



January 3, 2024

Arturo Duran
Designated Agency Manager
U.S. Department of Energy, Environmental Management
Los Alamos Field Office
1200 Trinity Drive, Suite 400
Los Alamos, NM 87544

**RE: EM-LA Response to Notice of Disapproval
Chromium Interim Measures and Characterization Work Plan
Los Alamos National Laboratory
EPA ID#NM0890010515
LANL-22-076**

Dear Mr. Duran,

The New Mexico Environment Department (NMED) received the United States Department of Energy's (DOE) *Chromium Interim Measures and Characterization Work Plan* (Work Plan) on September 29, 2022. The Work Plan is dated September 2022 and referenced by EM2022-0582. The Work Plan is subject to reporting and interim measure (IM) operational requirements provided in Paragraphs C and D of Section XV of the 2016 Compliance Order on Consent (Consent Order). Those Paragraphs reference Section XXIII of the Consent Order, which provides the process for NMED review and approval of these submittals. NMED issued a Notice of Disapproval (NOD) in accordance with Paragraph F of Section XXIII of the Consent Order on May 31, 2023.

On July 24, 2023 NMED received DOE's response to the NOD comments and held a meeting to discuss, pursuant to Section XXIII.G of the Consent Order. Another meeting was held on October 26, 2023 to discuss the Chromium Interim Measures and Characterization Work Plan NOD comments and the DOE proposed responses. NMED requested a timeline for the generation of a revised work plan, including redline changes, that address the NOD comments. DOE agreed to complete the revision of the Chromium Interim Measures and Characterization Work Plan no later than 26 weeks after receipt of the written feedback from NMED on DOE's "Response Matrix to the Notice of Disapproval, Chromium Interim Measures and Characterization Work Plan".

NMED issues this written feedback to the "Response Matrix to the Notice of Disapproval, Chromium Interim Measures and Characterization Work Plan". DOE must satisfactorily resolve all the disapproval comments provided herein and submit a revised Work Plan to NMED. The Revised Work Plan is due within 26 weeks of the date of this letter.

Should you have any questions regarding this correspondence, please contact Caitlin Martinez at (505) 690- 4742.

Sincerely,

Rick Shean Digitally signed by
Rick Shean
Date: 2024.01.03
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Rick Shean
Designated Agency Manager, Hazardous Waste Bureau
Director, Resource Protection Division, NMED

Cc with Attachment:

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File: LANL 2023, NMED Response to Comment Matrix, NOD LANL Chromium Interim
Measures and Characterization Work Plan, September 2022
LANL-22-076

Attachment: Response Matrix to the Notice of Disapproval, Chromium Interim Measures and
Characterization Work Plan

Response Matrix to the Notice of Disapproval, Chromium Interim Measures and Characterization Work Plan
Los Alamos National Laboratory, EPA ID# NM0890010515, HWB-LANL-22-076
Dated May 31, 2023

#	NMED Comment	EM-LA Response	NMED Response
General Comments (GC)			
GC 1	<p>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.</p>	<p>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.</p>	<p>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.</p>
GC 2	<p>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.</p>	<p>The proposed analysis and evaluations will be performed during preparation of 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.</p> <p>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.</p>	<p>NMED does not currently have the data necessary to adequately evaluate final remedy alternatives proposed in a corrective measures evaluation (CME). Following nonconcurrency with NMED, the CME was removed as an FY25 target on the Appendix B revision received on December 5, 2023. NMED has provided regulatory direction to accelerate remediation efforts while data gaps needed for final remedy determination are collected. Consistent with EPA guidance provided on <i>Fact Sheet #3: Final Remedy Selection for Results-Based RCRA</i></p>

