

Uranium Recovery Program Update June 10, 2024

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Recovery, and Waste Programs

Presentation Outline

- Opening Remarks Trends and Challenges
- Continued Agreement State focus
- Rare Earth pilot project application
- Wyoming application to supplement their Agreement to add Source Material (Rare Earth)
- License renewals
- Inspections
- Western Nuclear Inc. Split Rock site license termination and transfer to the DOE
- Disa application and SECY 23-0055
- New Potential Source Material Applications
- Specific Uranium Recovery Decommissioning sites

Opening Remarks – Trends and Challenges

- Expected changes over the next 5 years
- Increasing level of public interest at some sites
- Streamlining reviews
- Focus on risk
- Alternate concentration limit reviews
 - Assuring sites transferred to DOE and taxpayers are stable
- License termination and transfer to DOE continuous improvement of the process

□ Increased attention on long-term care fee

Agreement State Focus

- Agreement States have the bulk of the licensed uranium recovery facilities
- Monthly discussions with Wyoming on sites near to transfer to the DOE
- In person/hybrid workshop with Agreement States in November 2023
- Assistance to Agreement States
 - Approved CRR for release of Irigaray Mine Units 1 9 in June 2023 for Wyoming
 - Approved CRR for Intercontinental Energy in February 2024 for Texas
 - Approved draft CRR for La Palangana site in May 2024 and currently reviewing final CRR for Texas
 - Provided support to Washington State related to haul route remediation
- Review of Completion Review Reports (CRR's)
- Linking in DOE early on mill tailings sites and alternate concentration limit applications

Rare earth extraction pilot project application

- Pilot-scale project in Upton, Wyoming to test a new process for extracting rare earth elements
- Rare earth elements of interest include Neodymium, Praseodymium, and several others
- Ore contains levels of Thorium that require licensing
- Congressional interest January 2023 letter from Senators Barrosso and Lummis of WY
- Licensed in July 2023, pre-operational inspections May and August 2024
- Wyoming is not an Agreement State for source material, so the NRC is lead for the review. Wyoming has submitted a supplement to their agreement to include these types of licenses se next slide.
- This is an emerging area. Where the uranium or thorium is at source material concentrations, the NRC or Agreement State would license a part of the processing.

Wyoming Amendment to Agreement – Source Material

- Letter of Intent from Governor Gordon dated February 21, 2023, requested to amend Wyoming's Agreement to regulate source material recovered from any mineral resource processed primary for purposes other than obtaining source material.
- NRC has completed review of Wyoming's draft regulations.
- The Commission approved staff's request (SRM-SECY-23-0075) to amend the Wyoming Agreement by adding a specific subsection of the source material category.
- When the Agreement goes into effect, the NRC will transfer the Rare Earth Resources license to the State of Wyoming.
- Amended Agreement should go into effect late 2025 or early 2026.

License Renewals

- Powertech Dewey Burdock located in western South Dakota
 - □ License Issuance: April 8, 2014, for in situ recovery (ISR)
 - Hearing and additional litigation with Oglala Sioux Tribe and others
 - □ Renewal Application Receipt March 6, 2024
 - □ There has been no construction or operation
 - □ Scope of review changes
 - □ Acceptance review on-going
 - Powertech requests a 20-year license which is consistent with changes that we made

License Renewals

- Crow Butte ISR site located in western Nebraska
- Operating facility that has been in standby since March 23, 2018
- License renewal application to be submitted in October 2024
- Scope of the review will be changes
- Prolonged hearing on last license renewal

License Renewals

- NuFuels (formally HRI) ISR site located in NM, three separate locations, Church Rock (Section 8 and 17), Unit 1, and Crownpoint.
- Facility has not constructed or operated.
- Litigation for ~12 years. Litigation ended in Nov 2010.
- LAR for license renewal March 2013. In 2014, licensee requested additional time to negotiate with Navajo Nation, as licensee expected to make changes to the renewal application.
- NRC put license renewal in abeyance Nov. 2014 until further notice.
- Licensee has access issue to Section 8 with Navajo Nation. Licensee must cross Navajo Nation allottee land to access Section 8. The license requires Section 8 be the first location for ISR activities.
- NRC staff letter Jan 2024 requiring licensee to submit renewal application by Jan 2025.

