and systematically inventoried and their *present and future use is projected through a land use planning process* coordinated with other Federal and State planning efforts."[35] Finally, UMTRCA must be consistent with Resource Conservation and Recovery Act (RCRA) in regard to non-radiological hazards, and RCRA has no requirement for protection or preservation of a future use.

2. Meaning of phrase "Generally Applicable Standards"

EPA identifies the statutory authority for its 40 CFR Part 192 rulemaking as section 275 of the AEA (42 U.S.C. § 2022), as added by section 206 of UMTRCA.[36] UMTRCA established a dual regulatory scheme over the uranium milling industry between EPA and the NRC. Under this scheme, EPA sets "standards of general application" or "generally applicable standards"[37] for the,

> protection of the public health, safety, and the environment from radiological and non-radiological hazards associated with processing and with the possession, transfer, and disposal of [AEA Section 11e.(2)] byproduct material, … at sites at which ores

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[31] *Id*., at 7413.
[32] *Id*., at 7413 (emphasis added).
[33] 42 USC § 7901(b)(2).
[34] 33 USC § 1251(a) (emphasis added). Whether the groundwater resources of concern are waters of the United States, and thus subject to Federal jurisdiction, is beyond the scope of these comments.
[35] 43 USC § 1701(a)(2) (emphasis added).
[36] UMTRCA, Pub. L. 95-604, 92 Stat. 3021.
[37] AEA, Section 275b.(1) uses the term "standards of general application," whereas Section 275b.(2) uses the term "generally applicable standards." For brevity, the term "generally applicable standards" will be used from this point forward in this paper.

> are processed primarily for their source material content or which are used for the disposal of such byproduct material.[38]

The standards set by EPA for non-radiological hazards must be consistent with the standards required under RCRA.[39] The NRC or an NRC Agreement State (the "regulatory agency") is responsible for implementing EPA's standards of general application and is the sole regulatory authority for granting an operating license to uranium recovery facilities.[40]

According to the preamble, the proposed rule would promulgate three different types of groundwater protection standards for ISR facilities, namely, constituent concentration standards, initial stability standards, and long-term stability standards.[41] The preamble describes constituent concentration standards as "numerical concentration limits for a set of groundwater constituents that are present in or affected by ISR operations."[42] The proposed rule groundwater constituent standards are: (1) pre-operational background, (2) the numerical health based standards in referenced tables, or (3) an alternate concentration level.[43] An ISR licensee would need to meet these constituent concentration standards at various compliance points during the different phases of ISR wellfield operation, including the restoration phase. The proposed rule identifies 12 constituents that are the subject of the constituent concentration standards. Other than the express identification of the 12 constituents, these proposed standards are essentially equivalent to, if not the same as, those already in effect under current EPA regulations and are already implemented by NRC and Agreement States for ISR wellfields under NRC's regulations at 10 CFR Part 40, Appendix A (see NRC RIS-2009-005)[44] or the Agreement State equivalent to the NRC's 10 CFR Part 40, Appendix A regulations.

The NRC staff has no objection to such constituent concentration standards as their promulgation falls clearly within the EPA's generally applicable standards setting authority and are already used by NRC and the Agreement States. As explained below, however, the NRC staff continues to have both technical and jurisdictional objections to the initial stability standards and long-term stability standards. In particular, the NRC staff believes that the initial stability standards and long-term stability standards are not generally applicable standards but are implementation criteria, and as such, encroach upon NRC's authority and impair the NRC's ability to effectively regulate its ISR licensees. The initial stability standards and long-term stability standards that are of particular concern are the 95 percent confidence level requirement for a statistical trend analysis and the requirements for geochemical modeling (including the statements in the preamble showing EPA's expectations of such modeling). In addition, the NRC staff has concerns about the definition and use of the term "point of exposure."

The NRC staff acknowledges that the term "generally applicable standards" is not defined in the statutory language of the AEA or by its UMTRCA amendment. The term is, however, defined by

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[38] AEA, Section 275b.(1); 42 U.S.C. § 2022(b)(1) (alteration added).
[39] AEA, Section 275b.(2); 42 U.S.C. § 2022(b)(2).
[40] AEA, Section 275d.; 42 U.S.C. § 2022(d).
[41] 82 FR at 7405 and 7407.
[42] *Id*., at 7407
[43] *Id*.
[44] "RIS" is the NRC acronym for "Regulatory Issue Summary," a form of generic communication that the NRC issues to its regulated community. RIS-2009-05 clarified that the NRC's 10 CFR Part 40, Appendix A regulations were applicable to uranium ISR wellfields. RIS-2009-05, April 29, 2009, p. 3 ("Accordingly, the requirements in Criterion 5B(5) of Appendix A apply to restoration of groundwater at uranium ISR facilities").

the Reorganization Plan No. 3 of 1970, which established EPA, and is further described in the legislative history of UMTRCA.

Reorganization Plan No. 3 of 1970

EPA's authority to promulgate generally applicable standards, at least for radiological material, is prescribed by what is essentially EPA's organic authority, namely, the Reorganization Plan No. 3 of 1970 (Reorganization Plan).[45] Section 1 of the Reorganization Plan established the EPA. Section 2 transferred various authorities from other federal agencies to the EPA. Section 2(a)(6) transferred to the EPA Administrator certain "functions" of the former Atomic Energy Commission (AEC). Section 2(a)(6) states:

> (a) There are hereby transferred to the Administrator:
>
> [* * *]
>
> (6) The functions of the Atomic Energy Commission under the Atomic Energy Act of 1954, as amended, administered through its Division of Radiation Protection Standards, *to the extent that such functions of the Commission consist of establishing generally applicable environmental standards for the protection of the general environment from radioactive material. As used herein, standards mean limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment* outside the boundaries of locations under the control of persons possessing or using radioactive material.[46]

Thus, the Reorganization Plan provided EPA with an express transfer of AEA authority to set generally applicable standards "for the protection of the general environment from radioactive material." The Reorganization Plan, however, expressly prescribed this standard setting authority by defining the term "standards" to mean "limits on radiation exposures or levels, or concentrations or quantities of radioactive material"—essentially, numerical limits.

