



STATE OF NEVADA

Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor

Allen Biaggi, Director

Leo M. Drozdoff, P.E., Administrator

December 22, 2008

Susan Crowley (Contractor)
C/O Tronox LLC
PO Box 55
Henderson, NV 89009

Re: **Tronox LLC (TRX)**

NDEP Facility ID #H-000539

Nevada Division of Environmental Protection (NDEP) Response to:

*Technical Memorandum – Screening Level Indoor Air Health Risk Assessment for the
2008 Tronox Parcels A/B Soil Gas Investigation*

Dated November 13, 2008

Dear Ms. Crowley,

The NDEP has received and reviewed TRX's report identified above and provides comments in Attachment A. The revised report should include a fully annotated response-to-comments (RTC), a red-line strike-out version of the report, and a revised report.

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

Sincerely,

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

BAR:s



CC: Jim Najima, NDEP, BCA, Carson City
Shannon Harbour, NDEP, BCA, Las Vegas
Keith Bailey, Environmental Answers LLC, 3229 Persimmon Creek Drive, Edmond, OK 73013
Mike Skromyda, Tronox LLC, PO Box 55, Henderson, NV 89009
Barry Conaty, Holland & Hart LLP, 975 F Street, N.W. Suite 900, Washington, D.C. 20004
Brenda Pohlmann, City of Henderson, PO Box 95050, Henderson, NV 89009
Mitch Kaplan, U.S. Environmental Protection Agency, Region 9, mail code: WST-5, 75 Hawthorne Street,
San Francisco, CA 94105-3901
Ebrahim Juma, DAQEM, PO Box 551741, Las Vegas, NV, 89155-1741
Ranjit Sahu, BRC, 311 North Story Place, Alhambra, CA 91801
Rick Kellogg, BRC, 875 West Warm Springs, Henderson, NV 89011
Mark Paris, Landwell, 875 West Warm Springs, Henderson, NV 89011
Craig Wilkinson, TIMET, PO Box 2128, Henderson, Nevada, 89009-7003
Kirk Stowers, Broadbent & Associates, 8 West Pacific Avenue, Henderson, Nevada 89015
George Crouse, Syngenta Crop Protection, Inc., 410 Swing Road, Greensboro, NC 27409
Nick Pogoncheff, PES Environmental, 1682 Novato Blvd., Suite 100, Novato, CA 94947
Lee Erickson, Stauffer Management Company, P.O. Box 18890, Golden, CO 80402
Michael Bellotti, Olin Corporation, 3855 North Ocoee Street, Suite 200, Cleveland, TN 37312
Curt Richards, Olin Corporation, 3855 North Ocoee Street, Suite 200, Cleveland, TN 37312
Paul Sundberg, Montrose Chemical Corporation, 3846 Estate Drive, Stockton, California 95209
Joe Kelly, Montrose Chemical Corporation of CA, 600 Ericksen Avenue NE, Suite 380, Bainbridge Island,
WA 98110
Paul Black, Neptune and Company, Inc., 8550 West 14th Street, Suite 100, Lakewood, CO 80215
Kelly Black, Neptune and Company, Inc., 8550 West 14th Street, Suite 100, Lakewood, CO 80215

Attachment A

1. General comments, the NDEP has the following general comments regarding the subject document:
 - a. The subject document in general and the CSM in particular make no reference to the Phase 2 Investigation on Parcels A and B.
 - b. Shallow soil samples have been collected at other locations at the BMI Industrial Complex and analyzed for physical properties. BRC should explore how the default Johnson and Ettinger (J&E) model values compare to the data collected either on Parcels A & B or in the general area. For the soil gas calculations particular attention should be paid to the soil moisture content.
 - c. The subject document does not adequately describe the modeling work that was performed.
 - d. The NDEP's review of the subject document would be aided by the addition of Section numbers.
 - e. It appears that the data used in this assessment may have been reported with non-detects shown at their reporting limits rather than their detection limits. For example, for 1,1,2-TCA there are eight non-detects reported between 0.15 ug/m³ and 0.17 ug/m³. There is one detected value reported with a J flag at 0.12 ug/m³. Looking through the remainder of the dataset (beyond the nine samples used in these analyses), it appears that detects are quite often reported below the non-detect levels. This is usually an indication that the non-detects are being reported at a reporting limit rather than a method or instrument detection limit. That practice causes substantial overestimation of concentrations when the frequency of detection is low.
2. Introduction, page 1, the data validation summary report (DVSR) for the soil gas should be appropriately referenced. In addition, all referenced reports should denote their approval status.
3. Selection of Chemicals of Potential Concern, page 3, all chemicals that were not detected in soil gas at the site were eliminated from further consideration. This is an acceptable approach when it is accompanied by some consideration of whether reasonable detection limits were achieved for such chemicals. Without that information it is impossible to know if it is acceptable to eliminate those chemicals. This information may be in the DVSR that is referenced in the Introduction, if so, that is adequate, however, so additional explanation would be helpful. Please clarify.
4. Determination of Exposure Point Concentrations, pages 3 through 5
 - a. Please note that the United States Environmental Protection Agency (USEPA) actually encourages that both a central tendency estimate (CTE) and a reasonable maximum estimate (RME) be used to help account for the uncertainties associated with determining risk. It is fine in this case for TRX to use only an RME, but the wording of this paragraph is a bit confusing.
 - b. Indoor Air, page 4, TRX states "Maximum detected VOCs concentrations in soil gas were used as representative exposure concentrations for the indoor air exposure pathway." The J&E spreadsheet calculations used the 95 percent UCL values not the maximum. This inconsistency needs to be rectified.

