

October 13, 2026

Subject: Breakthrough Institute Comment on In Situ Recovery Monitoring and Decommissioning Timeliness [Docket ID NRC-2025-1204; RIN 3150-AI48].

The Breakthrough Institute (BTI) appreciates the opportunity to comment on the Nuclear Regulatory Commission's (NRC) proposed rule, *In Situ Recovery Monitoring and Decommissioning Timeliness*.¹ BTI is an independent 501(c)(3) research organization that advocates for appropriate regulation and oversight of nuclear reactors and radioactive materials to enable the new and continued use of safe and clean nuclear energy. BTI acts in the public interest and does not receive funding from industry.

The NRC's ongoing revision of its regulatory framework under Executive Order 14300 presents an opportunity to improve regulatory clarity, consistency, and efficiency while maintaining adequate protection of public health and safety. BTI has engaged extensively in this effort, providing comments on proposed changes to the NRC's radiation protection framework, the implementation of the National Environmental Policy Act (NEPA), and other regulations.²

BTI broadly supports the proposed rule's two principal objectives. Establishing groundwater protection requirements tailored to uranium in situ recovery (ISR) operations would address a longstanding gap in regulations developed primarily for conventional uranium milling, reducing reliance on site-specific license conditions with a more consistent and predictable regulatory framework. Similarly, revising decommissioning timeliness requirements would give licensees greater flexibility to manage periods of inactivity and pursue alternative decommissioning schedules where doing so does not compromise safety.

Achieving these objectives requires that the final rule clearly distinguish between requirements that codify existing regulatory practice and those that substantively change applicable standards.

¹ Nuclear Regulatory Commission, *In Situ Recovery Monitoring and Decommissioning Timeliness*, Proposed Rule, 91 Fed. Reg. 57728 (Sept. 10, 2026) (Docket ID NRC-2025-1204; RIN 3150-AI48) (hereinafter Proposed Rule).

² PJ Seel and Adam Stein, The Breakthrough Institute, *Comment on Reforming and Modernizing the NRC's Radiation Protection Framework*, Comment ID NRC-2025-1140-2078, Aug. 31, 2026 (hereinafter RP Framework Comment); Spencer Toohill et al., The Breakthrough Institute, *Comment on Implementation of the National Environmental Policy Act*, Docket ID NRC-2025-0478, Aug. 21, 2026 (hereinafter NEPA Comment); Deric Tilson and Spencer Toohill, The Breakthrough Institute, *Comment on Modernizing Materials Licensing*, Docket ID NRC-2025-1370, Aug. 10, 2026; PJ Seel, The Breakthrough Institute, *Comment on Reducing Barriers to Medical Use Licensing*, Docket ID NRC-2025-1237, Sept. 10, 2026.

It also requires clear, performance-based criteria for groundwater restoration, monitoring, and decommissioning extensions, with sufficient flexibility to account for site-specific circumstances. BTT's recommendations focus on these issues, as well as the relationship between the proposed requirements, implementing guidance, and related rulemakings.

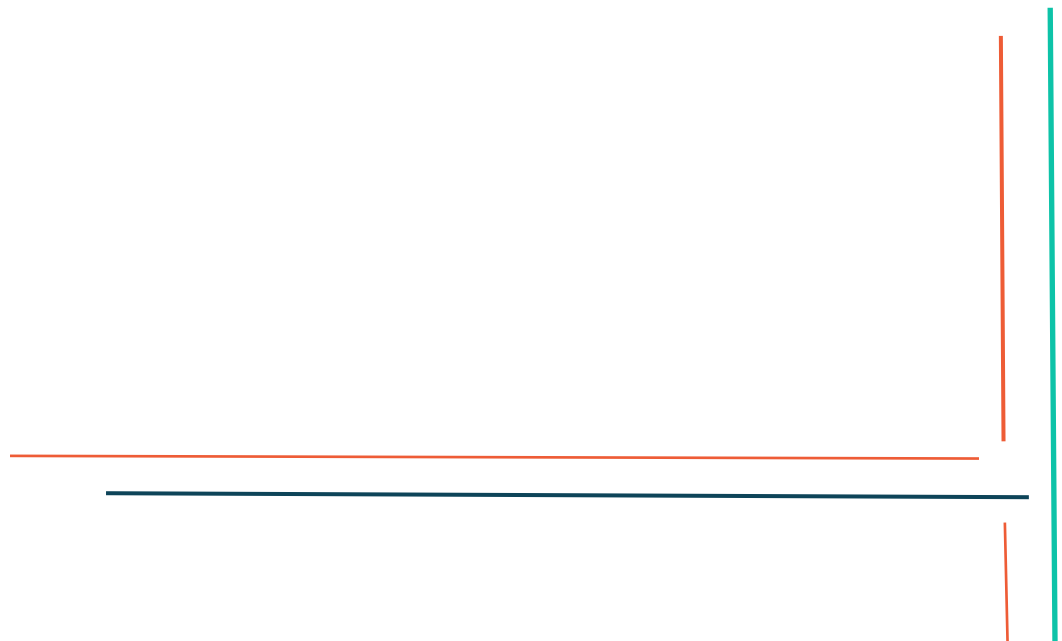
I. SUMMARY OF RECOMMENDATIONS

1. **Clearly identify where the rule changes existing standards.** Acknowledge that the revised Criterion 5C changes certain groundwater concentration limits, work with EPA to establish a coherent set of groundwater limits and alternate concentration limit (ACL) criteria on a shared technical basis, explain how later changes to incorporated EPA standards would affect previously approved limits, address the categorical-exclusion basis accordingly, and clarify the scope of the revised byproduct material definition.
2. **Reconsider the proposed Agreement State compatibility designations.** Explain why Criteria 5 and 6 require Category B treatment under the Atomic Energy Act, or retain Category C, and define the boundary between those requirements and the Category C provisions in Criterion 14.
3. **Establish a predictable framework for groundwater restoration and ACLs.** Replace the guidance's "lowest possible" expectation with the rule's practicability standard, define how a licensee demonstrates that further restoration is not practicable, apply Criterion 5B(6) consistently with the Part 192-based practicability standard, establish a clear individual-dose hazard criterion and de minimis lower bound for radiological constituents, and explain how the Part 192 distance and site-boundary condition applies at ISR facilities.
4. **Align Criterion 14's monitoring and response provisions with their protective purpose.** Control site-wide false positives in post-restoration testing, account for temporal variability in background conditions, distinguish confirmed excursions from hazardous-constituent exceedances, clarify responses to interruptions in hydraulic control, and reconcile inconsistencies between the rule and draft guidance.
5. **Streamline reporting without reducing oversight.** Use consistent notification deadlines for reportable events and allow routine monitoring data to be maintained onsite for

inspection where periodic summary reporting provides sufficient programmatic oversight.

