A U.S. Department of Energy Site-Specific Advisory Board

NNMCAB Members

March 28, 2023

Mr. Michael Mikolanis, Manager
Environmental Management Los Alamos Field Office
1200 Trinity Drive, Suite 400
Los Alamos, NM 87544

Dear Mr. Mikolanis,

I am pleased to enclose Recommendation 2023-02 "Chromium Plume Final Remedy and Concurrent Enhanced Monitoring for Plume Nature and Extent," which was unanimously approved by the Northern New Mexico Citizens' Advisory Board during its meeting on March 15, 2023.

Please contact me if you have questions regarding this recommendation. We look forward to the response from the Department of Energy.

Sincerely,

Cherylin Atcitty

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Chair, NNMCAB

Enclosure: a/s
Cc w/encl:
U. S. Senator Ben R. Lujan
U. S. Senator Martin Heinrich
U. S. Congresswoman Teresa Leger Fernandez
Secretary James C. Kenney, NMED
Elizabeth Gilbertson, EM-LA Deputy Manager
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NORTHERN NEW MEXICO CITIZENS' ADVISORY BOARD
Recommendation to the Department of Energy
No. 2023-02
Title: Chromium Plume Final Remedy and Concurrent Enhanced Monitoring for Plume Nature and Extent

Drafted by: Elena Fernandez

Background

The Hexavalent Chromium (Cr) Plume [Cr (VI) plume)] exists in the regional aquifer beneath the area of Los Alamos National Laboratory (LANL), Los Alamos, New Mexico, and possible infiltration into other significant waters within the Española Basin that support not only the environment and ecology, but the local communities and their livelihood, agricultural, cultural and traditional uses (Longmire, 2022). The Department of Energy Office of Environmental Management (DOE/EM) Los Alamos (EM-LA) has worked diligently to mitigate and contain Cr plume migration (McCrory, 2022; N3B, 2022a; N3B, N.D.); however, the Cr (VI) plume continues to flow in the general direction of west to east and northwest to southeast across the Pajarito Plateau and toward the land-based communities, including Tribal Sovereign Nations within New Mexico, and especially the Pueblo of San Ildefonso, toward the Los Alamos County drinking well PM3, and toward the Rio Grande as well as possible infiltration into the waters within the Española Basin and waters of the historic Rio Grande (McCrory, 2022). Two of the Interim Measures (IM) for Cr (VI) plume remediation have proven infeasible for this particular scenario (N3B, 2022b; N3B, N.D.). A hydraulic barrier (clean or treated water injected into parts of the Cr plume) has shown some effectiveness in slowing Cr (VI) plume migration in certain parts of the plume (McCrory, 2022, Department of Energy Office of Environmental Management Los Alamos, 2022); however, this IM is not entirely effective due to incomplete data and uncertainty from the nature and extent of the Cr (VI) plume, and Cr plume injection practices have exacerbated or caused regulatory violations in other parts of the Cr (VI) plume (NMED Ground Water Quality Bureau, 2022; N3Bc, 2022). Concurrently, the *Pump and Treat Plume Control Interim Measure* has yielded encouraging results for addressing the Cr (VI) plume via extraction and treatment (Department of Energy Office of Environmental Management Los Alamos, 2022; McCrory, 2022; Longmire, 2022) and appears to be an agreeable and somewhat favorable IM candidate for Final Remedy by NMED, DOE/EM-LA, members of the Northern New Mexico Citizens' Advisory Board (NNMCAB) and some local stakeholders.

Comments and Observations

Since its inception in 1994, the NNMCAB has been given the opportunity, on a 28 yearly basis, to participate in the development of top clean-up priorities for Environmental Management of Legacy Waste at Los Alamos National Laboratory, the clean-up program of which is under the purview of DOE/EM-LA and performed by its remediation subcontractor Newport News Nuclear BWXT-Los Alamos, LLC (N3B). This recommendation is consistent with that opportunity and responsibility, and the NNMCAB is accountable to the public of New Mexico.

Total dissolved Cr, consisting of Cr (III) and Cr (VI) is a heavy metal and regulated hazardous waste as listed under the Resource Recovery and Conservation Act (RCRA), is regulated by the United States Environmental Protection (USEPA) (USEPA, 2022), and the New Mexico Environment Department

(NMED) including NMED's Ground Water Quality Bureau (GWQB) through the New Mexico Water Quality Control Commission Regulations (WQCC) (NMED Ground Water Quality Bureau, 2022) and the Hazardous Waste Bureau (HWB) (NMED Hazardous Waste Bureau, 2018). Remediation of the Cr (VI) plume is a priority under the *2016 Order on Consent* and as agreed to by the NMED and DOE/EM, Los Alamos (EM-LA) (New Mexico Environment Department and Department of Energy, 2017). The Cr plume was discovered in December 2005, and subsequently IMs were implemented in an attempt to mitigate and/or clean-up the Cr (VI) plume. As now, up to 160,000 lbs. of hexavalent Cr was released into the environment, more than 400 million gallons of groundwater has been treated, and more than 680 lbs. of Total Cr—the principal majority of which is Cr (VI) (L. Bishop, E. Evered, personal communication, February 15, 2023)—has been removed from the regional aquifer (McCrory, 2022, Longmire, 2022). The two separate chemical amendment IMs that utilized 1) sodium dithionite and 2) molasses proved inappropriate for this unique area, an insufficient number of monitoring wells and the failure of extraction and injection wells (construction and plugging) have not yielded significant data necessary for a complete nature and extent of the Cr (VI) plume. These data gaps, unsuccessful remediation of the entire plume, and subsequent uncertainty compounded by regulatory violations (NMED Ground Water Quality Bureau, 2022), are of such an extent as to slow progress toward a final remedy. However, extraction and treatment IM (*Pump and Treat Plume Control Interim Measure*) has yielded the best results for addressing remediation of Cr (VI) plume (McCrory, 2022).

