

OFFICE OF THE NEVADA ENVIRONMENTAL RESPONSE TRUST TRUSTEE

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November 10, 2021

Dr. Weiquan Dong, 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
Nevada Environmental Response Trust
Henderson, Nevada

Dear Dr. Dong:

The Nevada Environmental Response Trust (NERT) is pleased to present the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum and associated Data Validation Summary Report and Electronic Data Deliverable for Nevada Division of Environmental Protection (NDEP) review. This memorandum summarizes operation of the Groundwater Extraction and Treatment System for the period of July 2020 through December 2020. Also attached is an annotated response to comments describing how the comments on last year's report were addressed in the enclosed report.

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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NDEP Comment	Response to Comment
General Comments	
<p>1. <u>General Comment #1</u>: Several of the performance metrics presented in the Performance Memorandum (e.g., well field capture zone evaluation, horizontal mass flux across transects upgradient of the well fields, vertical mass flux per OU-1, OU-2, and OU-3) are evaluated/calculated using the Phase 5 Model. The reliability of these metrics to evaluate actual remedial system performance is dependent on how well the Phase 5 Model matches observed groundwater elevations, groundwater flow directions, and horizontal/vertical hydraulic gradients at the Site under the influence of the groundwater extraction systems. The Performance Memorandum states that the performance metrics will be evaluated in the future using the Phase 6 Model once it is approved by the NDEP.</p> <p>The NDEP provided comments regarding the Phase 6 Model, dated July 22, 2020, to the Nevada Environmental Response Trust (NERT) that recommended modifications to the Phase 6 Model to improve the ability of the model to reasonably represent observed groundwater flow and contaminant transport conditions. NERT responded to these comments on October 9, 2020 effectively agreeing to implement NDEP's recommendations in the upcoming Phase 7 Groundwater Flow and Transport Model (Phase 7 Model). With NDEP's comments incorporated, the Phase 7 Model will provide a much more reliable predictive tool for the project moving forward. As a result, in future iterations of the Performance Memorandum, it is recommended that the Phase 7 Model, once completed, be used to evaluate/calculate the performance metrics to evaluate the effectiveness of the groundwater extraction systems at the Site.</p>	<p>The Semi-Annual Groundwater Monitoring and GWETS Performance Report for the reporting period of June through December 2020 used the Phase 6 Model to evaluate the performance metrics. The Trust agrees, the Phase 7 Model will be used to evaluate the performance metrics once it has been approved by NDEP. Based on the current timeline for completion of the Phase 7 model (including incorporation of the work that Desert Research Institute [DRI] is planning to complete), the current Phase 6 model will likely be used for the Semi-Annual Memoranda and Annual Reports through 2022.</p>
<p>2. <u>General Comment #2</u>: In future iterations of the Performance Memorandum, it could be helpful to include other lines of evidence to further demonstrate the performance of the groundwater extraction systems, consistent with 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). Several of the performance metrics presented in the Performance Memorandum rely on model predictions to evaluate the effectiveness of the</p>	<p>The evaluation of GWETS performance using the metrics is consistent with United States Environmental Protection Agency (USEPA) guidance on evaluating capture zones for groundwater pump and treat systems (USEPA 2008). Additionally, the USEPA guidance was used during development of the performance metrics and was cited in the 2013 GWETS Optimization Project Work Plan (ENVIRON 2013), which was the genesis of the metrics.</p>

