WWC ENGINEERING
1849 Terra Avenue – Sheridan, WY 82801 – (307) 672-0761
Fax (307) 674-4265 – Website: www.wwcengineering.com

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Air and Radiation Docket
Environmental Protection Agency
Mail Code: 2822T
1299 Pennsylvania Ave. NW
Washington, DC 20460

Comments Submitted On-Line Via www.regulations.gov

Re: Docket ID No. **EPA-HQ-OAR-2012-0788**
Comments on 40 CFR Part 192, Proposed Rule
Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings

To Whom It May Concern:

WWC Engineering (WWC) appreciates the opportunity to provide comments on the proposed rulemaking. WWC is a Wyoming-based, employee-owned consulting engineering company with extensive experience in the regulation of uranium ISR facilities. The following comments are organized by subject, beginning with general comments on the purpose and need for additional regulation and continuing with specific comments organized by subject. Page number citations refer to the Federal Register notice of the proposed rule, Vol. 80, No. 16, January 26, 2015.

In general, the proposed rule and background information reflect an alarming lack of knowledge on the part of EPA regarding ISR procedures and practices, implementation of existing regulations and performance-based license conditions, economics of uranium mining and milling, hydrogeology of ore bodies, and recent research regarding groundwater restoration and natural attenuation. Rather than science, this rule appears to be based on beliefs (also called superstitions), "what-if" scenarios, and draft technical reports or non-technical, non-peer reviewed reports prepared by avowed opponents of the uranium ISR industry.

If you have any questions or need to contact me for clarification of any of these comments, I can be reached at (307) 672-0761 or mevers@wwcengineering.com.

Sincerely,

Michael J. Evers

Michael J. Evers, P.G.
President, WWC Engineering

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1) General Comments on Purpose and Need for Proposed Rule

1-1: The Summary of the proposed rule discusses the risk of "an undetected contaminant plume in the absence of the proposed rule," but it also acknowledges that EPA has not included any scientific "basis for estimating which, if any, wellfields would experience" such impacts absent the proposed rule (p. 4157, last ¶). This general lack of quantifying the risk to groundwater under current state and federal regulations and performance-based license conditions makes it impossible to compare the cost versus any potential benefits of implementing the proposed rule. In fact, any benefits are speculative at best and very likely nonexistent.

1-2: The Background Information for the proposed rule does not acknowledge well-documented evidence that there has never been a documented off-site impact to groundwater even after decades of uranium ISR operations in the U.S. WWC requests consideration of the following references in the proposed rule and explanation of why additional regulation is warranted in light of such evidence.

First is documentation from NRC staff in a 2009 memorandum to the Commission (NRC, 2009a), which found that:

> "[t]he 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 impacts attributed to an ISR facility"

Second is NUREG/CR-6733 (NRC, 2001), which addresses the history of excursions at U.S. ISR facilities and documents the finding that:

> "there were no reports of extraction fluid excursions being detected in off-site water supplies in any of the documentation for U.S. uranium ISL sites reviewed for this report."

Third is documentation from the Texas Commission on Environmental Quality (TCEQ, 2008) that no such impacts have been documented in Texas:

> "With regard to research on the effects of similar mining projects on neighbors, the Executive Director is not aware of a documented case of off-site groundwater contamination from a Class III injection well operation in over 30 years of *in situ* uranium mining in South Texas. Also, the Executive Director is not aware of any other scientific evidence that in situ uranium mining in Texas has led to adverse health effects on the public."

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1-3: For support of the statement in the Background Information that "we believe there is sufficient information available to indicate that practices related to groundwater protection at ISR facilities have not been sufficiently rigorous to provide confidence either that groundwater is being restored appropriately or that such restoration will persist into the reasonably foreseeable future" (p. 4172), the proposed rule cites two papers or reports prepared by non-governmental organizations with a history of opposition to uranium ISR or by expert witnesses for groups opposed to uranium ISR. It does not appear that these reports have been peer reviewed and, in the case of "Nuclear Fuel's Dirty Beginnings," the report appears to be anti-industry propaganda rather than of a technical and scientific nature. Citing papers and reports from industry opponents without evaluating or considering conclusions by the NRC and TCEQ that no off-site impacts have ever been documented for a uranium ISR facility (NRC, 2001; NRC, 2009a; TCEQ, 2008) provides an incomplete basis for the proposed rule. A rule should be based on science, not a "belief" as stated here.

1-4: The Background Information for the proposed rule also references EPA (2012), EPA (2014a) and EPA (2014b), which are all *draft* technical reports. EPA is providing only one opportunity to comment on the proposed rule and associated background information, yet the background reports have not yet been finalized. How can regulations with such far-reaching cost impacts to the domestic uranium recovery industry be promulgated on the basis of draft reports with indeterminate status of peer review, fact checking and substantiation?

1-5: The Background Information for the proposed rule repeatedly mentions water scarcity as justification for its promulgation (e.g., pp. 4164, 4171). At the same time, it describes the need to codify groundwater restoration standards for the ISR industry. The proposed rule should quantify how much additional groundwater would need to be consumed in order to achieve the proposed groundwater restoration standards (as compared to current ISR industry practices) in order to determine whether benefits in water availability actually would be achieved under the proposed rule.

2) <u>Inadequate Quantification of Risk under Current Practices and Regulations</u>

2-1: In describing the justification for the proposed rule, the main emphasis is on potential exposure to radionuclides following ISR operations and restoration (e.g., page 4165 of the Background Information states "[w]e have addressed exposure scenarios and exposure pathways for potentially hazardous constituents (mainly radionuclides) …"). However, EPA has not shown that such exposure pathways occur under current practices. To the contrary, USGS Open-File Report 2009-1143 (Hall, 2009), which is cited repeatedly in the Background Information for the proposed rule, shows that the baseline concentration of radium (226 and 228), which is the primary radiological constituent of concern in groundwater associated with uranium ISR, was

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above the EPA MCL in 100% of the more than 70 production authorization areas (PAAs) evaluated prior to ISR; that is, in no case was the water fit for human consumption prior to ISR. What is more important with respect to potential risk associated with ISR is that the radium concentration decreased in 96% of the PAAs for which post-restoration groundwater quality data were available (see p. 14 of Hall, 2009). Therefore, the process of recovering the uranium and restoring the groundwater resulted in a reduction in the primary constituent associated with radiological dose from groundwater in almost every wellfield evaluated. EPA should explain why additional regulation is proposed on the basis of radiological risk in light of this evidence to the contrary.

2-2: Also regarding the Hall, 2009 report, the Background Information for the proposed rule cites this as evidence that "[m]ost ISR sites historically have been unable to meet restoration goals for all constituents" (p. 4165). However, the proposed rule does not include groundwater restoration standards that differ from current federal regulations in 10 CFR Part 40, Appendix A, Criterion 5B(5), under which groundwater must be restored to background or an MCL (whichever is higher) or to an ACL approved by the Commission. The EPA apparently equates not returning every constituent to background levels as not meeting restoration goals, but that is not currently the only criterion for successful restoration, nor would it be the sole criterion under the proposed rule.

2-3: Also regarding the Hall, 2009 report, while that report found that no facility returned every single constituent to its baseline concentration, it found two PAAs that returned every constituent for which EPA has established MCLs to baseline: the O'Hern-2 and Trevino-1 PAAs (p. 21 of Hall, 2009). The only constituents not returned to baseline at O'Hern-2 were calcium and carbonate, which do not even have secondary MCLs. At Trevino-1, the only constituent above baseline was sulfate, which does not pose a significant hazard to human health or the environment and has no MCL. If this report is to be used as evidence for the need for additional regulation of groundwater restoration at ISR facilities, EPA should evaluate the relative risk of various constituents in groundwater that were not restored to background levels rather than simply relying on the generalization that no site returned every single constituent to its baseline concentration.

