January 17, 2008

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 (Part 2) to:
Technical Memorandum – Data Review for 2007 Tronox Parcels A/B Investigation
Dated December 6, 2007

And

Asbestos Data Review for 2007 Tronox A/B Investigation,
dated December 17, 2007

And

Uranium Isotope Data Review for 2007 Tronox A/B Investigation,
dated December 18, 2007

And

Asbestos Data Review for 2007 Tronox A/B Investigation,
Dated January 9, 2008

And

Supplemental information provided via electronic mail (various dates)

Dear Ms. Crowley,

The NDEP has received and reviewed TRX's above-identified report and found that No Further Action (NFA) was required at this time with the conditions, as noted under separate cover.

Attachment A to this letter is intended to: provide additional clarity for the basis of this NFA; provide clarity for the administrative record; and to provide guidance for development of future Deliverables.

Please contact the undersigned with any questions at brakvica@ndep.nv.gov or (702) 486-2850 x 247.

Sincerely,

Brian A. Rakvica, P.E.
Supervisor, Special Projects Branch
Bureau of Corrective Actions
NDEP-Las Vegas Office

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Attachment A

1. General comment, examples of information provided by electronic mail which were used to supplement the review and understanding of Parcels A and B include (but are not limited to):
    a. Probability and box plots (exploratory data analysis);
    b. Revised data tables presenting USEPA SSLs (DAF1 and DAF 20);
    c. Legal descriptions of Parcels A and B (expected to be recorded following the issuance of this NFA). These descriptions serve as the basis of understanding for the definition of Parcels A and B).
    d. In addition, several telephone conferences were held to discuss and clarify technical issues relating to Parcels A and B.
2. General comment, the additional documentation submitted since December 6, 2007 causes some of the very specific conclusions stated in the report to be incorrect. For example, on Page 4, uranium now exceeds the screening level. Some rewording in light of the update information would have been helpful.
3. General comment, the report is lacking transparency in many ways. For example, the CSM is not provided in full, the data are not related back to the CSM fully (for example, consider how the radionuclides are handled), and the risk assessment is minimal. This comment is made in recognition that Parcels A and B appear to have only sporadic and low levels of contamination (now that the asbestos remediation has been performed), in which case a simple risk assessment can be deemed sufficient. However, NDEP expects greater level of detail in other risk assessments performed at TRONOX and elsewhere at the BMI Complex and Common Areas.
4. General comment, a further consideration related to the asbestos remediation is that many of the sample locations have now been remediated or partially remediated. No mention is made of the consequence of this cleanup on the data analysis and risk assessment for all the other chemicals included in the screening risk assessment. The new surface layer could have different concentrations. However, it might be reasonable to assume that the concentration distribution has not changed in any important way for these chemicals. This should be related to the CSM. It might even be reasonable to assume that concentrations are now lower for some chemicals (e.g., dioxins), because of the removal of some soil. Whichever argument is made, it should have been included in the text, and defended in the context of the CSM. A further option is to compare the data across the different depths of data collection. For example, if the concentrations are similar at the different depth intervals of sampling, then it would be reasonable to assume that the old samples are still representative of the current conditions. Consideration of concentrations by depth would also be helpful for understanding the leaching pathway (e.g., to see if concentrations are increasing with depth), and could have resolved some background comparisons for some metals or radionuclides. For example, for several metals and radionuclides the site data are statistically lower than the background data. Without some explanation, this raises issues about the appropriateness of the comparisons.
5. General comment, Although the radionuclide activities appear to be small there are still some outstanding issues that should be addressed in the future. The immediate issues surrounding the radionuclide uranium and thorium analysis appear to have been resolved (methods have been fully identified, and adjustments have been made to the uranium

radionuclide results), and we are comfortable enough with the methods used to predict uranium isotope concentrations for comparison with background and use in the risk assessment. Still of concern is that the uranium metal results fail background comparisons in Parcel A, but none of the other radionuclides fail background comparisons at all. In fact, some of the site radionuclides appear to be slightly lower than background. It might be reasonable to assume that the differences are the result of minor analytical differences, and that all radionuclides are at background concentrations. However, the argument should have been made. The argument includes concerns about the different methods that have been used (gamma-spec for radium, alpha-spec with strong acid digestion for thorium, and alpha-spec with weak acid digestion for uranium as well as uranium as a metal by ICPMS). Since secular equilibrium is expected, the results should be similar for radionuclides within the same chain, but they are not statistically similar. The different methods might provide some explanation.