			<p><i>CorrectiveAction</i>¹, "...the two most important short-term goals of the RCRA Corrective Action program are to achieve two 'environmental indicators.' These two indicators focus on ensuring that humans are not exposed to unacceptable levels of contamination, and that contaminated groundwater does not continue to migrate above levels of concern beyond its current furthest three-dimensional extent. As warranted, facilities should implement interim measures where necessary to achieve these indicators as soon as possible." The implementation of interim measures is necessary to prevent migration of the hexavalent chromium plume beyond the current furthest three-dimensional extent. However, the operation of the current injection well network is causing increasing trends in the eastern area of the plume, extending past the furthest three-dimensional extent at the time of approval. Additionally, EPA expects that the selection of a final remedy for contaminated groundwaters at RCRA Corrective Action Facilities will return usable groundwaters to their maximum beneficial use wherever practicable, within a time frame that is reasonable given the particular circumstances of the site. NMED and EM-LA do not have adequate information to design a remediation system that can achieve final remedy objectives in a reasonable time frame. The Interim Measure and Characterization Work Plan must include the installation of an alternative injection location for the continued remediation of contamination while data gap investigations occur. EPA guidance states that interim measures should also, to the extent practicable, be consistent with anticipated final remedies. NMED has agreed to facilitate this EPA guidance by incorporating the alternative injection location as a component of the final remedy design.</p>
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¹ U.S. Environmental Protection Agency, March 2000. Fact Sheet No. 3, Final Remedy Selection for Results-Based RCRA Corrective Action.

<https://www.epa.gov/sites/default/files/2016-01/documents/select.pdf>

			<p>NMED supports the utilizing Adaptive Management Strategy during interim measures, in addition to being a component of the final remedy. In an effort to resolve the differing technical positions and following the EM-LA's December 5, 2023 letter, <i>Response to New Mexico Environment Department September 6, 2023, Letter, "Corrective action under DP-1835 associated with the chromium plume"</i>², NMED agreed to an independent technical review of the chromium interim measures operations to be completed by the U.S. Department of Energy's Office of Science. NMED will consider the conclusions of the independent review panel when reviewing revisions to the Chromium Interim Measures and Characterization Work Plan.</p> <p>However, NMED does not concur with the proposal for future monitoring wells to be "convertible" with longer screens. The guidance provided in the June 2016 Compliance Order on Consent Appendix F, Sampling/Analytical/Field Method Regulatory Guidance, Section II.C.3, <i>Well Screen and Filter Pack Design</i> states "While monitoring wells are usually constructed with longer screens (usually five to twenty ft), they should be kept to a minimum length appropriate for intercepting a Contaminant plume." NMED does not disagree with convertible wells for the purposes of injection or extraction, which are both designed with a longer screen.</p>
GC 3	<p>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</p>	<p>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</p>	<p>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</p>

² Department of Energy Environmental Management Los Alamos Field Office, December 5, 2023. Response to New Mexico Environment Department September 6, 2023, Letter, "Corrective action under DP-1835 associated with the chromium plume".

	<p>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.</p>	<p>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.</p>	<p>Consent³. 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 letter⁴ 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.</p>
Specific Comments (SC)			
SC 1	Section 1.1.1, Characterization Work Plans, pg.2, “Although results of the characterization	The letter to close the 2015 work plan will include a cross-walk of the work plan	Revisions to the Chromium Interim Measures and Characterization Work Plan must include the analysis

³ Compliance Order on Consent, June 2016. State of New Mexico Environment Department and U.S. Department of Energy Los Alamos National Laboratory.

<https://hwbdocuments.env.nm.gov/Los%20Alamos%20National%20Labs/Permit/37925.pdf>

⁴ NMED, 2023. Notice of Disapproval, Chromium Interim Measures and Characterization Work Plan, May 31, 2023. https://ext.em-la.doe.gov/GovFTPFiles/api/GetFiles/GetFile?fileName=EMID-702742_NOD_Chr_IM_Wk_Plan_053123.pdf

	<p>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.”</p> <p>Revise the text to include a discussion regarding how the objectives from the documents listed in this section have been revised, or retained, as current Work Plan objectives. Additionally, the future submission of the letter to administratively close these documents must include an analysis of the initial objectives and must also discuss why any objectives have changed.</p>	<p>objectives, analysis of the initial objectives, and discussion of any changes to the previously proposed objectives.</p>	<p>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.</p>
SC 2	<p>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,</p>	<p>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</p>	<p>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 Operation⁵ as an Appendix.</p>