2-4: The proposed rule theorizes "[b]ecause radionuclides are human carcinogens, the main health risk averted would be cancer" (p. 4157). However, no attempt is made to quantify this benefit by estimating how many cancer deaths would be averted. In fact, as stated previously, the proposed rule ignores evidence that the primary radionuclide of concern in groundwater, radium, is reduced following uranium recovery and groundwater restoration under current practices and regulations. The proposed rule also should acknowledge that uranium is not a

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known carcinogen. For example, the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR) found the following (ASTDR, 2013):

> "Studies of workers at uranium milling or nuclear facilities and residents living near uranium mining and milling facilities have not found significant increases in cancer mortality associated with uranium exposure."

2-5: The rationale for the proposed rule asserts on p. 4170 that "[g]roundwater contamination is also of concern to us because of potential adverse impacts upon ecosystems, particularly sensitive or endangered ecosystems. For these reasons, it is a resource that needs protection." This statement is both confusing and misleading for the following reasons: first, ISR takes place in confined aquifers at depths ranging from approximately 200 feet to in excess of 1,000 feet below ground; no explanation is provided for what "sensitive or endangered ecosystems" exist at these depths in an environment with naturally high levels of natural uranium and radium. Second, the protection of groundwater as a potable water supply seems to ignore the fact that the groundwater naturally contains concentrations of radium, uranium and other constituents in excess of MCLs and therefore is not a good source of drinking water, irrigating water, stock water, etc. Third, EPA acknowledges that through the UIC program, Class III injection cannot occur without an exemption from the Safe Drinking Water Act; if the groundwater is exempted from the SDWA, then why would it or could it be a source of potable water? Fourth, the proposed rule implies that groundwater protection has not been done in the past, which is simply not the case. State regulatory programs overseeing ISR have been in place since the 1970s and early 1980s, with a high level of oversight and enforcement designed to protect the environment with specific focus on groundwater resources.

2-6: The Background Information for the proposed rule states that "We believe that only a combination of longer stability monitoring and geochemical modeling using site-specific data can provide confidence that the ISR site poses no long-term hazards" (p. 4166). However, this belief is not supported with any quantified risk from current ISR practices and regulations. As noted in §192.51(x) of the proposed rule, the point of exposure is the boundary of the exempted aquifer, since uranium ISR only takes place within an aquifer that has been determined to not currently and not in the future serve as a source of drinking water. Moreover, existing NRC regulations in 10 CFR Part 40, Appendix A, Criterion 5B(6) require a demonstration that the concentration of any constituent for which an ACL is proposed be as low as is reasonably achievable (ALARA) and not pose a substantial present or potential hazard to human health or the environment at the point of exposure (aquifer exemption boundary). Therefore, under existing regulations a licensee is required to demonstrate to the regulatory agency that the concentration of all constituents will meet the background levels or maximum contaminant levels at the aquifer exemption boundary. The existing, performance-based regulations are adequately protective and require the regulatory agency to make the same ultimate

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determination (that groundwater quality outside of the exempted aquifer will not be degraded) as that in the proposed rule. No explanation is provided as to why the current NRC regulations in 10 CFR Part 40, Appendix A, Criteria 5B(5) and 5B(6) are not adequately protective of public health and the environment.

2-7: In the Background Information discussion for ACLs on p. 4173 of the proposed rule, it states that "In the past, NRC and Agreement States have issued secondary class-of-use restoration goals at ISR sites" and that "[t]here is evidence that relaxed restoration standards have been granted in Agreement States." This is apparently provided as justification for the statement that "we believe it only is appropriate to … not approve ACLs unless it has proven impractical to achieve or maintain the initial restoration goals or return to background conditions after restoration." However, the past practice of relying on class-of-use restoration standards is not used today and should not form the basis for promulgating additional regulation.

NRC Regulatory Issue Summary (RIS) 2009-05 (NRC, 2009c) makes it clear that class-of-use restoration goals, which were based on the SDWA and the EPA UIC Program, are inconsistent with NRC regulations at 10 CFR Part 40, Appendix A and the Atomic Energy Act and that the applicable standards for groundwater restoration are those listed in Criterion 5B(5) to 10 CFR Part 40, Appendix A, which are background or an MCL, whichever is higher, or an ACL.

The current NRC regulatory framework also is stated in Supplement 1 to NUREG-1910 (NRC, 2010a, p. B-35):

> "The commenter is correct that NRC has used "class of use," a state designation under the SDWA, as a restoration goal. The "class of use" standard for restored groundwater quality was based on restoration standards provided in NUREG-1569. NRC has determined that the primary and secondary restoration standards in NUREG-1569 are inconsistent with the restoration standards in 10 CFR Part 40, Appendix A, Criterion 5B(5). NRC has notified licensees and applicants in Regulatory Information Summary, RIS 09-05, dated April 29, 2009, that the restoration standards listed in NUREG-1569, Section 6.1.3(4) are not consistent with those listed in 10 CFR Part 40, Appendix A. NRC requires that licensees commit to achieve the restoration standards in Criterion 5B(5). A licensee can apply for a license amendment for an ACL only after showing that restoration to the background level or MCL is not practically achievable for a particular constituent."

Therefore, EPA's belief that it is not appropriate to grant ACLs until it has proven impractical to achieve primary restoration goals (background or MCLs) is consistent with existing NRC regulations and does not form the basis for additional regulation. More specifically, 10 CFR Part 40, Appendix A, Criterion 5B(6) allows a licensee to apply for an ACL only after demonstrating

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that the constituent concentration is as low as is reasonably achievable after applying best practicable technology. Thus, the existing NRC regulations are consistent with the proposed rule for ACLs and it is unclear what if any risk will be reduced through promulgation of the proposed rule with respect to ACLs.

2-8: No technical support is provided for the statement on p. 4165 of the Background Information that "Typically, post-restoration monitoring concludes and license termination proceeds within a matter of several years after the restoration phase ends." To the contrary, NRC commonly takes years to approve groundwater restoration, after which it typically takes years to decommission the site prior to license termination. NRC has provided rigorous review for the groundwater restoration approvals at Crow Butte Mine Unit (MU) 1, Irigaray MU1-9 and Smith Ranch Wellfield A as well as the ongoing review of Christensen Ranch MU2-6 (NRC, 2003a, 2004, 2006).

3) Assertion That ISR Has Greater Potential Impacts than Conventional Mining and Milling

3-1: As justification for the proposed rule, the statement is made without supporting technical analysis that "ISR has a greater potential to directly affect groundwater than does conventional milling" (p. 4156, 1st ¶). This statement fails to acknowledge that conventional milling is accompanied by conventional mining using surface or underground mining techniques and that overall the potential environmental footprint from conventional mining and milling is greater than that for ISR. WWC requests that the proposed rule evaluate and consider the following evidence that apparently contradicts the statement that ISR has greater potential impacts than conventional milling/mining.

First is EPA's own draft technical report providing background information for the proposed rule (EPA, 2014a), which includes the following conclusion:

> "Where the ore body is amenable to use of the ISL technology, uranium can be recovered economically without the extensive surface facilities, large waste volumes, or expectations of long-term site maintenance associated with conventional milling."

Second are the following conclusions from the International Atomic Energy Agency (IAEA, 2005):

> "The advantages of ISL extraction or uranium relative to conventional mining include: …
>
> - Limited environmental impacts,
> - No waste rock,
> - No tailings,
> - No ore dust or direct ore exposure,
> - Lower consumption of water,
> - Economic recovery of lower grade ores (increases resource utilization)" (p. 11)

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> "ISL mining has been shown to have clear environmental and safety advantages when compared to conventional mining. Furthermore with proper environmental assessment and good operational practice ISL uranium projects may be developed, operated and closed with little or no safety and environmental impacts." (p. 18)

Third are the five Supplemental EISs (NRC, 2010a, 2011a, 2011d, 2014a and 2014b) tiered from the Generic EIS for In-Situ Leach Uranium Milling Facilities (NRC, 2009b), each of which compares conventional mining and milling as an alternative to ISR and each of which concludes that the potential impacts from operating a conventional mine and mill would be significantly greater than for operating an ISR facility. EPA reviewed and commented on all five draft and final Supplemental EISs and did not dispute this determination.