6. **Provide clear standards for decommissioning flexibility.** Retain an express approval standard for materials decommissioning extensions, preserve separate criteria for alternate decommissioning-plan schedules, use consistent safety findings across reactor provisions, clarify how inactivity periods apply to idle ISR wellfields, and distinguish extension-request cost information from financial assurance obligations, including when an extension requires an assurance update.
7. **Strengthen the regulatory analysis.** Reconcile inconsistent cost and savings estimates, identify the level of future ISR activity needed for quantified benefits to exceed implementation costs, and account for uncertainty in new wellfields, production units, and monitoring-well density.
8. **Coordinate the final rule with related regulatory frameworks.** Reconcile this rule's Appendix A amendments with the Radiation Protection (RP) Framework Proposed Rule, address the Part 57 and NEPA dependencies identified in Section IX, and document the outcome of NRC-EPA coordination on post-restoration monitoring.
9. **Correct the identified technical and drafting errors before publication.** Fix erroneous cross-references, docket and accession numbers, inconsistent sampling descriptions, and internal guidance citations.

This comment responds to ISR Specific Requests for Comment 1 through 5, Inactivity Period Request #1, Decommissioning Extension Requests #2 and #3, the request for comment on compatibility categories, and the cumulative effects of regulation question concerning the regulatory analysis.



II. STANDARDS AND DEFINITIONS

Changes to Criterion 5C Concentration Limits (ISR Specific Request for Comment #3)

BTI supports updating the groundwater protection standards in Criterion 5C of Appendix A to 10 CFR Part 40, but the update should rest on a common basis developed with EPA rather than a cross-reference to drinking water standards developed for other purposes. By replacing the current Criterion 5C table with cross-references to the EPA's maximum contaminant levels (MCLs) in 40 CFR Part 141 and the maximum concentrations in 40 CFR 264.94, the proposed rule would change the applicable concentration limits for certain hazardous constituents at both conventional uranium mills and ISR facilities.

The existing Criterion 5C table reflects concentration limits adopted in the 1980s, some of which differ substantially from current EPA standards. As illustrated below, the proposed revisions create a variable patchwork of values:³

Constituent	Current Criterion 5C (mg/L)	Current MCL (mg/L)
Arsenic	0.05	0.010
Cadmium	0.01	0.005
Barium	1.0	2
Chromium	0.05	0.1
Selenium	0.01	0.05
Uranium	Not listed	0.030

Updating these references is a reasonable approach to keeping Appendix A current, but the NRC should not mechanically incorporate numerical standards adopted by the EPA for other regulatory purposes without addressing how they operate within the uranium recovery framework. The *Uranium Mill Tailings Radiation Control Act of 1978* establishes complementary

³ 10 C.F.R. pt. 40, app. A, Criterion 5C; 40 C.F.R. §§ 141.62(b), 141.66(e).

roles for the two agencies: the EPA establishes applicable standards under the Atomic Energy Act (AEA) Section 275, while the NRC must conform to those standards and remains responsible for implementing them through licensing requirements for uranium recovery facilities.⁴ The NRC's general requirements must also, to the maximum extent practicable, be at least comparable to analogous Resource Conservation and Recovery Act (RCRA) requirements, with EPA concurrence under section 84a(3).

Rather than defaulting to whichever applicable EPA or NRC value is more restrictive, the two agencies should use this coordinated statutory framework to establish a single, coherent set of groundwater protection limits for uranium recovery, together with the hazard criteria and lower bounds that govern ACLs. Those standards should rest on a shared and stated toxicological and dosimetric basis, so that concentration limits, restoration endpoints, and ACL determinations reflect the same underlying judgments about health and environmental protection. Where existing values originate in different regulatory programs, the agencies should explain why those values are appropriate for uranium recovery groundwater restoration and how they fit together within the Part 40 framework.

The concurrence required under section 84a(3), together with the agencies' July 2020 memorandum of understanding, provides an existing vehicle for that coordination.⁵ Before replacing the current Criterion 5C table with dynamic cross-references to EPA standards, the NRC should document how the revised limits implement the applicable Part 192 standards within the Part 40 framework and specify how later EPA revisions would affect concentration limits that the NRC has already approved.

The proposed change also warrants a more complete discussion in the rulemaking's environmental and regulatory analyses. The NRC's categorical exclusion determination relies in part on the assertion that the proposed rule does not change existing technical criteria and therefore would not change environmental impacts. Yet the revisions to Criterion 5C would alter numerical groundwater protection standards. BTI does not suggest that these changes preclude

⁴ Uranium Mill Tailings Radiation Control Act of 1978, Pub. L. No. 95-604, 92 Stat. 3021; 42 U.S.C. §§ 2022, 2114.

⁵ 42 U.S.C. § 2114(a)(3); see Proposed Rule, 91 Fed. Reg. at 57730; U.S. Nuclear Regulatory Commission and U.S. Environmental Protection Agency, *Memorandum of Understanding Between the U.S. Nuclear Regulatory Commission and the U.S. Environmental Protection Agency Concerning the Regulation of Uranium In Situ Recovery Activities*, ML20218A248, July 23, 2020.

reliance on a categorical exclusion, but the NRC should acknowledge the substantive changes and explain why they remain consistent with the applicable exclusion, including the extent to which site-specific environmental review would address their implementation.

Finally, the proposed Criterion 5C cross-references incorporate several provisions of 40 CFR 141.66 but omit paragraph (d), which establishes the drinking water standard for beta particle and photon radioactivity. If this omission is intentional, the NRC should explain its basis in the final rule to avoid uncertainty about which radiological standards apply to uranium milling facilities.

Clarifying the Definition of Byproduct Material

The proposed rule would revise the definition of *byproduct material* in 10 CFR 40.4 to include liquid wastes resulting from uranium solution extraction processes. BTI supports clarifying the scope of materials subject to NRC oversight, particularly given the differences between conventional uranium milling and ISR operations. However, the revised definition should distinguish between wastes generated through ISR activities and groundwater within the production unit that is affected by the extraction process.

