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From: Deni Chambers, CEG, CHG
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Date: August 23, 2010

To: Shannon Harbour
Nevada Division of Environmental Protection (NDEP)

RE: July 6, 2010,
Nevada Division of Environmental Protection (NDEP) Response to:
Technical memorandum: Preliminary Evaluation of Soil Leaching to Groundwater Using NDEP Guidance
Dated: June 11, 2010

This memorandum presents a Response to Comments (RTC) provided by NDEP in a July 6, 2010 letter regarding the *Technical Memorandum: Preliminary Evaluation of Soil Leaching to Groundwater Using NDEP Guidance* (Northgate, June 11, 2010). A revised technical memorandum has been prepared to address NDEP's comments, and this RTC is included as Attachment 1 to the revised technical memorandum.

NDEP's comments are transcribed below, in italics, followed by responses to these comments.

1. *General comment, TRX should note that several issues remain unaddressed in the subject document (e.g., developing a site-specific DAF and statistical comparisons with the background data set not complete). These issues result in a preliminary document that needs significant development. The DAF calculation spreadsheet equations were reviewed and appear to work properly. However, until the infiltration factor is resolved, the NDEP is not necessarily in agreement with the results. Please note that the NDEP has not checked the LSSL calculations at this time.*

   Response: The statistical comparison with background data sets were presented in a technical memorandum dated July 22, 2010, and are summarized in Attachment 2 of the revised technical memorandum on the evaluation of soil leaching, dated August 23, 2010, with which this RTC is included as Attachment 1. NDEP's comments on the July 22 technical memorandum on the background evaluation were received on August 9, and are being addressed in a separate submittal. Input parameters were discussed with NDEP on July 16, 2010, and are presented in Attachment 3 of the revised technical memorandum.

2. *Introduction, page 1, TRX states that soil concentration data are to be compared to background data pursuant to the Soil Screening Guidance (EPA, 1996, p 8). Please specify when the background comparisons will be completed. The document is not considered complete until background comparisons are included.*

Response: As discussed in the response to Comment #1, background comparisons were completed and submitted in a July 22, 2010 technical memorandum. TRX received comments on this memorandum from NDEP on August 9, 2010. TRX is preparing a separate response to NDEP's comments on the background comparisons.

3. *Screening Evaluation Based on NDEP Guidance, page 2, 3rd paragraph, NDEP guidance on evaluating the soil leaching to groundwater pathway indicates that soil concentrations of SRCs are to be evaluated for a DAF of both 1 and 20. TRX only included comparison to DAF 20. TRX should additionally include a comparison to DAF 1.*

   Response: TRX has included a comparison to leaching-based, basic comparison levels (LBCLs) for dilution attenuation factors (DAF 1) of 1 and 20 for both inorganics and organic chemicals in the revised leaching evaluation. This comparison is included in the tables summarizing the selection of chemicals of potential concern (COPCs; Attachment 2 – Tables 3A-3D for inorganics and Table 4 for organics) and are also presented in the leaching screening Tables 1A-1E and Tables 2A-2E of the revised technical memorandum dated August 23, 2010.

4. *Attachment 2, Input Parameters, NDEP guidance states, "For either industrial or municipal developed areas of the BMI Complex and Common Areas in Henderson Nevada, the Companies must develop a site-specific infiltration rate (I) factor. The infiltration rate (I) factors must be supported via specific references applicable to the site, analytical calculations, or numerical model simulations to show how the factors were developed. The NDEP must approve the factor(s) prior to use (NDEP, 2009)." TRX should justify the infiltration rate used in this Deliverable.*

   In regards to Attachment 2 Input Parameters (NGEM, 6/11/10, pp 2-4 and 2-5), NDEP acknowledges that the conversation cited by NGEM occurred; however, the NDEP indicated that NGEM needed to research this topic and develop a TRX-specific rationale for an infiltration number. Since no rationale was included in this Deliverable, it appears that NGEM used the methods suggested by the NDEP without developing the requested rationale. As such, the NDEP has concerns regarding the infiltration rate calculations as follows:

   a. *The NDEP does not agree with NGEM's apparent interpretation of DBS&A's calibration (DBS&A, 2009, p 3). "The developed recharge value of 1.87 in/yr provided slightly better calibration statistics for model layer 1 hydraulic heads than the 0.57 in/yr value." The 1.87 in/yr value as indicated was not an upper limit, but rather a value that provided slightly better calibration statistics for model layer 1.*
   b. *NDEP did mention that the Upper Los Angeles River Area (ULARA) Watermaster uses 20% of delivered water as the recharge number. NDEP indicated that in using the 20% number in a groundwater model it was found that 10% of delivered water provided fewer calibration problems. The former, ULARA*

Watermaster information is publically available and as such can be quoted, referring to the 20% factor. The latter (10% factor) was contained in an unpublished consultant's report and as such cannot be properly referenced, and thus, not quoted in the subject document.