Our understanding of the Work Plan was that 10% of the samples submitted for gamma-spec analysis for radium would also be submitted for alpha-spec (and beta-spec) analysis for radium. If this had been done, then a better understanding of these inconsistencies might be possible. In our experience, gamma-spec analysis is biased low for some radionuclides. If this is the case here, then this could explain the differences that are seen. Alternatively, a CSM is needed that explains the slightly high uranium concentrations in Parcel A versus Parcel B. Please note that deviations from the Work Plan are not acceptable without NDEP approval.

A further option that could be considered is to perform background comparisons with subsets of the background dataset. We have not looked at the background dataset to see if this would be helpful, however, we recognize that the background dataset shows differences by geology and depth.

The risks are small at this site, but inclusion of uranium in the screening risk assessment raises issues about secular equilibrium and, hence, whether radium should also be included in the risk assessment. Uranium is now driving the cancer endpoint risk assessment, hence the concern. Without uranium the incremental (screening level) risks are, instead, 1x10-6.

It is also not clear yet that it is appropriate to combine cancer risk for radionuclides with those for non-radionuclides. USEPA has for many years not combined risk assessments for these two chemical groups, and this has not been done previously for risk assessments at the BMI Complex and Common Areas. It would help to have a clearer explanation of what is really expected given the data, and the thoughts described above could help provide greater defensibility for the risk assessment. This issue should be discussed between the NDEP and TRX for development of future Deliverables.

6. General comment, we note that use of maximum concentrations across Parcels A and B causes an unusual form of conservatism in the results. That is, if a similar risk assessment had been performed separately for Parcels A and B, then these screening risk assessments would produce lower risks. The maximum concentration must be less in one

area than in the other, for each chemical in turn. It would have been worth noting this in the uncertainty analysis.

7. General comment, it is not clear that it is appropriate to include lead in the HI calculation. Risk assessments for lead are often separated from the bulk of the risk assessment because of the source of information about lead risks. This would not affect the conclusions, but would raise beta-BHC and hexachlorobenzene to the level of drivers for the low HI presented. This issue should be discussed between TRX and the NDEP for the development of future Deliverables.
8. General comment, analytical methods appear to be insufficient (not always providing low enough concentrations) for several analytes, including: antimony, boron, selenium, niobum, and platinum. In the case of antimony this causes failure of the statistical background comparisons tests, and failure of comparison with SSLs. It would be helpful if this issue could be addressed in future sampling events.
9. General comment, please note that the USEPA no longer supports their Preliminary Remediation Goals. Consequently, some care should be taken to make sure that the most up to date toxicological information is being used in the screening risk assessment.
10. General comment, the calculations performed to assess risk following the scraping of soils to address asbestos include a "duration of construction" of 130 days. The USEPA default is 250 days/year. It is not appropriate to deviate from default values without justification.
11. Page 2, we note that the term "robust" has a specific meaning in statistics that is different than intended here. Since the term is used in the context of the data, it is inappropriate. The word "sufficient" could be used instead. Please address this in the development of future Deliverables.
12. Pages 3 and 4, Data Summary, the NDEP has the following comments:
    a. NDEP does not concur with the use of a DAF of 20 for this Site based on source area size and depth to groundwater.
    b. TRX provided a revised evaluation of Site data versus SSLs with a DAF of 1 and it appears that this modification does not materially change the conclusions regarding the Site. At a DAF of 1 the only compounds that were detected and above background were: cadmium and beta-BHC.
    c. The DAF of 1 for beta-BHC is extremely low and is often exceeded by non-detects as well. This is not a useful metric for the basis of a decision and additional lines of evidence must be examined. There is a known source of beta-BHC in soil and groundwater off-Site and the concentrations of this compound at this Site are considered insignificant relative to upgradient data. If beta-BHC were to leach to groundwater it is unlikely that the contribution from this Site could be detected.
    d. Based upon a review of available groundwater data in the region, cadmium does not appear to be leaching to groundwater and is not a concern at this time. It is also noted that the cadmium concentrations at the Site do not appear to pose any health risks. It is also noted that there are only three locations above the SSL DAF 1 and these concentrations are only marginally elevated (0.59 mg/kg maximum versus an SSL of 0.4 mg/kg). All cadmium detections are well below the SSL DAF 20 (8 mg/kg). If cadmium were to leach to groundwater it is expected that this