The use of the phrase "generally applicable environmental standards" in the Section 2(a)(6) provision is virtually identical to UMTRCA's language, namely, "standards of general application for the protection of the public health, safety, and the environment from radiological and non-radiological hazards."[47] Further, case law suggests that Congress intended that UMTRCA's "generally applicable standards" have the same meaning as the Reorganization Plan's "generally applicable environmental standards."[48]

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[45] Reorg. Plan No. 3 of 1970, 35 FR 15623 (October 6, 1970), 84 Stat. 2086 (December 2, 1970). The Reorganization Plan No. 3 of 1970 is codified in 5 U.S.C. Appendix 1.

[46] Reorg. Plan No. 3 of 1970, § 2(a)(6) (emphasis added).

[47] AEA § 275(b)(1)), 42 U.S.C. § 2022(b)(1).

[48] *See NRDC v. EPA*, 824 F.2d 1258, 1278 (1st Cir. 1987) (in interpreting EPA regulations promulgated under the Nuclear Waste Policy Act, 42 U.S.C. § 10141 (NWPA), the court construed the NWPA's statutory language in accordance with Section 2(a)(6) of the Reorganization Plan No. 3 of 1970, and stated "[m]oreover, if Congress disagreed with this definition of the general environment from the reorganization plan (which defined the duties of the EPA), Congress would not have used the same terminology (i.e., the term 'general environment') that was used in the reorganization plan") (alterations added).

UMTRCA's Legislative History Shows that EPA Generally Applicable Standard-Setting Authority is Bound by Reorganization Plan No. 3 of 1970, Section 2(a)(6)

UMTRCA's legislative history shows that Congress was aware of and considered section 2(a)(6) of the Reorganization Plan No. 3 of 1970 when it enacted UMTRCA in 1978. In fact, the legislative history shows that Congress structured UMTRCA's grant of authority to the EPA Administrator upon this very provision. During the consideration of the various bills that led to UMTRCA's enactment, Section 2(a)(6) was referred to several times in the statements of both the NRC Chairman and the EPA Deputy Assistant Administrator for Radiation Programs. In an August 2, 1978 statement made before the House Subcommittee on Energy and Power, Committee on Interstate and Foreign Commerce, then NRC chairman, Dr. Joseph M. Hendrie, stated that "[t]he EPA would establish ambient environmental radiation standards for this new class of byproduct material under Atomic Energy Act authority transferred to EPA under Reorganization Plan No. 3 of 1970."[49]

Similarly, William D. Rowe, Deputy Assistant Administrator for Radiation Programs, EPA, stated on the same date before the same subcommittee,

> However, any such legislative proposal should also provide the EPA to promulgate general environmental standards for such [byproduct] material so that there will be *consistency with the present authority of the Atomic Energy Act and Reorganization Plan No. 3 of 1970 which gives EPA such authority over present licensable material*.[50]

In response to a question from the Committee counsel, Mr. David B. Finnegan, asking what the phrase "generally applicable standards" encompasses, Dr. Rowe stated,

> General [sic] applicable standard is defined in the Atomic Energy Act. This is where the language comes from, *and it is the section that we use to set the standards outside the boundaries.*[51] *It covers standards which can be quantities, concentrations, and it is particularly defined here as concentrations or quantities of material into the general environment. That is how it has been defined*.[52]

Although Dr. Rowe stated that the term "general applicable standard" was defined in the AEA, he was, as shown by his earlier statement, likely referring to Section 2(a)(6) of the 1970 Reorganization Plan, which transferred AEA authority to EPA. Regardless, Dr. Rowe's statement shows that the EPA considered that the term "generally applicable standards" referred to a specified, numerical limit, namely, a concentration or a quantity of radioactive material.

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[49] *Uranium Mill Tailings Control Act of 1978: Hearing on H.R. 11698, H.R. 12229, H.R. 12938, H.R. 12535, H.R. 13049, H.R. 13650, and H.R. 13382 Before the Subcomm. On Energy and Power, H. Comm. On Interstate and Foreign Commerce*, 95th Cong. 343 (1978). The Committee on Interstate and Foreign Commerce bill version would become UMTRCA.

[50] *Id*., at 366 (emphasis added).

[51] As explained below, the phrase "outside the boundaries" was a point of contention between the EPA and the NRC during the development of UMTRCA.

[52] *Uranium Mill Tailings Control Act of 1978: Hearing on H.R. 11698, et al,* 95th Cong. 393 (emphasis added) (alteration added).

In response to Dr. Rowe's statement, Mr. Finnegan then asked about using the UMTRCA legislation to apply the Reorganization Plan definition of a generally applicable standard when setting such standards to control non-radiological hazards,

> Can I suggest to you that the statute be drafted in such a way that EPA would have authority to establish by rule the standards to protect the public and the environment, and I am asking if this is what you are looking for, from radiological hazards associated with the processing and transfer of byproduct material in the possession or control of any licensee … *including the establishment of limits on the exposure or levels or concentrations or quantities of hazards and for standards for the nonradiological hazards* in accordance with the requirements of [RCRA]. Is that essentially what you are looking for as far as legislation in this area?[53]

Dr. Rowe responded affirmatively.[54] Thus, this dialogue shows a legislative intent to apply the Reorganization Plan's Section 2(a)(6) generally applicable standards criteria of numerical limits to the non-radiological hazards covered by the UMTRCA legislation.

