

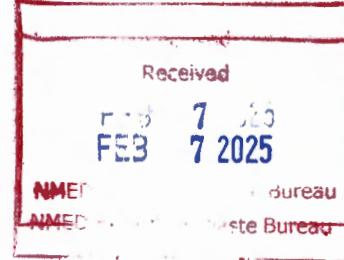


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DEPARTMENT OF ENERGY
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos, New Mexico 87544

ENTERED

EMLA-25-BF048-2-1

Mr. JohnDavid Nance, Hazardous Waste Bureau Chief
Designated Agency Manager
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6313



February 7, 2025

Subject: Response to the New Mexico Department Environment Department Notice of Disapproval Received on December 10, 2024, and Proposed Approach to Incorporating Independent Technical Review Team Report Recommendations into the Chromium Campaign

Reference(s): 1. NMED Letter, J. Nance to A. Duran, "Response to NMED Letter Re: "EM-LA Response to Notice of Disapproval Chromium Interim Measures and Characterization Work Plan", Dated January 3, 2024, Los Alamos National Laboratory, EPA ID#NM0890010515, LANL-22-076," dated December 10, 2024

Dear Mr. Nance:

The U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office (EM-LA) is in receipt of the New Mexico Environment Department (NMED) notice of disapproval (Reference 1) and understands the direction to submit a revised work plan to the NMED Hazardous Waste Bureau (HWB) within 60 days of receipt of the letter. The final report of the Independent Review of the Chromium Interim Measures Remediation System in Mortandad Canyon, Los Alamos, New Mexico by the Independent Review Team (IRT) provides multiple recommendations to EM-LA and NMED-HWB. Revised responses, informed by the report's recommendations, are provided in Attachment 1. EM-LA requests a meeting with NMED-HWB by March 7, 2025, to discuss the path forward to finalization of the revised Chromium Interim Measures and Characterization Work Plan.

EM-LA looks forward to working with NMED-HWB through the resolution of the ITR recommendations, finalization of the Interim Measures and Characterization Work Plan, and moving toward a new phase of the Hexavalent Chromium Campaign.

41101



If you have any questions or need additional information, please contact Brian Harcek at (505) 692-4261 (brian.harcek@doe.gov).

Sincerely,



Digitally signed by
Brian G. Harcek
Date: 2025.02.06
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Brian Harcek
Director, Office of Quality &
Regulatory Compliance
U.S. Department of Energy
Environmental Management
Los Alamos Field Office

Enclosure(s):

1. Two hard copies with electronic files:
Chromium Interim Measure and Characterization Work Plan NOD Comment Disposition –
Updated EM-LA Responses based on the Independent Report (EM2025-0036)

cc (letter emailed):

