June 26, 2007

Ms. Susan Crowley
Tronox LLC
PO Box 55
Henderson, Nevada 89009

Re: **Tronox LLC (TRX)**
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection Response to:
Response to NDEP Comments of the Tronox Semi-Annual Performance Report dated February 28, 2007 and the Required Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Henderson, Nevada dated May 30, 2007

Dear Ms. Crowley,

The NDEP has received and reviewed TRX's report/work plan identified above and has provided comments in Attachment A. It is requested that TRX resubmit this document with annotated response to comments **by July 31, 2007**. It is suggested that TRX discuss these issues with the NDEP prior to resubmittal.

If there are any questions, please do not hesitate to contact me.

Sincerely,

Shannon Harbour, P.E.
Staff Engineer
Bureau of Corrective Actions
Special Projects Branch
NDEP-Las Vegas Office

CC: Jim Najima, NDEP, BCA, Carson City
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Attachment A

1. General comment, the subject work plan must be signed by a CEM per NAC 459.9719.
2. General comment, the Flow Budgets presented herein could be improved by calculating the estimated groundwater flow at one or more cross sectional areas and comparing these values to the volume of groundwater extracted at the respective well field.
3. General comment, TRX must discuss the relationship between perchlorate, hexavalent chromium and other Site-related chemicals. Some portions of the plume which contain high TDS water may migrate in a fashion that is atypical (due to density gradients or other reasons).
4. General Comment, TRX must include a map(s) illustrating the proposed locations of piezometers and groundwater monitoring wells.
5. Section I, page 1 of 7, footnote #1, the NDEP recommends adding the following reference: Capture Zone Analysis for Pump-and-Treat Systems, EPA NARPM Conference May 24, 2005.
6. Section I, page 2 of 7, 2nd paragraph, 2nd bullet, "Demonstration of overlapping cones of depression via flow nets both in plan view and vertical cross section." This is not included in EPA (2002) reference as a line of evidence. The EPA (2005) clearly indicates that drawdown (cone of depression) and capture zone are not the same. The capture zone and cone of depression will only be the same if background hydraulic gradient is zero. However, given the geometry of the line of extraction wells within and extending across a mapped paleochannel, the NDEP acknowledges that overlapping cones of depression can be a line of evidence. This comment is applied to a number of Sections of the report and will not be repeated.
7. Section II, page 2 of 7, Capture Zone, TRX indicates that the barrier wall was designed "to provide a physical barrier to groundwater migration across the width of the identified perchlorate plume." It is important to frame this discussion in terms of concentration because it is obvious that the lower concentration portions of the perchlorate plume are not being captured.
8. Section II, page 2 of 7, Flow Budget, TRX needs to support the argument about upward hydraulic gradient with on-site data including both water level elevation and water quality. In addition, TRX states "Current capture rates (70 gpm) are double those before the wall was installed." Please note that the rate of capture is irrelevant when the upgradient flow rate is unknown.
9. Section II, page 3 of 7, 1st paragraph 2nd sentence, Flow Budget, please provide the calculations and input parameters.
10. Section II, page 3 of 7, 2nd and 3rd paragraphs, last sentences, Flow Budget, the NDEP has the following comments:
    a. The NDEP requests that this statement be supported with the installation of at least two monitoring wells at both locations as illustrated in Figure 1 (see following comment) to measure gradient. Flow may then be calculated using these newly installed monitoring wells and M69 (west side) and M74 (east side).
    b. Please note that the NDEP is including Figure 1 as example of possible well locations for comment clarity. TRX may propose different well locations.
    c. TRX should include a map illustrating the proposed locations of the monitoring wells. This comment applies to other portions of the work plan as well.
    d. TRX states "the volume of groundwater migrating around the…end of the barrier wall is estimated to be less than 1 gpm." It is not evident how this number was derived and what concentration applies to the 1 gpm number. Based on the data provided by TRX and others, the NDEP believes that a >1 mg/l plume impacts the northern 50% of the TIMET property. The source of this plume appears to be TRX.