In addition to the above statements, there are two House reports, one from each of the committees that considered the UMTRCA legislation, that show Congress intended to apply the Section 2(a)(6) criteria to the EPA's promulgation of generally applicable standards under AEA section 275, for both radiological and non-radiological hazards.[55] The Committee on Interior and Insular Affairs' report states,

> It is the responsibility of the Environmental Production Agency to establish generally applicable standards and criteria for the protection of the general environment, considering radiological and nonradiological aspects of tailings. The EPA standards and criteria should be developed to limit the exposure (or potential exposure) of the public and to protect the general environment from either *radiological or nonradiological substances* to acceptable levels through such means as *allowable concentrations in air or water, quantities of the substances released over a period of time, or by specifying maximum allowable doses or levels to individuals in the general population*.[56]

This report language, together with the dialogue between Mr. Finnegan and Dr. Rowe, demonstrate Congress' intent that EPA's generally applicable standards under UMTRCA, for both radiological and non-radiological materials, be in the form of numerical limits, namely, limits on concentrations of radiological and non-radiological material, quantities of such material, or allowable doses or levels to individuals from such material.

The Committee on Interstate and Foreign Commerce report stated that both committees held "considerable discussions with the EPA and NRC and developed these provisions" and was

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[53] *Id*. (emphasis added) (alteration added).
[54] *Id*.
[55] The two respective House committees were the Committee on Interstate and Foreign Commerce and the Committee on Interior and Insular Affairs.
[56] H.R. Rep. No. 95-1480, Part 1, at 16-17 (1978) (emphasis added).

"satisfied with this resolution of a very difficult problem."[57] Based upon the testimonies of Chairman Hendrie, Dr. Rowe and Floyd Galpin, another EPA witness, the primary dispute between the EPA and the NRC concerned whether EPA's generally applicable standards would be prescribed by the "outside the boundaries" of the licensed site language, as set forth in Section 2(a)(6) of the Reorganization Plan, or would apply inside the boundaries as well.[58] Congress resolved the dispute in favor of EPA, allowing application of the EPA generally applicable standards within the boundaries of the licensed facility, with the proviso, as set forth in an August 9, 1978 letter from then EPA Administrator Douglas M. Costle, that the NRC would establish management requirements for the licensed facility.

The Interstate and Foreign Commerce committee report quotes the pertinent part of Mr. Costle's letter, which states,

> We agreed that *NRC would establish management requirements for the uranium mill tailings*; that such requirements would be comparable, to the maximum extent practicable, to requirements applicable to the possession, transfer, and disposal of similar hazardous material under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976; and that in establishing general management requirements, the NRC would obtain the concurrence of EPA.
>
> Under both titles, *EPA would retain its generally applicable standards-setting authority under the Atomic Energy Act of 1954, as amended*.[59]

Administrator Costle's letter states that EPA shall "retain" its AEA "generally applicable standards-setting authority." Given the statements of Chairman Hendrie, Dr. Rowe, and Mr. Finnegan, the retention by EPA of its AEA generally applicable standards setting authority is best construed to mean section 2(a)(6) of the Reorganization Plan with its definition of the term "standards" being only in the form of numerical limits.

According to the legislative history, the only portion of section 2(a)(6) of the Reorganization Plan provision that is rendered inapplicable by UMTRCA is the very last part of the last sentence of the provision, which states "outside the boundaries of locations under the control of persons possessing or using radioactive material."[60] It is noteworthy that EPA challenged the "outside the boundaries" language of section 2(a)(6) and persuaded Congress to legislatively overturn it.[61] The legislative history shows no such similar effort by EPA with respect to expanding the

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[57] *Id*., Part 2, at 46.

[58] *Uranium Mill Tailings Control Act of 1978: Hearing on H.R. 11698, et al,* 95th Cong. 396-98.

[59] H.R. Rep. No. 95-1480, Part 2, at 46 (emphasis added). The report further stated that the committee "stresses that the EPA standards are not to be site-specific."

[60] UMTRCA, of course, only applies to those facilities involved in the processing of 11(e)(2) byproduct material. As such, the Section 2(a)(6) "outside the boundaries" language is still applicable to all other nuclear fuel cycle facilities. *See e.g.,* 40 CFR 190.10.

[61] The dispute between the EPA and NRC's predecessor agency, the Atomic Energy Commission (AEC), over setting standards for fuel cycle facilities, essentially within the boundaries of a licensed site, predate the UMTRCA legislation. In a December 7, 1973 memorandum to the EPA Administrator and to the AEC Chairman, the Director, Office of Management Budget resolved the dispute in favor of the AEC, stating that "EPA has construed too broadly its responsibilities, as set forth in Reorganization Plan No. 3 of 1970, to set 'generally applicable environmental standards for the protection of the general environment from radioactive material.'" OMB Memorandum Regarding Responsibility for Setting Radiation Protection

meaning of the term "standards" to be more than the setting of numerical limits. Indeed, the above legislative history, including the cited portions of Mr. Costle's August 9, 1978 letter, shows that Congress and the EPA considered the numerical limit definition of the term "standards" to be appropriate.

In this regard, Supreme Court precedent shows that courts attach "great weight" to the testimonies of agency officials, especially when such officials work closely in developing the legislative language with Congressional committees.[62] Thus, upon the basis of this legislative history, the intent of UMTRCA was that the EPA would set generally applicable standards in accordance with its standing AEA authority as prescribed in the Reorganization Plan (that is standards consisting of numerical limits), that such standards would apply both inside the boundaries of the licensed site as well as in the general environment, and the NRC (or the Agreement State) would implement such standards. In short, numerical limits on exposures or levels, or concentrations or quantities of material are the only types of standards that EPA can impose under UMTRCA (AEA section 275).