3-2: Also related to conventional mining and milling, the Background Information for the proposed rule repeatedly mentions water scarcity as justification for its promulgation (e.g., pp. 4164, 4171). However, this fails to acknowledge that ISR does not require the ore zone to be dewatered and thus consumes much less groundwater than if the same deposits targeted for ISR were instead mined by conventional methods.

3-3: The Background Information for the proposed rule states that ISR began in order to provide a "better return on investment than conventional mining and milling since it does not involve excavation of large volumes of ore or disposal of large volumes of byproduct material." Again, this fails to acknowledge the lower environmental footprint of ISR compared to conventional mining and milling. It is misleading to imply that the only benefit from ISR is a better return on investment.

3-4: With respect to groundwater quality, the Background Information for the proposed rule states that ISR "alter[s] large subsurface areas through injection of chemical solutions" (p. 4164). Again, this fails to acknowledge that conventional mining causes greater disturbance in the subsurface, since the ore body is dewatered (if necessary) and physically disturbed and exposed to the atmosphere.

4) <u>Impacts to State and Local Governments</u>

4-1: Section D of the Statutory and Executive Orders Review (p. 4182) asserts that "[t]he proposed rule imposes no enforceable duties on any State, local or Tribal governments or the private sector." How can this be? State regulatory programs have been developed and in place for decades. These programs include rules, regulations and guidance that would all require significant modifications in order to be consistent with the proposed rule. This is true not only for NRC Agreement States but also for states like Wyoming that regulate uranium ISR facilities

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through its primacy on Class III injection wells. While the proposal may not meet the requirements of the UMRA, it certainly imposes a significant duty on States and the private sector.

4-2: The proposed rule also fails to consider that local governments would be burdened with significant costs associated with road maintenance, maintaining adequate emergency services, etc. during the 30-year long-term stability monitoring phase, during which they would not accrue any revenues from taxes on production. This should be factored into the cost/benefit analysis.

5) Economic Impacts to the Domestic Uranium Recovery Industry

5-1: The economic analysis supporting the proposed rule (EPA, 2014b) underestimates the cost to U.S. uranium ISR producers, since it does not include the cost of maintaining financial assurance for an additional 30 years. On p. 2-29, the economic analysis improperly assumes that the magnitude of the financial assurance would decline significantly during the 30-year long-term stability monitoring phase. A decline in the financial assurance during this period could only occur as the regulatory agencies approve decommissioning activities such as plugging wells and removing pipelines and restoration equipment. However, given the proposed 90-day timeframe to initiate corrective action during the long-term stability monitoring period and the proposal to use most or all ISR wells to conduct the monitoring, very little decommissioning could occur until final regulatory approval of long-term stability monitoring. Therefore, an operator would be forced to maintain a bond potentially costing tens of millions of dollars for 30 years or more, which would represent a significant cost that is not included in the economic analysis.

5-2: The economic analysis also underestimates the probable decline in domestic uranium production. Table ES-2 in EPA (2014b) estimates that the proposed rule would cause U.S. production of uranium concentrate to decline by 362,000 to 474,000 pounds per year. This is described as up to a 5% decline in the U.S.-origin uranium supply. However, this percentage is calculated from a baseline domestic supply of 9.5 million pounds, which is twice the quantity actually produced by U.S. mines. Table 2-6 in the economic analysis shows that the amount of uranium concentrate produced by U.S. mines was 4.6 million pounds in 2013. If the projected decline in production is applied to this 2013 rate, the actual impact would be about twice as high, or up to 10% or more decline in production from U.S. mines. Moreover, since the economic analysis does not consider the added cost of financial assurance, the actual impact to the U.S. uranium mining industry likely will be much greater than that forecast in the economic analysis. This will result in greater disparity between U.S. uranium consumption and production.

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A drop in the domestic ISR uranium production rate means that either the U.S. would become even more dependent on foreign sources of uranium, or we would need to resort to conventional mining and milling, with its relatively larger environmental footprint, to make up the difference. These impacts should be considered in the proposed rule.

5-3: Similarly, page 2-18 of the economic analysis states that U.S. ISR facilities typically have produced less than 10 million pounds per year over the past 10 years. Again, this overstates the uranium ISR production rate by a factor of 2; this should read "U.S. facilities have produced less than 5 million pounds per year over the past 10 years."

5-4: The economic analysis overestimates the cost of current monitoring practices and therefore underestimates the added cost of monitoring under the proposed rule. Table 3-2 in EPA (2014b) states that current practice involves collecting preoperational background data (Phase 1) from one well per acre of wellfield. This does not reflect current ISR industry practice, which is one well per 2-4 acres of wellfield. Examples from recently issued NRC licenses for uranium ISR facilities include: (1) Moore Ranch, SUA-1596, license condition (LC) 11.3(A): one well per 3 acres; (2) Nichols Ranch, SUA-1597, LC 11.3(A): one well per 4 acres; (3) Lost Creek, SUA-1598, LC 11.3(A): one well per 4 acres; (4) Dewey-Burdock, SUA-1600, LC 11.3: one well per 4 acres; and (5) Ross, SUA-1601, LC 11.3(A): one well per 2 acres (NRC, 2010b, 2011b, 2011e, 2014c, 2014e).

Similarly, Table 3-2 in EPA (2014b) states that all extraction wells are used to assess the progress of restoration (Phase 3) monitoring. Current practice is that only a portion of the wells within the production zone are used to assess the progress of groundwater restoration and that only a select number of constituents are analyzed. For example, the Dewey-Burdock Safety Evaluation Report states that "[d]uring active aquifer restoration, each wellfield will be monitored on a frequency sufficient to determine the success of aquifer restoration, optimize the efficiency of aquifer restoration, and determine if any areas of the wellfield need additional attention … samples will be collected and analyzed for all or selected parameters, as needed" (NRC, 2014d, p. 199).

Similarly, Table 3-2 in EPA (2014b) states that all extraction wells are used during stability (Phase 4) monitoring. Current practice is that the same wells used to establish preoperational background are used to assess stability, which again is one well per every 2-4 acres of wellfield production area. For example, LC 10.6 in SUA-1601 (Ross) specifies that "[t]he sampling shall include the specified production zone aquifer wells used to define the baseline levels" (NRC, 2014e).

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Table 3-2 in EPA (2014b) also indicates that current practice involves sampling downgradient perimeter wells during Phase 3 (restoration) and Phase 4 (stability) monitoring. This is not a requirement for current ISR licenses.

Because of these inaccuracies, Table 3-2 in EPA (2014b) significantly overestimates the cost of current practices and therefore significantly underestimates the added cost of the proposed rule.

5-5: The economic analysis underestimates the cost of Phase 3 (restoration) monitoring under the proposed rule. Table 3-3 in EPA (2014b) states that only indicator parameters (e.g., chloride, alkalinity and EC) will be used to track the progress of active restoration during Phase 3 monitoring. This is inconsistent with § 192.53(c)(1) of the proposed rule, which indicates that the full suite of parameters will be required during restoration phase monitoring. This comment also applies to Table 3-4 in EPA (2014b).

