



environmental management, inc.

From: Deni Chambers, CEM
Taylor Bennett, PG, CHG

Date: February 14, 2011

To: Shannon Harbour, PE
Greg Lovato, PE
Nevada Division of Environmental Protection

RE: Nevada Division of Environmental Protection comments on *Revised Technical Memorandum: Evaluation of Soil Leaching to Groundwater Using NDEP Guidance*, dated January 13, 2011

This memorandum presents a Response to Comments (RTC) provided by NDEP in a January 13, 2011 letter regarding the *Revised Technical Memorandum: Evaluation of Soil Leaching to Groundwater Using NDEP Guidance* (Northgate, 2010). A summary of revisions and NDEP's comments on the technical memorandum is provided below, followed by individual responses to each of the comments in NDEP's January 13 letter.

On March 8, June 11, and August 23, 2010, Northgate submitted technical memoranda to NDEP presenting preliminary screening evaluations of the potential for SRCs to leach from soil to groundwater (Northgate, 2010a, 2010d, and 2010g). NDEP provided comments on these technical memoranda on March 29, 2010 and July 6, 2010 (NDEP, 2010b and 2010c). On July 22, 2010, Northgate submitted a technical memorandum to NDEP presenting background comparisons for metals in Remediation Zones B through E (RZ-B through RZ-E), using Remediation Zone A (RZ-A) as the background data set (Northgate, 2010e). NDEP provided comments on the July 22 background technical memorandum in a letter dated August 9, 2010, which was partially superseded by comments regarding background issues in a letter from NDEP dated August 17, 2010 (NDEP, 2010d and 2010e). A revised memorandum dated September 9, 2010 comprehensively addressed NDEP's comments on the March 8 and June 11 leaching evaluations, as well as NDEP's comments on the July 22 background evaluation (Northgate, 2010h). The September 9, 2010 memorandum was conditionally accepted with additional comments on the background screening in a letter from NDEP dated October 12, 2010 (NDEP, 2010f). The memorandum was revised and resubmitted to NDEP on November 18, 2010 (Northgate, 2010i).

Responses to NDEP's comments in the January 13, 2011 letter are provided below.

1. *Methods Used to Select COPCs for the Leaching Evaluation, page 3, 1st full paragraph on page, TRX states that "Some LBCLs were adjusted based on the hierarchy of risk-based groundwater concentrations (RBGCs) approved by NDEP for this project." Please include a list of these chemicals.*

Response:

Chemicals for which LBCLs were adjusted based on the hierarchy of RBGCs approved by NDEP are indicated in bold type as footnoted on Tables 2A and 2B of Attachment 3 to the memorandum.



2. *Organic Chemicals Selected as COPCs for Leaching Evaluation, page 5, NDEP has the following comments:*
 - a. *1st sentence of section, NDEP has noted that the reference to Attachment 2, Table 3 should be Attachment 3, Table 2. Please revise.*
 - b. *Organic Chemicals Selected as COPCs, page 5, SVOCs and VOCs, the following chemicals are listed in the Technical Memorandum text as retained for further evaluation. However, in Attachment 3 Table 2 column N (hidden) indicates “No” in terms of retention for the following chemicals. Please revise as necessary.*
 - i. *SVOCs – benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and*
 - ii. *VOCs – 1,1-Dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), acetone, bromoform, dibromochloromethane, hexachlorobutadiene, methylene chloride, tetrachloroethene (PCE), and trichloroethene (TCE)*

Response:

- 2a. The reference to Attachment 2, Table 3 has been changed to refer to Attachment 2, Table 6, “Selection of Organic COPCs for Leaching Evaluation,” in the current memorandum.
- 2b. The selection of organic COPCs is presented in Attachment 2, Table 6. The hidden column N in Attachment 3 Table 2 had a different purpose and has been removed to avoid confusion.

3. *Calculation of Leaching-Based..., page 5, footnote, NDEP notes the significance of chloroform as an SRC and its aerial distribution. As such, given that nine soil samples exceeded the LSSL, chloroform should be listed for both RZ-B and RZ-D. The location and depth of these soil samples should be provided.*

Response:

Chloroform has been included as a COPC in RZ-D only, based on its exceedance of the LSSL at three locations. The samples exceeding the LSSL for chloroform that were previously identified in RZ-B were samples collected in the UMCf, which were excluded from the data set used to measure source lengths and compared with LSSLs in the revised memorandum. Therefore, no exceedances of the LSSL for chloroform are currently identified in RZ-B. The locations and depths of soil samples in which chloroform exceeds the LSSL in RZ-D are as follows:

Remediation Zone	Location of Chloroform Exceedance of LSSL	Depth of Chloroform Exceedance of LSSL (fbgs)
RZ-D	RSAM7	28
	SA134, SA134-D	31
	SA88	20

