

OFFICE OF THE NEVADA ENVIRONMENTAL RESPONSE TRUST TRUSTEE

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May 3, 2024

Mr. Alan Pineda, P.E.
Bureau of Industrial Site Cleanup
Nevada Division of Environmental Protection
375 E. Warm Springs Road, Suite 200
Las Vegas, Nevada 89119

RE: Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum
July – December 2022 Performance Period
Nevada Environmental Response Trust
Henderson, Nevada

Dear Mr. Pineda:

The Nevada Environmental Response Trust (NERT) is pleased to present the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum, Revision 1 for Nevada Division of Environmental Protection (NDEP) review. This memorandum has been revised in accordance with NDEP's comments dated March 5, 2024. As requested, NERT has also presented an annotated response-to-comments.

If you have any questions or concerns regarding this matter, feel to contact me at (702) 960-4309 or at steve.clough@nert-trust.com.

Office of the Nevada Environmental Response Trust



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Remediation Director
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NDEP Comment	Response to Comment
General Comments	
<p>1. <u>General Comment</u>: The Performance Memorandum does not include evaluation of observed groundwater elevations to demonstrate capture. NDEP recommends that the evaluation of groundwater elevations be included as a line of evidence, consistent with EPA guidance: A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems (USEPA, 2008) list of recommended steps for completing capture zone evaluations.</p>	<p>The Semi-Annual Memoranda are abbreviated versions of the Annual Reports, which have expanded discussions of the monitoring data. Specifically, the Annual Reports use measured groundwater elevations to prepare contour maps to assess 1) plume-wide flow directions and gradients and 2) extraction well drawdown and horizontal capture near the well fields. The Annual Reports also provide additional discussion of the measured vertical hydraulic gradients, as well as horizontal and vertical capture zones. Moreover, a series of cross-sections depicting the vertical capture zones have been included starting with the Annual Groundwater Monitoring and GWETS Performance Report dated February 26, 2021 for the July 2019 – June 2020 performance period (Ramboll 2021).</p> <p>As such, NERT believes that the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum, July – December 2022 Performance Period - dated December 27, 2023 (the “2022 Semi-Annual Memo”) need not be revised in response to this comment because the requested evaluation of groundwater elevations has been provided in past Annual Groundwater Monitoring and GWETS Performance Reports and will be provided in the forthcoming 2023 Annual Groundwater Monitoring and GWETS Performance Report.</p>
Essential Corrections	
<p>2. <u>Essential Correction #1 – Section 2.2, Page 6, first bullet</u>: It is stated that the alluvium has largely been dewatered and the IWF is operating at its maximum sustainable pumping rate. As was identified in the AWF, is the reduced pumping rate for the IWF due to dewatering of the alluvium? If so, can observed groundwater elevations be used to show that the water level near the IWF has decreased, supporting that the reduction in pumping rate may be due to a decrease in the surrounding groundwater elevations?</p>	<p>Yes, the reduced pumping rate for the IWF is due to dewatering of the alluvium. Observed groundwater elevations and pumping rates versus time for the IWF can be found in Appendix B. A reference to Appendix B has been added to Section 2.2 of the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum, July – December 2022 Performance Period, Revision 1 (the “Revised Memo”).</p>