5-6: The economic analysis appears to be inconsistent with the proposed rule in regard to excursion monitoring during stability (Phase 4) monitoring. Table 3-3 in EPA (2014b) indicates that excursion monitoring will occur in perimeter and overlying/underlying monitor wells during stability monitoring; however, § 192.53(d) of the proposed rule does not specify that excursion monitoring is required during stability monitoring. This comment also applies to Table 3-4 and the statement on p. 3-20 in EPA (2014b) that excursion monitoring is needed to demonstrate that conditions are stable.

5-7: The economic analysis does not consider the increased cost of the proposed requirement to conduct preoperational background monitoring for "no less than one year" regardless of seasonal variability (or lack thereof) in the groundwater. As compared to current performance-based practices of spacing samples at least 2 weeks apart, the proposed rule could require nearly one year of additional preoperational sampling for each wellfield. This has the potential to delay the start of operations by one year or more, which would increase the capital construction cost incurred by the ISR facility due to the time value of money (i.e., interest costs on money borrowed for construction of wellfield infrastructure will accrue during this period in which the mine is not in production). This added cost should be estimated in the economic analysis.

5-8: The national cost estimate in Table 3-8 of EPA (2014b) does not include the added cost for three licensed facilities that will be impacted by the proposed rule (Nichols Ranch, SUA-1597; Dewey-Burdock, SUA-1600; and Ross, SUA-1601) or other facilities in the license review process such as AUC LLC's Reno Creek ISR Project.

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5-9: The Summary of the proposed rule states that it "will reduce the risk of undetected excursions" (p. 4157). However, the EPA does not quantify the risk of undetected excursions under existing practices, nor does the economic analysis estimate the potential benefits of reducing this risk. Given that there has never been a documented off-site impact attributed to an excursion (NRC, 2001; NRC, 2009a; TCEQ, 2008), the risk and cost of an undetected excursion should be weighed against any reduction in this risk under the proposed rule. Moreover, § 192.53(b)(1) of the proposed rule merely codifies existing excursion monitoring practices conducted across the ISR industry under performance-based license conditions. No evidence is provided that the proposed rule will lessen the risk of an excursion occurring or being detected.

5-10: The economic analysis clearly indicates that the benefits of the proposed rule are uncertain. For example, Section 4.5 of EPA (2014b) states "Although the proposed rule is expected to provide substantial benefits by helping to ensure that potential groundwater contamination occurrences from ISR operations are promptly detected and addressed, it is not possible to reliably quantify the total magnitude of these benefits." The same section later states "It should not be assumed that all restored ISR wellfields will fail in the long-term." Given the rigorous regulatory oversight already provided for ISR operations by the NRC, Agreement States, the EPA UIC Program, and overlapping state mine permit requirements, it is highly improbable that any ISR wellfield will "fail" in the long-term, since the expert regulatory agency or agencies charged with protecting public health and the environment must determine that groundwater quality outside of the exempted aquifer will not be impacted prior to making the determination that groundwater restoration is successful. In such a case there would be only costs and no benefits to the proposed rule. The economic analysis should consider possibility that this rule may provide no benefits.

5-11: The Summary of the proposed rule states that "Because costs do not exceed 2% of estimated sales, and because EPA projects that fewer than 10 small businesses will be affected by the rule at any given time, EPA concluded that the proposed rule would not result in significant impacts for a substantial number of small entities" (p. 4157). However, as described previously in these comments, EPA has not estimated many of the significant costs associated with the proposed rule and has overestimated the cost of monitoring under current practices, with the result that the actual cost easily could exceed 2% of estimated sales (with the important information omitted the cost is up to 1.7% of sales). Moreover, the impacts on domestic uranium production are understated, since the baseline production rate is overestimated. On the whole, while it may be true that the proposed rule would only impact a small number of companies, these are the only companies producing uranium in this country and significant impacts to these companies will have significant impacts on the domestic supply of uranium for nuclear power.

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5-12: In addition to impacting uranium ISR companies, the economic impacts to suppliers and local economies resulting from decreased uranium production should be estimated in the economic impact analysis.

5-13: The economic analysis does not consider the cost of maintaining lease agreements with landowners for an additional 30 years.

5-14: The proposed rule also does not consider the potential impacts of restricting access to the lands occupied by ISR wellfields, access roads, and processing facilities for agricultural or other uses for an additional 30 years.

6) Applicability to Existing ISR Facilities – Proposed § 192.50

6-1: § 192.50 of the proposed rule states that "all wellfields shall comply with this subpart as of the effective date of this rule." It is not clear how a licensee would comply with the proposed rule for ISR wellfields that are already in the operation, restoration, or restoration stability monitoring phase. For instance, preoperational background water quality would have already been established for such wellfields, and those background levels may not be consistent with the requirements in § 192.53(a) of the proposed rule. It would not be possible to go back and resample background water quality for operating wellfields.

7) Definitions – Proposed § 192.51

7-1: § 192.51(g) would define "exceedance" as "An exceedance has occurred when, during stability or long-term stability monitoring, a groundwater protection standard is exceeded at any point of compliance well." This definition of an exceedance is inconsistent with EPA Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (EPA, 2009) in that it does not account for statistical evaluation or retesting. As described on page 2-2 of the EPA Unified Guidance, "An exceedance occurs when a constituent level is shown to be significantly greater than the GWPS or compliance standard" (emphasis added). Accordingly, an exceedance of a groundwater protection standard during stability or long-term stability monitoring should be defined as when a constituent level is shown to be significantly greater than the groundwater protection standard established under § 192.52(c) based on statistical evaluation. More specifically, Chapter 7 of the Unified Guidance recommends that when testing for compliance against a fixed standard, the null hypothesis (i.e., that the concentration is above the groundwater protection standard) should not be rejected "unless the entire confidence interval defined by and including the lower confidence limit exceeds the GWPS." The Economic Analysis accompanying the proposed rule (EPA, 2014b) addresses statistical significance on page ES-1 when it states that long-term stability monitoring would determine whether "the concentration

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of each monitored constituent is not increasing with time and that the concentration is not statistically different from the restoration goals" (emphasis added).

The exceedance definition also ignores verification sampling or retesting to verify that the concentration exceeds the groundwater protection standard. Again, this is inconsistent with EPA Unified Guidance, which states that "[t]he Unified Guidance therefore recommends that tolerance limits be used in conjunction with verification resampling of those wells suspected of possible contamination, in order to either verify or disconfirm the initial round of sampling and to avoid false positive results." (EPA, 2009, p. 17-16)

7-2: In the summary of the proposed rule on p. 4157, it states that "[t]he proposed rule will reduce the risk of undetected excursions of pollutants into adjacent aquifers." This definition of an excursion – the introduction of pollutants into adjacent aquifers – is inconsistent with that in proposed § 192.51(h), which defines an excursion as an event in which non-hazardous indicator parameters exceed upper control limits in overlying, underlying or perimeter monitor wells.

7-3: Regarding the proposed excursion definition in § 192.51(h), one of the important facets of excursion monitoring appears to be missing from the definition. Upon initial detection of a potential excursion, a licensee collects up to two verification samples, and the well is placed on excursion status if either of these samples shows that the excursion criterion is exceeded (see, e.g., NRC, 2014e, license condition 11.5). Retesting is an important aspect of any groundwater detection monitoring program and an excursion should not be confirmed without retesting. This is supported by EPA Unified guidance, which states: "Except for small sites with a very limited number of tests, any of the three detection monitoring options [including tolerance intervals such as UCLs] should incorporate some manner of retesting." (EPA, 2009, p. 6-4).

7-4: In the definition for "indicator parameters" in § 192.51(l), WWC suggests clarifying that these indicator parameters "provide early warning" of potential contamination. For example, NUREG-1569 (NRC, 2003b, p. 5-40) states that indicator parameters "provide early warning that leaching solutions are moving away from the well fields and that groundwater outside the monitor well ring may be threatened." Similarly, Supplement 1 to NUREG-1910 (NRC, 2010a, p. B-75) states that indicator parameters "serve as early indicators of imbalance in the wellfield flow system to notify operators to take appropriate actions."