Inspections

 UR inspection program resides in Region IV's Division of Radiological Safety and Security (DRSS), Decommissioning, ISFSI, and Operating Reactor (DIOR) Branch

□ Greg Warnick, Branch Chief

- Operating Uranium Recovery Inspections
 - IMC 2801 issued October 2021
 - □ Crow Butte (stand-by), inspected annually
- Decommissioning Uranium Recovery Inspections
 - □ IMC 2602 issued December 2022
 - □ Homestake Mining, inspected semi-annually
 - □ Rio Algom Mining and UNC Church Rock, inspected annually
 - ANC Gas Hills, inspected biennial

WNI Spit Rock Tailings Impoundment Site

License Termination / Site Transfer for Long-Term Care

- Completed site transfer of Split Rock in November 2023, additional 20 sites down the road, working through Durita in CO now
- NRC role
 - Completion Review Report (CRR) review (CRR documents all applicable standards and requirements have been met prior to Agreement State's termination of the license)
 - Long-Term Surveillance plan (LTSP) review (includes land transfer documentation, which may include BLM land)

-Technical Evaluation

- Environmental Assessment

- Long-Term Care Fee (LTCF) Determination and Payment Verification (payment by licensee)
- CRR Concurrence and LTSP Acceptance Issuance (results in License Termination and Site Transfer)
- Oversight of DOE's Long-Term Care (under a general license to DOE)

WNI Spit Rock Tailings Land Ownership



Original Application Property Ownership and Restrictive Covenants Areas for the Split Rock, Wyoming, Disposal Site

WNI Spit Rock Tailings Land Ownership



Pre-transition Property Ownership and Restrictive Covenants Areas for the Split Rock, Wyoming, Disposal Site

WNI Spit Rock Tailings Impoundment Site

Lessons Learned - WNI License Termination / Site Transfer for Long-Term Care

Early DOE involvement

- ✓ to facilitate agreement of the DOE's LTSP with the State's license termination determinations (e.g., ACLs, monitoring network)
- Added collaboration with Licensee, DOE, and the Agreement State (more so for complex sites and opposing external views of the review)
 - ✓ to facilitate alignment with our government partners, the licensee, and other external stakeholders.
- Site visit by NRC reviewer for more complex sites
 - ✓ to minimize to the occurrence of a late discovery during NRC's review (e.g., impoundment deep-rooted plants, access, and erosion; as well as the verification of potential receptors of the groundwater plume)
- Early start of the relatively long BLM's land withdrawal process
- LTCF determination after the preliminary approval of the LTSP
- Licensee's payment of the long-term fee when the remaining review schedule is more certain (i.e., upon the receipt of the final LTSP)

Mine Waste Remediation – SECY Paper Update

- Staff delivered SECY 23-0055 to Commission in June 2023
- Staff developed four options for the licensing of emerging technologies used for remediation of mine waste:
 - Option 1 license under the current source and byproduct material framework in Title 10 of the Code of Federal Regulations (10 CFR) Part 40, including Appendix A, with exemptions and alternative standards for specific criteria, as appropriate, on a case-by-case basis.
 - Option 2A license under the source material framework for the site.
 - Option 2B license under the source material framework as a service provider.
 - Option 3 create a standardized position in guidance or regulations by which applicants can be exempt from certain Appendix A requirements.
 - □ Option 4 propose a legislative change.



Photo from EPA's Final Treatability Study (December 2023)

Mine Waste Remediation Results from EPA Treatability Study

- Final EPA Treatability Study completed in December 2023
- Treatability study performed on mine waste from 3 abandoned uranium mines on Navajo Nation
- HPSA technology achieved greater than 90 percent reduction in uranium and Ra-226 concentrations in the treated coarse fraction
- Treated coarse fraction does not leach metals or radionuclides above water quality standards
- NRC staff views
 - The HPSA technology can be effective in certain situations, depending on physical and radiological characteristics of the mine waste.
 - EPA's treatability study does not alter the staff's recommended option in SECY 23-0055.
 - The treatability study does not change the statutory/regulatory construct discussed in SECY 23-0055.



Post-HPSA Treatment

From Figure 4 in EPA's Final Treatability Study (December 2023)

Mine Waste Remediation SECY Paper -Recent Activities

- Awaiting direction from Commission
- Letters from external stakeholders
 - □ Senators from Arizona, Wyoming, Utah, and West Virginia
 - □ Letter from Navajo Nation EPA
 - □ Correspondence from other interested parties

