NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

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

October 19, 2017

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: *RI Study Area Mass Estimate and Expanded Performance Metrics Technical Approach*

Dated: October 5, 2017

Dear Mr. Steinberg,

The NDEP has received and reviewed the Trust's above-identified Deliverable and finds that the document is acceptable with the following comments noted for the Administrative Record:

1. Section 3.2. In the past it appears that both hand interpreted isoconcentration contours and point measurements of concentration were used to develop mass estimates. It is understandable that hand modifications to contours may be necessary, particularly around local discontinuities, but hand interpretation will lead to inconsistencies between mass estimates for different time periods. NDEP suggests that perhaps other interpolation software (e.g. Surfer) could be investigated that allows for line discontinuities or developing standards for hand interpretation to reduce temporal inconsistencies;

2. Section 3.3. A 100 x 100 foot grid is being proposed in the OU-1 area. Closer inspection of vadose zone borings suggests that the borings are spaced at 50 feet or less. Given the large variability in soil water concentrations, a smaller grid may be appropriate. NDEP suggests that at a minimum the spacing should be justified based on data spacing and expected variability;

3. With the exception of the UMCf-fg unit, why are separate grids and interpolations being used for each geologic unit? The physical parameters (i.e. porosity, bulk density, etc) may change by unit, but these could be applied to the calculations in a post-processing calculation. NDEP suggests using a single multi-layer grid over various geologic units that will allow concentrations to be conditioned based on measurements in other layers and reduce the likelihood of discontinuities introduced by separate grid calculations.

4. Section 3.4.4 and 3.5.3 – Hydrus Modeling. NDEP suggests that NERT addresses these questions when reporting the mass calculation and modeling groundwater flow and contaminant transport.

    a. Will the Hydrus model be calibrated to annual contaminant concentrations or will the model simply be run for additional years following an initial calibration? If the former, recalibration could lead to significant temporal inconsistencies.

    b. Will the direction and magnitude of the vertical hydraulic gradient be verified with field measurements?

    c. Given the potential need for annual recalibration and potential temporal inconsistencies, has NERT considered applying an exponential concentration gradient with peak concentrations controlled by measured data?

5. Section 4.2. Since model generated vertical hydraulic gradients will be used to calculate vertical mass flux, the vertical gradients should be field verified to ensure general agreement between the model and measurements.

6. Kriging with log transformed concentration measurements may be a more appropriate interpolation scheme given the large variability in contaminant concentrations. NDEP suggest that NERT explores this option (transforming data) when constructing the concentration contours.

7. Please notice that recalculating semi-variograms each year for the kriging interpolation may lead to temporal inconsistencies in mass.

8. Section 4.1. Strictly speaking, mass flux of a contaminant is due to advective and dispersive fluxes. Mass flux values being reported prior to development of the contaminant transport model will only be reporting the advective mass flux. Once the model is developed and used for estimating mass flux, it will be reporting both advective and dispersive mass flux. In the interim, NERT should note this discrepancy because the estimates are likely to be different.

9. Section 4.3. Is subsurface migration of perchlorate beneath and/or parallel to the Las Vegas Wash significant enough to consider when calculating the mass flux upstream of Three Kids? If structural controls at or near Three Kids force water and perchlorate into the Las Vegas Wash then mass flux calculations using surface water discharge and concentrations only may imply that additional mass is being added in the reach between Homestead and Three Kids. In reality it could have been introduced at any point upstream but flowed parallel to the wash. It might be helpful to quantity the order of magnitude of the subsurface flux to determine its relative importance in defining loading zones.

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

Sincerely,

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Bureau of Industrial Site Cleanup

NDEP-Las Vegas City Office

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