Unlike conventional uranium milling, ISR operations involve circulating a chemical solution through an underground ore body to extract uranium. This process alters groundwater chemistry within the production unit, which must be restored to NRC-approved concentration limits. Although the proposed definition would include liquid wastes that may affect groundwater, it does not address whether groundwater within the production unit itself constitutes byproduct material. The existing definition also excludes underground ore bodies remaining after ISR operations.

BTI recommends that the NRC clarify whether, and under what circumstances, groundwater within the production unit is considered byproduct material during ISR operations and subsequent restoration. The final rule should distinguish groundwater subject to restoration requirements from liquid wastes generated by the extraction and restoration processes, without creating uncertainty about the NRC's authority to require groundwater protection and restoration.

Recommendations

Affected Provision	Recommendation
Criterion 5C; 40 CFR 192.31, 192.32(a)(2); Preamble	Work with EPA, through the Section 84a(3) concurrence and the July 2020 memorandum of understanding, to establish a single set of groundwater protection limits for uranium recovery, together with ACL hazard criteria and lower bounds, on a shared and stated toxicological and dosimetric basis. Before replacing the Criterion 5C table with cross-references to EPA standards, document how the revised limits implement Part 192 within the Part 40 framework and specify how later EPA revisions would affect concentration limits the NRC has already approved.
Criterion 5C; NEPA Discussion; Regulatory Analysis	Explain why the categorical exclusion remains appropriate, including the role of site-specific environmental review.
Criterion 5C	State whether the omission of 40 CFR 141.66(d) is intentional and, if so, its basis
§ 40.4 (Byproduct Material)	State whether “liquid wastes” includes lixiviant-affected groundwater while it remains within the production unit and explain how the amended definition interacts with the existing exclusion for underground ore bodies.

III. AGREEMENT STATE COMPATIBILITY

The proposed rule would change the compatibility designations for Criteria 5 and 6 of Appendix A to 10 CFR Part 40 from Category C to Category B, requiring Agreement States to adopt provisions that are essentially identical to the NRC's requirements. BTI supports a consistent national framework for uranium recovery, particularly where uniform requirements improve regulatory predictability and avoid unnecessary differences between NRC and Agreement State programs. However, consistency should be based on shared and reasonable technical bases, and the NRC should establish why the proposed designation is appropriate for groundwater protection and site closure.

Section 274(o) of the AEA requires Agreement States regulating 11e.(2) byproduct material to adopt standards “equivalent, to the extent practicable, or more stringent than” the NRC.⁶ The statute also permits alternative requirements, including site-specific alternatives, where the Commission determines that they provide an equivalent or greater level of protection. These provisions recognize that a common level of protection can be achieved through different regulatory approaches, including where local conditions such as geology, hydrology, and groundwater use warrant different requirements.

The NRC justifies the proposed Category B designation by reference to national energy policy, domestic uranium production, and national security considerations. While these are legitimate considerations, they do not independently demonstrate why groundwater protection and closure requirements must be essentially identical across jurisdictions. Under the NRC's compatibility framework, Category B is intended for requirements that necessitate uniformity to maintain an orderly national regulatory program. The NRC should explain why that standard is met here, including whether less restrictive compatibility designations would provide sufficient consistency while preserving Agreement State flexibility.

The proposed compatibility structure also needs a clearer boundary between Criteria 5 and 6 and Criterion 14. Criterion 14 is designated Category C, but it relies on requirements in Criteria 5 and 6, including the concentration limits in Criterion 5B(5) and the ACL framework in Criterion 5B(5)(c). The final rule should identify which aspects of Criterion 14 Agreement States may implement differently under Category C and which must remain consistent with the essentially identical Category B requirements in Criteria 5 and 6. Without that distinction, Agreement States may reach different conclusions about the scope of their discretion in implementing groundwater restoration, ACLs, and related compliance requirements.

⁶ 42 U.S.C. § 2021(o).

Recommendations

Affected Provision	Recommendation
Appendix A, Criteria 5 and 6 (Compatibility Table)	Reconsider the proposed Category B designation for Criteria 5 and 6 and retain Category C unless the NRC can explain why identical requirements are necessary.
Criteria 5, 6, and 14	Identify which Criterion 14 requirements Agreement States may implement differently under Category C and which must remain consistent with the Category B requirements in Criteria 5 and 6.

IV. ALTERNATE CONCENTRATION LIMITS (ISR SPECIFIC REQUEST FOR COMMENT #5)

Establishing a Practical Endpoint for Groundwater Restoration

The proposed rule allows a licensee to pursue an ACL when approved concentration limits cannot practically be achieved. This recognizes that continued groundwater restoration may eventually yield diminishing improvements, where remaining constituent concentrations are constrained by site-specific hydrogeologic or geochemical conditions.

However, draft Appendix F of the proposed NUREG-1569 supplement introduces a different expectation. It directs NRC staff to evaluate whether restoration efforts achieved “the lowest possible concentration level of each hazardous constituent”⁷ and requires a licensee proposing an ACL to show it reached “the lowest possible level.”⁸ Unlike the rule's practicability standard, this language has no stopping point. Even where continued restoration would produce negligible improvements, a licensee could face uncertainty about whether sufficient effort has been undertaken to justify an ACL.

⁷ U.S. Nuclear Regulatory Commission, *Guidance for the Proposed Rule “Groundwater Protection at Uranium In Situ Recovery Facilities,”* [ML26243A344](#) (August 2026), at 6-25 (hereinafter Draft NUREG-1569 Supplement).

⁸ Draft NUREG-1569 Supplement at F-3.

The guidance also requires “evidence of asymptotic behavior” at each point of compliance well without defining it.⁹ While a declining rate of improvement can provide useful evidence that additional restoration is unlikely to be effective, the guidance should explain how this condition is to be demonstrated and evaluated. Without objective criteria, licensees and reviewers may reach different conclusions about when restoration has become impracticable.

BTI recommends that the NRC align the final guidance with the practicability standard established in Criterion 14(f) and Criterion 5B(5). The guidance should identify objective means of demonstrating that further restoration is unlikely to achieve the approved concentration limits, including trends in constituent concentrations, the effectiveness of completed restoration methods, and the expected improvement from additional treatment. Establishing a clearer endpoint would improve regulatory predictability without weakening the NRC's authority to require additional restoration where it would provide a meaningful protective benefit.

