
Draft Environmental Assessment for the Proposed Rule—Groundwater Protection at Uranium *In Situ* Recovery Facilities

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ABBREVIATIONS AND ACRONYMS

AEA	Atomic Energy Act of 1954
CFR	<i>Code of Federal Regulations</i>
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
ISR	<i>in situ</i> recovery
MCL	maximum contaminant level
NEPA	National Environmental Policy Act of 1969
NRC	U.S. Nuclear Regulatory Commission
RCRA	Resource Conservation and Recovery Act of 1976

1 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) is proposing to amend its regulations in Appendix A to Part 40 of Title 10 of the *Code of Federal Regulations* (10 CFR), “Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content,” for groundwater protection at uranium *in situ* recovery (ISR) facilities. This proposed rule would also revise Appendix A to include administrative, editorial, or clarification changes.

The NRC has prepared this environmental assessment (EA) in compliance with the NRC’s environmental protection regulations in 10 CFR Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions,” which implement the National Environmental Policy Act (NEPA) of 1969, as amended.

1.1 Background

The NRC is proposing to amend its regulations that govern the licensing of uranium mills and the disposition of tailings and waste that arise from the extraction and milling of uranium by promulgating risk-informed regulations for groundwater protection that are specific to ISR facilities. The NRC’s current regulations in Appendix A to 10 CFR Part 40 are focused on conventional uranium milling and do not expressly address uranium extraction by the ISR process. Industry began to use the ISR process in 1978, and it became the dominant method of uranium extraction in the United States in the 1990s.

To date, the NRC has regulated groundwater protection at ISR facilities by applying risk-informed and best management practices through site-specific license conditions. This regulatory approach has been protective of groundwater resources as described in the following NRC documents:

- In 2009, the NRC staff issued NUREG-1910, *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (NRC, 2009) (GEIS), which evaluated the potential environmental impacts associated with the construction, operation, aquifer restoration, and decommissioning of an ISR facility. The NRC developed the GEIS using knowledge gained during the previous 30 years of licensing and regulating ISR facilities. The GEIS identified the site-specific conditions that would need to be met to contribute to a conclusion that the impacts resulting from ISR operations to surrounding groundwater would be SMALL.¹ The NRC EAs prepared for the license renewals of the Smith Ranch-Highland Uranium Project (NRC, 2018), the Crow Butte Project (NRC, 2014), and the Willow Creek Project (NRC, 2011) used the GEIS analysis and found no significant impact to surrounding groundwater quality over the licensed periods for these ISR facilities.
- Also, in “Staff Assessment of Groundwater Impacts From Previously Licensed In-Situ Uranium Recovery Facilities,” July 10, 2009 (Staff Assessment Paper), the NRC staff reported its findings to the Commission on the environmental impacts resulting from the operation of the three then active ISR facilities under NRC license. The staff stated that the NRC had “approved 11 groundwater restorations at the 3 facilities” and that over 60 percent

¹ SMALL impacts are those that are “not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource considered” (GEIS section 1.4.3).

of the constituents were restored to their pre-operational concentrations.”² The staff concluded that all constituents were “restored to levels that NRC staff found to be protective of public health and the environment.”³

- In 2017, the NRC staff provided comments on the U.S. Environmental Protection Agency’s (EPA’s) 2017 proposed rulemaking for 40 CFR Part 192 (NRC, 2017). The NRC staff stated it did not believe that “ISR uranium activities that are operated under the [NRC’s] existing regulatory framework have caused, or are likely to cause, any contamination by listed hazardous constituents⁴ of adjacent or nearby aquifers or the non-exempt portion of the aquifer that is the subject of the licensed uranium ISR extraction activity.” The NRC staff noted that, through its requirements for extensive testing of licensee monitoring and private wells in and around its licensed ISR sites, it had not found evidence to challenge that finding.

1.2 Proposed Action

The NRC is proposing to amend its regulations in Appendix A to 10 CFR Part 40 that govern the operation of uranium mills and disposition of byproduct material from these mills to establish requirements for groundwater protection that are specific to ISR facilities. This byproduct material consists of both radiological and nonradiological constituents and is regulated by the NRC in accordance with the Atomic Energy Act (AEA) of 1954, as amended. Section 11e.(2) of the AEA defines this type of byproduct material as “the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.”⁵

The NRC has regulated groundwater protection at ISR facilities by applying risk-informed and best management practices through site-specific license conditions. The proposed rule would codify those ISR groundwater protection requirements currently used in NRC license conditions and described in regulatory guidance, thereby increasing regulatory efficiency and certainty. In addition to establishing ISR-specific regulations, this rulemaking would also clarify that several of the current conventional uranium milling regulations apply to ISR operations, including the use of alternate concentration limits. The proposed rule would also add new definitions specific to ISR operations. Finally, this proposed rule would cross reference the values for the maximum concentrations for groundwater protection for all uranium mills (both conventional mills and ISRs) to the EPA’s maximum contaminant levels (MCLs) regulations for drinking water.

