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September 15, 2023

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: Baseline Health Risk Assessment Report for OU-2 Soil Gas and Groundwater
Nevada Environmental Response Trust
Henderson, Nevada

Dear Dr. Dong:

The Nevada Environmental Response Trust (NERT) is pleased to present the Baseline Health Risk Assessment Report for OU-2 Soil Gas and Groundwater, Revision 1 for Nevada Division of Environmental Protection (NDEP) review. This report has been revised in accordance with NDEP's comments dated October 13, 2022. Additionally, the report was further updated to reflect NDEP's June 2023 updates to the Basic Comparison Levels and other modifications as required due to the passage of time. As requested, NERT has also prepared an annotated response to comments summarizing the revisions addressing NDEP's 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
CEM Certification Number: 2399, exp. 3/24/25

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Response to NDEP Comments on the Baseline Health Risk Assessment Report
 for OU-2 Soil Gas and Groundwater, Revision 1
 Nevada Environmental Response Trust Site, Henderson, Nevada

<p style="text-align: center;">NDEP Comments (October 13, 2022)</p>	<p style="text-align: center;">NERT's Response (September 15, 2023)</p>
<p>General Comments</p>	
<p><u>General Comment#1: Tables.</u></p> <p>In reviewing the tables, the Department could not reconcile many of the data tables. Primarily between tables 4-8 and 4-9 and those in appendix H; primarily H-4, H-5, and H-6. For example, the maximum concentration of 1,1,1,2-tetrachloroethane provided in Table H-4 is 3.03E-09 (note: there are also no units in Appendix H tables) as opposed to that of 0.065 µg/m³ listed in Table 4-8. In addition, there are several chemicals that do not appear across all tables. For example, Freon 113 is listed as a detected analyte in Table H-4 but not in Table 4-8. Please double check each table and cross reference to be sure all chemicals and concentrations are properly reported.</p>	<p>The Baseline Health Risk Assessment Report for OU-2 Soil Gas and Groundwater, Revision 1 (Revised Report) has been updated to address NDEP's comments. Tables 4-8, 4-9, H-4, H-5, and H-6 have been checked and minor changes were made for clarity and consistency. Please note that Tables 4-8 and 4-9 present the statistical summary of the OU-2 BHRA soil gas datasets at 5 feet below ground surface (bgs) and 10-15 feet bgs. They are different from the model-predicted outdoor air concentrations presented in Appendix H.</p> <p>To further clarify, the Appendix H tables include the inputs and outputs for calculating the 95% upper confidence levels (UCLs) of the volatile organic compounds (VOCs) in outdoor air which were used as the exposure point concentrations (EPC) for the outdoor commercial/industrial worker scenario. Before the 95% UCLs for the outdoor air concentrations can be calculated, the outdoor air concentrations at each sampling location need to be calculated first by multiplying VOC concentrations at the source (i.e., soil gas at 5 feet bgs, soil gas at 10-15 feet bgs, and groundwater) with depth-specific and media-specific transfer factors from source to outdoor air (see Section 4.2.2.1 and Table 5.5) within the commercial/industrial areas in the western portion of OU-2. Tables H-1 through H-3 present the model-estimated outdoor air concentrations at each sampling location based on data for soil gas at 5 feet bgs, soil gas at 10-15 feet bgs, and groundwater. Tables H-4 through H-6 present the outputs of the 95% UCLs calculations using the R codes provided by NDEP's consultant, Neptune.</p>