⁵ LANL, 2023. Initial Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operations. <https://ext.em-la.doe.gov/GovFTPFiles/api/GetFiles/GetFile?fileName=EMID-702597.pdf>

	<p>including decreasing chromium concentrations at R-50 to the 50-ppb New Mexico groundwater standard or less over a period of approximately 3 yr.”</p> <p>Revise the Work Plan to include specific discussions updating each of the anticipated responses in the plume boundary that were presented in Interim Measures Work Plan for Chromium Plume Control. Specifically, the Interim Measures Work Plan for Chromium Plume Control stated that chromium concentrations were expected to decline at R-45 and stay the same or decline at R-44. Revise the text to include a discussion on the observed responses in concentration trends and a comparison to the projected responses for R-45 and R-44.</p>	<p>Control with an Assessment of Potential Modifications to Operation (EMID – 702597), which will be included in the Work Plan revision as Appendix B . Analyses of R-44 data are presented in Sections 3.4 - 7.1; Analyses of R-45 data are presented in Section 5.3.4.1 of that evaluation.</p>	<p>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.</p>
<p>SC 3</p>	<p>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.”</p> <p>For the 2018 performance monitoring work plan to be administratively closed, revise the text to include the results for all tracer tests mentioned in the 2018 performance monitoring work plan. This discussion must provide key points, like travel time, recovered location, injection and recovery amounts and the aquifer parameters determined from testing. Specifically, one objective of the 2018 performance monitoring work plan was to utilize data from pressure responses and chromium transients to refine the understanding of aquifer properties (heterogeneity and hydraulic connections between pumping and observation wells). The text must directly state what data was used to refine the aquifer properties, state what the</p>	<p>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.</p>	<p>NMED would like this information included as an appendix on the current work plan and not submitted as a separate report.</p>

	<p>aquifer properties are currently assumed to be and must also include an evaluation of each objective from the 2018 performance monitoring work plan.</p>		
SC 4	<p>Section 3.2, IM Operations, pg. 6.</p> <p>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.</p>	<p>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. A brief background and references to number of critical submittals that document the investigations and work plans that advanced the Chromium IM to its present state are 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), which will be included in the Work Plan revision as Appendix B.</p>	<p>Revisions should not just cite the Five-Year Evaluation of the Interim Measures for Chromium Plume Control with an Assessment of Potential Modifications to Operation² and should provide key information in the body of the text.</p>
SC 5	<p>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.”</p> <p>As discussed in the pre-submittal meetings held between NMED and DOE, NMED requires that the Work Plan be revised to include a discussion of the observed plume responses regarding mass capture, using the mass removal estimates. Revise the text to include the estimated mass of chromium removed since initiation of the ion exchange treatment system and a discussion on any observed trends in mass removal. This discussion should also evaluate any deficiencies in the estimates, including the potential inaccuracy from using HACH test estimations.</p>	<p>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.</p>	<p>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.</p>

SC 6	<p>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.”</p>	<p>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.</p>	<p>According to the EPA guidance titled <i>A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems</i>⁶, “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.</p>
SC 7	<p>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-ug/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</p>	<p>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</p>	<p>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</p>

⁶ U.S. Environmental Protection Agency, January 2008. A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems.

