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Date: July 23, 2010

To: Shannon Harbour, P.E.
Nevada Division of Environmental Protection (NDEP)

RE: Response to NDEP's July 7 Comments on *Revised RZ-A Human Health Risk Assessment, Tronox LLC, Henderson, Nevada*, dated June 22, 2010

Response to Comments

Comments

1. General comment, TRX did not provide a red-line, strike-out (RLSO) version so as to be in compliance with SOP-0. The RLSO version is critical to facilitate a thorough review in regards as to how previous comments were addressed. Please ensure that all future submittals contain an electronic copy that provides all report components as well as a RLSO version.

   Response: Comment noted.

2. General comment, TRX should note that since the HRA work plan was approved, USEP A has issued new guidance on inhalation exposures via RAGS Part F (USEP A, 2009). All future HRAs should follow this guidance for inhalation exposures, including discontinuation of oral-to-inhalation route extrapolation. No response is necessary.

   Response: Comment noted.

3. Section 2.3, page 9, footnotes 2 and 3 should refer to Section 3.6.

   Response: Footnotes 2 and 3 in Section 2.3 have been revised to refer to Section 3.6 (p. 9).

4. Section 3.4, page 20, TRX should note that the language in this section is not specific to the DU guidance regarding comparability (USEPA, 1992). Please specifically document that the same analytical methods/performance characteristics, reporting limits and similar DQOs affecting sample design are applicable to all site and background data (including site versus background sample depth) employed in the HRA.

   Response: Section 3.4 has been revised to more closely follow U.S. EPA's DU guidance. As noted by U.S. EPA (1992), comparability is intended to address issues that may arise when combining datasets, often collected over long periods of time, to estimate the

reasonable maximum exposure (RME) (p. 107 of U.S. EPA 1992). As noted in Section 3.4 (Criterion III – Data Sources, p. 15), the HRA includes data collected as part of the Phase A and B investigations. For RZ-A, only two of the 44 samples were collected as part of the Phase A investigation (see Section 3.6.1.1, p. 28). Therefore, the vast majority of the data for RZ-A is from a single investigation. Further, while there has been some question as to whether different laboratories may have used slightly different extraction procedures for metals analysis between Phase A and Phase B, the samples from both phases of investigation were analyzed by the same standard methods for the different groups of chemicals (e.g., organochlorine pesticides, semivolatile organics, etc.). Finally, with the exception of asbestos, the maximum detected concentration was used as the exposure point concentration in the HRA (see Section 4.1, p. 36). As such, for purposes of estimating the RME, separate data sets did not have to be combined.

With regard to background data, Section 3.6.1.1 acknowledges that background samples were collected at 0, 5, and 10 ft below ground surface (bgs), whereas site samples were generally collected between 0.5 to 2 ft bgs and 10 to 11.5 ft bgs (p. 25). This section also acknowledges that samples from the background data set were analyzed using the same standard method (EPA Method 6020), but with a different digestion procedure than the samples from the Phase B investigation, and that this difference may be one reason why the statistical analysis of the two data sets suggests that the site data are lower than the background data for some, but not all, metals (p. 30). Despite these minor differences, the site data and background data are considered comparable for purposes of evaluating the site data relative to background. No further changes were made to the HRA in response to this comment.

5. Section 6.4.7, page 58, NDEP notes that this section references the use of route-to-route extrapolation for chemicals lacking inhalation toxicity criteria. This section should have referenced the approved HRA work plan as the basis for applying route-to-route extrapolation. Please revise.

   Response: Section 6.4.7 has been revised to indicate that the approved HRA work plan was the basis for applying route-to-route extrapolation (p. 58).

6. Tables 10 and 11, please list "Calculated" in the Reference column and provide the calculation in a footnote for the inhalation Average Time parameters.

   Response: Tables 10 and 11 have been revised to provide the calculation for the inhalation averaging time parameters.

7. Table 11, Relative Bioavailability should be listed as "1" in the Value column. Please revise.

   Response: Table 11 has been revised to list a value of “1” for the relative bioavailability.

8. Figure 4, NDEP has the following comments:

a. The "Off-Site Groundwater" under the Source column should have a line drawn directly to the "Groundwater" box under the Contact Medium and not to "Volatilization Into Indoor/Outdoor Air" as currently shown. Please revise.

b. Please add an arrow from groundwater to "Volatilization Into Indoor/Outdoor Air".

Response: Figure 4 has been revised as follows: "Groundwater" has been added as an Initial Medium of Concern. A line is drawn from "Off-Site Groundwater" under the Source column to "Groundwater", under the Initial Medium of Concern column. A line is drawn from "Groundwater" under the Initial Medium of Concern column to "Groundwater" under the Contact Medium column. A second line is drawn from "Groundwater" under the Initial Medium of Concern column to "Volatilization into Indoor/Outdoor Air" under the Secondary Inter-media Transfer column.

9. Appendix D, Excel File D19-D21 RZA calculation, NDEP recognizes that the exposure factors tables were updated, however, for the non-cancer average daily dose (ADD) soil ingestion calculation sheets, please note that the equation does not include reference to the "relative bioavailability" factor for the indoor commercial worker, outdoor commercial worker, and construction worker. NDEP notes that this does not change the results reported since the relative bioavailability factor is set at 1 or 100%. This comment is only for informational purposes in the event that these calculation spreadsheets will be used in future submittals. No revision necessary for this Deliverable.

   Response: Comment noted.