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	<p>The titles of the Appendix H tables have been revised to clarify this. A unit column has also been added to the Appendix H tables. In addition, Freon 113 was reported as 1,1,2-trichloro-1,2,2-trifluoroethane in Table 4-8 and Appendix H tables to use the same chemical name as in Table 4-8 instead of Freon 113.</p>
<p><u>General Comment#2: OU-1 and OU-2 Soil Gas and Groundwater Modification #1 Technical Memorandum</u></p> <p>It is good to see that the indoor air sampling results are within the uncertainty range of the J&E modeling results. However, NDEP understands that the results from the J&E model generally carry some uncertainty that is dependent on the conceptual site model, the inputs to the model and the assumptions for applying the model, so the NDEP will remain cognizant of these issues with the J&E moving forward.</p>	<p>Comment noted. No changes to the Revised Report were necessary.</p>
<p><u>General Comment #3: OU-1 and OU-2 Soil Gas and Groundwater Modification #1 Technical Memorandum: Section of Chloroform Indoor Air and Soil Gas Sampling Results and Evaluation</u></p> <p>"Since the J&E model does not account for indoor or ambient sources of chloroform, the range of predicted indoor air concentrations for each house was calculated by adding the range of chloroform concentrations found in the indoor air of background area houses to the modeled indoor air concentrations." NDEP asks for more details about this statement.</p>	<p>Consistent with NDEP's direction, the results of the indoor air quality (IAQ) investigation, as discussed in the OU-1 and OU-2 Soil Gas and Groundwater Modification #1 Technical Memorandum, have been integrated throughout the Revised Report.</p> <p>With respect to this comment, the text as cited in this comment from the OU-1 and OU-2 Soil Gas and Groundwater Modification #1 Technical Memorandum has been further discussed in Section 5.2.2.2 of the Revised Report to include more details and explain how the predicted indoor air concentrations were calculated.</p>
<p>Specific Comments</p>	
<p><u>Specific Comment#1: Executive Summary, last paragraph, p. ES-6.</u> The statement:</p> <p>"In summary, potential exposure to VOCs in soil gas and shallow groundwater in the OU-2 BHRA Area through the vapor intrusion</p>	<p>The statement cited in this comment has been revised as stated below per suggested revisions by NDEP in the Executive Summary section and other applicable sections of the BHRA report in regard</p>

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<p>pathway does not pose unacceptable carcinogenic and noncarcinogenic human health risks..."</p> <p>should be modified to the effect of</p> <p>"In summary, potential carcinogenic and noncarcinogenic human health risks due to exposure to VOCs in soil gas and shallow groundwater in the OU-2 BHRA Area are within the NDEP and USEPA risk range of 10⁻⁶ to 10⁻⁴."</p> <p>In fact, the ILCR range of 10⁻⁶ to 10⁻⁴ is the 'risk management range' and not an "acceptable" risk range. Statements to the effect of designating or determine what is or is not "acceptable risk" should not be in a health risk assessment. Rather, HRAs, should quantify the potential risk but the determination of acceptable risk is the purview of the risk managers and other interested stakeholders and should not be part of the HRA.</p>	<p>to replacing "acceptable risk" with the term "NDEP and USEPA risk management range".</p> <p>"In summary, potential carcinogenic and noncarcinogenic human health risks due to exposure to VOCs in soil gas and shallow groundwater in the OU-2 BHRA Area are below or within the NDEP and USEPA risk management range of 10⁻⁶ to 10⁻⁴ for carcinogenic impacts and the target HI of greater than one for noncarcinogenic impacts, under the conditions and assumptions evaluated."</p>
<p><u>Specific Comment #2 Section 4.1.1</u></p> <p>Unless incorrect, we recommend that the statement in the 'Groundwater' section on page 4-2 highlighted in the clip below be reworded to read "All wells with the top of the screen shallower than 60 feet bgs were included in this BHRA as they were deemed to provide the most representative data for the vapor intrusion models." or something similar.</p> <p>Groundwater</p> <p>Consistent with USEPA's most recent vapor intrusion guidance (USEPA 2015), shallow groundwater data were incorporated in this BHRA to provide a secondary line of evidence for the vapor intrusion risk analysis. All wells with the top of the screen shallower than 60 feet bgs were conservatively included in this BHRA for better spatial coverage. The monitoring wells from which groundwater samples were analyzed for VOCs and included in the BHRA data set are presented in Table 4-4.</p> <p>The point is that it's not conservative to take this approach but, rather, the approach is appropriate and consist</p>	<p>The statement cited in this comment has been revised according to NDEP's suggestion in Section 4.1.1 of the Revised Report.</p>