<https://nepis.epa.gov/Exe/ZyPDF.cgi/60000MYO.PDF?Dockkey=60000MYO.PDF>

	<p>(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.”</p> <p>Revise the text to include the NMED concerns with the data in the southern region of the plume. Specifically, the text must be revised to include specification that the plume is not adequately delineated in this region, therefore, describing the response as a retreat of the plume edge is speculative. Revise the Work Plan to include detail regarding the lack of delineation and the potential for dilution of the plume near R-50 via in situ mixing of clean injection water with the plume.</p>	<p>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 5.3.3.1, Figures 5.1-6.</p>	<p>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.</p>
SC 8	<p>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.”</p> <p>Revise the document to include a clear definition of the term residual or rephrase the language.</p>	<p>The word 'residual' will be removed from this sentence in the revised work plan.</p>	<p>Agreed.</p>
SC 9	<p>Section 3.3.2, Conceptual Site Model Updates Since Initiation of IM Operations, pg. 9, “In 2017, initial CrIN-6 concentrations of 250-300 ug/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-2019, samples collected from R-70 screen 1 and screen 2 showed that concentrations in excess of 200 ug/L extend significantly farther east than originally assumed, and those high</p>	<p>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;</p>	<p>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</p>

	<p>concentrations were present at depths at least 90 ft below the water table (depth of the top of R-70 screen 2).”</p> <p>Revise the text to include details about the depth of the contamination at the locations discussed in this section. The text should include the depth of the sampled screened interval for CrIN-6 (before conversion to extraction well CrEX-5). It should also include a comment about how this information assisted in the development of the subsequent R-70 screen depths.</p>	<p>Appendix B of the revised work plan), Section 3.4, and the Completion Report for Regional Aquifer Well R-70 (EMID - 700721).</p>	<p>Injection Well CrIN-6⁷ “The measured chromium concentrations of approximately 260 ug/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 ug/L) and justify this evaluation of whether injection at CrIN-6 is still the optimal means of obtaining the second 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 from CrIN-6 and reconsideration of the development as an injection well. Additionally, it states that GWQB issued a letter dated September 1, 2017, that detailed concerns 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.</p>
<p>SC 10</p>	<p>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 (Figure 3.3-10) and R-35b (Figure 3.3-11), situated northeast of R-70 and serving as a</p>	<p>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 towards 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</p>	<p>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.</p>

⁷ LANL, April 26, 2018. Evaluation of the Chromium Plume Control Interim Measure Operational Alternative for Injection Well CrIN-6. <https://permalink.lanl.gov/object/tr?what=info:lanl-repo/eprr/ESHID-603032-01>

	<p>sentinel well for municipal water supply well PM-3, either before or during the IM operational period. These concentrations remain at background with no upward trend.”</p> <p>Revise the text to discuss a contingency plan if the plume migration results in increasing hexavalent chromium concentrations at R-35. Given the proximity of R-35a and R-35b to PM-3 and the inability of the IM system to mitigate plume migration in a reasonable time frame, it is important to briefly discuss and prepare a contingency plan that will prevent the contamination from reaching PM-3.</p>	<p>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.</p>	
<p>SC 11</p>	<p>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 extraction at CrEX-2 and injection at CrIN-5, the chromium concentration trend is likely associated with IM operations. This work plan proposes further investigation into the chromium trends and the relation to the IM.”</p> <p>Revise the text to discuss potential reasons for an increased trend in hexavalent chromium concentration at monitoring well R-61. The text must include initial considerations with specific reference to which IM operations potentially caused the unfavorable response. The text must also be revised to include a discussion on how the increased concentration response can be used to evaluate the current IM system’s ability to effectively control migration in a relatively predictable way.</p>	<p>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.</p>	<p>Revisions to the text should include the language from the Five-Year Evaluation document and only providing a citation is not adequate.</p>

<p>SC 12</p>	<p>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 (Addendum 1), and was conducted from 2013 to 2017 (LANL 2018, 602964). The text below is an abbreviated description from the compendium.”</p> <p>Revise the text to include a table clearly listing the 17 tracer tests mentioned in the bullet points in Section 3.4 and the specific location within the compendium for the analysis conducted for each. This table should include a summary of each test and the specific location(s) within the compendium of the documented testing and all associated analysis for that test.</p>	<p>EM-LA will include the requested summary table in the revised work plan.</p>	<p>Agreed.</p>
<p>SC 13</p>	<p>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.”</p> <p>Revise the text to include the location of any analytical results associated with these tracer test deployments. Although a brief discussion is provided, the Work Plan must provide specific reference to the location of analyses conducted. The Work Plan must also include a discussion of how the results of these deployments have altered assumptions for hydraulic parameters of the regional aquifer. Additionally, the discussion in the Work Plan only refers to the tracers injected into CrIN-4, CrIN-1, and CrIN-2. The discussion must be revised to include the</p>	<p>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.</p>	<p>NMED would like the information for the tracer test summary report included as an Appendix, rather than a stand-alone report.</p>

	responses to the redeployments of tracers for CrIN-3 and CrIN-5.		
SC 14	<p>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 value that denotes success.”</p> <p>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 upcoming 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.</p>	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.
SC 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	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 measures 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