7-5: § 192.51(bb) lists regulatory standards for restoration goals that include 40 CFR 141.62, 141.66, 141.80, 143.3, 264.94 and Table 1 to subpart A of Part 192. Why are the 40 CFR 141.62 maximum contaminant levels for inorganic contaminants (drinking water standards) applied within an aquifer that has been permanently exempted from protection as a drinking water supply?

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7-6: Also related to § 192.51(bb), why would restoration standards include lead and copper action levels in 40 CFR 141.80? These are action levels that apply to control of lead and copper in public water supplies. The 0.015 mg/L action level for lead specified in 40 CFR 141.80 is not a maximum contaminant level but an action level for public water systems to control the corrosiveness of water, particularly with respect to piping and plumbing systems. No explanation is provided why an action level for water corrosiveness in public water supply piping or plumbing systems is applicable to groundwater protection generally or ISR facilities specifically. Therefore, it is recommended that the reference to 40 CFR 141.80 be removed from the proposed rule.

8) Standards – Proposed § 192.52

8-1: Proposed § 192.52(a) states that "all operating wellfields … shall comply with § 192.52(c) of this subpart as of the effective date of this rule." Please refer to comment #6-1. How would a currently operating wellfield comply with the rule when background has already been established and that background determination may not have followed the same methodology specified in § 192.53?

8-2: Proposed § 192.52(b)(1) states that "[s]urface impoundments associated with ISR activities shall conform to the standards of § 192.32 of this part." WWC suggests clarifying this to acknowledge that there are surface impoundments associated with ISR facilities that do not store byproduct material and therefore should not be subject to § 192.32. An example is a sediment pond used to capture stormwater runoff and sediment from areas subject to surface disturbance. WWC suggests changing this section to clarify that standards in § 192.32 would apply to surface impoundments containing uranium byproduct materials.

8-3: Proposed § 192.52(c)(1) lists 40 CFR 141.61 among the standards that would be used to establish restoration goals. WWC suggests omitting 40 CFR 141.61, Maximum Contaminant Levels for Organic Contaminants, since there are no organic contaminants among the 13 listed constituents in Table 1 to subpart F of the proposed rule. The inclusion of 40 CFR 141.61 also is inconsistent with the definition of "restoration goal" in proposed § 192.51(bb), which does not list 40 CFR 141.61. This comment also applies to Table 1 to Subpart F, which also states that the restoration goal includes 40 CFR 141.61.

9) Preoperational Background Water Quality – Proposed § 192.53(a)

9-1: Proposed § 192.53(a)(4)(i) states that "[t]he monitoring effort shall be of sufficient duration of no less than one year and of sufficient scope to adequately characterize temporal and seasonal variations in groundwater, and to account for impacts of well installation and development on

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background concentrations …" However, no technical support is provided for the proposed preoperational sampling duration of "no less than one year." In the Background Information on p. 4174, the need to address potential seasonal variation in shallow aquifers is discussed, but there is not a technical discussion of the potential seasonal variation (or lack thereof) in deeper aquifers in which uranium production typically takes place. The current NRC guidance for preoperational monitoring in NUREG-1569 Acceptance Criterion 2.7.3(4) is a performance-based guideline which indicates that "[a]t least four sets of samples, spaced sufficiently in time to indicate seasonal variability, should be collected" (NRC, 2003b). During pre-license, site characterization monitoring, which must be conducted for at least one year according to 10 CFR Part 40, Appendix A, Criterion 7, the license applicant samples the production zone, overlying and underlying aquifers and is able to use this information to determine potential seasonal variability. Not surprisingly, no seasonal variability typically is found in any but surficial aquifers. See, e.g., the Safety Evaluation Report for the Strata Energy, Inc. Ross ISR Project (NRC, 2014f, p. 270): "At the Ross Project, the DM [underlying], OZ [production zone] and SM [overlying] aquifers are under confining conditions and, based on results of the pre-operational monitoring program, exhibit no season variations." WWC suggests changing the language in § 192.53(a)(4)(i) to allow the regulatory agency to decide what preoperational monitoring frequency is adequate to address potential seasonal variability.

9-2: As potential justification for the proposed preoperational sampling duration for each wellfield of "no less than one year," the Background Information on p. 4174 references the NRC regulation at 10 CFR Part 40, Appendix A, Criterion 7, which requires that "[a]t least one full year prior to any major site construction, a preoperational monitoring program must be conducted to provide complete baseline data on a milling site and its environs." However, this fails to acknowledge that NRC staff determines compliance with this Criterion 7 requirement based on the pre-license, site characterization monitoring that must be conducted for at least one year prior to license issuance and prior to "any major site construction." On the other hand, background information needed to set restoration goals for each ISR wellfield are addressed in 10 CFR Part 40, Appendix A, Criteria 5B(5) and 7A, neither of which require one year of monitoring. This was summarized in a recent decision upholding Strata Energy Inc.'s Ross ISR Project license: "the applicant's 10 C.F. R. Part 40, Appendix A, Criterion 7 pre-licensing monitoring program for the purpose of site characterization was not required to be conducted so as to provide the information needed to set Appendix A, Criterion 5B groundwater protection standards, in accord with an Appendix A, Criterion 7A pre-operational license condition-based monitoring program" (NRC, 2015, pp. 111-112).

9-3: Proposed § 192.53(a)(4)(i) states that preoperational monitoring must "account for impacts of well installation and development on background concentrations of constituents and indicator parameters, where applicable." However, no technical support is provided for the assertion of

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"impacts of well installation and development on background concentrations of constituents." This issue is briefly discussed in the Background Information on p. 4174, which provides no citation for the assertion that "[t]he physical act of penetration the aquifer to install the well can cause localized changes in constituent concentrations or chemical parameters, which can lead to a misleading picture of background conditions … [which] can, in turn, result in selection of artificially high restoration goals."

Although not referenced in this context in the proposed rule, Section 5 of the draft technical report supporting the proposed rule (EPA, 2014a) references information from another opponent of uranium ISR, the Sass 2011 report, to conclude that "initial samples were not indicative of geochemical equilibrium" at the Uranium Energy Corporation Goliad Uranium Project (p. 95 of EPA, 2014a). However, there is abundant evidence from site characterization monitoring at ISR facilities recently licensed by NRC that industry standard drilling and well development techniques do not result in significant or prolonged changes in constituent concentrations. For example, the Atomic Safety and Licensing Board Panel recently concluded in its initial decision regarding the Strata Energy Inc. Ross ISR Project that the impact from mud rotary drilling and the associated use of air lift development are "likely to be both very local and very quickly dissipated by dilution or precipitation of uranium as the water moves back into a reducing environment." (NRC, 2015, p. 43)

9-4: Proposed §§ 192.53(a)(3) and 192.53(a)(4)(ii)(B) would require the licensee to establish background water quality for the immediately overlying and underlying aquifers, without consideration of site-specific hydrogeologic conditions. In some situations, the regulatory agency has determined that this is not necessary (e.g., if there is not an overlying or underlying aquifer or due to the presence of a regional confining unit). For example, at Powertech (USA) Inc.'s Dewey-Burdock Project, the production zone aquifers are underlain by the Morrison Formation, which is a regionally extensive confining unit 60 to 140 feet thick. Based on the thickness and continuity of this confining unit and the upward hydraulic gradient between the underlying, minor aquifer and the production zone aquifer, the regulatory agency (NRC) concluded that monitoring in the underlying aquifer will not be necessary (NRC, 2014d, p. 46). WWC suggests modifying the language in §§ 192.53(a)(3) and 192.53(a)(4)(ii)(B) to allow the regulatory agency to determine when it is appropriate to monitor immediately overlying and underlying aquifers. This would be consistent with § 192.53(b)(1), which indicates that the regulatory agency will determine the vertical excursion monitoring wells that are to be used during operational phase monitoring.

