NEVADA DIVISION OF
ENVIRONMENTAL PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
Colleen Cripps, Ph.D., Administrator

May 6, 2015

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: *Post-remediation Screening Health Risk Assessment Report for Parcels C, D, F, G and H, Revision 3, Nevada Environmental Response Trust Site, Henderson, Nevada*
Dated: June 19, 2014

and

The letter response on NDEP Draft Comments on Post-remediation Screening Health Risk Assessment Report for Parcels C, D, F, G and H, Revision 3, Nevada Environmental Response Trust Site, Henderson, Nevada
Dated: April 29, 2015

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 09/06/2015** 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.
Special Projects Branch
Bureau of Corrective Actions
NDEP-Las Vegas City Office

WD:jd

EC: Greg Lovato, NDEP, Dpty Admin., Carson City
James Dotchin, NDEP, BCA LV
Adam Baas, Edgcomb Law Group
Allan Delorme, ENVIRON
Alison Fong, U.S. Environmental Protection Agency, Region 9
Andrew Barnes, Geosyntec
Andrew Steinberg, Nevada Environmental Response Trust
Betty Kuo, MWDH2O
Brenda Pohlmann, City of Henderson
Brian Waggle, Hargis + Associates
Cassandra Joseph, AG's Office
Catherine Sties, MWDH2O
Charles K. Hauser, Esq., Southern Nevada Water Authority
Chris Ritchie, Environ Co.
Chuck Elmendorf, Stauffer Management Company, LLC
Dave Share, Olin
David Johnson, Central Arizona Water Conservation District
Ebrahim Juma, Clean Water Team
Ed Modiano, de maximis, inc.
Eric Fordham, Geopentech
Frank Johns, Tetratech
George Crouse, Syngenta Crop Protection, Inc.
Dave Share, Olin Co
Jasmine Mehta, AG Office
Jay Steinberg, Nevada Environmental Response Trust
Jeff Gibson, AMPAC
Jill Teraoka, MWDH2O
Joanne Otani
Joe Kelly, Montrose Chemical Corporation of CA
Joe Leedy, Clean Water Team
John Pekala, Environcorp
Katherine Baylor, U.S. Environmental Protection Agency, Region 9
Kirk Stowers, Broadbent & Associates
Kurt Fehling, The Fehling Group
Kyle Gadleym, Geosyntec
Lee Farris, BRC
Marcia Scully, Metropolitan Water District of Southern California
Mark Paris, Landwell
Matt Pocernich, Neptune & Company Inc
Michael Long, Hargis + Associates
Mickey Chaudhuri, Metropolitan Water District of Southern California
Nicholas Pogoncheff, PES Environmental, Inc.
Paul Black, Neptune and Company, Inc.
Paul Hackenberry, Hackenberry Associates, LLC
Peggy Roefer, Southern Nevada Water Authority
Ranajit Sahu, BRC
Rebecca Shircliff, Neptune and Company, Inc.
Richard Pfarrer, TIMET
Rick Kellogg, BRC
Ron Zegers, Southern Nevada Water Authority
Scott Bryan, Central Arizona Project
Steve Clough, Nevada Environmental Response Trust
Susan Crowley, Crowley Envirn.
Tanya O'Neill, Foley & Lardner LLP

Attachment A

General Comments

1. General Comment 1. Background for radionuclides. Background comparisons for metals were performed using the RZ-A data for background, per NDEP recommendations and previous comparisons of site data with background. This is because of the difference between the BRC/TIMET background concentrations and the RZ-A concentrations; the latter exhibit lower mean concentrations and the differences are often statistically significant. Hence, RZ-A was used as a more local background dataset than the BRC/TIMET BMI Complex-side background data.

   However, the BRC/TIMET background data have been used for radionuclides. An initial and cursory review of the BRC/TIMET background and RZ-A concentration data for radionuclides also indicates that the RZ-A mean concentrations are less than the BRC/TIMET mean concentrations. For at least five of the radionuclides under consideration the differences are statistically significant. This suggests that the RZ-A data should be used as background for radionuclides as well as for metals.

   An obvious conclusion is that RZ-A represents a (slightly) different geology than the locations for the BRC/TIMET data. However, both datasets of interest are ostensibly taken from McCullough range derived soils. It is possible that there are other issues at play, but this is difficult to determine based on the presentation. For example, perhaps there are analytical issues. It is not unusual for different labs to report slightly different concentrations. A possible course of action would be to investigate lab reports more closely. Also note that the Ra-228 concentrations appear to be quite low in RZ-A, compared to the BC/TIMET data and compared to data from other RZs (or Parcels). This is perhaps an indication of analytical issues.