	<p>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.”</p> <p>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.</p>		<p>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.</p>
<p>SC 16</p>	<p>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.”</p> <p>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.</p>	<p>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. Re-evaluation 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.</p>	<p>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 remediation area. Future determinations for the efficiency of mass removal require sufficient estimates for chromium mass. Additionally, these estimates will be revised as additional information regarding the contamination present in the vadose zone above the regional aquifer is obtained.</p>

SC 17	<p>Section 4.1.1.2, IM Mass Extraction, pg. 14, “For measurements supporting mass removal, concentrations will be measured one time per week using Hach test kits, but duplicate samples will also be sent to a state-approved laboratory for analysis. The Hach 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.”</p> <p>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).</p>	<p>Quantitative analysis of the mass extraction estimates based on both laboratory analytical and Hach data are presented in the Annual Interim Measure Performance Report. The work plan will be updated to describe the calculation methods in detail.</p>	<p>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 adequate 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.</p>
SC 18	<p>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.”</p> <p>The use of the term scientific studies is overly broad and implies that aquifer testing is not a scientific study. Revise the language.</p>	<p>EM-LA does not concur with this comment, but agrees with the premise that aquifer tests are scientific studies.</p>	<p>NMED would like revisions to specify the scientific studies proposed as work plan activities and will review revisions to determine concurrence.</p>
SC 19	<p>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</p>	<p>The aquifer testing supports the mass flux calculations. EM-LA will clarify the text.</p>	<p>NMED will review revisions to determine concurrence.</p>

	<p>and (2) how fast the water is moving through any given cross-sectional area.”</p> <p>Revise the text to clarify if the second activity is aquifer testing alone or if it will be combined with mass flux characterization.</p>		
SC 20	<p>Section 4.2.1, Plume Horizontal and Vertical Extent, pg. 15, “To evaluate the success of the IM system in maintaining chromium concentrations <50 ppb beyond the Laboratory boundary, both the horizontal and vertical extents of the chromium plume need to be established.”</p> <p>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.</p>	<p>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.</p>	<p>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.</p>
SC 21	<p>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 <50 ppb as measured from Hach data, and characterizing the extent of contamination in this region of the plume will be an important new data point.”</p> <p>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</p>	<p>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.</p>	<p>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.</p>

	<p>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.</p>		
SC 22	<p>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."</p> <p>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.</p>	<p>EM-LA will define proposed data quality objectives in the revised report to evaluate whether data gaps have been filled.</p>	<p>NMED will review revisions to determine concurrence.</p>
SC 23	<p>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 transect 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 (EBF), coupled with grab sampling, to conduct high-resolution stratified mass flux characterization at short (~5ft) intervals in existing long-screen (>40ft) wells (e.g., R-70 screen 1, CrEX-1, CrEX-2, CrEX-3, CrEX-4, CrEX-5)."</p> <p>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.</p>	<p>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.</p> <p>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.</p>	<p>NMED will review revisions to determine concurrence.</p> <p>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.</p>

SC 24	<p>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.”</p> <p>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.</p>	<p>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.</p> <p>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.</p> <p>Tests will be designed to meet Data Quality Objectives (DQOs) that will be presented in the revised work plan.</p>	NMED will review revisions to determine concurrence.
SC 25	<p>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.”</p> <p>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.</p>	<p>EM-LA requests clarification on NMED's concerns regarding the proposed aquifer test durations.</p> <p>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.</p>	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.
SC 26	<p>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.”</p>	<p>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.</p>	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.