The NNMCAB applauds the efforts to hydraulically slow the migration of the Cr (VI) plume in some areas, and the removal of more than 680lbs of Chromium. The NNMCAB also supports the regulatory oversight that creates an environmentally protective and technically defensible removal and treatment process (NMAC Title-19, 2023; NMAC Title-20, 2023; NMAC Title-21, 2023), the ongoing protections of the integrity of the area and affected communities, and the integrity of the water balance, beneficial use—within the scope of the existing water rights—and protection from causation of mainstream depletions of the Rio Grande (NMSA Chapter 72, 2023) that is detrimental to the public welfare (Formal Protest of Application, 2020). The NNMCAB acknowledges the time and effort put into the IMs, and the input from stakeholders', land-based communities', and New Mexico Tribal Sovereign Nations' concerns and suggestions for remediation and simultaneous protection of livelihood, environmental integrity, agricultural, and cultural and traditional use of the area and its waters.

The NNMCAB has reviewed clean-up and IM remedies, issues, possible final remedy, supporting and enabling documents, and presentations regarding the Hexavalent Chromium Plume presented and submitted to the NNMCAB and made and publicly available throughout CY 2022:

- Update on Hexavalent Chromium Model Update: LANL Legacy Waste Technical Working Group (TWG) 2022, May 4 (N3B, 2022a).
- Biogeochemical Remediation of the Chromium Plume in the Regional Aquifer, Los Alamos, New Mexico Ground Water Quality Bureau: Presentation to Los Alamos County Community Engagement, April 6, 2022 (Longmire, 2022).
- NNMCAB Site-visit of some of the Legacy Waste and remediation sites at Los Alamos National Laboratory including the Cr (VI) plume area, June 15, 2022
- DOE/EM-LA Strategic Vision Forum, October 3-4, 2022
- DOE/EM-LA Environmental Community Forum, October 26, 2022
- NNMCAB Meeting November 15, 2022 (McCrory, 2022). Los Alamos National Laboratory Legacy Waste Technical Working Group, December 7, 2022

Based the on the data and information available, and in the interest of the safety, wellbeing of the regional environment (and in consideration of migration across all other downwind communities) and environmental justice of land-based communities and New Mexico Tribal Sovereign Nations, the NNMCAB is providing the following as our input for the Cr (VI) plume remediation as a top clean-up priority for FY 2023, and for concurrent implementations and activities until the final remedy is approved, installed, and functional. Public health and safety and environmental justice are some of our highest priorities; therefore, we are hopeful that existing EM legacy cleanup funding and future monies be made available and that Congress appropriates full base-line funding necessary for this comprehensive clean-up effort. Furthermore, it is our recommendation the following should be reasonably implemented and completed *concurrently*.

Recommendation

1. The NNMCAB supports the *Pump and Treat Final Remedy* to extract Chromium [i.e. Total Cr and in particular CR (VI)] contaminated groundwater, treatment of that water to drinking water standards (50 parts per billion) to the best regulatory extent possible, and then reinject or apply the treated water back into the aquifer to recharge and maintain the water balance of the regional aquifer. The studies – to date – of the *Pump and Treat Plume Control Interim Measure* demonstrate a feasible final remedy given the complex hydrogeological makeup of Los Alamos County and the affected vadose zone, regional aquifer, and impacted wetlands (McCrory, 2022).
2. The NNMCAB recommends DOE/EM-LA and NMED immediately begin scientifically, regulatory based, and public-informed negotiations and agree upon the final remedy in calendar year 2023.
3. The NNMCAB recommends DOE/EM-LA begin preparation toward implementation of the Pump and Treat Final Remedy in calendar year 2023.
4. The NNMCAB recommends DOE/EM-LA install an enhanced monitoring well network for better understanding of the *Nature and Extent* of the Cr (VI) plume to fill-in existing data gaps to the greatest extent possible in an attempt to address uncertainty (McCrory, 2022).
5. The NNMCAB recommends DOE/EM-LA install a Pump and Treat System to run concurrent with the nature and extent monitoring and data-gathering and select the best available location for system installation that does not negatively impact nor exacerbate movement of the Cr plume.
6. The NNMCAB recommends that DOE/EM-LA report and respond in a reasonably and timely manner to their regulators and stakeholders: progress, any concerns, accidents, or delays that may arise with the concurrent installation and monitoring.
7. The NNMCAB recommends that DOE/EM-LA reasonably and timely reports on the Final Remedy in the interest of environmental and community safety and under the scope of environmental justice.

Intent

It is the intent of this recommendation to voice the NNMCAB's comments, concerns, and support of the Final Remedy, and to have input into providing guidance to DOE/EM-LA based on the best science available and in the best interest of the health and wellbeing of land-based communities and New

Mexico Tribal Sovereign Nations. It is also the intent of this recommendation for the NNMCAB to be an ally of and proponent for advancing environmental justice within those affected communities and the citizens of New Mexico. It is also the intent of this recommendation to voice concerns and offer guidance on best management and precautionary practices in the interest of the health and wellbeing of the local environment and ecology, protecting those natural resources that may be directly affected and those areas that are secondarily affected by fate-and-transport of contaminants through the air, soil, and water cycle, as well as biological uptake. It is also the intent of this recommendation to support compliance with federal and local regulations to the greatest extent possible for effective and safe remediation based on the best available science and data possible that are all technically and regulatorily defensible.

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