EPA Cites No Basis to Support Its Interpretation of the Reorganization Plan Provision

The proposed rule's preamble does not expressly reference the Reorganization Plan. In response to comments "critical of EPA's authority to require corrective action programs," however, the preamble states,

> While the term ''standard'' includes numerical limitations, such as the concentration based limits for the listed constituents in groundwater, the EPA has long interpreted this term to also encompass the actions a source must take to reduce, remediate or otherwise avoid release of pollutants. The EPA notes that the existing rule, in subpart D, includes similar non-numerical standards to those included in this proposed rule. For example, 40 CFR 192.32(a)(2)(iii) requires affected sources to implement detection monitoring programs, while 40 CFR 192.32(a)(3)(i) requires uranium mill tailings piles or impoundments to have a permanent barrier.[63]

Although EPA may have interpreted these provisions to go beyond the setting of numerical limits, it cites no legal basis to support this interpretation.

The preamble cites two 1985 Tenth Circuit decisions, involving an industry challenge to EPA's first AEA section 275 rulemaking, in 1983, to support the EPA's position that its proposed rule provisions are a proper issuance of generally applicable standards, *American Mining Congress et al. v. Thomas*, 772 F.2d 617 (10th Cir. 1985) ("*AMC I*") and *American Mining Congress et al.*

Standards (December 7, 1973) *reprinted in* NRC NUREG-0980, vol. 1, No. 11 (2015). The memorandum stated that "[o]n behalf of the President … the decision is that AEC should proceed with its plans for issuing uranium fuel cycle standards, … that EPA should discontinue its preparations for issuing, now or in the future, any standards for types of facilities; and that EPA should continue, under its current authority [i.e., the Reorganization Plan], to have responsibility for setting standards for the total amount of radiation in the general environment from all facilities combined in the uranium fuel cycle." *Id*.

[62] The Supreme Court stated that "we attach 'great weight' to agency representations to Congress when the administrators 'participated in drafting and directly made known their views to Congress in committee hearings.'" *United States v. Vogel Fertilizer Co.,* 455 U.S. 16, 31, 102 S.Ct. 821, 830, 70 L.Ed.2d 792 (1982), *quoting Zuber v. Allen,* 396 U.S. 168, 192, 90 S.Ct. 314, 327, 24 L.Ed.2d 345 (1969).

[63] 82 FR at 7419.

v. Thomas, 772 F.2d 640 (10th Cir. 1985) ("*AMC II*").[64] These two Tenth Circuit decisions, however, did not consider the numerical limits prescription of section 2(a)(6) of Reorganization Plan No. 3 of 1970. Only one of the Tenth Circuit decisions, *AMC I*, referenced the Reorganization Plan provision and only for the proposition that UMTRCA had removed the "outside the boundaries" limitation from the AEA authority transferred to EPA by the Reorganization Plan, as applied to activities concerning the possession and use of AEA section 11e.(2) byproduct material.[65]

Indeed, all of the challenged standards in the *AMC I* case were standards that set numerical limits.[66] The preamble to EPA's 1983 rule shows a relatively contemporaneous understanding of the limits of EPA's UMTRCA authority. The 1983 rule's preamble made a distinction from an earlier 1980 NRC UMTRCA rulemaking by stating "[w]e note that the NRC regulations specified design objectives; that is, the values specified were to be achieved based on average performance; whereas these EPA rules specify standards, *which designers must plan not to exceed*, with a reasonable degree of assurance."[67] The use of the phrase "must plan not to exceed" is informative as it is typically used in concert with a numerical limit. Similarly, the 1983 rule's preamble stated that "UMTRCA gives the NRC and the Agreement States the responsibility to decide what methods will assure these standards are satisfied at specific sites."[68]

The NRC staff acknowledges that EPA promulgated at least one standard that was not a numerical limit in its 1983 rulemaking, namely, the requirement for the use of liners at new waste depositories and to new portions of existing waste depositories. That requirement was one of the requirements challenged in *AMC II*, and is discussed further below. The NRC staff notes, however, that the *AMC II* petitioners did not appear to challenge the liner standard as violating the numerical limits prescription of the "standards" definition in Section 2(a)(6) of the Reorganization Plan—at least the published decision makes no reference to such a challenge. Here, the NRC staff finds relevant another Tenth Circuit decision, *Quivira Mining Co. v. EPA*, issued 1 year prior to *AMC I* and *AMC II*, which stated that "the Reorganization Act plainly provides that a reorganization plan may not create new agency functions,"[69] and the previously cited 1987 First Circuit decision, *NRDC v. EPA*, which stated that the Reorganization Plan No. 3 of 1970 "defined the duties of the EPA."[70] Moreover, the past promulgation of regulations by EPA does not provide an adequate basis to promulgate regulations, now or in the future, that exceed or are inconsistent with the Reorganization Plan's "numerical limit" definition of "standards."

