Homestake Mining Company Superfund Site

March 25, 2021

National Remedy Review Board

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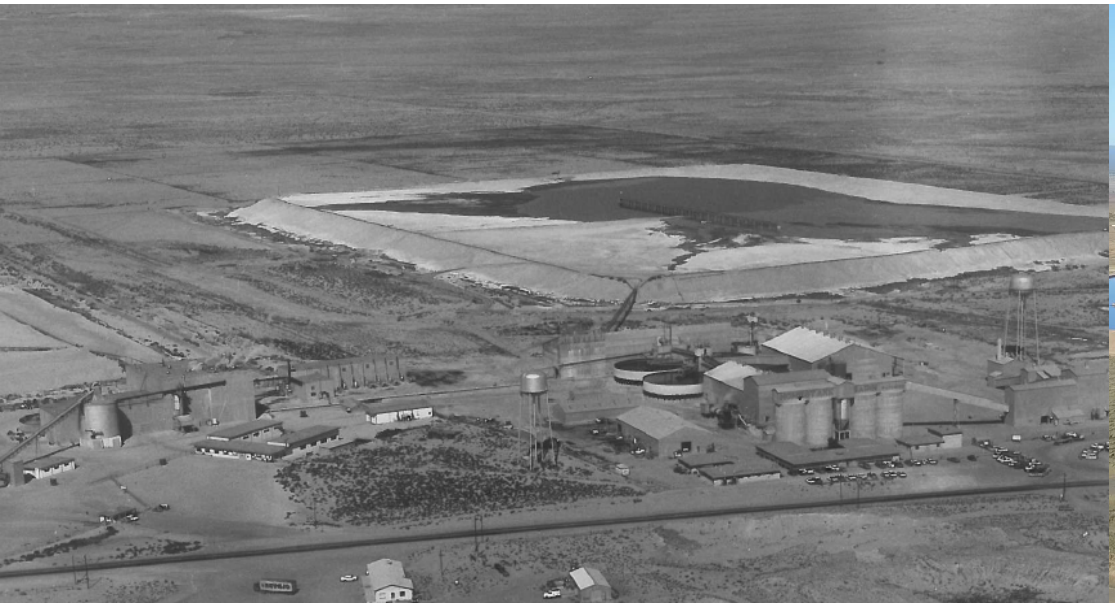

Agenda

- Site Overview
- Regulatory Oversight
  - NRC, EPA, & NMED
- History of Remediation
  - Surface & Groundwater
- Path Forward
  - Technical Impracticability

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Site Overview

- Located in Cibola County, New Mexico, ~5.5 miles north of the Village of Milan
- Uranium processing mill operated from approx. 1958 to 1990.
- Historically supplied uranium to the United States.
- 3 operable units: tailing seepage contamination of groundwater aquifers (OU1), long-term tailings stabilization, surface reclamation and site closure (OU2), and radon concentrations in neighboring subdivisions (OU3).
  - **Current focus is OU1 and OU2**
  - EPA issued a ROD for OU3 in Sept. 1989 requiring no further action.