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<p>ent with the conceptual models on which the vapor intrusion models are based. That said, the NDEP appreciates the first paragraph at the top of page 4-3 that acknowledges issues with the screened intervals of some wells and the subsequent discussion in the uncertainty analysis section of the BHRA.</p>	
<p><u>Specific Comment #3 Section 4.2.3</u> Rather than focus only on chloroform, inclusion of other analytes may be worth considering.</p>	<p>Chloroform is the dominant risk driver and contributes to 90 – 99.9% of the total cancer risk in all samples, and there is no other chemical with cancer risk over 1×10^{-6}. The total HI estimates for all COPCs other than chloroform are all well below the threshold of 1. Therefore, there are no other analytes that would have a material impact on the risk assessment or the temporal trend analysis in Section 4.2.3 of the Revised Report.</p>
<p><u>Specific Comment #4 Section 4.2.4, first paragraph</u> At the end of the first paragraph, what does “Only the shallow groundwater samples most representative for characterizing representative vapor source concentrations for vapor intrusion assessment were included in the analysis” mean? Is this another way of saying only collocated groundwater samples were used, or does it mean only certain data from collocated wells were used, and if so, how was the data point chosen to be the ‘most representative’? In addition, is there really greater variability at lower concentrations?</p>	<p>The cited text in this comment has been revised to clarify that the groundwater wells that are considered representative for vapor intrusion analysis were selected based on the USEPA recommendation regarding the screen interval and the depth to groundwater for each well (i.e., wells preferably screened over relatively narrow intervals and close to the top of the groundwater table, see Table 4-4). The statement with regard to greater variability at lower concentrations has also been revised in Section 4.2.4 of the Revised Report to indicate the conclusion of less variability as opposed to greater variability at lower concentrations.</p>
<p><u>Specific Comment #5 Section 4.2.4</u> First paragraph on page 4-11: In risk assessment parlance, groundwater is not a source of contamination – it is a transport and exposure medium. Please revise accordingly.</p>	<p>The text that was referred to in this comment has been revised according to NDEP’s suggestion in Section 4.2.4 of the Revised Report.</p>

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<p><u>Specific Comment #6 Section 4.2.5</u></p> <p>There is no discussion of the OU-1 sources here – only OSSM and TIMET. There are known potential NERT sources of chloroform on OU-1 referenced, but only details about OSSM and TIMET. Please revise accordingly.</p>	<p>The text in Section 4.2.5 of the Revised Report has been revised to include additional information on the NERT sources of chloroform in OU-1.</p>
<p><u>Specific Comment #7 Section 5.2.2</u></p> <p>On page 5-7, a trailer scenario is described but it is unclear how the J&E model was configured to simulate this. The same concern applies to the construction worker scenario. Provide the electronic spreadsheets for the vapor intrusion models (including the J&E and BioVapor models) as a separate appendix.</p>	<p>The text in Section 5.2.2.1 of the Revised Report has been revised to include additional details on modeling the trailer scenario and construction worker trench scenario. The J&E modeling files and BioVapor modeling files have been included in Appendix I.</p>
<p><u>Specific Comment #8 Section 5.4.1</u></p> <p>Regarding the footnote on page 5-12: Are UCLs appropriate for this BHRA? That is, given the existence of paleochannels noted in other reports related to the area, would sample-specific risk values be more appropriate?</p> <p>Further and of greater concern, though, is an apparent lack of an adequate statistical presentation of the data. Assuming NERT has used Neptune's UCL R code, it should be pointed out that this code should be used on iid data (independent and identically distributed). Some deviation from this assumption can be tolerated, and usually is (by default), but in this case there is obvious spatial correlation in the data, and there are temporal issues if data from all 3 sampling events are used (probability weighting should be used). That is, the UCLs should accommodate both spatial correlation and temporal location overweighting.</p>	<p>After a careful review of the BHRA datasets and the method used to calculate the 95% UCLs, Ramboll has determined that the 95% UCL is representative of a reasonable maximum exposure (RME) estimate to calculate the outdoor worker risks. The maximum model-predicted outdoor air concentrations for the VOCs at each sampling location were used as inputs to calculate the 95% UCLs to be conservative and accommodate the issue of potential temporal overweighting. In addition, the NDEP-approved soil gas and groundwater investigations were designed to focus more on the areas within the VOC plumes in the OU-2 BHRA Area, so the sample density within the VOC plumes is much higher than the sample density outside the VOC plumes (i.e., more samples were collected from the areas with higher VOC concentrations than from the areas with lower VOC concentrations). Therefore, the outdoor air EPCs developed using these data sets tend to overestimate the actual exposures and risks. It is very unlikely that an outdoor commercial/industrial worker would be exposed to VOCs in soil gas and shallow groundwater at concentrations higher than the 95% UCLs over an extended period of time. In addition, the</p>