Laurie King, EPA Region 6, Dallas, TX
Earthea Nance, EPA Region 6, Dallas, TX
Raymond Martinez, San Ildefonso Pueblo, NM
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NOD Comment Number	Original NMED Comment	EM-LA NOD Response (July 24, 2023)	NMED Response to EM-LA (January 3, 2024)	IRT Summary	IRT Reference	IRT Topic and Recommendation	Revised EM-LA Response
General Comment #1	After the submission of the Interim Measures and Characterization Work Plan (Work Plan) on September 29, 2022, the NMED Hazardous Waste Bureau (HWB) directed DOE to not restart operations at CrEX-1, CrEX-2, CrEX-3, CrIN-1, CrIN-2, and CrIN-3, that had been offline due to electrical issues, until further notice via an email sent and received on November 21, 2022. Additionally, NMED Ground Water Quality Bureau (GWQB) directed DOE in a letter, Corrective Action Plan Response and Further Action Required, Los Alamos National Laboratory Underground Injection Control Wells, DP-1835, to cease all injections authorized under Discharge Permit 1835 (DP-1835) by April 1, 2023. Due to this change in regulatory directive after the submission of the Work Plan, additional revisions to the Work Plan are required.	The work plan was developed to address data gaps and continued operation prior to specific operational direction from NMED. These data gaps still need to be addressed after restarting the interim measure. EM-LA will continue to work with NMED GWQB to address requirements to restart the interim measure.	NMED agrees that the work plan was developed to address data gaps and continued operation of the interim measures remediation system. As the work plan is currently written, the document states that the interim measures will consist of operation of the underground injection control wells, extraction wells and treatment train. Revisions to the text must specify that approval of the Interim Measures and Characterization Work Plan will not indicate approval to operate the interim measures pump and treat system without GWQB approval. Revisions also must include discussion regarding the ability to fulfill the data gap activities specified in Section 4 under the current operational constraints due to regulatory directives.	NA - The IRT does not discuss generation of a workplan with the IM system off, as the specifics of document generation are outside of IRT's scope. However, the IRT's single most important recommendation is to restart the IM, while other studies and field investigations move forward.	Executive Summary; Section 1.2	Topic 1 - recommendation 1: the restart of the IM system is recommended.	The IM system was restarted under GWQB-approved conditions. Additionally, the IRT recommends to keep the system operational while other studies and investigations move forward. Therefore, the new work plan will not include discussions regarding the ability to fulfill data gap activities under a no-injection constraint.
General Comment #2	Section 4.1, Objective 1: Provide Interim Measures to Prevent Migration of the Plume Beyond the Laboratory Boundary, of the Work Plan must be revised to include a discussion of alternative injection scenarios (i.e., shallow infiltration gallery, conversion of existing well outside the plume to an injection well, constructing a new injection well outside the plume boundary, etc.). The Work Plan must also be revised to include a proposal from DOE for an investigation activity that will achieve the regulatory requirement to implement an alternative injection well location for the treated water.	The proposed analysis and evaluations will be performed during preparation of a corrective injection scenarios (i.e., shallow infiltration gallery, conversion of existing well outside the plume to an injection well, constructing a new injection well outside the plume boundary, etc.). The Work Plan must also be revised to include a proposal from DOE for an investigation activity that will achieve the regulatory requirement to implement an alternative injection well location for the treated water.	NMED does not currently have the data necessary to adequately evaluate final remedy alternatives proposed in a corrective measures evaluation (CME). The CME is currently an Appendix B target for FY25. EM-LA could accelerate performance of the CME to facilitate this analysis. EM-LA proposes future monitoring wells are designed to be "convertible" for infrastructure use, e.g. 8-inch diameter and with longer screens suitable for injection or extraction such that wells may be added or removed from the pump and treat system as needed based on Adaptive Site Management practices.	The IRT supports pursuing an alternative cleaned water return system (Section 3.3.2.1). The IRT report evaluates six potential locations and designs for the clean water return system (Section 3.3.4). Additionally, the IRT report states that alternative cleaned water returns would promote adaptive site management strategies (section 3.3.5).	Section 3.3.2.1; Section 3.3.4; Section 3.3.5	Topic 3 - recommendation 1: an alternative cleaned water return system is recommended.	The revised work plan will describe a methodology to evaluate the technical feasibility of alternative treated water return systems. The revised work plan will also outline the approach to adaptive site management.
General Comment #3	The investigation activities and methods presented throughout Section 4 are necessary to fulfill the required data gap categories. However, the document must be revised throughout to include the prioritization of each investigation activity, including an estimated schedule for initiation or completion of each activity. Section XV.C, Interim Measures/Emergency Interim Measures, of the Compliance Order on Consent (June 2016) requires that the Interim Measures Work Plan shall include estimated implementation schedules for completion of the interim measures. Specifically, the text must clarify which investigation activities will be conducted concurrently and the anticipated completion order for each of the activities presented	NMED and EM-LA reached agreement on relative prioritization of data gaps and objectives on July 27, 2022 and the agreed upon priority table will be added to the revised work plan. A working schedule, reflective of the agreed upon priority will be developed and included in the revised work plan. EM-LA and NMED will review and adjust priorities if necessary, as part of the quarterly reports and meetings. This would initiate a collaborative relationship for adaptive site management of the hexavalent chromium plume. Work under this Chromium Interim Measures and Characterization Work Plan does not fall under Section XV.C of the Consent Order; this work plan is a campaign completion work plan.	EM-LA must provide a schedule in the revised work plan to address NMED's request for an estimated work plan activity implementation schedule that includes detailing actions that will be planned concurrently. The anticipated schedule of activities is important for prioritizing work in the annual planning under the 2016 Compliance Order on Consent. Additionally, the work under this Chromium Interim Measure and Characterization Work Plan will fall under Section XV, including the requirements to provide estimated implementation schedules for completion of the interim measures specified in Paragraphs C and D of Section XV. The Notice of Disapproval letter states that the Work Plan is subject to reporting and interim measure (IM) operational requirements in Paragraphs C and D of Section XV of the 2016 Compliance Order on Consent (CO). The CO does not differentiate requirements for corrective action proposed in a work plan anticipated to complete a campaign. Specifically, Section XV.D of the CO states that "Following completion of interim measures, DOE shall submit to NMED an Interim Measures Report. The Interim Measures Report shall summarize the results of the interim measures and include the results of all field screening, monitoring, sampling, analysis, and other data generated as part of the interim measures implementation. NMED will review and approve the Interim Measures Report in accordance with Section XXIII (Preparation/Review/Comment on Documents) of this Consent Order." NMED has not received an Interim Measures Report, including the required information and signifying completion of the interim measures. The Chromium Interim Measures and Characterization Work Plan is intended to administratively close the previous interim measures work plans and, as titled, will serve as an interim measures work plan.	NA - The IRT does not discuss a prioritization and estimated schedule. The IRT does state that prioritization is important, but does not define the priorities.	NA	NA	The schedules will be updated and/or discussed every year during the annual planning process for the Consent Order.
Specific Comment #1	Section 1.1.1, Characterization Work Plans, pg.2, "Although results of the characterization activities were to be published in a CME report, results from activities conducted under the "Work Plan for Chromium Plume Center Characterization" (LANL 2015, 600615) were documented in the "Compendium of Technical Reports Conducted Under the Work Plan for Chromium Plume Center Characterization" (hereafter compendium) (LANL 2018, 602964). Results that are documented in the compendium include nine borehole dilution tracer tests; two push-pull tracer tests (R-42 and R-28); four long-term pumping test in which geochemical transients were observed (R-42, R-28, R-62 and R-43 screen 1); one push-drift test (R-42); one cross-hole tracer test with three different tracer injection locations (CrPZ-2a, CrPZ-2b, and R-28); and one well in which tracers appeared (CrEX-3, with tracers from CrPZ-2a). The "Work Plan for Chromium Plume Center Characterization" (LANL 2015, 600615) will be administratively closed with an EM-LA letter that documents where data have been published within the compendium."	The letter to close the 2015 work plan will include a cross-walk of the work plan objectives, analysis of the initial objectives, and discussion of any changes to the previously proposed objectives.	Revisions to the Chromium Interim Measures and Characterization Work Plan must include the analysis of initial objectives, specifically addressing which have been revised or retained. The letter to close the 2015 work plan will expand on the information provided in the Chromium Interim Measures and Characterization Work Plan by including additional discussion on these changes to the previously incorporated objectives.	NA - The IRT does not discuss administratively closing older workplans, as this is outside of the scope of the IRT.	NA	NA	Administratively closing the workplans will occur independently of the Chromium Interim Measures and Characterization Work Plan. A letter to close the 2015 work plan will include a cross-walk of the work plan objectives, analysis of the initial objectives, and discussion of any changes to the previously proposed objectives.
Specific Comment #2	Section 1.1.2, Interim Measures Work Plans, Page 3, "Unlike the previous work plans associated with interim measures, the plume control IM identified metrics for performance, including decreasing chromium concentrations at R-50 to the 50-ppb New Mexico groundwater standard or less over a period of approximately 3 yr."	Analysis of the anticipated plume response, including at monitoring wells R-44 and R-45, are presented in the Initial Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operations as an Appendix. However, to adequately administratively close out the previous work plan, the revisions must specifically discuss the inconsistency between the anticipated plume responses before installation of the interim measure's infrastructure and the observed responses after five years of operation.	NMED agrees with the inclusion of the Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operations as an Appendix. However, to adequately administratively close out the previous work plan, the revisions must specifically discuss the inconsistency between the anticipated plume responses before installation of the interim measure's infrastructure and the observed responses after five years of operation.	The IRT describes the trends observed at R-45, R-44, and other key wells and presents hypotheses to explain the trends observed during IM operation at these locations (Section 3.1.1.1). The IRT states that the concentration trends at R-44 S1 suggest that it is outside of the Cr plume, but there is evidence of dispersion and mixing with injection water (Section 3.1.1.1). Question 3 of charge question 1 specifically addresses what impacts injection may have had at R-45 S1. In response to this question, the IRT states that more likely than not, R-45 S2 has been adversely impacted by IM injection operations (Section 3.1 & Section 3.1.3). The IRT does not address concentration trends in the context of previous IM work plan predictions.	Section 3.1; Section 3.1.1; Section 3.1.3	Topic 1 recommendation 4, sub-bullet 1: Additional effort is needed to gather field data that better define groundwater flow directions and capture zone boundaries is recommended.	A discussion of the predicted versus observed geochemical responses at key monitoring wells will be included in an updated work plan.
Specific Comment #3	Section 1.1.2, Interim Measures Work Plans, pg. 3, "The 2018 performance monitoring work plan (LANL 2018, 603010) will be administratively closed with the documentation provided in this work plan."	EM-LA will develop and submit a tracer test summary report, separate from the work plan, to NMED documenting the results of tracer testing and the requested analyses.	NMED would like this information included as an appendix on the current work plan and not submitted as a separate report.	NA - The IRT does not discuss summarizing tracer tests. The IRT also does not discuss administratively closing old workplans.	Section 3.2; Section 3.2.3	The IRT does not make any recommendations specific to this comment.	Administratively closing the workplans will occur independently of the Chromium Interim Measures and Characterization Work Plan.
Specific Comment #4	Section 3.2, IM Operations, pg. 6. Revise the text to include a background discussion on the identification of the hexavalent chromium, the investigation phases, and the technical work conducted that identified the spatial location and depth for the extraction and injection wells.	The work plan will be revised to include a background discussion on the identification of the hexavalent chromium, the investigation phases, and the technical work conducted that identified the spatial location and depth for the extraction and injection wells.	Revisions should not just cite the Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operations and should provide key information in the body of the text.	The IRT provides a discussion of the discovery of the chromium plume (Section 2.1.1), and touches on the development and progression of the current IM work plan (Section 2.1.4). Sections 2.2 - 2.2.6 summarizes aspects of the conceptual site model and references various technical reports, but does not detail the investigation phases.	Section 2.1; Section 2.1.1; Section 2.1.2; Section 2.1.3	The IRT does not make any recommendations specific to this comment.	A more detailed discussion of the background and history of technical work related to the chromium plume will be included in a future work plan submittal.
Specific Comment #5	Section 3.2, IM Operations, pg. 6. "Figure 3.2-3, parts a and b, plots the cumulative quantities of fluid extracted and injected in the IM infrastructure wells for extraction wells CrEX-1, -2, -3, -4 and -5, and injection wells CrIN-1, -2, -3, -4, and -5, respectively."	Mass removal estimates are presented in Chromium Interim Measure Performance Report submittals. These results include comparison of mass removal estimates derived from laboratory analytical results and HACH test results.	To adequately satisfy closing the administrative record for the Chromium Plume Control Interim Measure Performance Monitoring Work Plan, the revisions must include a summary of the chromium mass removed and any key trends discussed in the semi-annual and annual reports submitted as requirements of the performance monitoring.	The IRT does not explicitly evaluate mass removal, however, they did evaluate capture zone.	NA	NA	Mass removal calculations will continue to be presented in Annual Chromium Interim Measure Performance Report submittals.