Specifically, the NRC is proposing to establish groundwater protection requirements for ISR facilities by: (1) revising the definition of byproduct material in 10 CFR 40.4 to include liquid wastes from ISR facilities that may impact groundwater; (2) revising the preamble paragraph of Criterion 5, paragraphs 5B(1), 5B(2), 5B(5)(b), and 5C of Criterion 5, Appendix A; (3) adding a preamble paragraph to Section I, “Technical Criteria,” of Appendix A that will identify the classes of applicants and licensees that would be subject to the proposed rule, if ultimately promulgated; (4) adding a new Section VI and Criterion 14 to address ISR facilities; (5) adding, in the Introduction to Appendix A, new definitions for “aquitard,” “corrective action,” “excursion,” “ISR

² Staff Assessment Paper at 1.

³ *Id.*

⁴ Criterion 13 of 10 CFR Part 40, Appendix A, lists the hazardous constituents that are subject to the NRC’s regulation.

⁵ 42 U.S.C. § 2014(e).

facility,” “indicator constituent,” “in situ recovery,” “production unit,” and “wellfield;” and (6) revising the definition of “point of compliance.”

The proposed rule, if promulgated, will apply only to: an application for, and the licensing, operation, and decommissioning of, a new ISR facility, a new wellfield within a licensed ISR facility, or a new production unit within an operating wellfield of a licensed ISR facility, the application for which is submitted after the effective date of the final rule. For its review of any application for a new ISR facility, a new wellfield, or new production unit, the NRC will conduct a separate, site-specific NEPA review to determine the potential impacts to groundwater and to other environmental resources. The proposed rule, if promulgated, would not apply to current licensees who do not expand their facility by adding a new wellfield or production unit.

1.3 Purpose of, and Need for, the Proposed Action

By establishing specific requirements related to groundwater protection at ISR facilities, the proposed rule would continue to ensure that groundwater is protected in an efficient and consistent manner during and after completion of ISR operations. These new requirements would improve regulatory efficiency and allow the NRC’s review process for ISR license applications and amendments to be more consistent and transparent to the public and the uranium recovery industry. Additionally, the promulgation of ISR-specific regulations will also establish a national program for purposes of Agreement State⁶ compatibility and for the NRC’s evaluation and oversight of Agreement State programs for regulation of ISR facilities.

2 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

The NRC staff reviewed and analyzed the proposed rule changes to the definition of “byproduct material” in 10 CFR 40.4 and to the various groundwater protection requirements in Appendix A to 10 CFR Part 40 during the rulemaking development process. The NRC has also identified administrative and editorial changes to clarify the regulations.

The proposed rule includes some actions that are of the types described in 10 CFR 51.22(c). The NRC has previously determined that the NRC actions listed in 10 CFR 51.22(c) do not have a significant impact on the environment and has categorically excluded them from further environmental review under NEPA. As such, the NRC will not prepare an EA or environmental impact statement for the aspects of this proposed rule that fall under 10 CFR 51.22(c)(2). For this proposed rulemaking, the NRC has determined that the (1) the revision of the byproduct definition in 10 CFR 40.4, (2) the addition of definitions in the Introduction to Appendix A for ISR-specific terms; (3) the revision to the “point of compliance” definition; and (4) the addition of applicability language to the Introduction of Appendix A and to Criterion 5 fall under the 10 CFR 51.22(c)(2) categorical exclusion (amendments “which are corrective or of a minor or nonpolicy nature and do not substantially modify existing regulations,...”). The NRC also has determined that the proposed Criterion 14(d)(5) semi-annual report of the results of effluent monitoring pursuant to 10 CFR 40.65, the excursion reporting requirements, and the surface or

⁶ Section 274 of the AEA authorizes the NRC to relinquish or discontinue its regulatory authority over certain categories of radioactive material to a State following a duly executed agreement between the NRC and the governor of the State. 42 U.S.C. § 2021. After the agreement is entered into, the State, now an “Agreement State,” must issue or adopt regulations compatible to those NRC regulations that govern the subject matter areas relinquished to the Agreement State. A State that has not entered into a Section 274 agreement is referred to as a “non-Agreement State.”

near surface leakage or spills of byproduct material reporting requirements fall under the 10 CFR 51.22(c)(3)(iii) categorical exclusion, which relates to “[r]eporting requirements.”

