NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
David Emme, Administrator

December 22, 2016

Jay A. Steinberg
Nevada Environmental Response Trust
35 East Wacker Drive, Suite 1550
Chicago, IL 60601

Re: **Tronox LLC (TRX) Facility**
Nevada Environmental Response Trust (Trust) Property
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection (NDEP) Response to: *Identification of COPCs and Exposure Units for Soils, Nevada Environmental Response Trust Site, Henderson, Nevada. Interim Report*

Dated: August 26, 2016

Dear Mr. Steinberg,

The NDEP has received and reviewed the Trust's above-identified Deliverable and provides comments in Attachment A. A revised Deliverable should be submitted **by 2/22/2017** based on the comments found in Attachment A. The Trust should additionally provide an annotated response-to-comments letter as part of the revised Deliverable.

Please contact the undersigned with any questions at wdong@ndep.nv.gov or 702-486-2850 x252.

Sincerely,

Dong

Weiquan Dong, P.E.
Bureau of Industrial Site Cleanup
NDEP-Las Vegas City Office

WD:cp

EC:
James Dotchin, NDEP BISC Las Vegas
Carlton Parker, NDEP BISC Las Vegas
Adam Baas, Edgcomb Law Group
Allan Delorme, Ramboll Environ
Alison Fong, U.S. Environmental Protection Agency, Region 9
Andrew Barnes, Geosyntec
Andrew Steinberg, Nevada Environmental Response Trust

Anna Springsteen, Neptune & Company Inc.
Betty Kuo Brinton, MWDH2O
Brenda Pohlmann, City of Henderson
Brian Waggle, Hargis + Associates
Carol Nagai, MWDH2O
Chris Ritchie, Ramboll Environ
Chuck Elmendorf, Stauffer Management Company, LLC
Dave Share, Olin
David Johnson, Central Arizona Water Conservation District
Dave Johnson, LVVWD
Derek Amidon, Tetratech
Ebrahim Juma, Clean Water Team
Ed Modiano, de maximis, inc.
Eric Fordham, Geopentech
Frank Johns, Tetratech
Gary Carter, Endeavour
George Crouse, Syngenta Crop Protection, Inc.
Harry Van Den Berg, AECOM
Jay Steinberg, Nevada Environmental Response Trust
Jeff Gibson, Endeavour
Jill Teraoka, MWDH2O
Joanne Otani
Joe Kelly, Montrose Chemical Corporation of CA
Joe Leedy, Clean Water Team
John Pekala, Ramboll Environ
Katherine Baylor, U.S. Environmental Protection Agency, Region 9
Kelly McIntosh,GEI Consultants
Kevin Fisher, LV Valley Water District
Kirk Stowers, Broadbent & Associates
Kirsten Lockhart, Neptune & Company Inc.
Kim Kuwabara, Ramboll Environ
Kurt Fehling, The Fehling Group
Kyle Gadley, Geosyntec
Kyle.Hansen, Tetratech
Lee Farris, BRC
Marcia Scully, Metropolitan Water District of Southern California
Maria Lopez, Water District of Southern California
Mark Paris, Landwell
Michael J. Bogle, Womble Carlyle Sandridge & Rice, LLP
Michael Long, Hargis + Associates
Micheline Fairbank, AG Office
Mickey Chaudhuri, Metropolitan Water District of Southern California
Nicholas Pogoncheff, PES Environmental, Inc.
Paul Black, Neptune and Company, Inc.
Paul Hackenberry, Hackenberry Associates, LLC
Patti Meeks, Neptune & Company Inc.
Peggy Roefer, CRC
Ranajit Sahu, BRC
Richard Pfarrer, TIMET
Rick Kellogg, BRC
Scott Bryan, Central Arizona Project
Steve Clough, Nevada Environmental Response Trust
Steven Anderson, LVVWD
Tanya O'Neill, Foley & Lardner L
Todd Tietjen, SNWA

Attachment A

Fatal Flaw

Specific Comment #1 **Section 5.1, first bullet, page 26**

The Exposure Units do not seem to have any relation to a possible chronic exposure area for some individual. Hence it does not seem appropriate to call them exposure units. They seem to relate almost wholly to current land use and infrastructure. Further substantiation is warranted otherwise alternative EUs should be considered (e.g., based upon the Conceptual Site Model and potential the potential exposure realm for future on-site populations).