NDEP Comment	Response to Comment
<p>groundwater extraction systems at the Site. Additional lines of evidence consistent with USEPA (2008) that are observation-based could be added to increase confidence in demonstrating remedial performance, such as groundwater elevation contour maps based on measured groundwater elevation data per water-bearing zone to illustrate the degree of horizontal capture achieved by the well fields in each zone, groundwater elevation difference maps between adjacent water-bearing zones to illustrate vertical hydraulic capture, and vertical hydraulic gradients at key nested monitoring wells to illustrate vertical hydraulic capture.</p>	<p>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. Moreover, starting with the Annual Groundwater Monitoring and GWETS Performance Report dated February 26, 2021 for the July 2019 – June 2020 performance period (Ramboll 2021), the Trust has included a series of cross-sections depicting the vertical capture zones. Since receiving NDEP’s comments on the Semi-Annual Memorandum on November 4, 2020, the Trust has also received comments from NDEP for the Administrative Record dated May 6, 2021 (NDEP 2021) regarding the Annual Groundwater Monitoring and GWETS Performance Report for the July 2019 – June 2020 performance period. This comment was not repeated therein; therefore, the Trust assumes that the additional discussion provided in the expanded Annual Reports adequately addresses this comment. Acknowledging that the current configuration of the GWETS is likely to change as part of final remedy, the Trust recommends keeping the metrics as they are until a long-term monitoring program is developed. At that time, the Trust will revise the metrics to evaluate the effectiveness of the final remedy.</p>
Essential Corrections	
<p>1. <u>Essential Correction #1 – Section 3.2.4, Page 18:</u> It is mentioned that the Bioremediation Treatability Study is resulting in the destruction of 2 pounds of perchlorate per day while this groundwater extraction system is removing approximately 1,000 pounds of perchlorate per day. For the evaluation of options for the final remedy, the size of the bioremediation area should be compared with the groundwater extraction area to compare the destruction rates of perchlorate per unit area.</p>	<p>The Trust agrees that the efficiency of perchlorate removal should be considered for technologies being considered for the final remedy selection as part of the forthcoming Feasibility Study. However, the Annual Reports and Semi-Annual Memoranda are focused on evaluating the performance of the existing GWETS and not evaluating other technologies. During completion of the Feasibility Studies for the NERT Remedial Investigation (RI) Study Area, in-situ bioremediation will be evaluated and compared against other appropriate remedial technologies including pump and treat. However, it is premature to discuss this technology evaluation in the Semi-Annual Memoranda and Annual Reports.</p>

NDEP Comment	Response to Comment
<p>2. <u>Essential Correction #2 Section 3.2.4, Page 18, 1st paragraph, line 14:</u> It is stated that “<i>Only the SWF has an overall capture efficiency of less than 100%...</i>”, yet the table inset at the top of this page indicates a capture efficiency of less than 100% for all of the well fields. The statement likely is intended to refer to the hydraulic capture zone for the SWF from the particle tracking results shown on Figures 3a to 3b. This should be clarified.</p>	<p>The overall capture efficiency of the GWETS includes capture by downgradient well fields, while the capture efficiency in the table only includes capture by the individual well fields. To address this comment, additional clarification of the difference between overall and individual capture efficiency has been provided in the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum dated November 9, 2021 for the July – December 2020 performance period.</p>
<p>3. <u>Essential Correction #3 Section 3.2.6, Page 22:</u> The December perchlorate concentrations for LVW 5.3 (Historic Lateral), LVW 4.75 (Calico Ridge) and LVW 6.6-1 (Sunrise Mountain) were elevated. The increase at LVW 6.6-1 is discussed and explained by the issues with the extraction system on the AMPAC/Endeavour Plume. The increased concentrations at LVW 5.3 and LVW 4.75 should also be discussed.</p>	<p>The Annual Groundwater Monitoring and GWETS Performance Report dated February 26, 2021 for the performance period July 2019 – June 2020 includes LVW 5.3 and LVW 4.75 in the explanation for increased perchlorate mass reaching the Las Vegas Wash from the AMPAC plume. It states that the elevated December mass loading at LVW 6.6-1 (Sunrise Mountain) suggests that there may have been an increase in perchlorate mass reaching Las Vegas Wash from the AMPAC plume that was also reflected in the elevated the downstream transects LVW 5.3 (Historic Lateral) and LVW 4.75 (Calico Ridge). Future Annual Reports will describe relative changes at all surface water monitoring locations.</p>
<p>4. <u>Essential Correction #4 Section 3.2.6, Page 23:</u> The addition of a figure is suggested to show the effects of the shutdown of the AMPAC extraction wells AREW-1, 2 and 5 and AMEW wells 1-5 on flows and loading to the Las Vegas Wash. This figure would be similar to Figure 6 but would zoom in on the AMPAC area and show visually the changes in flow described at the top of page 23.</p>	<p>The Semi-Annual Memoranda and Annual Reports evaluate the performance of the GWETS with respect to capture and treatment of the NERT plume. The AMPAC plume and extraction wells are occasionally discussed because NDEP has directed the Trust to evaluate the contribution of AMPAC’s plume to perchlorate loading to the Las Vegas Wash. The Trust respectfully asks NDEP to engage with AMPAC directly if additional evaluation of AMPAC’s plume and its contribution to perchlorate loading to the Las Vegas Wash are desired.</p>
<p>5. <u>Essential Correction #5 Section 3.2.6, Graph Top of Page 24:</u> A line showing a past average perchlorate loading at each location would aid in clarifying this graph.</p>	<p>Agreed, this is a good suggestion. The previous performance period averages have been added as dots to the chart in the Annual Groundwater Monitoring and GWETS Performance Report dated February 26, 2021 for the July 2019 – June 2020 performance period and the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum dated November 9, 2021 for the July – December 2020 performance period. This feature will also be included in future deliverables.</p>