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[64] *Id*., at 7418-19 and 7422.
[65] *AMC I*, 772 F.2d at 630 ("The American Mining Congress argues that this strict distinction between the EPA operating outside site boundaries and the NRC operating on-site has been maintained in the UMTRCA").
[66] *E.g.*, *AMC I*, 772 F.2d at 623, n. 3 and 638 (various numerical concentration limits by milligrams/liter for a list of various constituents toxic substances that could be present in surface and ground water); *id.*, 772 F.2d at 624 ("radon-222 emission limits from tailings piles of 20 pCi/m^2s); and *id*. (radium-226 maximum concentration levels set at 5pCi/gram averaged over the first 15 centimeters of soil and at 15pCi/gram for soil layers more than 15 centimeters below the surface).
[67] 48 FR 45926, 45932 (October 7, 1983) (emphasis added).
[68] *Id*., at 45933.
[69] *Quivira Mining Co. v. EPA*, 728 F.2d 477, 481 (10th Cir. 1984); *see also NRDC v. EPA*, 824 F.2d at 1278 (stating that the Reorganization Plan No. 3 of 1970 "defined the duties of the EPA").
[70] *NRDC v. EPA*, 824 F.2d at 1278.

UMTRCA's Legislative History Further Prescribes EPA's Generally Applicable Standard-Setting Authority

In addition to prescribing that generally applicable standards promulgated by EPA must be in the form of numerical limits, the legislative history indicates a further restriction upon EPA's AEA section 275 authority. In its report, the Committee on Interior and Insular Affairs stated that

> The EPA standards and criteria *should not interject any detailed or site-specific requirements for management, technology, or engineering methods on licensees* or the Department of Energy. Nor should EPA incorporate any requirements for permits or licenses for activities concerning uranium mill tailings which would duplicate NRC regulatory authority over the tailings sites.[71]

Thus, if the legislative history is given its proper effect, UMTRCA allows EPA to only promulgate generally applicable standards consisting solely of numerical limits, and further, such standards cannot interject any detailed or site-specific requirements for management, technology or engineering methods. The NRC staff comments below describe how the initial and long-term stability standards, particularly, the 95 percent confidence level requirement and the geochemical modeling requirement, are not generally applicable standards under UMTRCA (AEA, section 275).

C. 95 Percent Confidence Level

Proposed rule provisions 40 CFR 192.52(c)(2) (initial stability standards) and (c)(3)(i) (long-term stability standards) require that the regulatory agency ensure that licensees must provide it with a minimum of "three consecutive years of quarterly monitoring results with no statistically significant increasing trends that would exceed the constituent concentration standards at the 95 percent confidence level."[72] EPA asserts that this requirement is necessary to demonstrate both the initial and long-term stability of the groundwater quality. The NRC staff has significant jurisdictional and technical concerns with EPA's attempt to impose any sort of groundwater stability standard, including but not limited to the 95 percent confidence level requirement.

In the preamble, EPA states that the 95 percent confidence level requirement is a "generally applicable stability standard" as it is used to "define stability" and further, that the "confidence level [is] a measure of stringency of the standard."[73] According to the preamble, the purpose of this stability standard is to ensure "full restoration" across all wellfields and "to confirm that the restoration was successful and likely to persist."[74] The preamble asks for comments on "alternative approaches that would present a rigorous benchmark against which to measure and ensure stability."[75]

From a jurisdictional perspective, this requirement goes well beyond a generally applicable standard and encroaches upon the NRC's authority as the regulatory agency. The NRC staff objects to the imposition of any confidence level requirement, regardless of the percentage target, as EPA has no authority to set such a standard and further, such a standard will require

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[71] H. Rep. No. 95-1480, Part I, 95th Cong., 2nd Sess. at 17 (1978) (emphasis added).
[72] 82 FR at 7428. The quoted language is from proposed 40 CFR192.52(c)(2). The language for proposed 40 CFR 192.52(c)(3)(i) is essentially the same.
[73] *Id.*, at 7422.
[74] *Id*.
[75] *Id*.

the NRC to implement a specific methodology (in this case, mandating a strict statistical confidence level for a hypothesis test of a stability trend).

Under its AEA section 275 authority, as transferred to EPA by section 2(a)(6) of the Reorganization Plan, EPA can only set numerical limit standards—limits on exposures or levels, or concentrations or quantities of material. As noted above, the EPA's proposed constituent concentration standards fall within the scope of Reorganization Plan's definition of a generally applicable standard, and as such, the NRC staff has no objection to them. In contrast, a groundwater stability standard that attempts to regulate the "stringency of the standard," whether by imposing a 95 percent confidence level requirement or otherwise, are not limits on exposures or levels, or on concentrations or quantities of material. Rather, a statistical confidence level for a hypothesis test of a stability trend is a measure of the false positive rate (Type I error) of a trend being found to be significant when it is not (e.g., a 95 percent confidence level means that there is a five percent chance of detecting what appears to be a significant trend when, in fact, none exists). Neither the use of the phrase "confidence level" nor placing a specific percentage before that phrase, here 95 percent, brings this proposed rule provision within the scope of the Reorganization Plan's definition of the term "standards."

In addition to not being a numerical limit, the proposed rule's stability standards are not consistent with the direction in the UMTRCA legislative history that EPA "should not interject any detailed or site-specific requirements for management, technology, or engineering methods on licensees or the Department of Energy." A groundwater stability standard, and efforts to ensure stringency, concern how the presence of a trend is detected, established, and statistically evaluated. Sampling, measurement and related calculations, factoring in uncertainty given site-specific conditions, and how to perform such sampling, measurements, and calculations, and finally, determining what standards and methodologies are appropriate, are all implementation matters. In accordance with AEA section 275d., implementation matters are solely within the province of the regulatory agency, not EPA. Determining stability, including defining stability, and ensuring proper sampling and analysis to demonstrate such stability, are professional judgments made by the technical staff of the regulatory agency.