	<p>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.</p>	<p>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 operation scenario.</p>	<p>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.</p>
SC 27	<p>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."</p> <p>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.</p>	<p>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.</p> <p>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.</p>	<p>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.</p>
SC 28	<p>Section 4.2.3.2, 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."</p>	<p>EM-LA requests clarification on NMED's request to account for background water levels during mass flux calculations.</p>	<p>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.</p>

	Provide clarification if background water levels will also be measured and corrected for.		
SC 29	<p>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.”</p> <p>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.</p>	<p>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.</p> <p>EM-LA recommends that the need for tracer testing is evaluated as new information is obtained.</p>	NMED will review revisions to determine concurrence.
SC 30	<p>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.”</p> <p>Revise the text to clarify how the viability of a monitoring well will be disturbed from tracer testing.</p>	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.
SC 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 dates collaboratively identified with NMED, generated for three depths, if possible, based on the	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	Revisions should include the referenced documents as Appendices and adequately cite the statements made in the referenced documents to address NMED’s comment.

	<p>availability of data; chromium and other concentration data needed to support the analysis.”</p> <p>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.</p>	<p>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.</p>	
SC 32	<p>Section 5.1, Quarterly Monitoring Reports, pg. 23, “Synoptic potentiometric surface maps using dates collaboratively identified with NMED, generated for three depths, if possible, based on the availability of data.”</p> <p>Revise the Work Plan to include the most recent synoptic potentiometric surface maps from a NMED approved document for at a minimum of two depths. Then continue to update the quarterly reporting requirements for three depths, if possible.</p>	<p>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).</p>	<p>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.</p>
SC 33	<p>Section 5.1, Quarterly Monitoring Reports, pg. 23, “Documentation of extraction and recovery rates for wells impacted by aquifer testing, providing data both graphically and in tabular form”</p> <p>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.</p>	<p>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.</p> <p>EM-LA requests clarification on this comment.</p>	<p>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.</p> <p>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.</p>
SC 34	<p>Section 5.2, Annual Monitoring Reports, pg. 23, “Time-series plots, and solute ratio plots will be</p>	<p>EM-LA will construct and evaluate these plots for the Annual IM Performance Reports.</p>	<p>NMED will review revisions to determine concurrence.</p>

	<p>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)”</p> <p>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.</p>		
SC 35	<p>Figure 3.2-2, Schematic of infrastructure well screen locations, pg. 32.</p> <p>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.</p>	<p>EM-LA concurs with this comment and will update the Work Plan accordingly. We note that CrEX-5 is a single screen well.</p>	<p>NMED will review revisions to determine concurrence.</p>
SC 36	<p>Figure 3.3-1 through Figure 3.3-14, pg. 34-40.</p> <p>Revise the figures to update to current data that includes the reduced pumping conditions from October 2022 to March 2023.</p>	<p>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).</p>	<p>NMED will review revisions to determine concurrence.</p>
SC 37	<p>Figure 3.3-14, Chromium concentrations over time at R-61, pg. 40.</p> <p>This figure is a duplicate of Figure 3.3-7. Revise Figure 3.3-14 to reflect concentration data for R-61 screen 2.</p>	<p>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.</p>	<p>Revisions to the report should include reference to the data collected and presented in the Evaluation of Regional Well R-61⁸ 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.</p>

⁸ LANL, June 2014. Evaluation of Regional Well R-61. <https://permalink.lanl.gov/object/tr?what=info:lanl-repo/eprr/ERID-257586>

<p>SC 38</p>	<p>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.</p> <p>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 >50 ft 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.</p>	<p>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.</p> <p>EM-LA does not concur with the comment to alter the chromium contouring method, as presentation of the shallow and deep portions of the plume is critical to demonstrating where lateral and vertical extent data gaps are present.</p> <p>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.</p> <p>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.</p>	<p>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.</p> <p>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 extend of 50 ppb Cr at depts less than 50ft below the water table.</p>
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