matter could be addressed by the existing groundwater treatment system, as necessary.

e. It would have been helpful to provide a site-specific model (e.g.: VLEACH to substantiate these concepts). Future Deliverables must address these issues in more detail.
f. Based upon the future use of this Site (commercial/industrial) it is expected that Site activities will not exacerbate the conditions in the soil.

13. Page 4. 1st full paragraph. This paragraph does not seem quite correct in light of the further information provided for uranium. As things stand, uranium as a radionuclide fails PRG comparisons and background comparisons.
14. Page 4, last paragraph, first sentence. It is not clear that this is accurate. The depth to groundwater is similar across the site, however, groundwater has been impacted across the BMI complex. The relevant issue here appears to be the low concentrations in the soil, in which case there is very limited source material for contamination in groundwater. The depth then helps support that argument, rather than the other way around. Beta-BHC appears as a potential problem across the site when SSL comparisons are made. This could be noted in the discussion (that the SSL for beta-BHC is very low, and hard to achieve anywhere at this site, and explain that SSLs are known to be very conservative). An alternative is to refine the model of transport to groundwater in this area using, for example, VLEACH.
15. Page 5, asbestos paragraph. More explanation is appropriate here, since amphibole was collected prior to remediation. Otherwise, what is stated here contradicts what is stated earlier.
16. Page 7. It appears as if mercury exceeds background as well, and should be carried into the screening risk assessment.
17. Page 7. Also, niobium should be considered to be less than background for the same reasoning that is used for platinum and selenium. In general the decision logic for the background comparisons should be consistent across metals and radionuclides.
18. Page 7. As noted in the general comments, more analysis, explanation and discussion is needed regarding uranium and the other radionuclides. It is not reasonable that uranium exceeds background and thorium and radium do not, given the likelihood of secular equilibrium.
19. Page 7. The meaning of the following sentence is not clear – "Although the comparison statistics indicate that these metals levels at the property are above background, the cumulative probability plots and box-and-whisker plots indicate that for several of these metals, the property and background datasets are most likely representative of a single population". Some more information needs to be provided to justify a conclusion that background comparisons fail statistically, but the property and background distributions come from the same population. For example, small analytical differences could be mentioned, or small differences might be related to geologic or depth differences as seen in the background dataset. And, the conclusion could be tied back to the CSM (that these chemicals are not expected to be found as contaminants).
20. Page 10, Review Criterion 3 and 4. It does not appear that the analytical methods are sufficiently sensitive for some of the metals. For example, the antimony data exhibit about 10 high values that exceed background, exceed SSLs, and otherwise create issues for data analysis.