Criterion 5B(6) Should be Practicability, Not ALARA

Criterion 5B(6) requires a licensee proposing an ACL to show that the limit is “as low as reasonably achievable” and conditions approval on the same finding. The NRC retains this residual ALARA phrasing to conform to EPA's standard for uranium byproduct material, which allows an ACL only where, “after considering practicable corrective actions, these limits are as low as reasonably achievable.”¹⁰ That standard asks how far corrective action must go once the prescribed groundwater standard cannot be met, not whether a dose already below its limit should be reduced further. The RP Framework Proposed Rule describes the Appendix A usage as “focused on the technical practicability of corrective actions,” and would revise the Appendix A introduction to treat “practicable” and “reasonably achievable” as equivalent terms.¹¹ Decisions under those terms would take into account the state of technology, the economics of improvements in relation to benefits to public health and safety, other societal and socioeconomic considerations, and the utilization of atomic energy in the public interest.

⁹ Draft NUREG-1569 Supplement at F-4.

¹⁰ Nuclear Regulatory Commission, *Reforming and Modernizing the NRC's Radiation Protection Framework*, Proposed Rule, 91 Fed. Reg. 43456, 43476 (July 15, 2026) (Docket ID NRC-2025-1140; RIN 3150-AL47) (hereinafter RP Framework Proposed Rule); Draft NUREG-1569 Supplement at F-6.

¹¹ RP Framework Proposed Rule, 91 Fed. Reg. at 43476.

BTI supports that clarification because it gives Criterion 5B(6) as a defined decision rule. Corrective action continues until further reduction is no longer practicable, and an ACL may then be approved if the remaining concentration is protective. Draft Appendix F does not apply the standard that way. Its "lowest possible" expectation can be read to require continued reduction beyond the point at which additional corrective action is no longer practicable, while its monetized collective-dose test imports a person-rem cost-benefit methodology associated with traditional NRC ALARA implementation. The final guidance should implement Criterion 5B(6) as the practicability standard defined in the RP Framework Proposed Rule, and should describe it that way rather than as an "ALARA requirement." Practicability does not provide a quantitative threshold below which further reduction is unnecessary, which is why BTI recommended a de minimis floor in the NRC-2025-1140 docket.¹²

Part 192 also supplies the determinate limit within which that practicability judgment operates. The same provision requires that, "in any case, the standards of § 264.94(a) are satisfied at all points at a greater distance than 500 meters from the edge of the disposal area and/or outside the site boundary."¹³ Criterion 5B(6) does not include this condition, and neither the proposed rule nor the draft guidance explains how it applies at an ISR facility, where there is no disposal area in the conventional sense and the production unit lies within an exempted aquifer. The NRC and EPA should jointly determine where this compliance boundary lies for an ISR wellfield, such as the edge of the production unit or the aquifer exemption boundary, and the final guidance should confirm that ACL approvals satisfy it. Protection is fixed at that boundary, and the practicability judgment governs how far corrective action must go within it.

Cost-Benefit Considerations Should Support, Rather Than Determine, the Hazard Finding

Draft Appendix F proposes evaluating the costs of additional groundwater restoration against the benefits of further reductions in hazardous constituent concentrations. BTI supports considering these tradeoffs. Additional restoration can require substantial groundwater withdrawals,

¹² RP Framework Comment § IV.

¹³ 40 C.F.R. § 192.32(a)(2)(iv).

generate waste requiring treatment or disposal, and impose costs that may be disproportionate to the environmental benefits achieved.

However, the draft guidance includes a dollar-per-person-rem comparison derived from NUREG-1530 among its acceptance criteria for radiological ACLs. Draft Appendix F would accept a radiological ACL where further corrective action would cost more than \$5,200 per person-rem avoided, the NUREG-1530 conversion factor.¹⁴ This imports the collective-dose cost-benefit approach of traditional ALARA into what the RP Framework Proposed Rule describes as a practicability determination. NUREG-1530 derives the factor from a value of statistical life and a risk coefficient applied to collective dose, so it is linear to zero; it reports a range rather than a single value; and it was developed for agency regulatory, backfit, and environmental analyses rather than as a licensee compliance criterion.¹⁵

The test also lacks a defined population. The guidance states that wells in the production unit “are not points of exposure for humans” because the production unit is exempted as a drinking water source.¹⁶ A collective dose for an aquifer with no exposed population depends entirely on assumptions not found in guidance. The RP Framework proposed rule’s economics-to-benefits factor can be weighed without a collective-dose screen, by asking whether further restoration would change the hazard at actual points of exposure

The final guidance should not treat a monetized collective-dose comparison as a substitute for the Commission’s required determination that a proposed ACL will not pose a substantial present or potential hazard to human health or the environment. That determination should be grounded in the applicable exposure pathways, site conditions, and protective standards. Within those bounds, the comparison should count the consumptive use of groundwater and the waste generated by each additional pore volume of restoration, which draft Appendix F treats as qualitative factors.¹⁷ Cost-benefit considerations should inform the evaluation of additional practicable corrective actions. The ADVANCE Act directs that regulation not unnecessarily limit

¹⁴ Draft NUREG-1569 Supplement at F-8.

¹⁵ RP Framework Comment § VI.

¹⁶ Draft NUREG-1569 Supplement at F-26.

¹⁷ Draft NUREG-1569 Supplement at F-8; *see also id.* at F-16 (groundwater consumption from maintaining an inward gradient).

the benefits of civilian nuclear technology to society, and these costs bear directly on that inquiry.¹⁸

The Radiological Hazard Finding Should Use One Grounded Criterion

The proposed guidance evaluates potential hazards from ACLs through several approaches: EPA drinking water standards through Criterion 5C, an incremental lifetime cancer risk of 1 in 10,000 or a reference dose at points of exposure,¹⁹ and the collective-dose cost test above. The radium benchmark dose approach of Criterion 6(6) separately governs residual radioactivity at the same sites.²⁰

These measures rest on different models and receptors and can give different answers for the same constituent at the same concentration. The final guidance should state one individual-dose criterion for the radiological hazard finding, grounded in values the NRC already applies to uranium recovery closure and license termination, with its basis stated in the record. Reference doses and drinking water standards can continue to govern nonradiological constituents.