NDEP Comment	Response to Comment
<p>3. <u>Essential Correction #2 Section 3.2.1, Page 15, figure:</u> The caption of the figure states that the chart shows the "monthly total chromium removed by the IWF, AWF, SWF, and AP." However, only the AWF and IWF are shown, the other two well fields should be added.</p>	<p>The caption noted in this comment states, "Chromium mass removal at the SWF and AP Area are relatively small and therefore are not shown as bars in the chart but are reflected in the total mass removal numbers above the bars". If added, the SWF and AP Area removal would not be visible in the chart, as they collectively remove less than or equal to approximately 2 pounds per month. Chromium removal data for all well fields can be found in Table 6. As such, NERT believes that the 2022 Semi-Annual Memo need not be revised in response to this comment.</p>
<p>4. <u>Essential Correction #3 Section 3.2.3, Page 21, first paragraph:</u> The capture analysis appears to be solely based on output from the Phase 6 Model. NDEP provided comments regarding the Phase 6 Model, dated July 22, 2020, and additional comments on proposed updates for the Phase 7 Model were provided on October 16, 2023, that recommended modifications for the Phase 7 Model to improve the ability of the model to represent observed groundwater flow and contaminant transport conditions. The Performance Memorandum states that the Phase 7 Model, once completed, will be used to evaluate/calculate the performance metrics to evaluate the effectiveness of the groundwater extraction systems at the Site.</p> <p>To predict capture, the Phase 6 Model was updated with extraction rates from the performance period, July through December 2022, where data was available. Where rates were not available for the performance period, such as the TIMET wells, assumptions were made regarding the rates based on previous years data. Total pumping rates from the third and fourth quarter 2021 were used for Titanium Metals Corporation (TIMET) extraction wells. Well specific pumping rates were not available for the TIMET extraction wells; therefore, the total pumping rate was distributed to the individual wells based on the distribution of individual extraction rates presented by TIMET for third and fourth quarter 2020. The Performance Memorandum does not state that the Phase 6 Model was updated to match observed water levels from July through December 2022. To predict capture for the period from July through December 2022 it must be demonstrated that the Phase 6 Model represents observed</p>	<p>As indicated in the response to Comment #1, the Semi-Annual Memoranda are abbreviated versions of the Annual Reports, which have expanded discussion of the monitoring data. Specifically, the Annual Reports use measured groundwater elevations to prepare contour maps to assess 1) plume-wide flow directions and gradients, and 2) extraction well drawdown and horizontal capture near the well fields. The Annual Reports also provide additional discussion of the measured vertical hydraulic gradients and horizontal and vertical capture zones. As such, NERT believes that the 2022 Semi-Annual Memo need not be revised in response to this comment because the requested evaluation of field data has been provided in past Annual Groundwater Monitoring and GWETS Performance Reports and will be provided in the forthcoming 2023 Annual Groundwater Monitoring and GWETS Performance Report.</p> <p>As noted by NDEP, the Phase 7 Model is under development to address NDEP comments. Once approved by NDEP, the Phase 7 Model will be used to evaluate performance of the GWETS in concert with the field data evaluations presented in the Annual Reports. The Phase 6 Model will continue to be used in the Semi-Annual and Annual Groundwater Monitoring and GWETS Performance Reports until NDEP approval of the forthcoming Phase 7 Model. The Trust would also like to note that the capture zones generated with the current draft Phase 7 model are generally consistent with those generated with the Phase 6 model.</p>

NDEP Comment	Response to Comment
<p>water levels for the same time period. Given that the Phase 6 Model required an update as described in NDEP comment letters noted above, and that it is not demonstrated that the Phase 6 Model provides a reasonable calibration to water levels observed during the performance period, the Phase 6 Model should not be the only method applied and relied on for the capture zone evaluation.</p> <p>Field data should be used as a first step to evaluate capture and can be complemented by the model results. The United States Environmental Protection Agency's (USEPA's) <i>A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems</i> (USEPA, 2008) lists recommended steps for completing capture zone evaluations.</p>	
<p>5. <u>Essential Correction #4 Section 3.2.5.1, Page 26, end of second paragraph</u>: It is mentioned that of the 7 lbs/day of uncaptured perchlorate mass flowing through the OU2/OU3 boundary, 2lbs/day are being destroyed by the Bioremediation Treatability Study area. It should be noted that as the Bioremediation Study was terminated in December 2022, this amount of perchlorate mass will no longer be destroyed and could potentially discharge to the Wash.</p>	<p>The eighth and final injection event of the Seep Well Field Area Bioremediation Treatability Study was performed in November 2021 and monitoring continued until the last sampling event in December 2022. Groundwater perchlorate concentration reductions compared to baseline conditions continued to be observed at most monitoring wells within the treatability study area, even after one year following the last carbon donor injection (Tetra Tech 2023).</p> <p>Section 3.2.5.1 of the Revised Memo has been updated to indicate that Modification #6 to the Seep Well Field Area Bioremediation Treatability Study concluded in December 2022 resulting from a requirement for NERT to decommission the infrastructure associated with the study consistent with the Access Agreement with the landowner.</p>
<p>6. <u>Essential Correction #5 Section 3.2.5.2, Page 27, second paragraph</u>: Vertical flow rates are estimated from the Phase 6 Model. NDEP's July 22, 2020 comments on the Phase 6 Model identified that observed vertical hydraulic gradients are not well matched by the Phase 6 Model. NERT has proposed that a general head boundary condition be applied in the Phase 7 Model (as opposed to a no-flow boundary condition in the Phase 6 Model) to improve the ability of the Phase 7 Model to better represent observed vertical hydraulic gradients. On October 16, 2023, NDEP provided supplementary comments on NERT's</p>	<p>As indicated above, the Semi-Annual Memoranda are abbreviated versions of the Annual Reports, which have expanded discussion of the monitoring data. The Annual Reports provide additional discussion of the measured vertical gradients.</p> <p>As such, NERT believes that the 2022 Semi-Annual Memo need not be revised in response to this comment because the requested evaluation of groundwater elevations has been provided in past Annual Groundwater Monitoring and GWETS Performance Reports</p>