The preamble, in an attempt to distinguish the provision from this prescription in the legislative history, states that the "proposed stability standards do not prescribe what specific statistical methods, sampling methods, or monitoring equipment should be used to show 95 percent confidence."[76] The preamble then states, however, that "EPA expects that the regulatory agency would provide additional guidance regarding the statistical analysis required and the reasons for using a statistical test that facility operators and other stakeholders understand the reasons for using the statistical test, the concepts of Type 1 and Type 2 errors, the calculations required to perform the test, and how test results are interpreted" and then ties this statement to one of the technical documents supporting the proposed rule, the Background Information Document (BID).[77] According to the preamble, the BID includes "[i]nformation about what parameter is tested, the null and alternative hypotheses, *requirements for implementing the statistical tests and tables for interpreting test results*."[78] Moreover, in Table 7.1 of the BID, EPA states that there are only two potential statistical methods available to adequately conduct a hypothesis test of a stability trend that supports a 95 percent confidence level: a regression trend test and the Mann-Kendall test.[79] The BID advocates exclusively for the Mann-Kendall

[76] *Id*. at 7419.
[77] *Id*. at 7422.
[78] *Id*. (emphasis added).
[79] The regression trend test is a parametric test which relies on a normal distribution of residuals (a "bell-shaped" curve), whereas the Mann-Kendall test is a non-parametric test.

test. Together, these preamble statements and the BID's clear preference for the Mann-Kendall test as the hypothesis test to be used to achieve the 95 percent confidence level, make this proposed rule provision a detailed standard.

In addition, imposing the 95 percent confidence level for a hypothesis test of a stability trend removes the regulatory agency's ability to apply its technical judgment and discretion and precludes or restricts the ability of the licensee to present alternatives such as the use of other appropriate methodologies for stability trend analysis such as linear regression or non-linear curve fitting, and groundwater fate and transport models. The NRC staff is aware of no analogous Federal regulation that mandates any statistical trend analysis as a groundwater protection standard, let alone a 95 percent confidence level.

The NRC staff disagrees with the preamble statement that the 95 percent statistical confidence level is "widely accepted and used in other environmental standards."[80] As explained above, there is a difference between using a confidence level for a test demonstrating compliance with or detecting exceedance of a constituent baseline standard, which is common (e.g. analysis of variance),[81] and using a confidence level for a hypothesis test of a constituent stability trend (e.g. Mann-Kendall). In the former case, current sample values are compared to baseline sample values (noted in BID Table 7.1, Phase 4) whereas in the latter case, an analysis of a trend with time is required (noted in BID Table 7.1, Phase 5). With respect to non-radiological hazards, UMTRCA requires consistency with the standards required under RCRA (AEA, section 275(b)(2)). In this regard, RCRA has no provisions requiring either a stability trend standard with a confidence level or modeling to demonstrate compliance with a constituent standard.

In addition, the NRC staff notes that the preamble states "that NRC staff has attempted to use the 95 percent confidence level for at least one facility."[82] Based upon NRC records, the NRC staff only applied a 95 percent confidence level for a hypothesis test of a stability trend to one licensee's request for approval of groundwater quality restoration (the restoration was not approved for several reasons, including the inability to meet the 95 percent confidence level). The staff did not apply the Mann-Kendall method nor use at least 3 years of data as recommended by EPA in the BID. The staff used a regression trend test with just 1 year of data, an approach the BID finds unsatisfactory. The staff applied the 95 percent confidence level only in this one instance on its own volition; it was not required by NRC license condition.

Moreover, the 95 percent confidence level requirement will compromise the NRC's ability to promulgate a conforming regulation as it may not be technically implementable. EPA states in its own supporting technical document (BID, p. 130), "[a]nalyses of quarterly sampling and assumptions about natural variability (Table 7-19 to 7-21, Section 7.7.2.2) suggest quarterly sampling to reach the required level of confidence about the presence or absence of trend may

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[80] *Id*., at 7417.

[81] The NRC staff is aware that an EPA RCRA regulation, 40 CFR 264.97(h)-(i), prescribes a 95 percent confidence level. This RCRA regulation, however, is not analogous to the proposed rule's 95 percent confidence level requirement for three reasons: 1) the RCRA regulation concerns the use of statistical tests of measured groundwater constituent concentrations (e.g., analysis of variance) to establish significant evidence of exceedance of groundwater standards (e.g., detection), which are not equivalent to a hypothesis test of a trend to show groundwater constituent concentration stability over a period of time; 2) the RCRA regulation provides for five options for statistical methods to be used to verify detection of an exceedance, including one proposed by the operator, and further, only two of the five require the 95 percent confidence level; and 3) under RCRA, unlike with UMTRCA, EPA has both standards-making and implementation authority.

[82] 82 FR at 7417.

require very long periods for post-restoration monitoring." The NRC staff has determined that Table 7-20 of the BID shows the 95 percent confidence level requirement for a hypothesis test of stability trend is impossible to meet within 3 years[83] for the majority of combinations of trend slope and variability of the constituent concentrations using the Mann-Kendall or regression trend test. Specifically, Table 7-20 shows that the 95 percent confidence level cannot be met for 66 percent of combinations of slope and variability of a given constituent. The inability to meet the 95 percent confidence level in these cases will cause substantial uncertainty in monitoring time frames. In order to meet the 95 percent confidence level requirement, licensees may have to conduct monitoring for time frames substantially longer than 3 years, thus significantly increasing the cost of the rule. Similarly, the regulatory agency will need to evaluate additional data and oversee the licensee for a longer timeframe. Moreover, it may be possible that stability is never demonstrated leading to regulatory stalemate and the inability to terminate the license.