   It is also possible that acid-solvent leaching of the soil matrix with subsequent transport to groundwater has occurred in this area, and this is cause for somewhat decreased concentrations of some metals and radionuclides in relatively near surface soils. Possible courses of action to further investigate this possibility might include evaluation of redox potential of these soils, and spatial comparison to groundwater concentrations for some metals (e.g., arsenic, uranium).

2. General Comment 3. Radionuclide risk. Certain radionuclides were identified as COPCs in Revision 3 of the Parcels C – H HRA Report pursuant to comments on Revision 2 of the HRA Report indicating that radionuclide concentrations appeared elevated relative to background. Because a radionuclide risk assessment has not previously been presented the assessment in Revision 3 was reviewed:
   a. Particulate inhalation exposure pathway; indoor worker. The exposure assessment for radionuclides (Section 5.3.2.3) includes a reference to the BCL User's Guide (NDEP 2008-rev 2013) for methodology and equations. Although NDEP (2008-rev 2013) does not differentiate indoor and outdoor workers for radionuclide BCLs, separate calculations for radionuclide risk were performed in Revision 3 of the Parcels C – H HRA Report consistent with the exposure assessment for chemicals. Inhalation of particulates in indoor air, using an attenuation factor applied to ambient air concentrations, is identified as a potentially complete exposure pathway for chemicals in NDEP (2008-rev 2013). In Section 5.1.3, the rationale provided for excluding this pathway for the indoor

worker in Revision 3 of the Parcels C – H HRA Report is a reference to a supplemental soil screening levels guidance (EPA 2002a). The fact that particulate inhalation was not identified as a recommended chemical exposure pathway for indoor workers in EPA (2002a) is not justification for excluding this pathway from the radionuclide risk assessment. EPA (2002a) was among the references evaluated during development of the BCLs for the BMI Complex and Common Areas, yet inhalation of particulates in indoor air was retained as a potentially complete exposure pathway for BCL calculations. An attenuation factor for indoor air particulate concentrations may be applied in the inhalation pathway risk calculation for indoor workers to refine this calculation. In fact, a dilution factor for outdoor to indoor air is listed among the parameters shown in Table 7 of the Parcels C – H HRA Report. Please provide rationale for not quantifying indoor worker inhalation risk for radionuclides.

It was noted that practically, the particulate inhalation pathway will make a negligible contribution to total radionuclide risks. But this should be demonstrated / explained to justify not evaluating it. An option might be to consider pathway contributions for the BCL calculations.

b. Particulate emission factor value. Revision 3 of the Parcels C – H HRA Report presents a screening-level calculation of risk using the maximum concentration for each COPC from all Parcels. The values for industrial/commercial and construction PEF are not stated in the report. Instead, tables are referenced that show Parcel-specific PEF values. The radionuclide risk calculation workbook was reviewed to determine that the Parcel G PEF values were applied in the calculations. The Parcel G PEF values are the largest among all Parcels, and particulate loading in air (and hence cancer risk) is inversely proportional to the magnitude of the PEF value. The selection of the Parcel G PEF values for a screening calculation should be explained since the most-protective value would more commonly be applied during screening.
c. Tables 7 and 8. The inhalation rate values used for the radionuclide risk calculations should be added to these tables.
d. Section 5.5.4. The use of maximum detected background concentrations as a point of comparison to the screening-level risk assessment results for each scenario is inappropriate and should be removed from this discussion. An estimate of average background radionuclide concentrations may be employed in the risk assessment calculations for the purpose of providing a point of comparison to Site risks and estimating incremental cancer risks. If the protectively biased screening-level risk assessment results using the maxima from all Parcels is inadequate to support risk management decisions a baseline risk assessment for each Parcel using Parcel-specific concentrations should be prepared. Comparison of maxima is completely inappropriate. Maxima are, by their very nature, highly uncertain with values that are greatly affected by sample size. In this case the sample size used for background is 95, which is much greater than the site sample size for any single parcel. Not only is this approach statistical indefensible, but it is made worse by the background sample size used. This is notwithstanding the issue in General Comment #1 above, which requires use of the RZA data to represent background for radionuclides.

e. Section 5.6, Uncertainty Analysis. A subsection should be added to the Uncertainty Analysis focusing on the radionuclide risk assessment. The current Uncertainty Analysis focuses primarily on the results of the chemical risk assessment. Various aspects of this discussion are not applicable to the radionuclide risk assessment and key uncertainties related to the radiation risk assessment (such as the radon-222 pathway) are not presently addressed.

f. Radon-222 risk. As discussed in Appendix E-4 of the BCL User's Guide (NDEP 2008-rev 2013) inhalation of radon gas within a building is potentially of greater concern than other exposure pathways related to radium-226. At a minimum, a discussion of potential radon-222 inhalation risks should be added to Section 5.5.4.1 and to the new radionuclide risk assessment subsection of the Uncertainty Analysis.