9-5: No technical basis could be found for the proposed requirement in §§ 192.53(a)(3) and 192.53(a)(4)(ii)(E) to conduct preoperational monitoring and establish point of compliance wells outside of the exempted aquifer, including areas both upgradient and downgradient of the

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production zone. Justification on p. 4174 is provided for establishing preoperational background water quality for the downgradient portion of the exempted aquifer, since such data would be needed for geochemical modeling. Upgradient monitoring within the exempted aquifer may be needed (although it does not appear to be discussed) to determine whether natural temporal variation should be accounted for during the long-term stability monitoring period. However, no technical justification could be found for the proposed requirement to establish point of compliance wells outside of the exempted aquifer, nor are any details provided to indicate how many wells might be needed or how long they would serve as compliance monitor wells. WWC suggests providing technical justification or omitting the proposed monitoring requirements outside of the exempted aquifer from §§ 192.53(a)(3) and 192.53(a)(4)(ii)(E).

9-6: Proposed § 192.53(a)(4)(iii) states that "[a]s determined by the licensee and approved by the regulatory agency, background concentration limits may be representative of individual wells, multiple wells, or all wells within the proposed production zone." The proposed rule does not make it clear how many wells within the production zone must be used to determine background. In proposed § 192.53(a)(1), it states that it should be a "sufficient number of wells, at appropriate locations and depths," which indicates a performance-based approach that would allow the licensee to propose, and the regulatory agency to review and approve, the number and locations of wells. On the other hand, proposed § 192.53(a)(4)(iii) may be interpreted such that "all wells within the proposed production zone" must be sampled. Similarly, p. 4179 states that "we are proposing that each well within the wellfield be considered for use as a point of compliance." Current industry practice is to sample wells in the production zone (typically future extraction wells) on a spacing of one well for every 2 to 4 acres of wellfield area. If the intent of the proposed rule is to allow the regulatory agency to determine how many wells, at appropriate depths and locations, are needed to establish background groundwater quality within each wellfield, this should be made clear (e.g., by modifying § 192.53(a)(1) to make it clear that the regulatory agency will approve the number or density of wells used to measure preoperational conditions). On the other hand, if it is EPA's intent that every single injection and extraction well should be sampled, the proposed rule appears to lack technical justification to show why the current industry practice of selecting one well for every 2 to 4 acres of wellfield area is inadequate.

9-7: In the Executive Summary and Background Information for the proposed rule, the requirement for uranium analysis is listed as "uranium (total)" (e.g., p. 4157, ¶3; p. 4170, 1st full ¶). This may be misconstrued as the total versus dissolved fraction of uranium as opposed to combined uranium-234, 235 and 238, which is apparently what is intended based on Table 1 to Subpart F of the proposed rule. WWC suggests clarifying this throughout the proposed rule.

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10) Operational Phase Monitoring – Proposed § 192.53(b)

10-1: Proposed § 192.53(b)(2) states that "[i]f an excursion is detected, as determined by the regulatory agency and as evidenced by indicator parameters exceeding established upper control limits …" WWC suggests referencing the excursion definition in § 192.51(h) rather than the more general condition of "indicator parameters exceeding established upper control limits." Otherwise this could be interpreted as a conflicting definition of an excursion with that under § 192.51(h) (i.e., under 192.51(h), an excursion would not occur unless two indicator parameters exceed UCLs, while § 192.53(b)(2) seems to indicate that any one measurement above a UCL would constitute an excursion). This comment also applies to the same language under proposed § 192.53(c)(3).

10-2: Proposed § 192.53(b)(2) also states that "all constituents listed in Table 1 of this subpart shall be monitored as part of the corrective action program" in the event an excursion is detected. As described in comment #7-3, an excursion should not be confirmed without some level of retesting, which is consistent with EPA Unified Guidance. Further, no technical justification is provided for requiring the licensee to monitor an extensive list of constituents immediately following confirmation of an excursion. Typically such monitoring would not commence unless an excursion persists for an extended period of time (e.g., 60 days), since most excursions are corrected quickly through increasing the bleed or rebalancing the wellfield. This is described in NRC, 2009a:

> "With regard to the migration of production liquids toward the surrounding aquifer, each licensee must define and monitor a set of nonhazardous parameters to identify any unintended movement toward the surrounding aquifer. Exceedances of those parameters result in an event termed an excursion; excursion events are not necessarily environmental impacts but just indicators of the unintended movement of production fluids. The data show over 60 events had occurred at the 3 facilities. For most of those events, the licensees were able to control and reverse them through pumping and extraction at nearby wells. Most excursions were short-lived, although a few of them continued for several years. None had resulted in environmental impacts."

11) Restoration Phase Monitoring – Proposed § 192.53(c)

11-1: Proposed § 192.53(c)(1) states that "[a]ll constituents listed in Table 1 of this subpart and otherwise specified by the regulatory agency shall be monitored during active restoration …" However, several of the parameters in Table 1 to Subpart F are not commonly found above laboratory detection limits in the ISR production zone prior to operations, during operations, or during restoration. Examples include mercury and silver. WWC suggests allowing the regulatory agency to determine which parameters should be included in the monitoring conducted during

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active groundwater restoration in order to avoid the unnecessary expense of repeatedly sampling for constituents that remain below detection limits.

12) Stability Phase Monitoring – Proposed § 192.53(d)

12-1: Proposed § 192.53(d)(1) would require all constituents in Table 1 to Subpart F to be monitored during stability phase monitoring. Please refer to comment #11-1. Again, the regulatory agency should have the discretion to select the constituents required during stability phase monitoring; not all constituents in Table 1 of Subpart F are likely to be present at detectable concentrations. This becomes particularly problematic in trying to determine whether a statistically significant increasing trend occurs. If all previous measurements were below the detection limit, would the double quantification rule or similar be used to determine whether a statistically significant increasing trend has occurred (i.e., two consecutive sample and resample measurements at or above detection limit) as specified in EPA Unified Guidance (EPA, 2009, p. 6-11)? This could lead to a significant number of false positives due to the inferior statistical tests available for data sets with a majority of non-detect values.

12-2: Proposed § 192.53(d)(2) indicates that stability shall be demonstrated based on "field measurements." This ambiguous language may imply that measurements are to be performed using field instruments rather than in a laboratory. This comment also applies to the same language in proposed § 192.53(e)(1).

12-3: Proposed § 192.53(d)(2)(i) states that "[s]tability shall be demonstrated for three consecutive years at a 95 percent confidence interval, measured from the time at which sufficient data to determine statistical significance has been collected, and based on sampling no less frequently than quarterly." The time interval seems to suggest that a licensee would need to collect sufficient data to determine statistical significance (this may require 4 or more quarterly samples), then collect an additional 3 years of data. Stability should be demonstrated from the time at which restoration standards are achieved.

12-4: Also regarding proposed § 192.53(d)(2)(i), the requirement to demonstrate stability at a 95 percent confidence interval is unclear and contrary to standard statistical tests for increasing trends. It should read to demonstrate no statistically significant increasing trends at a 95 percent confidence interval.

12-5: Also regarding proposed § 192.53(d)(2)(i), what is the technical justification for the proposed 3-year stability phase monitoring duration?