The same individual-dose framework can supply the lower bound the practicability standard otherwise lacks. Restoration ends when background or MCL values are achieved. Where those values cannot practicably be attained, and an ACL is considered, the practicability assessment does not itself establish a quantitative point below which additional reduction is unnecessary. A de minimis individual-dose criterion can provide that lower bound for radiological constituents. Where a residual radiological concentration would produce a dose at points of exposure below a de minimis criterion, the benefit of further corrective action is negligible. In that case, further corrective action should be treated as not reasonably achievable for that constituent. That criterion must sit below the hazard criterion and should be developed with EPA, given that the practicability language in Criterion 5B(6) conforms to Part 192.

¹⁸ Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act of 2024, Pub. L. No. 118-67, § 501.

¹⁹ Draft NUREG-1569 Supplement at F-29.

²⁰ 10 C.F.R. pt. 40, app. A, Criterion 6(6).

Recommendations

Affected Provision	Recommendation
Draft NUREG-1569 §§ 6.1.8, F.1	Replace the “lowest possible” restoration expectation with the “cannot practically achieve” standard in Criterion 14(f) and the ACL framework in Criterion 5B(5). Define how licensees demonstrate that further restoration is not practically achievable, including through concentration trends and expected gains from additional treatment.
Criterion 5B(6); Draft Appendix F.2	Apply Criterion 5B(6) as the practicability standard defined in the Appendix A introduction proposed in Docket NRC-2025-1140, and describe it in Appendix F as a practicability standard rather than an ALARA requirement. In ACL evaluations, separate the demonstration that a proposed limit is protective from the evaluation of whether further corrective action is practicable.
Criterion 5B(6); Draft Appendix F; 40 CFR 192.32(a)(2)(iv)	Identify where the Part 192 condition that § 264.94(a) standards be met beyond 500 meters from the edge of the disposal area and/or outside the site boundary applies at an ISR wellfield, and confirm that ACL approvals satisfy it.
Draft Appendix F.2	Remove the \$5,200 per person-rem comparison as an acceptance criterion for radiological ACLs. Ground the hazard finding in applicable exposure pathways, site conditions, and protective standards, and apply cost-benefit considerations only to evaluate additional corrective actions within those bounds. Account explicitly for groundwater consumption and waste generated by additional restoration, quantitatively where practicable.
Draft Appendix F.3.7	State one individual-dose criterion for the radiological hazard finding, consistent with existing uranium recovery closure and license termination criteria, with its basis in the record. Continue to apply reference doses and drinking water standards to nonradiological constituents.
Draft Appendix F.2, F.3.7	For radiological constituents, treat further corrective action as not reasonably achievable where residual concentrations would produce a dose at points of exposure below a de minimis criterion set below the hazard criterion, applying any criterion adopted in Docket NRC-2025-1140.

V. CRITERION 14 IMPLEMENTATION (ISR SPECIFIC REQUESTS FOR COMMENT #1 AND #2)

Post-Restoration Testing Should Limit False Positives

The NRC should require that post-restoration statistical testing control the site-wide false positive rate, and should connect background sampling to the temporal variability that post-restoration monitoring will encounter.

Criterion 14(f)(1) requires quarterly post-restoration monitoring for one year, analyzed “on a well-by-well basis,” with corrective action for any statistically significant exceedance.²¹ The regulatory analysis models a 20-acre wellfield with 20 point-of-compliance wells in the production unit, and identifies seven probable hazardous constituents from past ISR restorations.²² If those seven constituents were evaluated at each of the 20 wells, that would produce approximately 140 well-constituent comparisons per quarterly sampling event. If each comparison were evaluated independently at a 5 percent significance level without adjustment for the number of comparisons, the probability of at least one false positive would exceed 99 percent.²³ The final guidance should specify a statistical approach, consistent with EPA’s Unified Guidance, that limits the overall risk of false positives when many wells and constituents are tested during the same monitoring period.²⁴

Background hazardous constituent levels may be based on as few as four samples collected at least two weeks apart, while the guidance also asks licensees to demonstrate “the absence of seasonal or other temporal variation.”²⁵ At the minimum sampling interval, four samples would span approximately six weeks, which may not be sufficient to characterize seasonal variation. Criterion 14(a)(1) separately requires one year of quarterly groundwater sampling for site characterization. The final guidance should explain how those longer-duration data, where

²¹ Proposed Rule, 91 Fed. Reg. at 57755.

²² U.S. Nuclear Regulatory Commission, *Regulatory Analysis for the Proposed Rule: In Situ Recovery Monitoring and Decommissioning Timeliness*, [ML26243A343](#), at 3-7 (hereinafter Regulatory Analysis).

²³ Assuming independent tests, the probability is one minus 0.95 raised to the 140th power, or about 0.999.

²⁴ Environmental Protection Agency, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance*, EPA 530/R-09-007 (Mar. 2009).

²⁵ Draft NUREG-1569 Supplement at 2-29.

representative of the relevant wellfield conditions, may be used to evaluate temporal variation when establishing background levels.²⁶

Excursion Response Should Scale With Time and Consequences

Indicator constituents, such as chloride and conductivity, serve as an early warning of potential migration of ISR fluids beyond the production unit. Their detection warrants investigation and appropriate action to prevent hazardous constituents from reaching surrounding groundwater. However, an indicator excursion does not necessarily establish that a hazardous constituent has exceeded its approved concentration limit, and the regulatory response should reflect that distinction.

Under proposed Criterion 14(h)(1), an excursion not eliminated within 60 days requires termination of lixiviant injection in contributing portions of the wellfield, sampling for hazardous constituents, and an increase in financial surety.²⁷ Additional remediation is required only if a hazardous constituent exceeds its approved limit, but the surety increase applies either way. The preamble instead describes corrective action for prolonged excursions that have “demonstrated an exceedance of an approved hazardous constituent concentration limit.”²⁸ The final rule should reconcile the two. A confirmed excursion should continue to trigger prompt investigation and action to limit further migration. Injection termination, corrective action, and additional financial assurance should then be calibrated to the persistence and consequences of the excursion, including whether the licensee has restored hydraulic control and whether hazardous constituents exceed their approved limits.

Operating Requirements Should Accommodate the Contingencies the Rule Anticipates

Criterion 14(d)(1)(i) requires an inward hydraulic gradient “at all times” until post-restoration monitoring begins, while Criterion 14(d)(1)(iv)(D) requires contingency plans for shut-ins and well failures.²⁹ The final rule or guidance should state the expected regulatory response when an

²⁶ Proposed Rule, 91 Fed. Reg. at 57752.