Parameter	4-Minute HPSA		8-Minute HPSA		30-Minute HPSA	
Low-Concentration	Uranium (mg/kg)	Radium-226 (pCi/g)	Uranium (mg/kg)	Radium-226 (pCi/g)	Uranium (mg/kg)	Radium-226 (pCi/g)
Feed Concentration	110	31.8	110	31.8	110	31.8
Coarse Fraction Concentration	16.6	5.1	19.5	4.6	10.4	4.0
Fines Fraction Concentration	230	112	230	120	210	95.5
Site-Specific Cleanup Goals	3.2	2.0	3.2	2.0	3.2	2.0
Contaminant Reduction	84.9%	83.9%	82.3%	85.7%	90.6%	87.3%
Contaminant Recovery in Fines	80.1%	86.4%	76.5%	87.9%	86.6%	88.3%
Treated Mass to Fines Fraction	22.5%		21.6%		24.2%	
Medium-Concentration	4-Minute HPSA		8-Minute HPSA		30-Minute HPSA	
Feed Concentration	230	91.9	230	91.9	230	91.9
Coarse Fraction Concentration	18.2	8.0	13.3	8.2	10.3	5.7
Fines Fraction Concentration	770	372	710	357	640	328
Site-Specific Cleanup Goals	3.2	2.0	3.2	2.0	3.2	2.0
Contaminant Reduction	92.1%	91.3%	94.2%	91.0%	95.5%	93.8%
Contaminant Recovery in Fines	91.4%	92.1%	93.2%	91.8%	95.1%	94.7%
Treated Mass to Fines Fraction	20.0%		20.6%		23.8%	

From Exhibit 11 in EPA's Final Treatability Study (December 2023)

New Potential Source Material Applications

- Letter of Intent dated October 31, 2023, from Thorium Energy Alliance
 - Intend to submit a license application for a "Thorium Storage/Manufacturing Facility" (TSMF) in Sullivan, Missouri (ML23305A131)
 - □ End products thorium chloride, thorium oxide, thorium tetraflouride
 - NRC staff acknowledgement letter issued February 6, 2024 (ML23356A090)
 - Encourages pre-application discussions to better understand the processes, quantities, and hazards associated with your proposed activities

New Potential Source Material Applications (continued)

- Letter of Intent dated November 28, 2023, from Caldera Holdings, Inc.
 - Intend to submit a license application for a rare earth processing facility at the Pea Ridge Mine in Sullivan, Missouri (ML23342A194)
 - □ Plan to process existing iron ore tailings for rare earth elements.
 - Anticipate possessing thorium over 0.05% weight threshold, plan to isolate thorium in liquid form and send to Thorium Energy Alliance facility
 - NRC staff acknowledgement letter issued February 6, 2024 (ML24008A118)
 - Encourages pre-application discussions to better understand the proposed activities

SPECIFIC URANIUM RECOVERY DECOMMISSIONING SITES

Homestake Site Grants, NM

Milan

Interstate 40

Zeolite

Route 66/122

Route 605

Route 334

Evaporation ponds

Small Tailings and Evaporation ponds

Reverse Osmosis Building

Large Tailings

Historic Mill Location

Google Earth

2016 Conge 2018 (1831) age Lenosa / Scienci

Homestake site

- Conventional mill tailings site located in Grants/Milan, NM
- Active groundwater corrective action program
- ACL application submitted Aug. 2022
 - □ Non-acceptance letter May 2023 (ML23119A006)
 - Very complex geology and large plume under many private properties
 - Need ownership or institutional controls see next slide
 - □ NRC reviewing Homestake Feb. 2024 response
- Sept. 2023, OE relaxation of CO GCAP requirement (ML23233A105)
 - GCAP Crosswalk submitted March 2024 (ML24092A406)
- LTP ET cover design change submitted in July 2023 (ML23222A171)
 - Accepted for review Oct. 2023
 - □ RAI's issued April 2024 (ML24089A054)
- Radon/gamma background location change settlement March 2024
- EPA superfund site coordination with EPA Region 6
- Coordination with the State of NM and DOE

Homestake Proposed Long-Term Care Boundary



HMC 2022 Alternate Concentration Limit License Amendment Request

UNC Church Rock site

- Conventional mill tailings site located in Churchrock, NM
- Adjacent Northeast Churchrock uranium mine site Number 1 Navajo priority site out of over 500 abandoned uranium mines
 - EPA led cleanup
- License amendment request to bring mine waste onto the NRC mill site
 - EIS with consultation with Navajo Nation and coordination with the EPA, DOE, and State
 - Revised schedule due to extension of draft EIS comment period and additional outreach with Navajo Nation
 - Commission involvement
 - □ Revised SER Completed February 2023
 - □ Final Environmental Impact Statement Completed February 2023
 - □ License Amendment Decision Completed February 2023
 - Work with EPA on timing of construction activities
- Inspections focus on erosion risk (civil engineering expert)

Sequoyah Fuels – Disposal Cell

- Uranium conversion facility located near Gore, OK
- On-site disposal cell for 11e2 byproduct material
- Cover system construction in progress
- ACL application expected in FY2025



Sequoyah Fuels 4/2024



Sequoyah Fuels 4/2024 - cell



Sequoyah Fuels – Ground Water Contamination





Figures from SFC's 2024 annual ground water monitoring report

Sequoyah Fuels site (2024 photo)



Sequoyah Fuels site (2024 photo)



Questions?



Photo: Sedona AZ 2024