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12-6: Also regarding proposed § 192.53(d)(2)(i), in the Summary and Background Information for the proposed rule, EPA repeatedly states that stability monitoring only occurs "for a short period of time" – as short as 6 months – under existing regulations. This fails to acknowledge the performance-based standard in recently issued ISR licenses that requires stability monitoring to continue for a sufficient period of time such that the regulatory agency is assured that no statistically significant increasing trends are occurring. Examples include the following:

- For the Moore Ranch ISR Project (SUA-1596, issued September 2010), stability monitoring is required for a minimum of 12 months, and the licensee must demonstrate aquifer stability based on evaluation of potential trends. If increasing trends are confirmed, an evaluation of the cause must be conducted and corrective actions taken (NRC, 2010c, p. 134)
- For the Nichols Ranch ISR Project (SUA-1597, issued July 2011), stability monitoring must occur until four consecutive quarters of data indicate that there are not any statistically significant increasing trends in constituent concentrations (NRC, 2011c, p. 167).
- For the Lost Creek ISR Project (SUA-1598, issued August 2011), stability monitoring must include a minimum of seven quarters of quarterly sampling followed by statistical analysis for potential temporal trends. If an increasing concentration trend is confirmed, then the licensee will be required to take additional action such as resuming active restoration or extending the stability monitoring period. (NRC, 2011f, p. 206)
- For the Dewey-Burdock ISR Project (SUA-1600, issued April 2014), stability monitoring must continue until the data show that the most recent four consecutive quarters indicate no statistically significant increasing trend (NRC, 2014c, license condition 10.6).
- For the Ross ISR Project (SUA-1601, issued April 2014), stability monitoring shall be conducted for at least 12 months and will continue until the data show no statistically significant increasing trend (NRC, 2014e, license condition 10.6).

Based on these examples, it is inaccurate to state that stability monitoring only occurs "for a short period of time" or merely as a fixed 6- to 12-month interval. In all cases cited, the licensee must continue stability monitoring for a minimum of 1 year and until no statistically significant trend is observed.

12-7: Proposed § 192.53(d)(2)(ii) states that "[i]ndividual wells within the production zone can be the point of compliance for the purpose of assessing stability." This language is ambiguous and inconsistent with proposed § 192.53(a)(4)(iii), which allows background to be established for individual wells, multiple wells, or all wells within the proposed production zone. If background is established for multiple wells or all wells within the production zone, it would be inconsistent to assess stability for individual wells. The licensee should have the same flexibility as in § 192.53(a)(4)(iii), and the regulatory agency should decide what is appropriate.

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12-8: With respect to protecting groundwater quality outside of the exempted aquifer, which should be the ultimate goal of groundwater restoration and stability monitoring, stability should assessed for the entire production zone and not on a well-by-well basis due to the heterogeneity in the production zone and overall goal of protecting downgradient groundwater quality. No risk analysis has been performed for the potential impacts from a single well inside the aquifer exemption boundary.

12-9: Proposed § 192.53(d)(3) states that "[i]f an exceedance occurs, as determined by the regulatory agency and as evidenced by exceeding groundwater protection standards in § 192.52(c) at point of compliance wells …" This definition of exceedance is inconsistent with that for an excursion during ISR operations and generally inconsistent with EPA Unified Guidance (EPA, 2009). As written, an exceedance could be interpreted as one measurement of one constituent above the background level or MCL established for that constituent. WWC suggests revising this definition to account for statistical significance and retesting. A suggested definition for exceedance that would be consistent with EPA Unified Guidance is: "if an exceedance occurs, as determined by sampling results (including verification sampling) which indicate that the concentration exceeds the § 192.52(c) standard for that constituent at a 95% confidence level …"

13) Long-Term Stability Phase Monitoring – Proposed § 192.53(e)

13-1: Proposed § 192.53(e)(1)(ii) states that "[s]pecific individual wells within the production zone and approved by the regulatory agency shall be the points of compliance for the purpose of assessing stability and groundwater protection compliance." Please refer to comment #12-8; long-term stability should be assessed for the entire production zone and not on a well-by-well basis due to the heterogeneity in the production zone and overall goal of protecting downgradient water quality. Further, if a licensee establishes compliance limits for the entire production zone as allowed under proposed § 192.53(a)(4)(iii), it would be inconsistent to evaluate long-term stability for individual wells. It would be more meaningful to establish sentry wells downgradient of the production zone but within the aquifer exemption boundary to establish the potential long-term risk to downgradient users.

13-2: Proposed § 192.53(e)(1)(iii) states that "[l]ong-term stability monitoring shall be conducted for a period of 30 years" unless the regulatory agency shortens the long-term stability monitoring period based on geochemical modeling. Beyond simply referencing RCRA standards, no technical support is provided for the proposed 30-year duration. Due to the site-specific nature of groundwater geochemistry at ISR facilities and groundwater restoration methods, a performance-based standard similar to that in all recently issued ISR licenses (i.e., demonstrating stability over four or more consecutive quarters of data) is recommended instead of a fixed time interval, which may or may not account for site-specific conditions.

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13-3: Refer to comment #5-1. The economic analysis supporting the proposed rule (EPA, 2014b) underestimates the cost to U.S. uranium ISR producers, since it does not include the cost of maintaining financial assurance for an additional 30 years during the proposed long-term stability monitoring period.

13-4: Proposed § 192.53(e)(2) states that "one or more monitored groundwater constituents in a point of compliance well" exceeding a groundwater protection standard will require corrective action and reporting. One constituent exceeding the compliance limit in one sample from one well would not indicate with statistical significance that the groundwater protection standard has been exceeded for the production zone. Retesting should be incorporated through verification sampling, and the standard should be statistical significance that the entire production zone exceeds the compliance limit or has a statistically significant increasing trend that would threaten downgradient groundwater quality.

13-5: Also regarding proposed § 192.53(e)(2), no provision is made to account for the possibility that natural variability in the background concentration could occur over 30 years that would cause an increasing trend. For this reason the proposed rule should account for natural variability and allow the licensee the flexibility to update the background water quality if justified by natural variability (e.g., in upgradient wells).

13-6: Proposed § 192.53(e)(2) also states that all the Table 1 constituents must be monitored as part of corrective action. This implies that not all Table 1 constituents need to be monitored as part of long-term stability phase monitoring. If this is the case, § 192.53(e)(1) should be modified to indicate that the regulatory agency will approve the specific parameters to be included in long-term stability phase monitoring. This approach is recommended due to the unnecessary cost of analyzing 30 years' of samples for parameters that are either consistently below detection limits or that do not present a potential risk to downgradient water users.

14) Corrective Action Program – Proposed § 192.54

14-1: Proposed § 192.54(a) states that "[a] corrective action program shall be developed by the licensee and approved by the regulatory agency at each ISR site at the time of licensing." It is unclear how this requirement would apply to existing licensees. Also, the need for this regulation is unclear given that NRC guidance in NUREG-1569 indicates that an excursion corrective program should be included in all license applications (NRC, 2003b) and most or all recently issued NRC licenses include corrective action requirements for excursion monitoring as license conditions, meaning that the corrective actions must be in place prior to operations. Examples include: 1) Moore Ranch, SUA-1596, LC 11.5; (2) Nichols Ranch, SUA-1597, LC 11.5; (3)

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Lost Creek, SUA-1598, LC 11.5; (4) Dewey-Burdock, SUA-1600, LC 11.5; and (5) Ross, SUA-1601, LC 11.5 (NRC, 2010b, 2011b, 2011e, 2014c, 2014e).

14-2: Proposed § 192.54(a) describes "minor to catastrophic" excursion and exceedance scenarios. However, no explanation is provided for what is meant by a "catastrophic" excursion or exceedance scenario. Since the monitoring would occur within an aquifer that has been permanently exempted from protection as a drinking water supply, how could the results of such monitoring show a catastrophic impact? If there has never been a documented off-site impact to groundwater quality from a uranium ISR facility, what is the basis for regulation addressing "catastrophic" impacts?