NOD Comment Number	Original NMED Comment	EM-LA NOD Response (July 24, 2023)	NMED Response to EM-LA (January 3, 2024)	IRT Summary	IRT Reference	IRT Topic and Recommendation	Revised EM-LA Response
Specific Comment #6	Section 3.2, IM Operations, pg. 6, "Because of the lack of deeper monitoring points in the centroid of the plume, the depth of groundwater capture is unknown."	EM-LA does not concur with this comment; the original text is factual. The capture zone analysis is based on hydrogeologic analysis and plume delineation does not factor in the capture zone calculations.	According to the EPA guidance titled A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, "The items listed in Exhibit 2 should be considered prerequisites for performing a capture zone analysis. If the plume is not adequately delineated (width and/or extent), it may not be possible to establish a meaningful Target Capture Zone (Step 2)." The first bullet point included in Exhibit 2: Elements Associated with Step 1 (Prerequisites for a Capture Zone Evaluation) states "Is the plume adequately delineated in three dimensions?" This Work Plan is intended to complete data gap activities to adequately delineate the plume in three dimensions. The capture zone analysis conducted with the high level of uncertainty in the current conceptual site model is not adequate to develop remedy objective and associated performance criteria for a pump and treat system. The text should be revised to clarify the uncertainty present within the capture zone calculations presented in the referenced material and the need to adequately delineate the plume for the development of remedy objectives. As noted in General Comment #2, NMED will consider the conclusions of the independent review panel when reviewing revisions to the Chromium Interim Measures and Characterization Work Plan.	The IRT concludes that the chromium plume is not sufficiently characterized horizontally or vertically (Executive Summary). The IRT response to one of the charge questions (Section 3.1 - question 1) is that there is insufficient data to conclude that the IM has hydraulically contained the plume, but that simple 2-D modeling shows that the IM captures most of the plume (Section 3.1.1, Section 3.1.1.3). Additionally, the IRT notes that FEHM 3-D modeling clearly indicates that the plume was not fully controlled (Section 3.1.1.3). Additionally, the IRT states that if the hydraulic conductivity in the central IM area was underestimated at the CrIN & CrEX wells, then the 3-D FEHM modeling would have overestimated the extent of the capture zone (Section 3.1.1.5). The IRT report states that it cannot be determined to what extent the IM captures chromium vertically based off of current data (3.2.4.1).	Topic 1 - recommendation 1, sub-bullet 1: Defining new capture zone boundaries for various IM configurations is recommended.	Vertical extent of chromium is a known and recognized data gap. Work plan revisions will include a discussion of the uncertainty and the necessity of deeper monitoring locations to delineate the plume vertically. The work plan will also describe how currently identified monitoring well drilling work plans inform this data gap.	
Specific Comment #7	Section 3.3.1, Chromium Concentration Trends Indicative of Meeting Primary IM Objectives, pg. 8, "These tracer data, along with the decreasing chromium concentrations at R-50, provide the basis for changes (retreat) in the plume edge (as defined by the 50- $\mu\text{g/L}$ NMED groundwater standard) over time. These data, along with monitoring information indicating continued maintenance of low chromium concentrations in R-44 screen 1 and screen 2 (Figures 3.3-3 and 3.3-4, respectively); R-13 (Figure 3.3-5); and SIMR-2 (Figure 3.3-6), indicate that the IM has achieved its objective of maintaining the southern edge of the plume within the Laboratory boundary."	EM-LA does not concur with this comment. The demonstrated decline in chromium concentrations in R-50, the observed hydraulic gradient along the southern edge of the plume, and the results of the tracer studies suggest that decrease of chromium concentrations at R-50 is a function of a hydraulic control generated by injection along the laboratory boundary. Additional analysis is presented in the Initial Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operation (EMID - 702597; Appendix B of the revised work plan), Section 3.3.1, Figures 5.1-6.	Revisions to the text should clarify the lack of adequate monitoring wells downgradient of the injection operations in the southern region of the plume. The addition of monitoring well SIMR-3 will provide a data point to appropriately evaluate the response to injection operations to the south of CrIN-4 and CrIN-5. The primary concern is for the potential contamination residing south of the injection wells, as indicated by the exceedance of chromium concentration in the injection wells on the southern boundary. At the time of installation and before any influence from the injection of treated groundwater, the detected chromium concentrations in 2016 exceeded 99 ppb in CrIN-4 and exceeded 95 ppb in CrIN-5. Until a downgradient monitoring well is available to determine if the contamination from the region of the injection wells has migrated away from the extraction well network, we cannot state with certainty that the plume boundary has been maintained within the Laboratory boundary.	Overall, the IRT suggests that the plume should be investigated further to better define the southern extent of chromium contamination. The IRT does not suggest that a retreat of the plume edge is speculative, as this can be shown with both manual contours and computer-generated contours. Lastly, the IRT suggests that R-50 chromium concentrations are defined of redirected flow (not necessarily mixing).	Section 2.2.3; Section 3.1.1	Topic 1 - recommendation 1, sub-bullet 3: "This area (southern area) of the plume should be investigated further to better define the southern extent of chromium contamination."	The IRT states, "While the possibility that chromium reached the southern property boundary cannot be discounted, there are no direct measurements to confirm this possibility; the available evidence is only speculative and suggests that the amounts involved are/were small."
Specific Comment #8	Section 3.3.1, Chromium Concentration Trends Indicative of Meeting Primary IM Objectives, pg. 8, "A residual uncertainty remains with respect to increasing chromium concentrations at well R-61 (Figure 3.3-7), which will be the subject of additional work proposed in this work plan."	The word 'residual' will be removed from this sentence in the revised work plan.	Agreed.	NA	NA	NA	The word 'residual' will be removed from this sentence in the revised Chromium Interim Measures and Characterization Work Plan.
Specific Comment #9	Section 3.3.2, Conceptual Site Model Updates Since Initiation of IM Operations, pg. 9, "In 2017, initial CrIN-6 concentrations of 280-300 $\mu\text{g/L}$ indicated that the plume extended further east and was likely deeper than previously thought. In response to this finding, CrIN-6 and the surface infrastructure was then converted to extraction well CrEX-5. In mid-2018, samples collected from R-70 screen 1 and screen 2 showed that concentrations in excess of 200 $\mu\text{g/L}$ extend significantly farther east than originally assumed, and those high concentrations were present at depths at least 90 ft below the water table (depth of the top of R-70 screen 2)."	EM-LA does not concur with this comment. CrIN-6 and CrEX-5 are the same well and have the same screen interval. The name change reflects change in the use and necessary infrastructure for enabling the well's change in purpose, rather than installation of a replacement well. Information regarding how CrIN-6/CrEX-5 informed the design of R-70 is presented in the Initial Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operation (EMID - 702597; Appendix B of the revised work plan), Section 3.4, and the Completion Report for Regional Aquifer Well R-70 (EMID - 700721).	NMED requires that EM-LA include a discussion of the depth for the screened interval for CrIN-6. This discussion should include specification that the screened interval was anticipated to be installed in a region downgradient of the boundary of contamination and was converted after encountering the high concentrations, thus refining the extent of contamination of the plume. As stated in the Evaluation of Chromium Plume Control Interim Measure Operational Alternatives for Injection Well CrIN-67, "The measured chromium concentrations of approximately 280 $\mu\text{g/L}$ provided additional data in that portion of the plume and led to a refinement of the estimated extent of chromium contamination (as defined by concentrations in the regional aquifer above 50 $\mu\text{g/L}$) and justify this evaluation of whether injection at CrIN-6 is still the optimal means of obtaining the required IMWP objective (Figure 1.0-2)." Citations to the administrative record for the NMED requirements to evaluate the potential conversion should be referenced. Specifically, the Evaluation of Chromium Plume Control Interim Measure Operational Alternatives for Injection Well CrIN-6 discussed that DOE and NMED began technical discussions to address the contamination measured for CrIN-6 and reconsideration of the development as an injection well. Additionally, it states that GWCB issued a letter dated September 1, 2017, that detailed comments and technical uncertainties regarding the potential impacts to the aquifer from the use of CrIN-6 and CrIN-1 as an injection well. Reference to these discussions should be provided in the revised document. It is not adequate to only reference the Five-Year evaluation document.	NA - The details of depth of sampled screen interval are not discussed in the IRT. The IRT does not discuss how CrIN-6/CrEX-5 assisted in the development of R-70 screen depths. The IRT mentions the CrIN-6 conversion as background information.	Section 2.1.3; Section 3.3.1	NA	The CrIN-6 to CrEX-5 conversion and geochemical trends at CrEX-5 and R-70 will be included in the background discussion of the revised Chromium Interim Measures and Characterization Work Plan.