NDEP Comment	Response to Comment
<p>proposed updates for the Phase 7 Model, which recommended that a specified flux be applied at the bottom of the Phase 7 Model that is based on observed vertical hydraulic gradients. As such, observed groundwater elevations should be used as the first line of evidence to evaluate vertical gradients and subsequently vertical flows and vertical fluxes.</p>	<p>and will be provided in the forthcoming 2023 Annual Groundwater Monitoring and GWETS Performance Report.</p> <p>As noted by NDEP, the Phase 7 Model is under development to address NDEP comments. Once approved by NDEP, the Phase 7 Model will be used to evaluate performance of the GWETS in concert with the field data evaluations presented in the Annual Reports. The Phase 6 Model will remain in-use to evaluate performance metrics until NDEP approval of the forthcoming Phase 7 Model.</p>
<p>7. <u>Essential Correction #6, Section 3.2.6.2, Page 33, last paragraph</u>: The groundwater flux rates and mass loading rates to the Las Vegas Wash are "difficult to reconcile" in part because the groundwater flux rates appear to be based on model results, and the mass loading rates appear to be based on field data. This should be highlighted in the text. This is an example of why field data are necessary to validate model results.</p>	<p>There are several factors making the mass flux along the Las Vegas Wash and mass loading difficult to reconcile. The forthcoming RI Report for OU-3 further evaluates the migration of contaminants from groundwater into surface water of the Las Vegas Wash and will present an adjusted mass discharge and a mass balance which reconciles the disparate performance metrics of mass flux and mass loading. The forthcoming RI Report for OU-3 will also present an updated conceptual site model that describes the complexities of the hydrogeology and mass transport mechanisms surrounding the Las Vegas Wash (i.e., the mass flux in fluvial deposits), which collectively impact the estimates of mass flux in groundwater as perchlorate in groundwater approaches the Las Vegas Wash, enters the stream, and mixes with surface water.</p> <p>Future Annual Reports will integrate the updated conceptual site model into the performance evaluation and will include the additional metric of mass discharge to the Las Vegas Wash. While mass flux is a relevant metric for assessing contaminant migration in groundwater, mass loading and mass discharge are better indicators of contaminant migration to the Las Vegas Wash because they are based on concentration data from surface water samples.</p> <p>As such, NERT believes that the 2022 Semi-Annual Memo need not be revised in response to this comment.</p>
Minor Corrections	
<p>8. <u>Minor Correction #1, Section 3.2.1, 2nd last paragraph on Page 14</u>: The last sentence of the paragraph reads "The decrease in</p>	<p>Section 3.2.1 of the Revised Memo has been updated accordingly.</p>

NDEP Comment	Response to Comment
<p>total mass removal is due to reduced extraction rates (as a result of dewatering the alluvium) and perchlorate concentrations in extracted groundwater, as discussed in Section 2.5." Should it read "The decrease in total mass removal is due to reduced extraction rates (as a result of dewatering the alluvium) and decreased perchlorate concentrations in extracted groundwater, as discussed in Section 2.5. "?"</p>	
<p>9. <u>Minor Correction #2 Section 3.2.3 Note for Table on Page 19:</u> The meaning of the note for the table appears misleading. Instead of stating that "NERT's COPCs are administratively limited to perchlorate and chlorate in OU-2 and OU-3 east of Pabco Road", it should read "NERT's COPCs in OU-2 and OU-3 east of Pabco Road are administratively limited to perchlorate and chlorate."</p>	<p>Section 3.2.2 of the Revised Memo has been updated accordingly.</p>

References:

Ramboll. 2021. Annual Groundwater Monitoring and GWETS Performance Report; Performance Period July 2019 – June 2020; Nevada Environmental Response Trust Site; Henderson, Nevada. February 26. NDEP Approved May 6, 2021.

Tetra Tech. 2023. Seep Well Field Area Bioremediation Treatability Study Quarterly Progress Report, Nevada Environmental Response Trust; Henderson, Nevada. February 10.

United States Environmental Protection Agency (USEPA). 2008. A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems: U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/003.