11. Section II, page 3 of 7, 4th paragraph, Flow Budget, TRX must provide basis for this evaluation, i.e., calculations and input parameters.
12. Section II, page 3 of 7, Downgradient Concentration Declines over Time, water from Lake Mead is likely 0.010 mg/L or less based on historical analysis. Thus, the expansion of a zone containing less than 100 mg/L could occur through dilution alone by the addition of low perchlorate concentration water regardless whether the extraction wells were achieving capture at the rate in which TRX describes.
13. Section II, page 3 of 7, Downgradient Concentration Declines over Time, please delete the last two sentences from this paragraph because the addition of low perchlorate concentration water invalidates the analysis.
14. Section II, page 4 of 7, Proposed Additional Evaluation, 1st bullet, as noted above, the NDEP is not sure what this will prove because low perchlorate concentration water from Lake Mead is being injected downgradient of these wells.
15. Section II, page 4 of 7, Proposed Additional Evaluation, 3rd bullet, the NDEP requests three shallow (water table) monitoring wells at each end of the barrier wall to evaluate effectiveness of the barrier. (See also comment above.)
16. Section II, page 4 of 7, Proposed Additional Evaluation, 5th bullet, the NDEP requires contouring water level elevation excluding the use of pumping water levels from extraction wells. TRX may propose a method to estimate water levels for pumping wells taking into account well losses (inefficiency). Alternately, TRX could install piezometers in this area.
17. Section II, page 4 of 7, Proposed Additional Evaluation, the NDEP suggests that TRX consider installation of monitoring wells in a north south line along the TIMET-TRX border to delineate the extent of the plume in this area. Alternately, TRX could utilize some existing TIMET wells if they are adequate. Based upon the recently completed TIMET CSM the concentrations of perchlorate at TIMET range from 0.069 mg/l (along Lake Mead Parkway) to a high of 4.3 mg/l on the western side of the TIMET property (well CLD1-R).
18. Section II, page 4 of 7, Performance Evaluation, TRX should examine the concentration versus time trend graphs for the Athens Road well field. The NDEP notes that no appreciable change can be discerned from September 2001 to the most current quarterly report. The NDEP acknowledges that some of the declines may be obscured by the scale of the Figure. In any case, TRX should discuss these trends specifically and present Figures which are legible and appropriately scaled. In addition, TRX should discuss these concentrations versus time trend graphs in relation to the estimated travel times of the remedial system. For example, discuss the concentrations in the Athens Road well field from the time of the installation of the slurry wall until the present time and then explain why the concentrations are not declining. It appears to the NDEP that some portion of the 100 mg/l perchlorate plume is not being captured on-Site.
19. Section II, page 5 of 7, Athens Road Extraction Gallery, Flow Budget, the NDEP requires TRX to provide the calculations and input parameters before the NDEP will comment on the results of the calculations.
20. Section II, page 5 of 7, Athens Road Extraction Gallery, Overlapping Cones of Depression, see comment above regarding overlapping cones of depression. The 11 foot drawdown reported for ART-3 in the *Semi-Annual Performance Report for Chromium and Perchlorate* dated February 6, 2007 may be the result of well inefficiency.
21. Section II, page 5 of 7, Athens Road Extraction Gallery, Inward Flow, the NDEP does not agree that inward flow is demonstrated by the Potentiometric Surface Map, Fourth Quarter 2006. West of the TMCf high the groundwater elevation contours and data as posted on the map show a gradient south to north, *i.e.*, towards the wash. East of the TMCf high there is insufficient data to support the closed (depression)

contour as drawn on the map. No groundwater elevation data have been reported between the closed 1590 contour and the 1590 contour to the north to indicate a higher water level. An alternative way to map this data could include connecting the 1590 depression contour with the same 1590 contour to the north.

22. Section II, page 5 of 7, Athens Road Extraction Gallery, Proposed Additional Evaluation, 2nd bullet, unless the "available and accessible monitor wells along the width of Athens Road" lie between the ART-series and ARP-series wells there may still not be adequate groundwater level data to demonstrate inward flow. It may be necessary to install one or more well pairs to the ART "buddy" wells to achieve this purpose. If well pairs are installed NDEP should review and approve the location for these wells.
23. Section II, page 5 of 7, Numerical Modeling, this discussion has no references and hence cannot be verified by the NDEP. In addition, the NDEP noted that the numerical modeling completed previously (but not referenced in this report) does not demonstrate the 97.5% capture purported by TRX.
24. Section II, page 6 of 7, Seep Area Collection System, Flow Budget, no flow budget is presented or referenced in this section. The NDEP requires a flow budget calculation to be presented or referenced.
25. Section II, page 6 of 7, Seep Area Collection System, Overlapping Cones of Depression, see comment above. In addition, the NDEP does not believe that overlapping cones of depression have been demonstrated to exist in this area.
26. Section II, page 6 of 7, Seep Area Collection System, it is not clear to the NDEP that full capture in the Seep Area is warranted or feasible. The goals for this area should be discussed and a capture zone should be agreed upon. It is evident that the remedial system can be optimized in this well field and others.