²⁷ Proposed Rule, 91 Fed. Reg. at 57755.

²⁸ Proposed Rule, 91 Fed. Reg. at 57734.

²⁹ Proposed Rule, 91 Fed. Reg. at 57754.

anticipated contingency interrupts the gradient, while keeping prevention of migration outside the production unit as the governing objective. Criterion 14(b)(3)(ii) allows an NRC-approved alternative interval for background sampling,³⁰ but Criterion 14(d)(2)(iii) fixes excursion sampling at twice per month and confirmation sampling at 48-hour intervals. The NRC should retain those intervals as defaults and allow approved alternatives that provide equivalent detection capability.

Rule Text and Guidance Should Agree

Criterion 14(b)(2)(iii) makes a constituent hazardous only if it is listed in Criterion 13.³¹ However, Draft NUREG-1569 directs licensees to identify constituents not listed in Criterion 13, such as nitrate, sulfate, and ammonia, and assign them protective limits.³² One should conform to the other. The point of compliance definition uses “uppermost aquifer” in the conventional mill sense,³³ while Criterion 14(d)(4) applies the term to aquifers exposed to surface and near-surface operations.³⁴ At a deep deposit, these can be different units, and the final rule should define the term for Criterion 14(d)(4).

At existing facilities, Criterion 14 will govern new wellfields and production units while existing wellfields remain under license conditions.³⁵ The NRC should explain how facility-wide programs operate under both regimes, allow existing licensees to adopt Criterion 14 for existing wellfields by amendment, and conform the guidance to the rule’s criterion.

Post-Restoration Monitoring and the EPA-NRC Memorandum of Understanding

The NRC states that codifying one year of post-restoration monitoring “could necessitate revisiting” its July 2020 memorandum of understanding with EPA, which identifies the Resource Conservation and Recovery Act (RCRA) corrective action framework as the appropriate framework

³⁰ Proposed Rule, 91 Fed. Reg. at 57753.

³¹ Proposed Rule, 91 Fed. Reg. at 57753.

³² Draft NUREG-1569 Supplement at 2-24.

³³ Proposed Rule, 91 Fed. Reg. at 57751.

³⁴ Proposed Rule, 91 Fed. Reg. at 57754.

³⁵ Proposed Rule, 91 Fed. Reg. at 57733.

for ISR facilities.³⁶ Section 84a(3) of the Atomic Energy Act also requires EPA concurrence that the NRC's general requirements are comparable to RCRA requirements.³⁷ The final rule should document the outcome of NRC-EPA coordination and explain how the one-year monitoring requirement remains consistent with the RCRA-based framework and the statutory comparability requirement.

Recommendations

Affected Provision	Recommendation
Criterion 14(f)(1); Draft NUREG-1569 § 6.1.1	Require post-restoration statistical tests to control the site-wide false positive rate consistent with EPA's Unified Guidance.
Criterion 14(b)(3); Draft NUREG-1569 §§ 2.11.3	Use representative Criterion 14(a)(1) quarterly data to characterize temporal variance in background levels and upper control limits.
Criterion 14(h)(1); Preamble	Reconcile the rule text with the preamble. Retain prompt investigation and containment upon a confirmed excursion, and calibrate injection termination, corrective action, and surety increases to the persistence and consequences of the excursion, including whether hazardous constituents exceed approved limits.
Criterion 14(d)(1)–(2)	State the regulatory response when an anticipated contingency interrupts the inward gradient, and allow NRC-approved alternative sampling intervals with equivalent detection capability.
Criterion 14(b)(2)(iii); Criterion 14(d)(4)	Reconcile the Criterion 13 limitation with the draft guidance, and define "uppermost aquifer" for Criterion 14(d)(4).
Appendix A, Section I; Criterion 14	Explain how facility-wide programs operate where wellfields fall under both license conditions and Criterion 14, allow existing licensees to adopt Criterion 14 for existing wellfields by amendment, and issue the final NUREG-1569 supplement with the final rule.

³⁶ Proposed Rule, 91 Fed. Reg. at 57732, 57734.

³⁷ Proposed Rule, 91 Fed. Reg. at 57730.

Affected Provision	Recommendation
Criterion 14(f)(1); Preamble	Document the outcome of EPA coordination under the memorandum of understanding and AEA § 84a(3), and explain how the one-year monitoring requirement remains consistent with the RCRA-based framework.

VI. REPORTING (ISR SPECIFIC REQUEST FOR COMMENT #4)

Criterion 14 requires prompt reporting of conditions that may warrant NRC awareness or corrective action, including confirmed excursions and contamination of the uppermost aquifer. Event-driven reporting serves an important oversight function. However, the NRC should use consistent reporting deadlines for the same or closely related events and avoid routine reporting requirements that do not materially improve oversight.

For a confirmed excursion, Criterion 14(d)(5) in the proposed rule requires notice within one business day and a written report within seven days,³⁸ while the draft guidance specifies telephone notice within 24 hours.³⁹ For contamination of the uppermost aquifer, the rule requires notice within one business day and a written report within seven days, one guidance section specifies only a report within seven days of detection,⁴⁰ and the management control program section retains a 48-hour license condition for spills.⁴¹ The NRC should select a single notification deadline for each reportable event and conform the associated guidance and license-condition provisions accordingly.

The NRC should also distinguish event-driven reporting from routine submission of monitoring information. Draft NUREG-1569 expects semi-annual reports to include all point-of-compliance analytical data and potentiometric maps.⁴² These data are important for inspection and compliance verification, but do not require immediate NRC action without a reportable trigger. Where maintaining the underlying records onsite for inspection would provide equivalent regulatory access, the NRC should permit onsite retention rather than require routine

³⁸ Proposed Rule, 91 Fed. Reg. at 57754.

³⁹ Draft NUREG-1569 Supplement at 5-11.

⁴⁰ Draft NUREG-1569 Supplement at 5-12.

⁴¹ Draft NUREG-1569 Supplement at 5-5.

⁴² Draft NUREG-1569 Supplement at 3-8 to 3-9.

transmission of the complete dataset. Periodic summary reporting can be retained where necessary to support programmatic oversight.