The NDEP would like to offer another perspective on infiltration or recharge to the alluvial aquifer on-site. Per Attachment 2 Input Parameters (NGEM, 6/11/10, p 2-5) the total annual water delivered to Tronox for 2009 was 7.43E+07 gallons. Dividing 7.43E+07 gallons/year by 365 days/year by 1440 minutes/day equals 140 gallons per minute (gpm). The on-site IWF pumps between 60 to 65 gpm on an on-going basis. Using 10% or even 20% of delivered water as a potential recharge number means that from 34 to 48 gpm must come from another source. Alternatively, the leakage from infrastructure may exceed 20%. The implication here is that the infiltration factor may be too low.

TRX should contact NDEP as soon as possible to arrange a conference call to discuss these issues with the infiltration rate.

Response: A conference call was held between representatives of Tronox and NDEP on July 16, 2010 to discuss the input parameters. The revised value for the Site-specific infiltration rate is discussed in Attachment 3 of the memorandum.

5. *Comparison of Screening Evaluation Results with Site Groundwater Data, pages 3-5, NDEP has the following comments:*
   a. *Bulleted list, TRX should support the conclusions and/or representations in this list with isoconcentration plots, data tables, documents, etc. as appropriate.*
   b. *4th bullet, please clarify whether any soil samples been collected above the area where the chromium concentrations in groundwater are at maximum value.*

   Response: The scope of the revised technical memorandum has been limited to the calculation of leaching-based, Site-specific levels, and no longer includes a discussion of the comparison of screening evaluation results with groundwater data. This discussion will be revisited in the Phase B groundwater assessment report (a separate submittal).

6. *Removal Activities, Inorganic Chemicals, page 6, NDEP has the following comments:*
   a. *2nd paragraph, please specify what the background concentration is at this point.*
   b. *Last paragraph, please provide the rationale for leaving cobalt in place in surface soil at this location.*

   Response: This section has been removed from this version of the technical memorandum. TRX will discuss specifics of removal activities in the Excavation Plans and Groundwater Assessment report.

7. *COPCs Attenuating in the Shallow Water-Bearing Zone, Inorganic Chemicals, pages 8-9, NDEP has the following comments:*

a. *1st full paragraph, 2nd sentence, please provide the data being discussed as the reference to telephone calls alone is insufficient.*
b. *2nd paragraph, 1st sentence, please explain the occurrence of cobalt north of Warm Springs Rd at the northern extent of the Tronox Site.*

Response: This discussion as been removed from this version of the memorandum. TRX will address groundwater data in the Groundwater Assessment report.

8. *COPCs Requiring Further Evaluations, Organic Chemicals, Chloroform, page 11, NDEP has the following comments:*
   a. *2nd paragraph, TRX states that "The LSSL is also lower than the LBCL (DAF=20), in part because a lower fraction of organic carbon was used to calculate the LSSL (a default value of 0.002 was used to calculate the LSSL, in accordance with the guidance, while NDEP uses a value of 0.006 to calculate LBCLs)." The NDEP used a f_{oc} value of 0.002 for the LBCL calculation in conformance with the Soil Screening Guidance (EPA, 1996) and Soil Screening Guidance: Technical Background Document (EPA, 1996). Please revise.*
   b. *2nd paragraph and footnote #5, the rationale explained in the footnote for the use of f_{oc} equal to 0.002 is stated as based upon limits of f_{oc} for controlling sorption, which is not an acceptable rationale. The f_{oc} should be determined based on site specific values. Also, please note that soil samples for f_{oc} determination must come from areas not contaminated by organic compounds.*
   c. *2nd paragraph, last sentence, please explain why "A total of twelve soil samples containing chloroform at concentrations exceeding the LSSL are expected to remain in-place after the planned removal actions…"*

Response:

a. The discussion of the fraction of organic carbon (f_{oc}) has been changed to indicate that NDEP used a value for f_{oc} of 0.002 for the LBCL calculation, although the spreadsheet formulas for the calculation of equilibrium distribution coefficients (*Kd*) in the table of LBCLs provided by NDEP use a value for f_{oc} of 0.006.
b. The value for f_{oc} used in the calculation of LSSLs has been revised based on Site-specific data (see Appendix 3).
c. The discussion of samples remaining after the planned removal actions has been removed from this version of the memorandum and will be addressed in the EPs.

References:

Nevada Division of Environmental Protection, 2010. Letter re: Tronox LLC (TRX), NDEP Facility ID #H-000539, Nevada Division of Environmental Protection (NDEP) Response to: Technical memorandum: Preliminary Evaluation of Soil Leaching to Groundwater Using NDEP Guidance, Dated: March 8, 2010. March 29.

Northgate, 2010a. Technical memorandum: Preliminary Evaluation of Soil Leaching to Groundwater Using NDEP Guidance, Tronox LLC, Henderson, Nevada. March 8.

Northgate, 2010b. Technical Memorandum: Evaluation of Soil Leaching to Groundwater Using NDEP Guidance, Tronox LLC, Henderson, Nevada. June 11.