3. General Comment 4. Asbestos data. ENVIRON noted in their comment responses to Neptune DVSR comments as follows: DVSR Comment d on Table D-10 of the HRA. The comment response indicates that sample Q3-PF-1-1-0.0 was adjusted in Table D-10 to show an analytical sensitivity of 2.99E+06 structures/g PM10. In asbestos workbook Parcel F_asbestos_riskcalcrev.xlsx the analytical sensitivity for this sample is instead 2.96E+06 structures/g PM10. Please clarify.
4. General Comment 5. Asbestos risk calculation workbooks:
   a. The asbestos risk assessment calculations employ both original and field duplicate samples. This increases the sample size by treating these quality control samples as independent samples, resulting in lower values of pooled analytical sensitivity. If field duplicate samples are to be treated as independent samples the magnitude and variability of results for the field duplicate pairs must be compared with that of primary samples to demonstrate that field duplicate results are independent of primary sample results, otherwise the asbestos risk can be under-estimated.
   b. References for site-specific values used in the PEF calculations should be provided in the workbooks. These include site surface area, in situ wet bulk soil density, gravimetric soil moisture content, soil silt content, and road surface soil silt content. The references were discovered in Table 6 of the HRA Report. Please provide the appropriate reference in appropriate asbestos sections of the report.

Attachment A-1

1. RTC Comment 3. Table 5. Please update using the latest BCL table and guidance (August, 2013).
2. RTC Comment 4. Table 9. The Deliverable should rely upon the latest toxicity criteria for each of the COPCs (listed in Table 9). The NDEP (2013) reference necessarily documents toxicity criteria current when this reference was prepared, but these criteria are subject to revision over time. The authors should review the federal and state agency references where relevant toxicity criteria are published to identify current toxicity criteria. (The values in Table 9 were checked and are current with present-day values published by federal and state agencies – this clarification pertains to methodology and future assessments).

Attachment A-2

1. RTC Comment 1. Section 5.2.1. The reasoning by which all radionuclides were dismissed as COPCs appears flawed. In the case of Parcel H, not just one but all four radionuclides in the uranium series were clearly elevated with respect to background.
2. RTC Comment 1. Section 5.2.1, 3rd paragraph, 1st sentence. The text indicates that the "potential comparability issues identified for metals data were not observed" for radionuclides. Our review of radionuclide summary statistics for the RZ-A site background and BRC/TIMET (2007) background data sets suggests that, as for metals, RZ-A site background for radionuclides may also be lower than regional background for radionuclides. Data analysis must be provided to support the statement that radionuclides are not affected by the comparability issues and justify the use of the BRC/TIMET (2007) background data set for radionuclides.
3. RTC Comment 1. Section 5.2.1, last paragraph. A review of Table F-4 does not support the identification as COPCs of only the uranium-238 decay series radionuclides (U-238, U-234, Th-230, Ra-226) in Parcel H. Thorium-232 and radium-228 are also indicated as being present in Parcel H soils at concentrations elevated above background, indicating that the thorium-232 decay series (Th-232, Ra-228, Th-228) should be retained as COPCs.
4. RTC Comment 3. Executive Summary. Please revise the paragraph related to asbestos risks to correct the reference to constant lifetime exposure for construction worker amphibole upper-bound cancer risk results in the risk assessment.
5. RTC Comment 3. Footnote 2 clarifies that the fiber counts referenced to the Removal Action Workplan are not remediation goals. Explain the relevance of the cited Removal Action Workplan fiber counts or remove these sentences from the paragraph.
6. RTC Comment 3. Executive Summary and Section 5.5.3 there are statements that the upper-bound risk estimates are based on an observed count of zero long amphibole structures in the 75 remaining (post-abatement) samples from the Parcels. These statements are incorrect and misleading, and conflict with the request for clarification of this issue in Comment 19. Asbestos UCLs and related risk estimates were not calculated with 75 samples but rather with the number of post-abatement samples collected in each individual parcel, which range from 6 samples (Parcel G; 6E-06 cancer risk) to 23 samples (Parcel H; 2E-06 cancer risk). Please revise the text in this paragraph and Section 5.5.3.
7. RTC Comment 4. Section 2.2., last paragraph. Asbestos remediation goals are stated in this paragraph without reference. The basis for the chrysotile and amphibole asbestos counts referenced to the Removal Action Workplan is not described in the post-remediation risk assessment and it is inappropriate to infer that these fiber counts somehow define acceptable post-remediation levels of asbestos in soil. Fiber counts in a sample are not meaningful without an associated analytical sensitivity, so while these counts may have significance for delineating target areas for soil remediation in the workplan context they have no particular significance in a risk assessment context. More specifically, it is the pooled analytical sensitivity based on multiple samples that is relevant for estimating asbestos soil concentrations and this is a function of the number of samples as well as sample-specific analytical sensitivity. Explain the relevance of the cited Removal Action Workplan fiber counts or remove this language.