NDEP Comment	Response to Comment
Minor Corrections	
<p>1. <u>Section 1.1, Page 2, 1st paragraph, line 1; Section 3, Page 8, 3rd paragraph, line 5; and Section 3.2.4, Page 17, 1st paragraph, line 19:</u> In the statement "...will not be limited to the capture of perchlorate and chlorate present in groundwater west of Pabco Road...", the word "chlorate" likely should be replaced with "chromium".</p>	<p>This has been corrected in the Annual Groundwater Monitoring and GWETS Performance Report dated February 26, 2021 for the July 2019 – June 2020 performance period and the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum dated November 9, 2021 for the July – December 2020 performance period.</p>
<p>2. <u>Minor Correction #2 Section 2.4, Page 6:</u> Are the reduced chromium concentrations in groundwater extracted from the IWF and AWF part of a downward trend in chromium concentrations? It would be helpful to draw conclusions based on this observation relative to the site conditions and the success of the groundwater extraction remedy.</p>	<p>Yes, this comment was addressed in the Annual Groundwater Monitoring and GWETS Performance Report dated February 26, 2021 for the July 2019 – June 2020 performance period (Section 4.1), which indicates that chromium concentrations are likely decreasing due to continued depletion of chromium sources over time, resulting from continued operation of the GWETS. This conclusion is also included in Section 2.4 of the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum dated November 9, 2021 for the July – December 2020 performance period. The Trust will include similar language in future deliverables as appropriate. The Trust would like to note that the current GWETS is not a remedial action but rather a removal action designed to capture the core groundwater plume that originates from releases in OU-1. The success of the current removal action will be evaluated in greater detail in the forthcoming Feasibility Studies.</p>
<p>3. <u>Minor Correction #3 Section 2.5, Pages 6-7:</u> Are the reduced perchlorate concentrations in water extracted from the four well fields, but particularly the IWF, part of a downward trend in perchlorate concentrations? It would be helpful to draw conclusions based on this observation relative to the site conditions and the success of the groundwater extraction remedy.</p>	<p>Yes, this comment was addressed in the Annual Groundwater Monitoring and GWETS Performance Report dated February 26, 2021 for the July 2019 – June 2020 performance period (Section 5.1), which indicates that perchlorate concentrations at the well fields are likely decreasing due to the continued depletion of perchlorate sources over time. This conclusion is also included in Section 2.5 of the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum dated November 9, 2021 for the July – December 2020 performance period. The Trust will include similar language in future deliverables where appropriate. The Trust would like to note that the current GWETS is not a remedial action but rather a removal action designed to capture the core groundwater plume that originates from releases in OU-1. The</p>

NDEP Comment	Response to Comment
	success of the current removal action will be evaluated in greater detail in the forthcoming Feasibility Studies.
4. <u>Minor Correction #4 Section 3.2.6, Page 24, 2nd paragraph, line 5:</u> The statement "...is provided in Figure 7 and the following table" likely is intended to reference Figure 6.	This has been corrected in the Annual Groundwater Monitoring and GWETS Performance Report dated February 26, 2021 for the July 2019 – June 2020 performance period and the Semi-Annual Groundwater Monitoring and GWETS Performance Memorandum dated November 9, 2021 for the July – December 2020 performance period.
5. <u>Minor Correction #5 Section 3.2.7:</u> It may be helpful to divide up the environmental footprint into the different areas served by the treatment system for comparison purposes when selecting the final remedy or remedies.	Agreed, division of the environmental footprint by Operable Units will be considered during remedy selection.

References:

ENVIRON International Corporation (ENVIRON). 2013b. 2013 GWETS Optimization Project Work Plan, Revision 1, Nevada Environmental Response Trust Site; Henderson, Nevada. November 22. NDEP approved December 3, 2013.

NDEP. 2021. Nevada Division of Environmental Protection (NDEP) Response to: Annual Groundwater Monitoring and GWETS Performance Report, Nevada Environmental Response Trust Site, Henderson, Nevada. May 6.

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.

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.