The remaining recommended changes to Appendix A to 10 CFR Part 40 require the NRC to prepare this EA to address the potential associated environmental impacts. These changes are (1) revising the preamble paragraph of Criterion 5, paragraphs 5B(1), 5B(2), 5B(5)(b) of Criterion 5B, and Criterion 5C of Appendix A; and (2) the addition of Criterion 14.

The potential environmental impacts of the proposed action are those which arise from the additional ISR licensee and applicant efforts that may be required to meet the rule’s requirements, if ultimately promulgated, and the benefits to the public health and safety and the environment.

ISR Groundwater Protection Standards in Criterion 5(B)(1)(b) and Criterion 5(B)(2)

The NRC proposes to add a new paragraph 5(B)(1)(b) to Criterion 5 that would establish the applicable groundwater protection standard for ISR facilities with an express cross-reference to paragraph 5B(5) of Criterion 5, which, in turn, sets the hazardous constituent concentration limits that must not be exceeded at the point of compliance in the groundwater. The new paragraph also provides that the Commission will establish the point of compliance and compliance period on a site-specific basis pursuant to Criterion 14, and that the Commission will identify hazardous constituents, establish concentration limits, and may adjust the point of compliance, if needed.

The NRC proposes to revise paragraph 5B(2) of Criterion 5 to provide that, for an ISR facility, a constituent becomes a hazardous constituent subject to paragraph 5B(5) when the constituent meets all three of the tests in Criterion 14(b)(2) (i.e., “(i) The constituent is reasonably expected to be in or derived from the byproduct material produced from ISR operations; (ii) [t]he constituent has been detected in the groundwater in an aquifer; and (iii) [t]he constituent is listed in Criterion 13 of this appendix”).

Revision to Criterion 5(B)(5)(b) and Replacement of Table 5C

The NRC is proposing to revise paragraph 5B(5)(b) of Criterion 5 to cross reference Criterion 5C for determining the MCL for a hazardous constituent concentration, provided that the background level is below the value listed. Additionally, the NRC is proposing to replace Table 5C with Criterion 5C by directly cross referencing the EPA’s 40 CFR Part 141 tables that contain MCLs for drinking water and the maximum concentrations in 40 CFR 264.94 Table 1 only for those constituents not listed in the Part 141 tables (e.g., lead and silver). The proposed revisions will avoid the need for future NRC amendments whenever the EPA revises or adds a new MCL and will thus ensure consistency between the NRC and EPA provisions.

Addition of Section VI and Criterion 14

The NRC proposes to add a new Section VI, Additional Technical Criteria for ISR Operations, to Appendix A, which consists of a new Criterion 14. Criterion 14 would include:

- (1) specific geologic and hydrologic site characterization information to be submitted by the applicant, or as part of a license amendment request, to be submitted by the licensee, to demonstrate site suitability at an ISR facility;
- (2) specific requirements for wellfield characterization by the licensee before initiating ISR operations, including:
 - Characterization of the specific geologic and hydrologic conditions within the wellfield to demonstrate they are suitable to prevent migration of byproduct material from the production unit to surrounding groundwater;
 - Identification, sampling, and analysis of radiological and nonradiological hazardous constituents at point of compliance wells in the production unit and in the aquifers immediately overlying, overlying and adjacent to the production unit to establish hazardous constituent concentration limits (per paragraph 5B(5)(a) or (b) of Criterion 5);
 - Selecting, sampling, and analysis of indicator constituents to detect excursions⁷ in point of compliance wells in the immediately overlying, underlying, and adjacent aquifers to the production unit and determining the upper control limit for each indicator constituent at each point of compliance well;
 - Submission of a wellfield restoration plan.
- (3) well design and construction specifications, mechanical integrity testing requirements, and requirements for the plugging and abandonment of wells to ensure that AEA section 11e.(2) byproduct material fluids do not migrate into the immediately overlying, underlying, and adjacent aquifers to the production unit;
- (4) establishment of: an operating plan with specific requirements to prevent leakage of contaminants from above-surface components of the ISR facility into the uppermost aquifer and migration of AEA section 11e.(2) byproduct material into the immediately overlying, underlying, and adjacent aquifers to the production unit; a monitoring plan to detect such leakage and migration; and requirements for how to report these events.
- (5) requirements for groundwater restoration to be considered a Resource Conservation and Recovery Act of 1976 (RCRA) corrective action as provided for in section VII.c. of the July 2020 “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” (NRC, 2020). Under the RCRA corrective action framework, Criterion 14 will require 3 years of quarterly post-restoration monitoring at the points of compliance after the corrective action has met the approved hazardous constituent concentration limits. The licensee must demonstrate that there has been no statistically significant exceedance of the approved standards for 3 consecutive years. The licensee

⁷ The proposed rule defines an excursion as the detection of indicator constituents that may signal the movement of fluids containing byproduct material from the production unit into surrounding groundwater.

must submit a wellfield restoration report demonstrating compliance with these requirements for NRC approval.