Specific Comment #10	Section 3.3.2, Conceptual Site Model Updates Since Initiation of IM Operations, pg. 9, "Even though CrEX-5 is likely capturing chromium mass from this location, the current array of injection and extraction wells is screened at shallower depths and may not provide complete access to the depths required to fully control the plume in this area. However, there has been no indication of chromium contamination at wells R-35a and R-35b (Figure 3.3-10) and R-35b (Figure 3.3-11) situated northeast of R-70 and serve as a sentinel well for regional public water supply well PM-3, either before or during the IM operational period. These concentrations remain at background with no upward trend."	EM-LA does not concur with this comment. The scope of the Chromium Interim Measure and Characterization Work Plan is to support continued operation of the IM and characterization activities necessary to close data gaps to support subsequent CME. Addressing a contingency plan for potential migration of the plume toward R-35a and R-35b is not within the scope of this document. Regardless, EM-LA is committed to containing the plume within the laboratory boundary and strongly urges the resumption of injection in CrINs-3, -4, and -5 to allow for control of the northeastern edge of the plume via operation of CrEX-5.	Supporting continued operation of the IM includes the need to have contingency mechanisms in place if migration of the plume continues toward key receptors. Documenting the commitment to maintain the plume within laboratory boundary is achieved by including a discussion for notifications required when R-35a or R-35b show increasing concentrations.	The IRT states that R-35 is significantly eastward of the Cr plume and outside of the plume (Section 3.1.1.1). Note that the IRT report does not distinguish between R-35a and R-35b in this section, but the statement is true for both wells.	Section 3.1.1.1; Section 3.1.4	The IRT does not make any recommendations specific to this comment.	Contingency plans are not discussed by the IRT. Their analysis shows that chromium migration to PM-3 is highly unlikely. A summary of the IRT analysis of the unlikely chromium migration to PM-3 will be included in the revised Chromium Interim Measures and Characterization Work Plan.
Specific Comment #11	Section 3.3.3, Upward Trends in Chromium Concentration, pg. 9, "Trends in chromium at monitoring well R-61 (located to the southeast of the chromium investigation area) have also exhibited increases in chromium concentrations coincident with initiation of the IM (Figure 3.3-14). As indicated by the pressure responses in R-61 screens 1 and 2, primarily associated with installation of SIMR-3 with approval from the Pueblo de San Ildefonso to better characterize the southwest portion of the plume."	Additional information on R-61 will be presented in the work plan revision Appendix B: Initial Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operation (EMID - 702597), Section 3.3. In addition, EM-LA is pursuing installation of SIMR-3 with approval from the Pueblo de San Ildefonso to better characterize the southwest portion of the plume.	Revisions to the text should include the language from the Five-Year Evaluation document and only providing a citation is not adequate.	The IRT does not suggest that the IM has a negative impact on R-61, instead they suggest that the IM is capturing mass around R-61. However, in combination with pumping at CrEX-2, chromium transported from a location southwest of R-61 could have been redirected to that well in response to the pumping and injection (Figures 3-10 and 3-11). This scenario might represent a desirable outcome, as it results in chromium plume capture at CrEX-2 from a western source (Section 3.1.3).	Section 3.1.3; pg. 35 and pg. 40	Topic 1 - recommendation 3: "the analysis presented here suggests that the IM is capturing the chromium passing R-61 and should therefore continue operating"	The revised Chromium Interim Measures and Characterization Work Plan will include text on how the IM operations may be impacting R-61 and potentially capturing mass around R-61, per the IRT's evaluation.
Specific Comment #12	Section 3.4, Tracer Tests, pg. 10, "Several field tracer tests have been conducted to examine flow velocities, hydraulic connections, and natural attenuation capacity of the regional aquifer. This testing was documented in the compendium (Appendix 1), and was conducted from 2013 to 2017 (LANL 2018, 602964). The text below is an abbreviated description from the compendium."	EM-LA will include the requested summary table in the revised work plan.	Agreed.	NA	NA	EM-LA will include the requested summary table in the revised Chromium Interim Measures and Characterization Work Plan.	
Specific Comment #13	Section 3.4.1, Tracer Testing in Injection Wells, pg. 11, "The "Chromium Plume Control Interim Measure Performance Monitoring Work Plan" (LANL 2018, 603010) described tracers that were to be redeployed in CrIN-3, CrIN-4, and CrIN-5, and first-time deployments into CrIN-1 and CrIN-2 once those injection wells were brought online."	EM-LA will develop and submit a tracer test summary report, separate from the work plan, to NMED documenting the results of tracer testing and the requested analyses that will be added to the work plan.	NMED would like the information for the tracer test summary report included as an Appendix, rather than a stand-alone report.	NA - The IRT does not provide or request references to locations of analytical results associated with tracer test deployments or discussions on how additional aquifer tests have altered assumptions on the hydraulic parameters.	NA	NA	Administratively closing the workplans will occur independently of the Chromium Interim Measures and Characterization Work Plan.
Specific Comment #14	Section 4.1, Objective 1: Provide Interim Measures to Prevent Migration of the Plume Beyond the Laboratory Boundary, pg. 12, "Whereas a metric is a quantifiable measure used to track and assess the status of a specific process (e.g. decreasing chromium concentrations at R-50 to below 50 ppb within 3 yr), the activities described in this work plan (e.g. estimates of mass extracted through treatment) are measures that provide useful information and insight with respect to IM operations but do not have specific quantitative target values that denotes success."	The revised work plan will include proposed data quality objectives (DQOs) to evaluate whether data gaps have been filled and extent of contamination has been adequately defined.	NMED will review revisions to determine concurrence.	The IRT report discusses numerous data gaps, but does not expand on data quality objectives to fill data gaps (Section 3.2.4, Section 3.4.3). The IRT does not discuss defining data quality objectives to be used to determine when data gaps have been filled. However, the IRT does recommend the development of a procedure to close data gaps (Section 3.4.7).	Executive Summary; Section 3.2.4; Section 3.4.3; Section 3.4.5; Section 3.4.4	Topic 4 - recommendation 1: Implementation of adaptive site management is recommended	The revised Chromium Interim Measures and Characterization Work Plan will include proposed data quality objectives (DQOs) to evaluate whether data gaps have been filled and extent of contamination has been adequately defined.
Specific Comment #15	Section 4.1, Objective 1: Provide Interim Measures to Prevent Migration of the Plume Beyond the Laboratory Boundary, pg. 12, "Whereas a metric is a quantifiable measure used to track and assess the status of a specific process (e.g. decreasing chromium concentrations at R-50 to below 50 ppb within 3 yr), the activities described in this work plan (e.g. estimates of mass extracted through treatment) are measures that provide useful information and insight with respect to IM operations but do not have specific quantitative target values that denotes success."	Although providing a specific quantitative target value can be difficult, the Work Plan must be revised to provide clarification denoting fulfillment of the required data gap. For instance, specific explanation should be provided for what data collected in the preliminary construction of monitoring wells will be used to define the vertical and horizontal extent. Additionally, the text must include what results from the sampling of the new wells presented in the Work Plan activities would suggest that the extent of contamination has adequately been defined. Revise the text throughout Section 4 to include what metrics will be used to determine if the data gap is fulfilled or if additional activities will be required.		The IRT recommends the use of an adaptive management strategy rather than the typical RCRA sequence (Section 3.4.4). Under an adaptive management strategy, flexibility of data collection and continued reevaluation of the conceptual model is encouraged (Section 3.4.4).			