8. RTC Comment 5. Section 3.1. Appendix C contains data files for samples with qualified results only. The text of Section 3.1 states, "A complete listing of the Parcel Soil Confirmation samples and SDGs is presented in Table 1-2 of the Northgate (2010a) Data Validation Summary Report for the Parcels, which is discussed later in this report and provided in Appendix C." Please briefly describe the three Excel workbooks also provided in Appendix C.
9. RTC Comment 9. Section 4.2. Provide more details about detection limits above BCLs for benzo(a)pyrene and dibenz(a,h)anthracene. Table 5 indicates that detection frequencies for detected PAHs are relatively low, being in all cases less than 5%. This provides evidence that PAHs are not a widespread soil contaminant and support a conclusion that detection limit issues for benzo(a)pyrene and dibenz(a,h)anthracene are not a significant concern. Please add a discussion of this line of evidence to the text of the report.
10. RTC Comment 10b. Section 4.2. More information needs to be provided about the RPD exceedances. This information should be summarized in a table. Vinyl acetate is identified as the only analyte for which an MS/MSD sample exceeded the RPD criterion. This result was qualified with the statement that vinyl acetate "is not a compound that is included in the HRA data set (Appendix D)." Section 4.4 states that all confirmation data are included in Appendix D. Please identify any other analytes that have been excluded, explain the basis for which an analyte such as vinyl acetate would have been excluded from the assessment data set, and provide this information in the risk assessment report.
11. RTC Comment 14. Section 5.2.1. Please clarify why data from two different locations are used as background. Analysis must be provided to support this statement and justify the use of the BRA and TIMET (2007) background data set for radionuclides. As noted in the New Comment for Comments 1, 2 and 3, our cursory review of radionuclide summary statistics for the RZ-A site background and BRA and TIMET (2007) background data sets suggests that, as for metals, RZ-A site background for radionuclides may also be lower than regional background for radionuclides. Geologic differences are cited in Section 5.2.1 and in this comment response as one possible explanation of the discrepancy between Site and background concentrations for analytes in the metals analytical suite, and such differences could also affect radionuclide concentrations.
12. RTC Comment 15. Section 5.2.1. The reason for using different substitution values for non-detects for parametric and non-parametric tests should be discussed. Replacement values for parametric and non-parametric tests are based on NDEP guidance, the rationale and citation will be added to 5.2.1. Section 5.2.1 was revised to cite NDEP guidance for the substitution values, but the rationale for the use of different values for parametric and non-parametric tests was not provided as the response indicated it would be. Please provide a brief summary of the rationale, which pertains to the difference between representing results by ranked value (non-parametric tests) versus representing results by the most-likely actual value (parametric tests).
13. RTC Comment 17. Section 5.2.2. Reconcile presentation of amphibole risks with amphibole not being identified as a COPC. Consistent with the April 1, 2014 NDEP response to the NERT response to Comment 17, amphibole was retained as a COPC. Table 5 indicates amphibole was identified as a COPC based on NDEP (2011), but no NDEP (2011) reference is included in the risk assessment references (Section 7). Please provide the reference.

14. RTC Comment 18. Section 5.2.3. Revise paragraph to accurately describe bias related to the asbestos URF used in the risk assessment. The Comment 6 is also applied to this comment.
15. RTC Comment 19. Section 5.6. Add a discussion explaining the relationship between sample size and pooled analytical sensitivity to provide context for upper-bound asbestos risk estimates. This discussion provides a good summary of the relationship between sample size, fiber count, and the 95UCL for asbestos. This should be referenced in addressing New Comment for RTC Comment 3 and RTC Comment 13.
16. RTC Comment 20. Section 5.2.1. The rationale and distinction between parcel level comparisons and site wide comparisons should be more fully discussed in the main report.

    The following new text was added to Section 5.2.1: "The background evaluation was performed for each Parcel individually and is presented for both the combined Parcels and individual Parcels. The Parcels were evaluated individually because potential sources of chemicals could exist only in certain Parcels." Please revise the second sentence as follows: "The Parcels were evaluated individually because they had different operational histories and previous soil investigations identified different potential contaminants among the different Parcels (see Section 2.0)"
17. RTC Comment 22. Section 5.5.3. The variation in the asbestos upper-bound risk estimates is a function of differences in sample size and should be explained in that context.