10. Response to Comment (RTC) 8.c, Section 2.1, Sources and Release Mechanisms, states "Potential release mechanisms from above-ground source areas, such as spills, leaks, or accidents, could have released SRCs to surface soils ... In addition to the potential primary release mechanisms, secondary release mechanisms may include resuspension of SRCs in surface soils into ambient air. In addition, surface water runoff and movement along effluent ditches may have allowed SRCs to migrate to other areas in surface soil ... " For low mobility SRCs that may have primary and/or secondary release mechanisms directly to surface soil, there is reasonable potential that concentrations in the 0-0.5 ft bgs depth interval (most likely to be contacted by chronic workers under a "no redevelopment" scenario) may exceed concentrations measured in the 0.5 - 2 ft bgs depth interval, which were used as the basis for the RME exposure point concentrations. This concern has identified the need to conduct additional dioxin sampling in other areas of the Tronox site. Please provide additional rationale to address this concern for the RZ-A exposure area.

    Response: Section 6.4.1 has been revised to provide additional rationale as to why the absence of samples from the 0 to 0.5-foot interval (except for asbestos) is not expected to affect the conclusions of the HRA for RZ-A. As already noted in Section 2.3 (p. 10), samples collected from 0.5 to 2 ft bgs were used to represent the 0 to 2-ft interval to which future commercial workers are assumed to be exposed. While it is possible that the concentration of some low mobility COPCs may be higher in the 0 to 0.5-ft interval, the concentration would have to be substantially higher to greatly affect the average

concentration over the entire 0 to 2-ft interval (i.e., the 0 to 0.5-ft interval represents only 25% of the entire 0 to 2-ft interval to which the commercial worker is assumed to be exposed). Further, as noted in Section 6.4.4 (p. 55), the maximum concentration was used as the exposure point concentration, which is a highly conservative assumption because it is very unlikely that receptors will be exposed to the maximum concentration for all COPCs over an extended period of time.

11. RTC 10.a, NDEP has the following comments:

    a. TRX should note that the revised DU evaluation still relies on the Data Validation Summary Report (DVSR) too heavily for conclusions regarding the usability of qualified data for risk assessment without independent assessment of key issues by the risk assessors. The current text on page 17 states, "Only rejected data were considered unusable for decision-making purposes and rejected analytical results are not used in the HRA". As discussed during the teleconference, data flagged "R" (rejected) in the data validation report do not represent the only data that require analysis by the risk assessor as to impacts on the risk characterization results.

    b. Additionally, a list of all rejected data should be provided in the DU evaluation and assessment of the impact of non-use (rejection) of the affected data points (that were identified in the original work plans as being of interest/relevant to human exposure points) should be discussed in the DU evaluation and uncertainty analysis.

    c. At a minimum, data points flagged "J-" in the Data Validation report tables should be discussed in the DU evaluation as these are analytical results that have the potential to underestimate risk. NDEP has conducted this task for Tronox for this HRA; however, for future submittals, TRX should conduct this task as a component of the DU evaluation.

    d. NDEP notes that all data> 10 feet bgs and all SPLP data are not relevant to the DU evaluation for human health and, therefore, do not need to be discussed in the DU evaluation for the human health endpoint. These data are, however, relevant to the leaching pathway evaluation. NDEP has determined that all data deemed usable by TRX are confirmed as usable by NDEP. TRX only needs to provide the list of all rejected samples/analyses in the DU evaluation and provide further discussion in the DU and uncertainty sections as to why the final dataset is adequate for the HRA regardless of the elimination of the R-flagged data points.

    Response:

    (a) TRX agrees that R-flagged data are not the only data requiring analysis by the risk assessors. To that end, one or both of the risk assessors who are signatories to the RZ-A HRA reviewed the DVSR findings, including the tables summarizing data that were either rejected or otherwise flagged. This review process independently ensured that flagged data, other than R-flagged data, were usable in the HRA (see Section 3.4, Criterion V, p. 16 to 18). Further, as noted in Section 3.5 (pg. 20 to 24), the risk assessors specifically evaluated and discussed all data that were qualified as estimated with a low bias (“J-“). It is important to note that the data usability

evaluation was conducted for all data contained in the Area IV DVSR even though samples collected within RZ-A, beginning at depths between 0 and 10 ft bgs, represent only a subset of these data. Therefore, additional information has been added to Section 3.5 (p. 20 to 24) to clarify whether the flagged data are relevant to the RZ-A HRA. Future data usability evaluations will be focused on only those data pertinent to the HRA for the area(s) being evaluated.

(b) As noted in Section 3.5.1 (p. 21), 23 data points representing the OCP analysis from one sample were rejected because the sample was analyzed after two times the method holding time. These data are provided in Table 3-1 and 3-12 of the Area IV DVSR. As noted in these tables, this sample was collected at 20 ft bgs and analyzed following a synthetic precipitation leaching procedure (SPLP) to evaluate the potential for OCPs to leach from the soil and impact groundwater. As such, this sample is not applicable to the HRA, which is limited to evaluating the potential for direct contact with soil. The only other rejected data were other SPLP samples analyzed for cyanide, which also do not apply to the HRA. This has been clarified in Section 3.4 (Criterion VI, p. 17), Section 3.5 (p. 20), Section 3.5.1 (p. 21 to 22), section 6.4.2 (p. 53), and Table 16.

(c) As discussed in Section 3.5 (p. 20 to 24), the data that were flagged J- were reviewed by the risk assessors prior to inclusion in the HRA. The uncertainty associated with including these data in the HRA was discussed in Section 6.4.2 (p. 53). As noted above, additional information has been added to Section 3.5 (p. 21 to 23) to clarify that only a subset of these data are pertinent to the HRA.

(d) As noted in the response to 11(b) above, the only data that were rejected were for SPLP data that are not relevant to the HRA; therefore, no further change was made to the HRA in response to this comment.