NOD Comment Number	Original NMED Comment	EM-LA NOD Response (July 24, 2023)	NMED Response to EM-LA (January 3, 2024)	IRT Summary	IRT Reference	IRT Topic and Recommendation	Revised EM-LA Response
Specific Comment #15	Section 4.1.1.1, Capture Zone Analysis, pg. 14, "EPA encourages the use of groundwater models at complex sites to support the CSM and provide a technical basis for CZA. However, field monitoring is a critical component in evaluating the model predictions and assessing a capture zone effectiveness. The Finite Element Heat and Mass Transfer Code (FEHM) simulator can account for complexities associated with partially penetrating wells, aquifer heterogeneity, and complex boundary conditions. To this end, the FEHM-based model of the site will be calibrated to available field data (e.g., heads, hydraulic gradients, and chromium concentrations) to support the CZA." The Work Plan does not mention the aquifer parameter characteristics or assumptions in the model that have changed since initiation of injection and extraction operations. The Interim Measures Work Plan for Chromium Plume Control discussed utilizing the FEHM-based model to provide plume response predictions. To adequately address optimization, the Work Plan must be revised to include how key characteristics or assumptions in the model have changed since the application for use in the Chromium Plume Control document.	This is covered in the Cr Model enclosure to the annual report (June 30th, 2023). All model assumptions, parameterizations, etc. are described in that annual report.	Include a discussion on the evolution of the assumptions used in the FEHM model to determine anticipated plume responses in early interim measure work plans. This discussion must discuss what key assumptions were used to provide model predictions for plume responses and what has changed in the current version of the FEHM model used to produce the data in the Cr Model enclosure to the annual report. Simply citing an enclosure to a document is not sufficient. EM-LA could also include the enclosure from the annual report as an Appendix to this Work Plan.	The aquifer properties at the IM Site are discussed in section 2.2.4.2 - 2.2.4.2.2 (Hydraulic Conductivity and Porosity). The IRT discusses how the model utilizes these aquifer parameters. However, it does not discuss the history of the modeling assumptions and how they have changed over time.	Section 2.2.4.2 - 2.2.4.2.2	Topic 2 - recommendation 1 and 2: Documenting lessons learned and a concise "groundwater modelling needs assessment" is recommended.	The chromium model enclosure included in the 2023 Annual Performance Report will be included as an attachment in the Chromium Interim Measure and Characterization Work Plan. The revised Chromium Interim Measures and Characterization Work Plan will address future groundwater modeling analyses and capabilities and updates, such as key assumptions and what has changed over time.
Specific Comment #16	Section 4.1.1.2, IM Mass Extraction, pg. 14, "Influent and effluent water quality analysis will be performed to (1) determine concentration loadings to the treatment system, (2) estimate the mass removed from the regional aquifer, (3) ensure compliance with applicable discharge requirements, and (4) identify the need to adjust system components." In addition to the mass extraction analysis on influent and effluent water quality analysis, the approaches for determining total mass of chromium dissolved in the regional aquifer must be provided. This requires applying data-based and model-based approaches to determine total dissolved chromium mass estimates, including specification to the potential mass estimates on Pueblo de San Ildefonso property and the associated uncertainty bounds.	The Phase II Investigation Report for Sandia Canyon (ERID – 22864) completed in 2012 provides an estimate of the total mass of chromium in the remediation area. Reevaluation of the chromium mass in the regional aquifer can be added as a work plan task to be completed after vertical and lateral extent are better constrained.	Revise the document to include the text from the Phase II Investigation Report for Sandia Canyon with an estimate of the total mass of chromium in the groundwater system. However, the IRT states that there is insufficient information regarding the mass flux of Cr to the groundwater and recommends refining the mass flux analyses (Section 3.2.9, Section 3.2.4.2). Additionally, the IRT identifies the vadose zone transport as a data gap which needs to be understood (Section 3.4.3).	The IRT discusses the potential of chromium migration onto Pueblo de San Ildefonso land in Section 2.2.3. The IRT states that based on the locations of CrIN-3, -4, and -5 and their initial Cr concentrations, a small amount of Cr may have migrated across the southern land border. However, the IRT notes that no empirical data can confirm this possibility and that hydraulic information suggests that any occurrence of Cr on Pueblo de San Ildefonso land would likely be temporary (Section 2.2.3).	Section 3.2.9; Section 3.2.4.2; Section 3.4.3; Section 2.2.3	Topic 2 - there are multiple recommendations on modelling that apply in this situation..	A discussion of the current mass estimates of chromium will be provided and an update of chromium mass estimates will be proposed in the revised Chromium Interim Measures and Characterization Work Plan.
Specific Comment #17	Section 4.1.1.2, IM Mass Extraction, pg. 14, "For measurements supporting mass removal, concentrations will be measured one time per week using Hatch test kits, but duplicate samples will also be sent to a state-approved laboratory for analysis. The Hatch data will continue to provide rapid results on chromium influent and effluent concentrations, whereas analytical laboratory results will be used in the mass removal calculations." The Work Plan must incorporate a discussion on a quantitative analysis of chromium mass removal, including calculations of mass removed to date for the IM operations. A clear estimation of the mass removed must be provided that specifically identifies mass removed from chromium treatment unit A (CTUA) and chromium treatment unit C (CTUC).	Quantitative analysis of the mass extraction estimates based on both laboratory analytical and Hatch data are presented in the Annual Interim Measure Performance Report. The work plan will be updated to describe the calculation methods in detail.	Revisions to the text should include the language presented in the Annual Interim Measure Performance Reports that specify the quantitative analysis of mass removed to date. To adequately close the administrative record for the Chromium Plume Control Interim Measure Performance Monitoring Work Plan, which required the submission of the Annual Interim Measure Performance Report, the information from the annual reports for chromium mass removed must be added to the text.	NA - The IRT did not evaluate mass removal estimates, nor did it evaluate mass removal from specific chromium treatment units. The IRT did not discuss how chromium mass removal estimates were calculated.	NA	NA	Quantitative analysis of the mass extraction estimates based on both laboratory analytical and Hatch data is presented in the Annual Interim Measure Performance Report. The Chromium Interim Measures and Characterization Work Plan will be updated to describe the calculation methods in detail.
Specific Comment #18	Section 4.2, Objective 2, Perform Scientific Studies and Aquifer Testing to Obtain Data Necessary to Conduct a Corrective Measures Evaluation Including a Data Gap Analysis, pg. 15, "The first activity, scientific studies, is to support identifying the nature and extent of chromium plume in the regional aquifer."	EM-LA does not concur with this comment, but agrees with the premise that aquifer tests are scientific studies.	NMED would like revisions to specify the scientific studies proposed as work plan activities and will review revisions to determine concurrence.	NA	NA	NA	The Chromium Interim Measures and Characterization Work Plan revision will specify which scientific studies are being referred to.
Specific Comment #19	Section 4.2, Objective 2, Perform Scientific Studies and Aquifer Testing to Obtain Data Necessary to Conduct a Corrective Measures Evaluation Including a Data Gap Analysis, pg. 15, "The second activity, aquifer testing, supports chromium mass flux characterization within the regional aquifer, a measure that combines two key features of the chromium plume: (1) the amount of chromium mass in the groundwater and (2) how fast the water is moving through any given cross-sectional area." Revise the text to clarify if the second activity is aquifer testing alone or if it will be combined with mass flux characterization.	The aquifer testing supports the mass flux calculations. EM-LA will clarify the text.	NMED will review revisions to determine concurrence.	NA	NA	NA	The revision will have clarified text stating that the aquifer testing supports the mass flux calculations.
Specific Comment #20	Section 4.2.1, Plume Horizontal and Vertical Extent, pg. 15, "To evaluate the success of the IM system in maintaining chromium concentrations <50ppb beyond the Laboratory boundary, both the horizontal and vertical extents of the chromium plume need to be established." Revise the text to include specification that monitoring wells will be needed on Pueblo de San Ildefonso land to adequately determine the vertical and horizontal extents for the southern region.	EM-LA does not concur with this comment. Analytical results from the existing monitoring well network, including SIMR-2, indicate that the plume does not extend laterally on Pueblo de San Ildefonso land. Dual-screen monitoring wells in the southern plume area indicate that contamination is shallow in that area. However, EM-LA is pursuing installation of SIMR-3 on Pueblo land to provide groundwater flow and chromium concentrations. EM-LA will prioritize those wells, provided continue support from the Pueblo.	NMED reiterates the response to Specific Comment #8. The addition of monitoring well SIMR-3 will provide a data point to appropriately evaluate the response to injection operations to the south of CrIN-4 and CrIN-5. The primary concern is for the potential contamination residing south of the injection wells, as indicated by the exceedance of chromium concentration in the injection wells on the southern boundary. At the time of installation and before any influence from the injection of treated groundwater, the detected chromium concentrations in 2016 exceeded 99 ppb in CrIN-4 and exceeded 95 ppb in CrIN-5. The current monitoring well network has not adequately delineated the extent of contamination in the southern region because the wells along the southwestern Laboratory boundary exceeded regulatory standards. Data from SIMR-3 can be used to determine if the plume has adequately been delineated.	The IRT report does not discuss additional monitoring wells on Pueblo de San Ildefonso beyond SIMR-3 (Section 3.2.2.1). The IRT hypothesizes that a chromium source may be located southwest of R-81, but does not discuss whether this source (if present) would be within LANL or on Pueblo de San Ildefonso land (Section 2.2.6.1). Additionally, the IRT states that "CrEX-1 and CrEX-2 would control the plume along the southern boundary..." implying that the southern portion of the Cr plume may be contained with the existing IM system (Section 3.3).	Section 3.3.2.1; Section 2.2.6.1; Section 3.3.3;	The IRT does not make any recommendations specific to this comment.	It is not possible to determine the need for hypothetical wells on Pueblo de San Ildefonso property before completing SIMR-3. Analytical results from SIMR-3 will provide the necessary information to determine if additional monitoring wells are necessary in accordance with an adaptive site management strategy.