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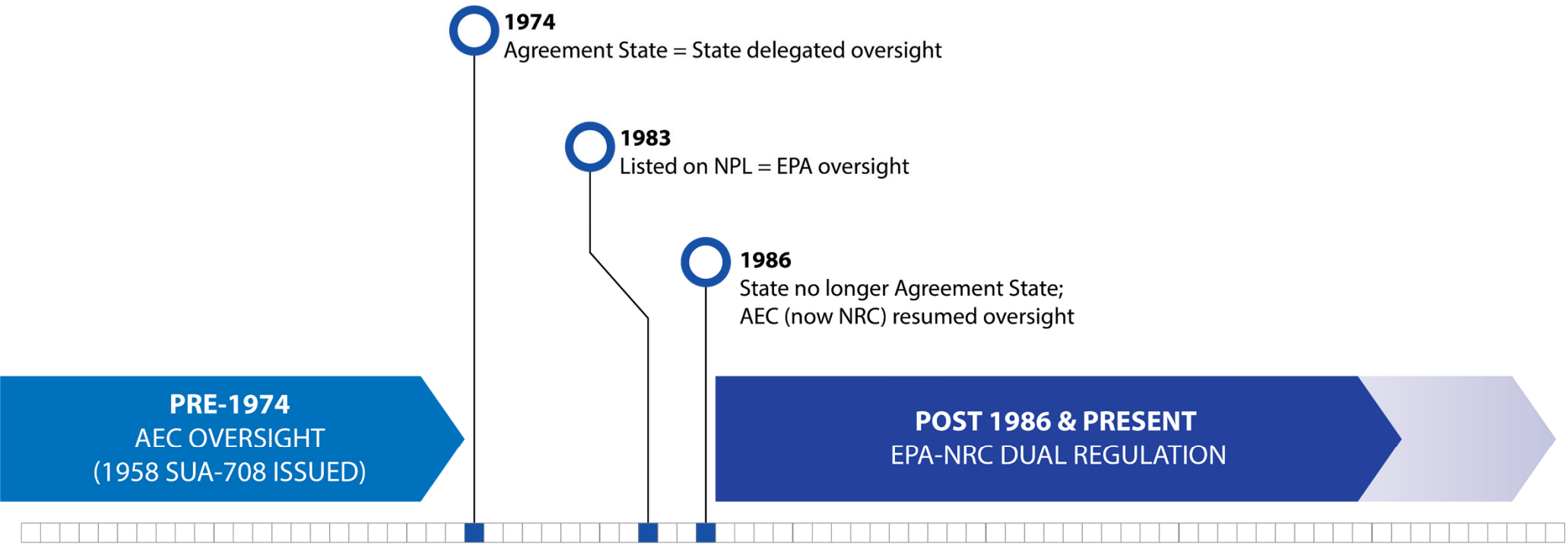
Regulatory Oversight

1. Nuclear Regulatory Commission (NRC) (Lead Agency)
2. United States Environmental Protection Agency (EPA)
3. New Mexico Environment Department (NMED)

How Did EPA-NRC Dual Regulation Happen?



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CERCLA Equivalency

- "Equivalency" approach approved by agencies 2012.

- **Equivalency Goal**: simultaneously meet Homestake's CERCLA obligations while achieving its NRC obligations. NRC process remains the lead, via the MOU, but allows EPA to also achieve its goals parallel to the NRC actions.

  - Equivalency = satisfy CERCLA obligations by substantial compliance with NCP requirements resulting in a CERCLA-quality cleanup. See 40 CFR § 300.700(c)(3).

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Current CERCLA Status

- Prepared documents in cooperation with Region 6 using work performed for NRC & supplementing where necessary
  - RI (including HHRA, BERA, CSM) –approved by EPA
  - Candidate Technologies Memorandum
  - Screening of Remedial Alternative Memorandum
  - Entered into AOC for preparation of FS, including TI Waiver Evaluation
    - Submitted TI on Nov. 16, 2020
    - Submitted FS on Dec. 15, 2020

History of Remediation: Surface

- **1988 – 1993:**
  - HMC excavated windblown materials with elevated radium-226 concentrations in areas adjacent to the tailings piles and placed the soil on the piles.
  - Approx. 1,200 acres of surface soils removed.
- **1993 – 1995:**
  - Mill decommissioned and demolished.
  - Average of two feet of contaminated soil (containing elevated radium-226 concentrations) excavated from the mill area following the completion of demolition and transported to the LTP and STP. Excavated areas were backfilled with alluvial soils, as well as rock for erosion protection.
  - Tailings piles were stabilized by regrading, soil covers and rock on the side slopes for erosion protection.

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History of Remediation: Groundwater

- Approx. 10 billion gallons collected over 4 decades of remediation
- Over 1 million pounds of Uranium removed
- Over $230,000,000 spent

Detailed Groundwater Remediation Efforts

Remediation and monitoring activities began circa 1976 under applicable state and federal licenses and authorities. The following is a brief summary of the groundwater remediation efforts conducted at the Site:

- **1975 – HMC began providing bottled water to residents of nearby subdivisions upon request.**
- **1976 – HMC entered into agreement with NMEID to provide bottled water to residents located hydraulically downgradient of the source areas.**
- 1977 - Water is added into the alluvial aquifer to create a hydraulic barrier to limit the movement of contaminated groundwater
- **1977-1983 - Multiple hydraulic extraction wells were installed in the alluvial aquifer.**
- 1984 - Hydraulic containment of the Upper Chinle aquifer was initiated.
- **1986 - Extension of the Milan water supply to the Broadview Acres, Felice Acres, Murray Acres, Valle Verde, and Pleasant Valley Estates subdivisions was initiated.**
- 1990 – Evaporation Pond EP-1 was constructed within the footprint of the STP to assist in the dewatering of the LTP and to hold water pumped from the collection wells.
- 1992 - Toe drains were installed around the tailings (LTP/STP).
- 1993-2000 - During this period, corrective action and monitoring well networks were revised through addition and abandonment of wells.
- 1994 - HMC completed bench-scale treatability testing for ion exchange and activated alumina.
- 1996 - Use of Evaporation Pond EP-2 began in March.
- 1999 - The reverse osmosis (RO) treatment unit was added; treated water is used for hydraulic containment of the alluvial aquifer.
- 2000 - Irrigation of 270 acres groundwater was initiated as a means to manage extracted groundwater. HMC began flushing program.
- 2000-2015 – Tailings flushing of the LTP was conducted where water was introduced into the LTP to expedite the mass flux of contaminants from the tailings.
- 2002 - 60 acres of irrigation area were added and added an additional RO skid to plant for increased treatment rate.
- 2002-2009 - During this period, corrective action, and monitoring well networks were revised through addition and abandonment of wells.
- 2004-2005 - 64 acres of irrigation area were added.
- **2006 - EPA, NMED, and NRC approved groundwater site standards**
- 2010 - Evaporation Pond EP-3 was constructed and commissioned.
- 2012 - Land Application program ceased operation
- 2012 - 300 gpm Zeolite pilot treatment started operation.
- 2015 - RO Plant was expanded to a theoretical maximum throughput of 1200 gpm with the addition of a 600 gpm low pressure skid, a 250 gpm high pressure skid, and two microfiltration skids to replace the existing sand filters amongst other updates.
- 2016 - Zeolite system with a theoretical maximum throughput of 1200 gpm started operation for off-Site water treatment..
- 2016 - EPA initiated background reassessment study (USGS split sampling event)
- **2018 - HMC (Arcadis) borehole development and geophysics programs near wells DD and DD2 (Controls on Groundwater Background Constituent Concentrations due to Mineralogy Local to Monitoring Wells)**
- **2019 - In collaboration with EPA, HMC conducted additional field investigations to expand the characterization of the soils east of wells DD and DD2, across the alluvial channel (Supplemental Background Soil and Groundwater investigation Report Grants Reclamation Project)**

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Path Forward: Technical Impracticability Waiver

- Draft TI waiver evaluation submitted Nov. 16, 2020.
- Draft FS submitted Dec. 15, 2020 **proposing long-term monitoring, institutional controls, and TI waiver**.
- Homestake has already conducted 40+ years of groundwater remediation and even with 360+ years of continued remediation will not reach ***present*** groundwater standards.
- Continued Sources:
  - Primary: LTP/STP
  - Secondary: vadose beneath LTP/STP and silt/clay in heterogeneous aquifer

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Groundwater Remediation Is Technically Impracticable

- Unable to remediate the primary source (LTP/STP) and secondary source (vadose and silt/clay in alluvial aquifer beneath the LTP)
- HMC has remediated for 40+ years
  - **Applied all available technologies** (RO treatment, Zeolite treatment, ion exchange, in situ phosphate treatment, in situ bioremediation, amongst others)
  - **Treatability studies** (Tripolyphosphate, Electrocoagulation, In-situ biological treatment) – each supported impracticability
- ARARs cannot be achieved in a reasonable timeframe. 1st Order of Decay Analysis:
  - Uranium – over 200 yrs
  - Molybdenum – over 300 yrs

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Protective Measures

Already implemented:

- Land Purchase - HMC currently owns approx. 74% (4,200 acres of the total 5,700 acres) of the land within the LTC/TI Zone Boundary
- Alternative Groundwater Supply – HMC connected all residents in subdivisions to municipal water system
- Groundwater Use Restrictions - Office of the State Engineer Order restricting well drilling

Future measures:

- Continued property acquisition
- Water well abandonment
- Point of use treatment if necessary
- Water use restrictions including restrictive covenants.

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Summary

- **HMC has done everything that is practicable**
  - HMC has applied all available remedial strategies and tested all technologies
- **All alternatives require a TI waiver**
  - Even remediating for 200 years with overly optimistic system capacity requires a TI waiver
- **HMC is presently and will continue to implement a protective strategy**
- **A TI waiver aligns with the other regulatory programs**
  - NRC ACLs
  - NMED AAS (if necessary)

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