Finally, the proposed rule's preamble states that the two 1985 Tenth Circuit decisions, *AMC I* and *AMC II*,[84] support EPA's position that the proposed standards are not "detailed" standards. The preamble cites the *AMC I* statement that the standards promulgated by EPA under AEA section 275 are "general in nature—they apply to all sites—we do not view them as site-specific 'management, technology or engineering methods."[85] The NRC staff, however, does not view the proposed standards in the January 2017 proposed rule as site-specific; rather, the NRC staff views the proposed standards as "detailed." The *AMC I* decision did not address whether the challenged standards were detailed, only that they were not site-specific.

The *AMC II* decision likewise does not support the EPA's argument that the proposed standards are not detailed. In *AMC II*, one of the requirements challenged by the petitioners concerned the use of a liner for new waste depositories and to new portions of existing waste depositories.[86] The *AMC II* court, in ruling that the liner requirement was not the imposition of a detailed requirement, stated that "[a]lthough the regulations require a 'liner' for new piles and extensions thereof, *we understand that term to refer to any impermeable barrier* the NRC may approve that will prevent seepage."[87] Unlike the requirements for the 95 percent confidence level and the geochemical modeling, which the NRC staff believes to be detailed requirements, the requirement for a liner is not the imposition of a detailed methodology given the wide variety of impermeable barrier types that may installed by a licensee.[88]

D. Geochemical Modeling Requirements

The proposed rule has several provisions that require geochemical modeling, namely, 40 CFR 192.52(c)(3)(ii), 40 CFR 192.53(d)(2)(ii)(A) and (d)(5). In connection to this geochemical

[83] Three years of quarterly sampling is the minimum term required under the proposed rule to demonstrate initial and long-term stability.
[84] *Id*., at 7418-19 and 7422.
[85] *Id*., at 7419 *quoting AMC I*, 772 F.2d at 630.
[86] *AMC II*, 772 F.2d at 647 *citing* 40 CFR 192.32(a)(1)-(2).
[87] *Id*., 772 F.2d at 648 (emphasis added).
[88] *See* EPA, Risk Reduction Engineering Laboratory, Office of Research and Development, "Lining of Waste Containment and Other Impoundment Facilities," EPA/600/2-88/052 (September 1988). Chapter 4 of the document provides a detailed description of the wide variety of materials that can be used to manufacture liners.

modelling requirement, the preamble states that the licensee should include the following seven elements in its long-term stability assessment.[89] The seven elements are:

- Conceptual hydrogeochemical modeling for the mine unit/production zone;
- Ground water and solid (core) data used for geochemical model(s), including field parameters;
- Incorporation of ground water data in an initial geochemical model (*i.e.*, saturation indices calculations and assessment);
- Demonstration that stability (mainly reduction-oxidation or redox) conditions can be maintained in the production zone;
- Demonstration that ground water migrating into the production zone will not significantly change the geochemical stability within the production zone;
- Demonstration of alternative geochemical conditions that demonstrate stability (uranium and other elements); and
- Inter-relationships and contradictory claims (unintended consequences) for these various elements need to be identified and assessed in the context of the conceptual hydrogeochemical model.

Similar to the specific 95 percent confidence level requirement, the geochemical modeling requirements go well beyond an UMTRCA generally applicable standard and encroach upon the regulatory agency's authority. Moreover, the geochemical modeling, as characterized by the seven elements listed in the preamble are not technically implementable as standards and compromises the ability of the NRC to promulgate a conforming regulation.

As described above, EPA can only promulgate generally applicable standards that are numerical limits. A requirement to use geochemical modeling is not a standard that consists of a numerical limit. Moreover, the proposed geochemical modeling requirement encroaches upon NRC's authority as it is essentially an implementation requirement. Under the UMTRCA scheme, implementation of the generally applicable standards is a regulatory agency obligation. Whether to use geochemical modeling or another method as a means to demonstrate restoration is solely within the province of the regulatory agency. Likewise, if the regulatory agency decides to require that its licensees use geochemical modeling, the nature of that modeling is determined by the regulatory agency, not the seven elements listed in the preamble.

The complexity of these geochemical modeling and geochemical evaluation requirements are presented in Section 4.73 of the BID. These requirements will demand very detailed and non-standardized methods, which will be specific to each ISR site. Nor is the proposed rule consistent with RCRA, as RCRA does not require geochemical modeling or a geochemical evaluation of any type and only requires that there be no exceedance of a groundwater protection standard for 3 years (as shown by compliance monitoring, not a statistical trend analysis).

[89] 82 FR at 7410.

The seven elements listed in the preamble are beyond the scope of UMTRCA as they concern the stability of the subsurface conditions of depleted underground ore bodies, which is much broader than groundwater protection from ISR wellfields. For example, the second element states that the long-term stability assessment should include "ground water and solid (core) data used for geochemical model(s), including field parameters." In this regard, the NRC staff's definition of byproduct material excludes "underground ore bodies depleted by [uranium and thorium] extraction operations."[90] The AEA, as amended by UMTRCA, does not provide the NRC with any authority to regulate subsurface conditions or depleted underground ore bodies in the ISR wellfield. All but one of the seven of the preamble elements concern subsurface conditions of depleted underground ore bodies.

Seven Elements Not Technically Implementable

The proposed rule's geochemical modeling requirements, particularly, if the regulatory agency were to address the seven elements listed in the preamble, will require specific detailed methods all of which are subject to tremendous uncertainty and none of which have been standardized for implementation or to demonstrate compliance. In fact, all of the elements listed in the preamble are currently the subject of research for potential application to ISR wellfields (e.g., Dangelmayr et al., 2017).[91] Therefore, no standard methods are even known or established for addressing these model elements for any listed constituent in Table 1 of the proposed rule at ISR wellfields. In addition, it is widely understood that all geochemical modeling is highly uncertain and non-unique because of the inherent uncertainty in the choice of conceptual models; limited availability and quality of input data; variability in modeling codes/solvers and their performance; limited availability of observation data for calibration and lack of standard methods for calibration. The EPA's BID document states that "[m]odeling of any type does not lead to a unique solution."[92] The EPA BID document lists the same limitations of geochemical modeling including insufficient input data, uncertainty and variability in results, misinterpretation of results and differences between modeled and actual field conditions.[93] The NRC staff concludes that the tremendous uncertainty and lack of standard methods for the proposed rule's geochemical modeling regulatory standard will make it impossible to establish conforming regulations to which a licensee can demonstrate compliance.