Essential Corrections

Specific Comment #2 **Section 2.2 Remedial Investigation – Soil, Page 7, First paragraph, third line from the bottom, page 7 (Remedial Investigation Data Evaluation Technical Memorandum (Ramboll Environ 2016), which is currently under NDEP review)**

If the memorandum is still under review, please identify the exposure units (EUs) that may be affected by the pending review and how this might affect the selection of COPCs in soil.

Specific Comment #3 **Section 3.1 Data Usability Evaluation, second paragraph, last line, page 8**

Please discuss how the review with of EU-specific data relative to Criterion VI with NDEP may affect the selection of COPCs. For example, if there are potential issues with data quality indicators, then this could affect the selection of COPCs (and is there a chance that COPCs have been eliminated prematurely?).

Specific Comment #4 **Section 3.1.4 Criterion III – Data Sources, 2nd paragraph, last sentence, page 11**

The document states that based on the review that sample coverage from the historical investigations and RI are considered adequate for the BHRA. However, there are some areas that are still undergoing investigation to fill data gaps. Therefore, this statement is misleading. Please caveat by indicating areas where sample coverage is still being investigated.

Specific Comment #5 **Section 3.1.5, Criterion IV, first paragraph, second sentence, page 12**

Table 2 is Soil Sampling Results for Asbestos. Suggest correct to reference Table 3.

Specific Comment #6 **Section 3.2.1 Summary Statistics, Last paragraph, last line, page 13**

The text notes that limitations in the available data sets will be discussed in the BHRA. However, the purpose of a data usability section to select COPCs, is to identify the limitations. If addition data collection is ongoing, then this can be documented in the explanation.

Specific Comment #7 **Section 3.2.4 Comparison to CSM second bullet, page 18**

Review of Table D2 indicates boron and hexavalent chromium had low detection frequencies as indicated by "LDF" and suggests background comparison results may not be applicable. Additionally, thallium and tungsten indicate that study area samples are greater than background samples in the last column of the table but are not addressed in this section of the text. Suggest verifying and revising text/tables accordingly.

Additionally, Table 6 data for "Study Area > Bkg?" are not in agreement with Table D2 for boron, chromium VI, and iron. Please revise accordingly.

Specific Comment #8 **Section 4.1 Step 1 – Concentration/Toxicity Screen, Second paragraph, third line, page 21**

The text states that "…with the exception of the analytical results excluded based on the DUE (see Section 3)." However, the DUE section does not discuss the excluded data. In addition, Table 1 does not explicitly list the data that are excluded. Please provide.

Specific Comment #9 **Section 4.1.4, Page 23**

There are several soil samples with multiple amphibole protocol structures: 1, 2, 3, 4, 7, 9, and 11 fibers. The "intensity plot" for asbestos only shows grids where fibers were detected, so in fact no intensity at all, just 0/1. Please revise such that intensity is indicated in some manner (e.g., color coding).

Specific Comment #10 **Section 4.4 Study Area Preliminary COPCs last bullet, page 25**

This radionuclide did not pass the background evaluation. The investigator's note to interpret "with caution" the U-235 results yet the DUE found the data usable for risk assessment. Suggest U-235 be continued into the risk assessment where its overall contribution to risk can be further evaluated.

Specific Comment #11 **Section 4.1.4, first full paragraph, first sentence, page 26**

It is stated that Th-232 is within background yet Figure D1-30 shows total uranium results that clearly have a tail extending well outside the range of background results. This warrants further discussion.

Specific Comment #12 **Section 5.1, Page 26**

The size of the six EUs range from about 12 to 45 acres. There is some narrative of which COPCs are elevated in each EU, but no indication that spatial patterns of contamination were used to define these areas. Please expand this discussion accordingly by elaborating on how and why they were defined in this manner.

Specific Comment #13 **Section 5.1, last paragraph, page 26**

The plots showing the spatial distribution of COPCs don't assist with the visualization of whether the outliers in the boxplots of many COPCs occur in common areas or independently. Please see Specific Comment #19, fourth paragraph for additional recommendations.

Specific Comment #14 **Section 5.2, Page 27**

Figure 19 shows that these areas are not all spatially contiguous and as such they are not plausible exposure units. Please see Fatal Flaw #1 and Specific Comment #12.