14-3: Proposed § 192.54(a) states that corrective action is required for any exceedance during the stability or long-term stability phase. However, again, the definition of an exceedance during stability or long-term stability monitoring has not been clearly defined. It should not be construed as one constituent in one well exceeding the compliance limit established for the entire production zone. It should be defined as the entire production zone demonstrating a statistically significant increasing trend or water quality (at a specified confidence interval) that exceeds the groundwater protection standard.

14-4: Proposed § 192.54(a) states that the objective of the corrective action program will be to return "constituent concentration levels in groundwater to the restoration goals within the production zone and the maximum contaminant level in adjacent aquifers." This language is ambiguous, since the goal of correcting an excursion would be return groundwater to within the upper control limits established for that monitor well and not to an MCL.

14-5: Proposed § 192.54(a) states that the corrective action program shall be implemented no later than 90 days after an exceedance is detected during the stability or long-term stability phase. Given that long-term stability monitoring will occur for 30 years under the proposed rule (unless shortened by geochemical modeling) and that the typical natural groundwater velocity at uranium ISR facilities is on the order of 5-10 feet per year, it would be justifiable to allow a longer time period to implement a corrective action program during the long-term stability monitoring phase. This could allow a licensee to drill additional wells if needed for a pump and treat system, restart or remobilize processing equipment needed to treat the groundwater recovered from the wellfield, etc., all without risk that the groundwater would move further than 10-20 feet if implemented within 2 years. The Background Information on p. 4165 actually acknowledges the low natural groundwater velocity in stating that "given the slow groundwater travel times in these deposits, it would take even longer time for the degraded water to make its way to water supply wells downgradient of the production zone aquifer and be detected there." On the basis of low natural groundwater velocity and given that the groundwater would be

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required to meet restoration goals prior to entering long-term stability monitoring, at least 2 years should be allowed to implement corrective action during this phase.

14-6: Proposed § 192.54(a)(1) states that the corrective action program shall address removing constituents at the point of compliance or treating them in place. Regarding the long-term stability monitoring phase, a license applicant could only generally address corrective actions to remove constituents or treat them in place, since it wouldn't be known what constituents could potentially exceed the compliance limit within the production zone until after groundwater restoration is complete. Therefore, it is unclear how this information could be specified at the time of licensing as would be required by proposed § 192.54(a).

14-7: Proposed § 192.54(a)(2) states that the corrective action program shall address removing or treating in place any constituents that exceed groundwater protection standards between the point of compliance and the point of exposure. If the point of exposure is the aquifer exemption boundary as stated in proposed § 192.51(x), how can long-term stability compliance be assessed on an individual well basis within the production zone (e.g., § 192.53(e)(1)(ii))? The corrective action program should be able to account for potential natural attenuation between the production zone and the aquifer exemption boundary (point of exposure).

14-8: Proposed § 192.54(b) states that the licensee shall continue corrective action measures to the extent necessary to achieve and maintain compliance with the groundwater protection standards in § 192.52(c). However, it is not clear how this applies to corrective actions for excursions (which are also subject to the requirements of proposed § 192.54), since the standards in § 192.52(c) are listed as "restoration goals" and not groundwater protection standards for excursion monitoring wells, which are the UCLs.

14-9: Proposed § 192.54(c) states that after the corrective action program has been terminated, the licensee must establish and implement a groundwater monitoring program to demonstrate the effectiveness of the corrective action program and that the monitoring program shall continue for no less than 3 years. As written, this appears to require monitoring for 3 years following an operational excursion. This does not seem to be the intent of this section, since it references § 192.53(d) [stability phase monitoring] and § 192.53(e) [long-term stability phase monitoring]. This should be clarified. If the intent is in fact to require 3 years of monitoring after any operational excursion, additional justification should be provided as to the need for such monitoring, given that there has never been a documented off-site impact attributed to an excursion and that most operational excursions are corrected quickly simply by adjusting the wellfield balance. Refer to comment #10-2.

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15) Effective Date – Proposed § 192.55

15-1: It is not clear how the proposed rule, which would become effective 60 days after the date of publication of the final rule, would provide State programs with sufficient time to update and modify the extensive sets of rules, regulations and guidance that would be affected by the proposed rule. This same comment applies to NRC regulations and guidance documents.

16) Other Comments

16-1: No technical support is provided for the following assertion on p. 4165:

> "Originally, uranium was precipitated from groundwater moving through pore spaces in the host medium, which altered the flow paths on a local level throughout the deposit as the deposition of uranium continued and changed the porosity and permeability of the host medium. Once uranium extraction processes begin, fluids are pumped into the deposit to mobilize the precipitated uranium and remove it; the porosity and permeability of the host rock are also affected."

EPA must provide a strong technical basis for its decision making, and this is one of the many instances where technical support is absent in the proposed rule.

16-2: Similarly, no technical support is provided for the following assertion on p. 4165 (emphasis added):

> "These changes in hydrologic properties in the host rock during extraction and restoration processes can have the net effect of altering flow paths within the deposit on a local level. Such largely unavoidable, incomplete restoration efforts may result in pockets of slowly leaching contaminants that may migrate out of the production zone over time."

16-3: The statement on p. 4175 of the Background Information that "chloride is often incorporated into the lixiviant as a tracer" is not accurate. Chloride is introduced through the ion exchange process.

16-4: The last sentence on p. 4165, states "These assessments [referring to the EPA groundwater modeling studies] suggest that a robust regulatory approach is advisable in order to prevent various failure scenarios that may occur during and after ISR operations …" The statement implies that the regulatory approach currently used to prevent failure scenarios is not robust. In light of the extensive and often overlapping existing regulation of uranium ISR facilities by NRC, Agreement States, State UIC programs, EPA, and other regulatory agencies, additional explanation should be provided as to what aspects of the existing regulations and performance-

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based license conditions are inadequate to "prevent failure scenarios." WWC suggests that the EPA consider the robust regulations already in place by NRC and other agencies before implementing duplicative regulations.

16-5: Also with respect to the EPA groundwater modeling studies (EPA, 2012), the groundwater modeling scenarios focus on wellfield failures that may potentially occur during operations (i.e., Section 2.6.1 describes spills and leaks and Section 2.6.2 describes excursion scenarios during operations). In the event that any of these scenarios occurred during active ISR operations, the licensee would be required by the conditions of its license to make corrective actions to control the spill, leak or excursion. This report does not include any model simulations of potential failures after restoration of the ISR wellfields (i.e., during the stability monitoring or long-term stability monitoring phases). Therefore, the EPA groundwater modeling studies report does not provide support for additional regulation regarding stability monitoring or long-term stability monitoring.

16-6: Also with respect to the EPA groundwater modeling studies (EPA, 2012), the hypothetical contaminant concentration modeling performed is overly simplistic in nature and ignores the variable geochemical conditions that would occur within and downgradient from the wellfields. For example, outside of the production zone, naturally reducing conditions of the aquifer will not have been altered by the injection of lixiviant, and the uranium concentration would be reduced through natural attenuation processes including adsorption and reduction. Estimating dispersion but not adsorption in the modeling scenarios results in unreasonably high estimates of downgradient concentrations of the constituents most likely to be affected by adsorption, including uranium and radium. For example, it was recently reported based on tracer studies at a Wyoming ISR facility that the downgradient concentration of uranium at that site is greatly delayed and greatly reduced by adsorption and much more so than dispersion. Whereas dispersion accounted for a 3 to 5-fold decrease in the modeled uranium concentration at a fixed downgradient location, adsorption accounted for at least an order of magnitude or greater decrease at the same distance according to the calibrated modeling results (Reimus, 2015). Further, in NUREG-1569, the NRC does not recommend using uranium as an excursion indicator, since "it may be retarded by reducing conditions in the aquifer" (NRC, 2003b, p. 5-41). The simplistic modeling described in the draft groundwater model report should not be used to make final decisions on dose/risk assessments considering that it does not make any attempt to estimate the impact of natural attenuation by adsorption or chemical reduction.

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