Recommendations

Affected Provision	Recommendation
Criterion 14(d)(5); Draft NUREG-1569 §§ 5.1.3, 5.6.8	Use a consistent notification deadline for each reportable event and conform the guidance and retained license-condition provisions to the final rule.
§ 40.65; Draft NUREG-1569 § 3.1.3	Allow routine point-of-compliance data and potentiometric maps to be maintained onsite for inspection, with periodic summary reporting where needed, while retaining prompt event-driven reporting.

VII. DECOMMISSIONING TIMELINESS

Paragraph (f) Should Retain an Approval Standard (Decommissioning Extension Request #3)

The final rule should state the finding required to grant a materials decommissioning extension. The current §§ 30.36(f), 40.42(f), 70.38(f), and 72.54(f) allow an extension the NRC finds “not detrimental to the public health and safety and is otherwise in the public interest.”⁴³ Proposed paragraph (f) lists what a request must contain and states that the Commission “may grant” it, but sets no decision standard.⁴⁴ The reactor provisions retain one: the new special circumstances require that the extension not adversely affect safety for its duration.⁴⁵ A materials standard written the same way would bound staff discretion and give licensees a predictable target. The two reactor provisions should also use the same words, since § 50.12(a)(2)(vi) refers to “site safety” while § 53.080(b)(6) refers to “public health and safety.”

⁴³ Proposed Rule, 91 Fed. Reg. at 57740.

⁴⁴ Proposed Rule, 91 Fed. Reg. at 57750.

⁴⁵ Proposed Rule, 91 Fed. Reg. at 57756.

Alternate Decommissioning Plan Schedules Need Their Own Criteria (Decommissioning Extension Request #2)

The NRC should retain a separate provision for alternate decommissioning plan schedules. Paragraphs (f)(4) and (f)(5) are built around resumption of principal activities, requiring a timeframe for resumption and a commitment to notify the NRC if activities do not resume.⁴⁶ Those may not apply to a licensee that has permanently ceased operations and is seeking additional time to submit its decommissioning plan. Deleting § 30.36(g)(2) and its counterparts removes the only criteria written for that request: that the alternate schedule is necessary to the effective conduct of decommissioning, presents no undue risk, and is in the public interest.⁴⁷ The final rule should keep those criteria in a provision of their own. DUWP-ISG-04 should distinguish the cost discussion required by paragraph (f)(3) from existing financial assurance obligations and state when information developed for an extension request triggers a financial assurance update.

Idle ISR Wellfields (Inactivity Period Request #1)

The NRC cites uranium price cycles as a reason for the longer Part 40 period.⁴⁸ Criterion 14 begins restoration when lixiviant injection permanently ceases and requires an inward gradient until post-restoration monitoring begins.⁴⁹ The rule does not say whether an idle wellfield is a separate outdoor area under § 40.42(d), whether standby can defer restoration through the full inactivity and extension periods, or how gradient maintenance during standby is reflected in surety. BTI supports flexibility for licensees facing market downturns, and the final rule should state how these two parts of the same rule interact.

Recommendations

Affected Provision	Recommendation
§§ 30.36(f), 40.42(f), 70.38(f), 72.54(f)	State the finding required to grant an extension, either retaining the existing standard or adopting the reactor provisions' safety finding.

⁴⁶ Proposed Rule, 91 Fed. Reg. at 57750-51.

⁴⁷ Proposed Rule, 91 Fed. Reg. at 57739.

⁴⁸ Proposed Rule, 91 Fed. Reg. at 57740.

⁴⁹ Proposed Rule, 91 Fed. Reg. at 57754-55.

Affected Provision	Recommendation
§§ 50.12(a)(2)(vi), 53.080(b)(6)	Use the same safety finding in both provisions.
§§ 30.36(g)(2), 40.42(g)(2), 70.38(g)(2), 72.54(f)(2); proposed paragraph (f); DUWP-ISG-04	Retain the streamlined paragraph (f) process, but specify that requests for an alternate decommissioning-plan schedule must satisfy the existing criteria applicable to those requests. Distinguish the cost information required under paragraph (f)(3) from existing financial assurance obligations, and state when information developed for an extension request requires an update to financial assurance.
§ 40.42(d); Criterion 14	Clarify whether an idle wellfield constitutes a separate outdoor area under § 40.42(d), whether standby may defer restoration, and how inward-gradient and financial-surety requirements apply during the inactivity period.

VIII. REGULATORY ANALYSIS (CUMULATIVE EFFECTS OF REGULATION QUESTION #3)

The inconsistencies in the regulatory analysis should be corrected before the final rule. The analysis estimates savings of \$288,600 for industry and \$316,200 for the NRC for each new ISR application,⁵⁰ but elsewhere cites a future net savings of \$154,663 from improvements in preparing and reviewing an ISR application.⁵¹ It also uses different time horizons (30 years in one place and 20 years in another) for the same projection of five reactor decommissioning exemption requests.⁵² The final analysis should reconcile those figures and assumptions.

The regulatory analysis identifies approximately \$646,000 in undiscounted costs: \$376,500 for NRC implementation, \$44,200 for NRC compatibility review, \$53,200 and \$159,600 for Agreement State implementation and operation, and \$12,640 for EPA concurrence.⁵³ That exceeds the combined savings from one ISR application, about \$605,000, and the only application the analysis projects is expected in 2026, before its assumed 2027 effective date.⁵⁴ The final analysis should

⁵⁰ Regulatory Analysis at 3-6, 3-12.

⁵¹ Regulatory Analysis at 3-16.

⁵² Regulatory Analysis at 3-11, 3-13.

⁵³ Regulatory Analysis at 3-12 to 3-15.

⁵⁴ Regulatory Analysis at 2-4, A-1.

identify the number of future ISR licensing activities necessary to support its conclusion that the rule will produce net cost savings.

The analysis also does not model new wellfields or production units at existing facilities because the NRC could not reliably project the number of such licensing actions.⁵⁵ Yet those actions are within the scope of proposed Criterion 14 and could represent a material share of future implementation. The analysis also estimates monitoring costs using a hypothetical 20-acre wellfield with one point of compliance well per acre in the production unit, while the draft NUREG-1569 supplement allows greater spacing where technically justified.⁵⁶ The final Regulatory Analysis should account for this uncertainty by evaluating how different assumptions about future wellfield activity and monitoring-well density affect the rule's estimated costs and benefits.