Specific Comment #21	Section 4.2.1, Plume Horizontal and Vertical Extent, pg. 15, "To assess the vertical extent of the plume to the south, fixed-laboratory geochemical sampling will be conducted at CrEX-1 screen 2. This screen initially showed <50ppb as measured from Hatch data, and characterizing the extent of contamination in this region of the plume will be an important new data point." Revise the text to include details regarding how this sampling will be accomplished. Currently, CrEX-1 has a permanent pump in the upper screen with a packer underneath. Clarification must be provided to state how the reconfiguration of the downhole pump and packer system will be conducted to sample screen 2. Additionally, revise the text to include the basis for using an extraction well for delineation.	EM-LA will provide a detailed work plan for CrEX-1 sampling to NMED for approval prior to sampling CrEX-1. This work can be completed prior to resumption of IM operation.	Revisions to the text should clarify that the details will be provided in a subsequent work plan and should include the timeline for submission of that work plan. NMED will review revisions to determine concurrence.	NA	NA	NA	EM-LA will evaluate the CrEX-1 sampling as part of data gaps and needs.
Specific Comment #22	Section 4.2.1, Plume Horizontal and Vertical Extent, pg. 16, "The exact locations of the monitoring wells will be established in collaboration with NMED and will be dependent on local topography, cultural site locations, and infrastructure constraints." Revise the text to include a statement that additional monitoring wells may be required after the completion of the Work Plan activities if the extent of contamination has not yet been defined.	EM-LA will define proposed data quality objectives in the revised report to evaluate whether data gaps have been filled.	NMED will review revisions to determine concurrence.	The IRT concludes that additional monitoring wells are necessary, but does not discuss these hypothetical wells in relation to the timeline of this work plan. The IRT states that additional monitoring wells are required to delineate the plume (Section 3.1.1.1 & Executive Summary). Additionally, the IRT supports the use of an Adaptive Site Management strategy which promotes refining and revisiting of the conceptual site model as new information is obtained (Section 3.4.4).	Executive Summary; Section 3.1.1.1; Section 3.4.4	Topic 4 - recommendation 3: The IRT recommends that data gaps be closed efficiently which includes the installation of monitoring wells.	The amount of additional monitoring wells can not be defined until sufficient information is gathered regarding the plume's spatial extent. Each new well will inform whether additional monitoring wells are needed in accordance with an adaptive site management strategy. The original EM-LA comment response is still valid.
Specific Comment #23	Section 4.2.3, Mass Flux Distribution Characterization, pg. 16, "Two direct methods will be used to characterize chromium mass flux within the regional aquifer, including the transsect method (concentration and flow data measured at individual monitoring points) and aquifer testing (groundwater is extracted and total flow and mass discharge are measured)." The former method will make use of an electromagnetic borehole flow meter (EBFM) coupled with grab sampling, to conduct high-resolution stratified mass flux characterization at short (4-5ft) intervals in existing long-screen (>40ft) wells (e.g., R-70 screen 1, CrEX-1, CrEX-2, CrEX-3, CrEX-4, CrEX-5)." Revise the text to include a discussion of how the effects of intraborehole flow will be prevented or how an assessment will be conducted to ensure that the results will accurately reflect distribution with depth in the aquifer.	The work plan was developed to address data gaps and continued operation prior to specific operational direction from NMED. These data gaps still need to be addressed after restart of the interim measure. EM-LA will continue to work with NMED GWQB to address requirements to restart the interim measure.	NMED will review revisions to determine concurrence. EM-LA must provide discussions for any data gap activities that require the operation of injection wells currently not approved by GWQB, and must state if the data gap activities can be completed under the current operational constraints. If the data gap cannot be completed without injection in specific wells, EM-LA must include additional methods to fulfill the required data gap.	The IRT does not discuss generation of data gaps fulfilled under the IM system off, or mass flux calculations. However, the IRT's single most important recommendation is to restart the IM, while other studies and field investigations move forward.	Executive Summary; Section 1.2	Topic 1 - recommendation 1: the restart of the IM system is recommended.	All work plans for aquifer testing will be submitted to NMED for approval prior to implementation. Aquifer test work plans will include the requested detail and will be designed for implementation under the contemporaneous operational scenario.
Specific Comment #24	Section 4.2.3.1, Local Scale Mass Flux, pg. 17, "Two surveys will be performed in each well, one under ambient flow conditions (IM off) and another under pumping conditions (IM on). This will help determine zones of relatively high mass flux conditions that may be created by the IM and provide information for the design of the final remedy." Revise the text to discuss how the data gap activity can be accomplished without a survey being conducted under pumping conditions (IM on). If previously collected data can be used, clarify which data and any existing constraints in applying the data to fulfill the data gap requirement.	The work plan was developed to address data gaps and continued operation prior to specific operational direction from NMED. These data gaps still need to be addressed after restart of the interim measure. EM-LA will continue to work with NMED GWQB to address requirements to restart the interim measure.	NMED will review revisions to determine concurrence.	This topic was not directly discussed in the IRT report. The IRT is recommending revisiting the CSM, which includes aspects of mass flux (Section 3.2.4.2), but they do not have specific recommendations for aquifer tests.	NA	NA	Testing activities described in the work plan will be revised to account for flexibility in the operation of injection and extraction wells.
Specific Comment #25	Section 4.2.3.2, Aquifer Testing: Plume-Scale Hydraulic Properties and Mass Flux, pg. 18, "The test duration for each screen will be dependent on individual test conditions but is anticipated to be approximately 7 days long to (1) increase the probability of capturing the hydraulic response that occurs after delay yield effects dissipate and to (2) enhance the response in observation (monitoring) wells." NMED does not concur with the anticipated test duration of 7 days and the text must be revised to clarify that the anticipated test duration will be 24 hours.	EM-LA requests clarification on NMED's concerns regarding the proposed aquifer test durations. The work plan was developed to address data gaps and continued operation prior to specific operational direction from NMED. These data gaps still need to be addressed after restart of the interim measure. EM-LA will develop DQO's for proposed aquifer tests to inform design and duration of proposed aquifer tests. These objectives will be monitored in real time during tests, and testing will be completed when those objectives are met.	Revisions should remove specifications for the future aquifer test work plans. NMED will determine validity of the specific conditions to conduct the test when reviewing any aquifer test work plan submissions. Revisions to this Work Plan should include high level DQO's that will allow us to determine when the data gap activity will be deemed complete.	NA	NA	Specifications will be removed from the work plan. EM-LA will develop DQOs for proposed aquifer tests to inform design and duration of proposed aquifer tests. These objectives will be monitored in real time during tests, and testing will be completed when those objectives are met.	
Specific Comment #26	Section 4.2.3.2, Aquifer Testing: Plume-Scale Hydraulic Properties and Mass Flux, pg. 18, "Water produced from testing will be treated to remove hexavalent chromium and injected into injection wells. The use of different injection locations can be used to evaluate pressure responses in nearby monitoring wells associated with each injection event." Revise the text. NMED does not support injection occurring in the same aquifer the pumping is being conducted during the aquifer testing and will not approve of an aquifer test work plan following that procedure. Provide specification that the portions of the aquifer testing requiring the injection of treated water into the injection wells will not be completed until NMED has revised the regulatory directive to cease injection.	The work plan was developed to address data gaps and continued operation prior to specific operational direction from NMED. These data gaps still need to be addressed after restart of the interim measure. EM-LA will continue to work with NMED GWQB to address requirements to restart the interim measure.	Revisions should remove specifications for the future aquifer test work plans. NMED will determine validity of the specific conditions to conduct the test when reviewing any aquifer test work plan submissions. Revisions to this Work Plan should include high level DQO's that will allow us to determine when the data gap activity will be deemed complete.	NA - The IRT does not evaluate how an aquifer test is performed.	NA	Testing activities described in the Chromium Interim Measures and Characterization Work Plan will be revised to account for flexibility in operation of injection and extraction wells.	