21. Page 10, Review Criterion 3. In addition, issues have been identified associated with the radionuclide analysis, as described in the general comment above. Different methods were used for thorium and uranium, creating differences in activities for radionuclides that are, arguably, in secular equilibrium. In addition, the work plan called for 10% analysis of radium by alpha-spec methods, which have not been performed.
22. Data adequacy section. The formula used is questionable, despite its publication in USEPA documents. The multiplier of 1.16 is based on some simulations that were performed at PNNL to evaluate the difference in power between parametric tests and non-parametric tests. On average in the simulations the difference was a factor of 1.16. This does not mean that this multiplier is appropriate for the characteristics of the data presented here. Because the multiplier is included, some of the statements made are not strictly correct. The test is not based on averages. It is based on the Wilcoxon Rank Sum test, which is a non-parametric test (although the basis of the formula depends on the standard test for normality, the 1.16 multiplier came from simulations of the non-parametric test). The use of z in this formula is also suspect, since its use implies a known standard deviation. The standard deviation is estimated here, in which case t should be used instead of z, and the formula should be based on a t-test instead of a z-test. Finally, results of 0 are not recommended. The raw results are decimal, and are, presumably rounded. It is not appropriate to round any results down, because at least the number on the raw result is needed to prove data adequacy under the assumptions made. That is, the minimum possible integer response should be 1. None of these comments or observations appears to make any substantial difference to the general conclusion that there are enough data, given the assumptions of the model. However, it would be preferable if the statistical analysis and explanation was tightened. These issues must be addressed prior to submittal of future Deliverables.
23. Data adequacy section. Also, since asbestos was a driver for action at this site, some calculations should be presented to verify that sufficient asbestos data have been collected.
24. Page 15 – determination of EPCs. In the middle of the paragraph a statement is made that UCLs were computed. This does not appear to be the case. In addition, it appears initially as if all analytes were evaluated in this way, whereas, asbestos is not. In fact, the approach taken with asbestos to use analytical sensitivity is much more like using a UCL for the other analytes. A clearer distinction could be made.
25. Uncertainty analysis. One more type of uncertainty, or bias, has been introduced in this risk assessment. That is, the use of maximum concentrations across both parcels. Using maxima is clearly conservative, but it is also conservative to apply the maximum to both parcels simultaneously. This could be discussed.
26. Uncertainty analysis. Some discussion of some of the specific uncertainties should be provided in this section.
27. Page 19, 3rd paragraph. "The risk estimates are based on reasonable maximum exposure scenarios," This statement is not strictly true given the use of maximum concentrations in the screening risk assessment. These are not based on a reasonable exposure scenario, instead they are based on a very conservative exposure scenario.
28. Page 19, risk results. The risk results are different if uranium as a radionuclide is included. Some changes to the text are appropriate.

29. Page 20, Summary. "Based on the results of the 2007 investigation, this data review, and the screening-level health risk assessment, there is no evidence to conclude that the Tronox Parcels A and B property is contaminated. In summary, BEC concludes that an NFAD for the property is warranted". This should be reworded. There is evidence of contamination, it is just that the concentrations levels are not at levels of concern for human health risk for the industrial scenario. Some chemicals exhibit concentrations greater than background, and some organic chemicals have been detected. In addition the RME risk for amphibole is 5x10-6, which is based on zero detects of amphibole fibers, and, apparently, insufficient samples to achieve 1x10-6 risk.
30. Figure 4. The term "clean" should be clarified. That is, the site was cleaned because of asbestos contamination. As currently used, an implication is that the areas are clean for all chemicals.
31. Table 1. Results for the pre- and post-remediation asbestos data are not presented in this table, although the main text suggests that they are.
32. Table 2 seems like it should be broken out into two separate tables. In addition, mercury appears elevated relative to background, however is not presented in Table 2.
33. Electronic mail (e-mail) containing boxplots, the boxplot for tin appears to contain an error in presentation.
34. *Uranium Isotope Data Review for 2007 Tronox A/B Investigation*, we note also that much of the needed discussion/explanation about radionuclide issues at this site are discussed in the uranium technical memorandum. Perhaps some discussion is needed with NDEP, but it does not seem unreasonable to conclude that the radionuclide activities at this site are similar to background. The only case based on the raw data for which background comparisons fail is uranium as a metal, and, whereas the failure is statistically significant, the difference in activities between site uranium and background uranium activities is small. If uranium is included in the risk assessment, then the risk (radionuclide and no-radionuclide summed, per the risk assessment technical memorandum) is 4x10-6. However, it is 1x10-6 if uranium is not included, and it is not clear that it needs to be included. We also note that, whereas, these issues are addressed in the memorandum, the issue concerning gamma-spec analysis for radium is not fully resolved and must be resolved in future investigations.