- (6) requirements to undertake corrective action to meet the approved hazardous constituent concentration limits after: detection of contamination in the immediately overlying, underlying, and adjacent aquifers to the production unit from an excursion that lasts more than 60 days; detection of contamination in the uppermost aquifer; and detection of a statistically significant exceedance of the approved hazardous constituent concentration limits in the production unit during post-restoration monitoring.

In this proposed rule, the NRC is codifying its licensing practice over the last 40 years for ISR facilities and adding additional post-restoration groundwater monitoring requirements. This licensing practice has successfully protected groundwater resources in that there have been no known adverse, significant impacts to groundwater quality in surrounding aquifers. Therefore, the NRC finds that the proposed rulemaking, in codifying groundwater protection standards for ISR facilities, would not involve any significant environmental impact.

3 ENVIRONMENTAL IMPACTS OF THE ALTERNATIVE TO THE PROPOSED ACTION

The NRC considered the No-Action Alternative, under which the NRC would not take the action to revise Appendix A to 10 CFR Part 40, thus leaving in place the current regulations and criteria. The NRC has, to date, regulated groundwater protection at ISR facilities by applying risk-informed and best management practices using site-specific license conditions and regulatory guidance that incorporate relevant regulations for groundwater protection in criteria in Appendix A. As discussed in Section 1.1 of this EA, this regulatory approach has been shown to successfully protect groundwater at NRC licensed ISR facilities for over 40 years in that there have been no known adverse, significant impacts to groundwater quality in surrounding aquifers (NRC, 2018; NRC, 2017; NRC, 2014; NRC, 2011; NRC, 2009). Therefore, the NRC considers that there would be no change in environmental impacts associated with this alternative, as the current regulations are protective of public health and safety and the environment.

4 AGENCIES AND PERSONS CONSULTED

The NRC is requesting public comment on this draft EA. The NRC intends to hold a public meeting during the proposed rule comment period to allow stakeholders to ask questions about the proposed rule and this EA. The NRC will consider comments received on the docket as it develops the final rule and the final EA. If the Commission approves promulgation of a final rule, the NRC will issue the final EA when it publishes the final rule.

The proposed rule changes are administrative in nature or would not result in significant impact on the environment. As such, the proposed rule would not result in impacts to Federally-listed threatened or endangered species or their critical habitat; the NRC has determined that Section 7 consultation under the Endangered Species Act is not necessary. Likewise, the NRC has determined that the proposed rule would not have the potential to cause effects on or to historic properties. Therefore, the NRC has determined that it has no further obligations under Section 106 of the National Historic Preservation Act or its implementing regulations (36 CFR Part 800).

5 CONCLUSION

The Commission has preliminarily determined under NEPA, as amended, and the Commission's regulations in Subpart A of 10 CFR Part 51, that the proposed amendments would not be a major Federal action significantly affecting the quality of the human environment and, therefore, an environmental impact statement is not required. The proposed rule would codify ISR ground water protection requirements currently used in NRC licenses and would add additional post-restoration monitoring requirements to enhance these protections. The environmental impacts arising from the changes have been evaluated and would not involve any significant environmental impact. Other amendments are administrative in nature and would have no significant impact on the environment.

The NRC preliminarily determines, through this draft EA, that there would be no significant impact to the environment from this action.

6 REFERENCES

10 CFR Part 40, "Domestic Licensing of Source Material."

10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

Endangered Species Act of 1973, as amended. 16 USC §§ 1531 *et seq.*

National Environmental Policy Act of 1969, as amended. 42 USC §§ 4321 *et seq.*

National Historic Preservation Act of 1966, as amended. 54 USC §§ 300101 *et seq.*

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NRC, 2017. "U.S. Nuclear Regulatory Commission Staff's Comments on the U.S. Environmental Protection Agency's Proposed Rulemaking for 40 CFR Part 192, 82 FR 7400." ADAMS Accession No. ML17173A638. July 17, 2017.

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