Specific Comment #15 Section 5.2, footnote 18, page 27

There should be some basis in an exposure model for how big a "localized area" might be. The 1-acre grid could be a localized area, or 10 grids, or...? Please provide a more definitive discussion.

Specific Comment #16 Page 5 of Table 1

This table lists DOE EML HASL 300 as a standard analytical method on historical investigations for thorium and uranium. Review of Table 3, Evaluation of Sample Quantitation Limits, only summarizes U-235 and U-238. In addition, Table 1 lists PCB Congeners by EPA Method 1558A as a standard analytical method on historical investigations. However, review of Table 3, Evaluation of Sample Quantitation Limits, does not include any samples associated with this method; same for herbicides by EPA Method 8151 and for formaldehyde by EPA Method 8315A. Suggest clarification/revision.

In addition, Criterion IV Analytical Methods and Detection Limits, (last set of bullets on page 7 of Table 1): For the analytes where the SQL exceeded the 0.1 x BCL, it would be helpful to have some additional information about these analytes and samples. For example, are these samples with elevated SQLs co-located in one EU? If so, how would this affect the COPC selection process (e.g., is a chemical eliminated because it is non-detect due to elevated SQLs?). Please provide additional information here or in the text (or table).

Specific Comment #17 Page 4 of Table 6

The data for "Study Area > Bkg?" are not in agreement with Table D4 for U-234, is missing a "no" for U-238, and indicates "TBD" for Th-232 whereas Table D4 indicates "no". Suggest clarification/revision.

Specific Comment #18 Page 2 of Table 8

Zirconium is highlighted in blue color to indicate the chemical "failed" the toxicity screen. However, the maximum detection reported of 31 mg/kg and a screening level of 104 mg/kg appears to contradict the "fail" status. Please revise as appropriate.

Specific Comment #19 Figure 5 and all other spatial intensity plots

The spatial intensity plots are not useful for characterizing the spatial pattern of the data, which is an essential component of the development of a narrative that allows for the defensible delineation of exposure units, or combinations of exposure units over such large areas. The proposed exposure units are larger than a typical industrial receptor's exposure area at this site, and the intent seems to be to combine across smaller exposure units (typical default industrial exposure units are about 0.5 – 1 acre in size) to create larger units (note in comments above that these are not really exposure units). This type of combination of exposure units is only reasonable if the spatial pattern of the data demonstrates relative homogeneity and randomness across the exposure unit. However, the spatial plots do not allow for sufficient evaluation of the potential for areas with comparatively large or small concentrations. Also, because the term exposure unit is often reserved for the size of area to which a receptor might be exposed, some consideration should be given to using another term for a larger area (such as exposure area), with definitions provided for the terms used.

In addition, the background comparisons have been performed for the entire site, and not for each exposure unit. The same statistical principle applies as for defining exposure areas. This is only appropriate if the data are relatively homogenous across the site (essentially independent and identically distributed – essentially one population). This is an assumption that underlies the background statistical tests. To the extent that the assumption is violated, the study area should be broken up into smaller units that separate area of different concentrations.

For example, the challenges that have been presented regarding radionuclides appear to be because of relatively large concentrations in the north-east quadrant of the data. It looks doubtful that this quadrant would pass background comparisons, but we defer judgment on that until the statistical analysis is redone.

Plots that are useful to support these EU and background comparison concerns should have a relatively continuous representation of the range of concentration (or counts for asbestos fibers). The current use of three ordinal categorical classes for the concentrations (defined as relative to 0.1 the respective BCL) does not allow for the necessary determination of hot spots and general spatial trends in the data. We suggest the generation of new plots (not as replacements necessarily, but in addition – the current plots might be useful to some who like to be able to distinguish concentrations at these discrete levels).

Furthermore, it is not clear from the plots how the existence of multiple samples within a grid cell is depicted. More generally, the basic algorithm underlying the current plots is not provided, and could affect appearance – it should be provided.

Specific Comment #20 Appendix A-1 Data Validation Summary Reports

With the exception of the Data Validation Summary Report for Phase A, tables associated with the DVSRs have not been included. As the tables compliment and complete the DVSR, they should be included in the Appendix or, at least, provided on CD.