NOD Comment Number	Original NMED Comment	EM-LA NOD Response (July 24, 2023)	NMED Response to EM-LA (January 3, 2024)	IRT Summary	IRT Reference	IRT Topic and Recommendation	Revised EM-LA Response
Specific Comment #27	Section 4.2.3.2, Aquifer Testing: Plume-Scale Hydraulic Properties and Mass Flux, pg. 18. "The use of different injection locations can be used to evaluate pressure responses in nearby monitoring wells associated with each injection event. To the extent possible, injection of extracted water will begin when test pumping begins and at the same flow rate. Water-level monitoring at surrounding wells will enable observation of system responses to both the pumping and the injection events." Revise the text to discuss what pumping analyses will be used to account for extraction and injection influences and to account for the overlapping, interfering influences. Provide specification that the portions of the aquifer testing requiring the injection of treated water into the injection wells will not be completed until NMED has revised the regulatory directive to cease injection.	The work plan was developed to address data gaps and continued operation prior to specific operational direction from NMED. These data gaps still need to be addressed after restart of the interim measure. EM-LA will continue to work with NMED GWQB to address requirements to restart the interim measure. All work plans for aquifer testing will be submitted to NMED for approval prior to implementation. Aquifer test work plans will include the requested detail and will be designed for implementation under the contemporaneous operational scenario.	EM-LA must provide discussions for any data gap activities that require the operation of injection wells currently not approved by GWQB, and must state if the data gap activities can be completed under the current operational constraints. If the data gap cannot be completed without injection in specific wells, EM-LA must include additional methods to fulfill the required data gap.	NA - The IRT does not evaluate how an aquifer test is run.	NA	Topic 1 - recommendation 1; the restart of the IM system is recommended.	All work plans for aquifer testing will be submitted to NMED for approval prior to implementation. Aquifer test work plans will include the requested detail. However, because the IRT's recommendation is to restart the system as soon as possible, additional discussion will not be included under a no-injection scenario.
Specific Comment #28	Section 4.2.3.3, Aquifer Testing: Plume-Scale Hydraulic Properties and Mass Flux, pg. 19. "It is important to remove the effects of barometric pressure changes on the water levels measured at the site. Therefore, in addition to the pressure transducers installed to monitor pressures, barometric pressure will be monitored throughout the testing process."	EM-LA requests clarification on NMED's request to account for background water levels during mass flux calculations.	NMED notes that there are multiple methods that can remove the effects of barometric pressure changes on the water levels measured at the site. NMED will review revisions to determine concurrence.	NA - The IRT does not evaluate the corrections needed for an aquifer test.	NA		Chromium Interim Measures and Characterization Work Plan revisions will include details on corrections that will be applied to the aquifer test data.
Specific Comment #29	Section 4.3, Potential Tracer Testing, pg. 19. "Although tracer testing is not proposed in this work plan, tracer tests may be required to establish a baseline of information needed to transition to the CME. If additional information is needed to estimate mass flux, additional tracer tests may be considered. Tracer tests may also be used to identify chromium source locations." Revise the text to include a statement discussing the requirement for NMED involvement in the planning of future tracer testing. Additionally, clarify what criteria will trigger implementation of tracer tests. When additional tracer tests are deployed, the quarterly monitoring reports must discuss the details, specifically mentioning key points like travel time, recovered location, injection and recovery amounts and the aquifer parameters determined from the testing.	All work plans for tracer testing will be submitted to NMED for approval prior to implementation. Tracer test work plans will include the requested detail and will be designed for implementation under the contemporaneous operational scenario. EM-LA recommends that the need for tracer testing is evaluated as new information is obtained.	NMED will review revisions to determine concurrence.	NA - The IRT does not discuss the planning of future tracer tests, or the reporting requirements of these future tracer tests, including any monitoring configuration or frequency.	NA		All work plans for tracer testing will be submitted to NMED for approval prior to implementation. Tracer test work plans will include requested detail. EM-LA recommends that the need for tracer testing is evaluated as new information is obtained.
Specific Comment #30	Section 4.3, Potential Tracer Testing, pg. 19. "However, the potential to disturb the viability of a monitoring well will need to be considered if tracer testing is desired." Revise the text to clarify how the viability of a monitoring well will be disturbed from tracer testing.	All work plans for tracer testing will be submitted to NMED for approval prior to implementation. Tracer test work plans will include description of the potential risks of the use of proposed tracers, e.g., temporary alteration of redox conditions by the use of certain organic tracers.	NMED will review revisions to determine concurrence.	NA - This comment is out of the scope of the IRT.	NA		All work plans for tracer testing will be submitted to NMED for approval prior to implementation. Tracer test work plans will include description of the potential risks of the use of proposed tracers, e.g., temporary alteration of redox conditions by the use of certain organic tracers.
Specific Comment #31	Section 5.1, Quarterly Monitoring Reports, pg. 22-23. "Evaluation of the IM influence on the water table configuration, hydraulic gradients, and chromium plume response using: Graphical and tabular presentations of water level data at each performance monitoring well; synoptic potentiometric surface maps using data collaboratively identified with NMED, generated for three depths, if possible, based on the availability of data; chromium and other concentration data needed to support the analysis." Revise the text to include a discussion on the effectiveness of the current injection well network to control migration. Specifically, evaluate if the data shows evidence of mound or reversal of the hydraulic gradient.	The Initial Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operation (EMID – 702597, Appendix B of the revised work plan), Sections 5.1-7.2 and the Chromium Interim Measure Capture Zone Analysis enclosure 4 within the Annual Progress Report on Chromium Plume Control Interim Measure Performance, April 2022 through March 2023 (EMID – 702801) document the effectiveness of the current IM well network to control migration of chromium onto Pueblo de San Ildefonso land.	Revisions should include the referenced documents as Appendices and adequately cite the statements made in the referenced documents to address NMED's comment.	The effectiveness of the current injection well network is discussed under Topic 1: Assessment of Potential Modifications to Operation (EMID – 702597) report. The IRT states the water level and chemical data are not sufficient to conclude that the IM operation has hydraulically contained the plume. However, a simple 2D model developed by the IRT indicates that most if not all of the plume may have been within the capture zone of full IM operations. In contrast, 3D modeling with FEHM clearly shows that the plume was not hydraulically controlled. As discussed in the following section, at this time FEHM remains the most capable tool for predicting capture for any IM well field configuration. (Section 3.1) The IRT states that the current IM system at full operations will not contain all chromium migration (Section 3.1). The IRT states, as discussed in Sections 3.2 and 3.3, there are alternative approaches to operating the IM. Because the plume has yet to be sufficiently characterized from field data, the extent of chromium contamination that needs to be controlled is not known. The existing IM system will likely need to be modified, reconfigured, and possibly expanded with at least one additional extraction well in the vicinity of R-70 (Section 3.1).	Section 3.1; Section 3.1.1 - 3.1.5	Topic 1	The Initial Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operation (EMID – 702597) report addresses this specific comment and will be formally submitted to the Hazardous Waste Bureau by May 31, 2025.
Specific Comment #32	Section 5.1, Quarterly Monitoring Reports, pg. 23. "Synoptic potentiometric surface maps using data collaboratively identified with NMED, generated for three depths, if possible, based on the availability of data." Revise the Work Plan to include the most recent synoptic potentiometric surface maps from a NMED approved document for a minimum of two depths. Then continue to update the quarterly reporting requirements for three depths, if possible.	EM-LA does not concur with this comment and will not update the document to incorporate data collected after submittal of the Work Plan. Synoptic water level maps have recently been presented in the Chromium Interim Measure Capture Zone Analysis enclosure 4 within the Annual Progress Report on Chromium Plume Control Interim Measure Performance, April 2022 through March 2023 (EMID – 702801).	EM-LA provided synoptic potentiometric surface maps for the shallow and deep regional potentiometric surface for data collected on April 2, 2022 (Figures 3.3-3 and 3.3-4) and also for data collected September 10, 2022 (Figures 3.3-5 and 3.3-6) as part of the NMED requirement for the Annual Progress Report on Chromium Plume Control Interim Measure Performance, April 2022 through March 2023. Including these figures would not require incorporating data collected after the submittal of the Work Plan but would require the inclusion of the analysis of data collected before the submission.	NA - This comment is out of the scope of the IRT.	NA		The 5-year evaluation report addresses this specific comment and will be formally submitted to the Hazardous Waste Bureau. This letter will be sent by May 31, 2025.