4. *Input Parameters, page 3-2, NDEP has the following comments:*
 - a. *2nd paragraph, please provide data in tabular format supporting the use of pH 8 in calculations and reference laboratory reports.*
 - b. *Footnote, TRX states that “The criteria for selecting samples for calculating the Site-specific foc were that total petroleum hydrocarbons (TPH) were non-detected and VOCs, SVOCs, and PCBs were all below the basic comparison levels (BCLs).” TRX should indicate that detection limits (DLs) were evaluated and none of the samples used for this calculation had elevated DLs.*



Response:

- 4a. Table 6 has been added to Attachment 3 providing pH values for each of the soil samples collected in Phase A and B. As shown in this table, over 90 percent of soil samples had a pH value greater than 8.0, and 97 percent of samples had a pH value greater than 7.8, supporting the use of Kd values for soil with pH 8.
 - 4b. The text of Attachment 3 has been edited to indicate that detection limits were evaluated for organic compounds for the samples used to calculate the Site-specific foc, and none of the samples used for this calculation had elevated DLs.
5. *Contaminant Source Length, page 3-7, 1st and 2nd paragraphs, NDEP has the following comments:*
- a. *The maps used to measure source lengths should be appended to the Technical Memorandum.*
 - b. *It appears inconsistent to use two different methods to calculate source lengths for the inorganic chemicals. Please revise as necessary.*
 - c. *TRX states that “The method involves excluding remediation zones and depth intervals which were determined to be consistent with background from the source length estimation.” NDEP notes that “pre-confirmation” samples were collected within most remediation zones (RZs) to delineate the depth of excavation and that in some cases post-remediation confirmation samples will be required. Please clarify that this method is supported by samples and if not provide the rationale for excluding RZs.*

Response:

- 5a. Figures showing the polygons represented by soil samples and the flow paths used to measure source lengths are presented in Attachment 3, which describes how these figures were generated.
 - 5b. In the November 18, 2010 memorandum, source lengths were re-measured after removing polygons that were determined to be consistent with the background screening in Attachment 2, only for those chemicals that otherwise would have exceeded the LSSLs before the polygons determined to be consistent with background were removed. In the current revised memorandum, all the source lengths were measured using a consistent procedure, after removing polygons determined to be consistent with background concentrations. These figures are presented in Attachment 3.
 - 5c. Pre-confirmation sampling was performed to provide additional lateral and vertical delineation of the boundaries of areas to be excavated to remove chemicals that exceeded Basic Comparison Levels (BCLs) for direct contact exposure. These samples were not used in the measurement of source lengths because they were not intended to provide complete data to more precisely define the extent of every chemical with potential leaching concerns. The data set was limited to the Phase A and B samples used for source definition, because this was a more conservative approach (i.e., polygon dimensions weren't reduced by additional pre-confirmation samples).
6. *Input Parameters Used for Calculation..., page 3-8, RBGCs, please provide the following information and include a summary in the report::*



- a. Which chemicals fit the category of no established RBGC;
- b. Which chemicals in this category had detections;
- c. What are concentrations of these chemicals;
- d. What is their potential to impact the outcome of the soil leaching to groundwater pathway.

Response:

6a-c. Statistical summaries of chemicals with detections in soil and with no established RBGCs are presented in Attachment 2, Tables 5a-d (inorganics) and 6 (organics).

6d. A comprehensive evaluation of the fate and transport of detected chemicals with no established RBGCs would require significant effort and has not been included in this technical memorandum. The purpose and scope of such an evaluation will be discussed further with NDEP and the Nevada Environmental Response Trust, which is now responsible for management of the project.

7. Tables 1A through 1D, please indicate on this table which chemicals have an "adjusted" LBCL.

Response:

Chemicals with adjusted LBCLs are identified by a footnote on Tables 1A-D of the main text.

8. Table 2B, please explain the differences between columns "N" and "O" (both hidden columns) where there appear contradictory responses.

Response: In Attachment 3 Table 2B, the hidden columns are used as follows: column M indicates if the chemical has an established RBGC; column N indicates if we have a Kd value for that chemical; and column O indicates whether the chemical was detected in soil on Site.

9. Table 3B, for organics that had no Kd, Koc, or Henry's Law constant, please clarify whether there were any detections?

Response:

Attachment 2, Table 6, indicates whether there were detections of those chemicals for which Kd, Koc, or Henry's Law Constants were not available.

10. Table 4A, please explain the meaning of "--" as used in the table.

Response:

A footnote has been added to all tables in the memorandum and attachments in which the double-dash "--" symbol has been used, to explain its meaning.