Specific Comment #21 Appendix A-1 Data Validation Summary Reports

Per the guidance in effect at the time of validation, data in all but one DVSR were censored for blank contamination. The final DVSR included in this report for the August 2011 Soil Remediation Completion Sampling was produced after the guidance changed and the associated data were not censored for blank contamination. In order for all datasets to be treated equivalently, and to avoid the loss of data, perhaps censored results (detects qualified as non-detected), should be considered as estimated detects as they would be per current guidance. These data should be easily queried from the project database and the original result should be used.

Minor Correction

Specific Comment #22 Section 5.2, first full paragraph, page 27

If the spatial plots were reviewed to identify possible hot spots then the outlines of the proposed EUs should be shown in the spatial plots. Currently they are not. In addition, it would be fairly easy to take the ratios of sample results to BCLs and create some contour plots. That could be done across COPCs for cancer risk and HI. This would provide a basis for proposing exposure units.

Specific Comment #23 Table 1, Data Quality Indicators, Precision

Text indicates precision goals were met; however, several DVSRs note samples qualified for field duplicate precision outliers. Perhaps this should read, "Precision of the individual investigations met the goals of 50% established in the QAPPs *or were qualified as estimated.*"

Specific Comment #24 Table 1, Data Quality Indicators, Precision

The precision goal of 50% is strictly for field duplicates; laboratory precision goals are defined for specific methods and should be noted here.

Specific Comment #25 Table 1, Data Quality Indicators, Accuracy

Text indicates surrogate and LCS percent recoveries were met; however, several DVSRs note samples qualified and rejected for these criteria. Matrix spikes are not included here as having met criteria, but should be. Perhaps this should read, "Surrogate, LCS, and matrix spike percent recoveries met the QC acceptance criteria established in the QAPPs *or were qualified as estimated or rejected.*"

Specific Comment #26 Table 1, Data Quality Indicators, Accuracy

Sample preservation - may want to consider adding details regarding data rejected because the laboratory did not correctly preserve some SPLP samples (rejected data).

Specific Comment #27 Table 1, Data Quality Indicators, Accuracy

For sample integrity, at least one soil sample was noted as having been received with standing water (estimated), likely from melting ice in the cooler. And a number of holding times were missed, resulting in estimated and rejected data.

Specific Comment #28 Table 1, Data Quality Indicators, Accuracy

Depending on what happens regarding specific comment #3, blank qualifications discussed here may need to be changed.

Specific Comment #29 Appendix A-1, Acronyms and abbreviations

The correlation coefficient is not r2, it is simply r.

Specific Comment #30 Spatial plots

Note that the plots have a legend that has lowest concentrations first, then middle, then high (greater than BCLs for the most part), and the NDs. However, NDs are really the lowest concentrations, so it would make more sense to change the order so that it is monotonic). Also the color scheme is awkward for the NDs (grey) – they clearly are not from the same color palette, and given that their concentrations are usually small, it is not clear why this has been done this way.

Specific Comment #31 Arsenic spatial plot

The arsenic plot indicates that background is 7.2 mg/kg. This is not a correct statement. Clarification is needed on what 7.2 mg/kg actually represents. (That is, it represents the maximum background values from the BRC/TIMET background data set – it does not represent NERT site conditions, and it does not represent average background (for example)).

Specific Comment #32 Table D4 Shapiro-Wilk tests

The Shapiro-Wilk test results are not useful. Given the amount of data, these tests are very likely to reject a hypothesis of normality or of any other distribution. In addition, t-tests are very robust to deviations from underlying normality assumptions, in large part because large number of data points causes the mean to be approximately normal. There are large numbers of data points here. The non-parametric tests are reasonable, and presenting t-tests for the actual data and the log data is ok, but the results should now be interpreted for every test that is run, without picking one or the other t-test based on a Shapiro-Wilk test that is likely to reject.

Specific Comment #33 Missing information

Although the box plots and quantile plots show the background data, it would also be helpful if the background data summaries were included in the summary statistics tables. A numerical comparison can then be made, as well as the graphical comparisons that are provided.

Editorial Changes

Specific Comment #34 Section 5.1.1, Last paragraph, 5th line, page 35

This sentence should be removed. The fact that there is a less than 10-fold difference between min and max does not provide evidence that the data are background. This might be even more the case with such a low coefficient of variation, which could imply a large mean (compared to the standard deviation). Chemical data tend to get noisier at low concentrations, not more stable. In addition, the coefficient of variation is not a sufficient statistic, and, as such should not be used for this type of conclusion.