E. Other Concerns

1. Point of Exposure

Issue: The "points of exposure" reference in the proposed 40 CFR 192.54(a)(3), which states that "points of exposure" are located in the wellfield, encroaches upon the NRC's authority to review and approve the location of a point of exposure—an action that must be based upon a site specific determination.

Comment: In its prior January 2015 proposed rule, the EPA defined the point of exposure as "Intersection of a vertical plane with the boundary of the exempted aquifer."[94] This definition

[90] 10 CFR § 40.4 (alteration added).
[91] Dangelmayr, M.A. et al., "Laboratory column experiments and transport modeling to evaluate retardation of uranium in an aquifer downgradient of a uranium in-situ recovery site," Applied Geochemistry, 80 (2017), pp.1-13.

[92] BID at 82.
[93] *Id*.
[94] 80 FR 4156, 4184 (January 26, 2015).

was not objectionable. Because EPA has now removed all references to exempt aquifers from its current proposed rule, however, defining a "point of exposure" in the wellfield encroaches upon the regulatory agency's ability to implement its regulatory program.

The regulatory agency has sole authority to review and approve an alternate concentration level (ACL), which under the UMTRCA scheme is an implementation and a site-specific compliance mechanism. To approve an ACL, the regulatory agency must review and meet the requirements of the factors listed in proposed 40 CFR 192.54. These are the same factors that the regulatory agency currently uses in its regulations for granting an ACL for any constituent in an ISR wellfield restoration (RIS 09-005). The approval of an ACL requires a site-specific determination of the "point of exposure," which can only be made after the wellfield is restored and the regulatory agency is able to evaluate all of the pertinent factors based on that restoration outcome. An *a priori* determination of the "point of exposure" in the wellfield effectively prohibits the regulatory agency from approving an ACL as it is precluded from considering technical factors of natural attenuation (e.g. adsorption, decay, low flow aquifer) of the ACL to background concentrations at a downgradient "point of exposure" (i.e., outside of the wellfield at the exempt aquifer boundary) when establishing an ACL.

Any statement about the location of a point of exposure in the proposed rule is also contrary to the 10th Circuit ruling in *Environmental Defense Fund vs U.S. Nuclear Regulatory Commission* (866 F.2d 1263 (1989). In that case, the court held that AEA Section 84(c) (42 U.S.C. § 2114(c)), gave sole authority to the NRC to evaluate and approve ACLs.[95] If EPA proceeds with this rulemaking, then the definition of "point of exposure" and references to its location should be deleted.

2. Gross alpha particle activity

Issue: EPA's January 2015 proposed rule listed gross alpha particle activity (GAA) as one of the Table 1 groundwater constituents. Although GAA has been removed from Table 1 in the January 2017 proposed rule, EPA has requested comments on whether GAA should be included within Table 1.[96]

Comment: The NRC staff has significant technical concerns with the inclusion of GAA as a constituent in Table 1. GAA does not meet the proposed rule's definition of "constituent," which is "a detectable component within the groundwater."[97] Both government and industry use GAA as a screening parameter for the purpose of measuring the alpha particle activity of all alpha emitting constituents in a water sample. The measurement of GAA is subject to substantial error, bias and non-reproducibility (e.g., the same sample or duplicate samples will not produce similar results). A comprehensive report titled "Evaluation of Gross Alpha and Uranium Measurements for MCL Compliance" written for EPA by the Water Research Foundation (2010)[98], stated that "GAA is subject to various sources of bias and error which lead to substantially higher or lower values than the actual GAA and can cause duplicate

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[95] *Environmental Defense Fund vs. the Nuclear Regulatory Commission*, 66 F.2d 1263 (10th Circuit 1989) "We … hold that AEA Sec. 84(c) permits the NRC to approve, when the contrary is not practicable, licensee-proposed site-specific alternatives that are less stringent than the EPA general standards."
[96] 82 FR at 7411.
[97] *Id.*, at 7427.
[98] Water Research Foundation, "Evaluation of Gross Alpha and Uranium Measurements for MCL Compliance" (2010), *available at* http://www.waterrf.org/PublicReportLibrary/3028.pdf.

measurements to differ significantly." The report goes on to describe the measurement problems inherent to GAA as a consequence of sampling, sample holding time, and limitations of the standard methods and correction.

Although the NRC requires the measurement of GAA in its conforming 10 CFR Part 40 Appendix A regulations, it does so because the measurement of GAA is required in EPA's current 40 CFR Part 192 regulations for conventional mill tailings impoundments. However, the existing regulations for GAA were not required to establish statistically representative constituent concentration standards, meet stability standards, and conduct the required hypothesis tests of trend at any confidence level, or geochemical modeling and analysis as would be required in EPA's proposed rule.

The proposed rule's list of twelve constituents in Table 1 includes the major alpha emitters such as radium-226, radium-228, and uranium. Their inclusion reflects the improvement in technology to cost effectively separately measure major alpha emitters. As a result, the requirement to measure the GAA screening parameter provides no additional benefit, and will only incur unnecessary burdens and costs on the regulatory agency and licensees.