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	<p>maximum model-predicted outdoor air chloroform concentration is 0.00047 µg/m³, which is orders of magnitudes below the 1x10⁻⁴ acceptable cancer-risk threshold concentration of 12 µg/m³. Therefore, it is not expected that using the maximum location-specific concentrations instead of the 95% UCLs to estimate the health risks for outdoor workers would result in cancer risks higher than the NDEP and USEPA cancer risk management range of 10⁻⁶ to 10⁻⁴. The discussions on the uncertainties associated with using the 95% UCLs for the outdoor worker scenario have been added to Section 6.2.2.2 of the Revised Report.</p>
<p><u>Specific Comment #9 Section 6.2.2.3</u> Table 5-3 lists mean, minimum, maximum, and median values for soil properties. Which values were used in the models? Was it the mean, median, or something else?</p>	<p>The means of the measured soil properties in OU-2 were used in the vapor intrusion modeling for this BHRA. The text in Sections 5.2.2.1 and 6.2.2.3 of the Revised Report has been revised to clarify this. A footnote has also been inserted in Table 5-3.</p>
<p><u>Specific Comment #10 Section 6.2.2.3</u> The sample collected at approximately 10 ft bgs at RISG7 is supersaturated. That is, the water-filled porosity reported by the laboratory (0.546) exceeds the total porosity (0.423). These values are expected to be equal (or very nearly so) for a fully saturated sample. The significantly higher water-filled porosity compared to the total porosity renders the moisture value unusable. Strictly speaking, it was not 'conservative' to exclude this sample from the modeling effort as stated in the report – rather, it was the appropriate thing to do from a data usability standpoint.</p>	<p>The text "to be conservative" has been deleted in the following statement in Section 6.2.2.3 of the Revised Report. The text that is referred to in this comment now reads as below in Section 6.2.2.3: "Additionally, the one soil sample collected from approximately 10 feet bgs at RISG-7 was not used in our evaluation due to super saturated conditions under which soil properties were measured at that location. "</p>
<p><u>Specific Comment #11 Figures</u> Figure 4-2 (and similar) is also difficult to follow. Although the quartiles are provided, one has to continually go from figure to colors to numeric breakdown. Bubble plots would make this easier</p>	<p>Spatial bubble plots (Figures 4-5 through 4-7) have been prepared using chloroform concentrations in soil gas at 5 feet bgs, soil gas at 10-15 feet bgs, and shallow groundwater to support the spatial analysis in Section 4.2.2 of the Revised Report.</p>

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<p>(or intensity plots with a color scale). Please consider for future deliverables.</p>	
<p><u>Specific Comment #16 Appendix A</u> It is not clear what the basis is of the estimated zone of influence for soil gas samples for this appendix. Please elaborate.</p>	<p>Following the 2015 USEPA Vapor Intrusion Guidance, Ramboll used 100 feet to define an initial lateral inclusion zone for the vapor intrusion assessment (i.e., for identifying buildings or infrastructure that are 'near' a subsurface vapor source and generally warrant assessment). The text in Section 3.1.3 of the Revised Report where Appendix A is referenced has been revised to incorporate this information.</p>