Specific Comment #33	Section 5.1, Quarterly Monitoring Reports, pg. 23. The text will be revised to state: "Documentation of extraction and recovery rates both graphically and in tabular form for extraction wells, and wells impacted by aquifer testing, for individual wells and the overall system" NMED requires that extraction and recovery rates are provided for each extraction well, not just for the wells impacted by aquifer testing. Specifically, the recovery rates for each well and the system overall should be presented as plots in the future Quarterly Monitoring Reports.	The work plan was developed to address data gaps and continued operation prior to specific operational direction from NMED. These data gaps still need to be addressed after restart of the interim measure. EM-LA will continue to work with NMED GWQB to address requirements to restart the interim measure. EM-LA requests clarification on this comment.	Revisions should remove specifications for the future aquifer test work plans. NMED will determine validity of the specific conditions to conduct the test when reviewing any aquifer test work plan submissions. Revisions to this Work Plan should include high level DQO's that will allow us to determine when the data gap activity will be deemed complete. EM-LA must provide discussions for any data gap activities that require the operation of injection wells currently not approved by GWQB and must state if the data gap activities can be completed under the current operational constraints. If the data gap cannot be completed without injection in specific wells, EM-LA must include additional methods to fulfill the required data gap.	NA	Topic 1 - recommendation 1; the restart of the IM system is recommended.		All work plans for aquifer testing will be submitted to NMED for approval prior to implementation. Aquifer test work plans will include the requested detail. The IM system was restarted under GWQB-approved conditions. Additionally, the IRT recommends to keep the system operational while other studies and investigations move forward. Therefore, the revised Chromium Interim Measures and Characterization Work Plan will not include discussions regarding the ability to fulfill data gap activities under a no-injection constraint.
Specific Comment #34	Section 5.2, Annual Monitoring Reports, pg. 23. "Time-series plots, and solute ratio plots will be constructed and evaluated in the Annual Monitoring Reports, and include data for chromium, perchlorate, nitrate, and tritium and trend analysis as appropriate (e.g., Mann-Kendall)" Revise the text to add that solute ratio plots shall be constructed and evaluated. NMED requested that chromium/sulfate, chromium/nitrate, and chromium/chloride plots be constructed and evaluated in the Annual Monitoring Reports.	EM-LA will construct and evaluate these plots for the Annual IM Performance Reports.	NMED will review revisions to determine concurrence.	NA - This comment is out of the scope of the IRT.	NA		Solute ratio plots will be constructed and will require evaluation over time in order to understand patterns and trends of the aquifer behavior. This will be performed as part of the evaluation of the conceptual site model. Following the initial evaluation, updates on these solute ratio trends will be included starting in the 2025 Annual Performance Report.
Specific Comment #35	Figure 3.2-2, Schematic of infrastructure well screen locations, pg. 32. Revise the figure to include all infrastructure well screen locations for the chromium plume monitoring well network. Additionally, revise the figure to accurately represent the dual screen configuration of CrEX-1 and CrEX-5.	EM-LA concurs with this comment and will update the Work Plan accordingly. We note that CrEX-5 is a single screen well.	NMED will review revisions to determine concurrence.	NA	NA	EM-LA concurs with this comment and will update the Chromium Interim Measures and Characterization Work Plan accordingly. EM-LA notes that CrEX-5 is a single screen well.	
Specific Comment #36	Figure 3.3-1 through Figure 3.3-14, pg. 34-40. Revise the figures to update to current data that includes the reduced pumping conditions from October 2022 to March 2023.	EM-LA does not concur with this comment and will not update the document to incorporate data collected after submittal of the Work Plan. These data are presented in the Annual Progress Report on Chromium Plume Control Interim Measure Performance, April 2022 through March 2023 (EMID – 702801).	NMED will review revisions to determine concurrence.	NA - This comment is out of the scope of the IRT.	NA		Maps and data will be updated in a revised Chromium Interim Measures and Characterization Work Plan submittal.
Specific Comment #37	Figure 3.3-14, Chromium concentrations over time at R-61, pg. 40. This figure is a duplicate of Figure 3.3-7. Revise Figure 3.3-14 to reflect concentration data for R-61 screen 2.	EM-LA does not concur with this comment and will remove the duplicative Figure 3.3-14. R-61 S2 water quality is known to be artificially reducing because of contamination by hammer oil introduced during sampling. Due to these artificially reducing conditions, chromium data from this well are not representative of local groundwater concentrations and will not be presented in the report.	Revisions to the report should include reference to the data collected and presented in the Evaluation of Regional Well R-61 for the exclusion of R-61 S2 and the inclusion of R-61 S1. The work plan should discuss the results of this evaluation. NMED will review revisions to determine concurrence.	NA	NA		The report will include a reference to the evaluation of R-61, with inclusion of S1, exclusion of S2.
Specific Comment #38	Figure 3.3-16, Present-day plume depiction, along with symbols depicting the level of chromium concentration (<50 or <50 ug/L) at sampling locations, pg. 42.	EM-LA will revise figure 3.3-16 to clarify the depth of contamination relative to the water table surface. EM-LA will revise the 50-ppb contour on future report submittals as new wells are installed and chromium concentrations change over time.	NMED will review revisions for Figure 3.3-16 to determine concurrence. NMED would like the revised plume depiction figure to add clarity in the uncertainty between the shallow and deeper contamination portions of the plume.	The IRT concludes that the injection wells are outside of the 50 ppb boundary. However, they mention that CrIN-1 and CrIN-2 may eventually be within the 50 ppb contour area (Section 3.1.2).	Section 3.1.2	Topic 1 - recommendation 2, sub-bullet 3: avoiding operating CrIN-1 and CrIN-2 with caution as injection is recommended.	Based on the IRT recommendation, CrIN-1 and CrIN-2 should not be shown to be within the 50 ppb region at this time based on their chromium concentrations. The revised work plan will contain a discussion and visual representation on plume maps of the areas where data are poorly constrained.
Specific Comment #39	The boundary lines are currently showing the approximate extent of 50 ppb Cr at depths >50ft below water table and the approximate extent of 50 ppb Cr at a depth <50ft below water table. For consistency throughout the document, the boundary location provided should represent the position of the 50 ppb extent of contamination. If including a visual representation of the deeper portions of contamination within the regional aquifer, the reference point should include linear depth and depth below water table. Additionally, revisions must be made for the assumptions between known data points representing the approximate extent of 50 ppb Cr at depths >50ft below water table. For instance, Figure 3.3-16 shows that the approximate extent excludes CrIN-2, CrEX-1, CrEX-2, CrPZ-1 and CrPZ-4 despite the lack of data points in those regions that would allow for exclusion. In regions where data gaps exist and not enough information has been established to determine the approximate extent boundary line, Figure 3.3-16 should err on the side of caution and include it in the potential contamination boundary until enough data has been collected to exclude. Figure 3.3-16 does not accurately represent the injection wells that showed contamination above 50 ppb in the initial sampling, and it should be revised to reflect the concentration above regulatory standards.	EM-LA does not concur with NMED's comment that deep plume boundary should be expanded to include the locations of CrIN-2, CrEX-1, CrEX-2, CrPZ-1 and CrPZ-4. EM-LA recognizes that the plume boundary is uncertain, but there are no data at this time that show the plume extends beyond these wells. Drilling to evaluate vertical extent will provide the data necessary to better inform the deep plume boundary. EM-LA does not concur that the map should use concentration data pre-dating IM operation for the CrIN wells. The figure is documenting the present-day state of the Chromium plume. The concentrations of chromium in the CrIN wells prior to operation of the IM are well documented in the Initial Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operations (EMID – 702597; Appendix B of the revised work plan), section 5.1-1, page 55.	However, the detected concentrations at CrIN-1 and CrIN-2 exceeded the regulatory standard of 50 ppb when sampled in 2016 and 2017, and therefore should not be excluded from the approximate extent of 50 ppb Cr at depths less than 50 ppb below the water table.		NA		