Recommendations

Affected Provision	Recommendation
Regulatory Analysis	Reconcile the inconsistent savings figures and reactor-exemption time horizons, and identify the number of ISR licensing activities needed for the rule's quantified savings to exceed implementation costs.
Regulatory Analysis	Account for uncertainty in future wellfield and production-unit activity by evaluating how different assumptions about licensing volume, wellfield size, and monitoring-well density affect the estimated costs and benefits.

IX. CROSS-RULE COORDINATION

This proposed rule overlaps with several other NRC rulemakings being developed under Executive Order 14300. The radiation protection rulemaking would amend Part 40 Appendix A, including provisions this rule also amends; the Part 57 rulemaking may cross-reference the Part 50 decommissioning provisions revised here; and the NEPA rulemaking would revise the categorical-exclusion framework on which this proposed rule relies. The NRC should address

⁵⁵ Regulatory Analysis at 2-4.

⁵⁶ Regulatory Analysis at 3-7 to 3-8; Draft NUREG-1569 Supplement at 2-26.

those dependencies before finalizing this rule rather than assume they can be resolved later through separate dockets.

First, the RP framework rulemaking would amend Appendix A, revising the introduction to define "as low as is reasonably achievable" as a practicability standard for corrective action, and would revise Criteria 6(6) and 8.⁵⁷ This rule and its guidance should apply Criterion 5B(6) consistently with that definition, as discussed in Section IV. Both rules would also amend the Appendix A introduction, this rule to add ISR definitions and the RP Framework Proposed Rule to revise its first and fifth paragraphs. The NRC should coordinate the two rulemakings so that the final Appendix A text incorporates both sets of amendments without conflict or omission.

Second, the NRC should review the proposed microreactor rule for provisions that cross-reference §§ 50.12 and 50.82, so the decommissioning exemption pathway adopted here applies consistently, and should not rely on a later rulemaking to supply an unstated conforming change.⁵⁸

Third, the NRC's NEPA rulemaking would revise the categorical exclusions in Part 51.⁵⁹ The final rule should cite the categorical exclusion as it exists in the final Part 51, and NUREG-1569 should be conformed to the final Part 51 once adopted rather than to the proposal. Congress is also considering legislation, including the Bipartisan American Affordability and Jobs Act of 2026, that would amend NEPA's applicability provisions and the role of categorical exclusions.⁶⁰ If such legislation is enacted before this rule is finalized, the NRC should confirm that the categorical exclusion relied on here remains available and explain any resulting change to the rule's environmental basis.

⁵⁷ RP Framework Proposed Rule, 91 Fed. Reg. at 43476, 43500.

⁵⁸ Adam Stein et al., The Breakthrough Institute, *Comment on Licensing Requirements for Microreactors and Other Reactors with Comparable Risk Profiles*, Docket ID NRC-2025-0379, June 15, 2026.

⁵⁹ NEPA Comment S VI.

⁶⁰ Bipartisan American Affordability and Jobs Act of 2026, S. 5653, 119th Cong. (2026).

Recommendations

Affected Provision	Recommendation
Appendix A; NRC-2025-1140	Apply Criterion 5B(6) consistently with the practicability definition proposed in the RP Framework Proposed Rule, and reconcile both rules' amendments to the Appendix A introduction into a single text.
§§ 50.12, 50.82; NRC-2025-0379	Review Part 57 provisions that cross-reference §§ 50.12 and 50.82 and conform them to the exemption pathway adopted here.
NEPA Discussion; NRC-2025-0478	Cite the categorical exclusion as it exists in the final Part 51, conform NUREG-1569 to the final Part 51, and address any enacted amendment to NEPA.

X. TECHNICAL CORRECTIONS

The NRC should correct the following errors before publication of the final rule and guidance:

Provision	Issue	Correction
Criterion 14(d)(5)(ii) (91 Fed. Reg. at 57754); Draft NUREG-1569 § 5.1.3	Cites an excursion confirmed under paragraph 14(d)(2)(ii), which addresses flow rates. Draft NUREG-1569 § 5.1.3 repeats the same incorrect cross-reference.	Cite paragraph 14(d)(2)(iii).
§ 72.54(f)(4)	Cites paragraphs (d)(1)(iii) and (iv), but proposed paragraph (d)(1) contains only paragraphs (i) through (iii).	Cite paragraphs (d)(1)(ii) and (iii).
Paperwork Reduction Act discussion (91 Fed. Reg. at 57745)	Directs commenters to Docket ID NRC-2025-1140.	Cite Docket ID NRC-2025-1204.
Executive Summary (91 Fed. Reg. at 57728)	Cites the regulatory analysis at ML25337A100 (which is the early release of the proposed rule); the documents table lists ML26243A343.	Cite ML26243A343 when referring to the regulatory analysis document.

Provision	Issue	Correction
Preamble Section IV.E (91 Fed. Reg. at 57735)	Describes excursion sampling every two weeks; Criterion 14(d)(2)(iii) requires twice per month with at least 10 days between samples.	Conform the preamble to the rule text.
Draft NUREG-1569, Introduction and Appendix B	Lists sections 5.2, 5.7.8, and 6.1.1 through 6.1.3; the body numbers them 5.1, 5.6.8, 6.1.7, and 6.1.8.	Conduct a document-wide conforming review of section numbers and internal cross-references.
Draft NUREG-1569 §§ 3, 5.1.4	Cites paragraph 14(d)(3) for excursion monitoring and paragraph 14(d)(4)(iv) for spill reporting.	Cite paragraphs 14(d)(2)(iii) and 14(d)(5)(iii), respectively.
Draft NUREG-1569 § 5.1.3(5)	Cites 20 CFR 1902(e).	Cite 10 CFR 20.1902(e).

XI. CONCLUSION

BTI supports the NRC's effort to codify groundwater protection for ISR facilities and modernize decommissioning timeliness. The final rule should build on that approach by clearly identifying substantive changes to existing standards, establishing predictable criteria for groundwater restoration, ACLs, monitoring, reporting, and decommissioning extensions, and preserving appropriate flexibility for site-specific conditions and Agreement State implementation. The NRC should also work with EPA to ensure that groundwater protection limits and ACL criteria rest on a coherent technical and statutory basis, and should ensure that the final rule, implementing guidance, regulatory analysis, and related rulemakings operate consistently.

BTI appreciates the opportunity to comment and welcomes further engagement with NRC staff on the issues raised in this letter.

Sincerely,

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