- a. Page 4, 1st paragraph, in the final sentence, “non-detect” isn’t quite the right term to use. NDEP suggests that TRX use the term “minimum” in place of “non-detect”.
5. Uncertainty Analysis, page 5, the NDEP has the following comments:
 - a. TRX states “The environmental sampling at the property is one source of uncertainty in the evaluation. However, the number of sampling locations and events is large and widespread...” Please note that nine samples within Parcels A and B would not be considered “large”, however, this may be “adequate”.
 - b. The uncertainty analysis should discuss the fact the screening level indoor risk assessment used default values for a residential scenario while the assessment was intended for a commercial use scenario.
6. Screening-Level Indoor Air Health Risk Assessment Results and Summary, page 7, the results of the previous screening-level health risk assessment for Parcels A and B should be mentioned in this summary. The soil gas assessment for indoor air was intended to fill a gap in that assessment. These results on their own, without combining the potentially additive risks, do not provide an adequate assessment of the potential risks to a commercial worker on this site.
7. Table 1, TRX needs to review this table for issues with significant figures.
 - a. Upon close inspection, the main issue seems only to occur with trailing zeros. For example, the data are presented with two significant digits, but 8.0 is shown as 8, and .50 is shown as .5.
 - b. NDEP also notes that three significant figures were reported for some medians (e.g., 1,4-Dioxane) although the reported value in the data files contains only two significant figures (0.39 in the data file and 0.385 in Table 1).
 - c. Finally, another case where three significant figures were used was for the Chloroform UCL, which should clearly only have two significant figures since it is calculated from data that contain only two significant figures.
8. Table 2, the NDEP has the following comments:
 - a. Please note that average soil temperature is not intended to be a default value.
 - i. The average soil temperature of 10°C appears low for Las Vegas which has a mean annual temperature of approximately 20°C.
 - b. Was the soil type used (sand) based on site-specific data? There are no text references in this regard.
 - i. The NDEP is accepts the default soil physical properties provided the soil type is site-specific.
 - c. Exposure duration, exposure frequency, and averaging time for non-carcinogens values employed are not J&E Model default values.
9. Table 4, several of the chemical names were truncated.
10. J&E Model Spreadsheets
 - a. Chemical Properties Lookup Table, Vlookup Tab. References were not provided for updated information and for the chemicals added to the table.
 - b. DataEnter sheets were provided even when the chemical was non-detect (ND) in all nine samples. Chemical Group 1, for example, includes input sheets 1,1,1-TCA and 1,2-DCB but the chemicals were not detected.
 - c. J&E model calculations were checked for one chemical from each of the four chemical groups as follows:

- i. Group 1 – 1,4-DCB
 - ii. Group 2 – benzene
 - iii. Group 3 – chloroform
 - iv. Group 4 – PCE
 - v. NDEP comments are provided below for each of these compounds.
- d. Group 1
- i. DataEnter 1,4-Dioxane – the CAS number appears correct but the chemical reported at I12 (spreadsheet location) is Crotonaldehyde (2-butenal)? The problem is that TRX added chemicals to the *Chemical Properties Lookup Table*; but did not sort the table (lowest to highest CAS number). Hence the VLOOKUP formula in cell I12 does not work properly in the files provided. This problem can be solved in one of two ways:
 - 1. Simply sort the VLOOKUP table in ascending order after adding new chemicals to the list, or
 - 2. Modify the formula in cell I12 as follows by adding argument FALSE (highlighted yellow):
IF(ISERROR(MATCH(E12,CAS_No,0)),"CAS No. not found",VLOOKUP(E12,Chemical_Data,2,FALSE))
 - a. By adding this argument the table need not be in ascending order.
 - ii. The NDEP sorted the VLOOKUP table and the formula worked properly.
 - 1. This operation was performed for the VLOOKUP table for each of the four chemical groups
 - iii. Various factors (*e.g.*, RfC and URF) were updated but no references for this information were provided.
- e. Groups 2 through 4
- i. This set of spreadsheets contains the same error as noted above.
 - ii. Various factors (*e.g.*, RfC and URF) were updated but no references for this information were provided.