



March 18, 2013

Mr. Weiquan Dong, PE
Bureau of Corrective Actions, Special Projects Branch
Nevada Division of Environmental Protection
2030 E. Flamingo Rd., Suite 230
Las Vegas, Nevada 89119

Re: *Soil Gas Investigation and Human Health Risk Assessment Work Plan for Parcels C, D, F, G and H, Nevada Environmental Response Trust Site, Henderson, March 2013, and Response to NDEP Comments on Soil Gas Investigation Work Plan for Parcels C, D, F, G, and H Nevada Environmental Response Trust Site, Henderson, Nevada, Dated October 2012*

Dear Mr. Dong:

Please find enclosed the *Soil Gas Investigation and Human Health Risk Assessment Work Plan for Parcels C, D, F, G, and H*, dated March 18, 2013. This work plan presents the Human Health Risk Assessment (HHRA) methodology for evaluating the vapor intrusion pathway. The work plan also incorporates the revised *Soil Gas Investigation Work Plan for Parcels C, D, F, G, and H*, dated October 2012 (ENVIRON 2012a) and addresses comments received from the Nevada Division of Environmental Protection (NDEP) on the October 2012 work plan. Our annotated response to NDEP comments is included in Attachment A to this letter. NDEP approved the field work described in the October 2012 work plan in comments dated January 29, 2013. As previously communicated to NDEP, the approved field work was implemented the week of March 4, 2013.

Please contact Allan DeLorme at (510) 420-2565 if you have any comments or questions concerning this report.

Sincerely,

John M. Pekala, CEM #2347
Senior Manager

Allan J. DeLorme, PE
Managing Principal

Attachment

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Attachment A:
Response to NDEP Comments on
Soil Gas Investigation Work Plan for Parcels C, D, F, G, and H
Nevada Environmental Response Trust Site, Henderson, Nevada
Dated October 2012

Attachment A

Response to Soil Gas Investigation Work Plan for Parcels C, D, F, G, and H, Nevada Environmental Response Trust Site, Henderson, Nevada, dated October 2012

Note to Reviewer. The previously submitted October 2012 Soil Gas Investigation Work Plan has been expanded to include the human health risk assessment methodology. In addition, revisions have been made to the text for consistency with the December 17, 2012 Remedial Investigation and Feasibility Study Work Plan (ENVIRON 2012b).

1. Section 1.3 Site Background, page 4, the Work Plan notes that there are no LOUs in Parcel F; however, the Work Plan should acknowledge that there are still sources of compounds that may represent a vapor intrusion problem (such as subsurface groundwater and NAPL contamination issues).

ENVIRON assumes that this comment refers to the third paragraph of Section 1.3 Site Background, page 4, of the October 2012 report that included the following sentence: "No LOUs are located in Parcels C or H."

To address NDEP's comment, Section 2.6 of the March 2013 report identifies subsurface groundwater beneath all Parcels as a potential source of VOCs in soil gas and includes mention of the NAPL contamination issues along the western boundary of the Site. In addition, information on the former uses of Parcels C, D, F, G, and H (collectively referred to as the Study Area), including expanded descriptions of the LOUs within the Study Area, has been added to Section 2.0 of the report.

2. Section 1.4 Geologic and Hydrogeological Setting, penultimate paragraph and Figure 2, please identify the referenced paleochannels on Figure 2.

The paleochannels (as mapped by Northgate [2010a]) have been added to Figure 4 (previously Figure 2).

3. Section 2.0 Soil Gas Sampling and Analysis, page 7; Section 2.3 Sample Locations, page 8, first paragraph; Table 1 Proposed and Existing Soil Gas Sampling Locations; and Sections 2.3.1-2.3.5, pages 8-9; the Work Plan implies that the soil gas probes installed by ENSR in 2008 will be used in the health risk assessment (HRA). Given that these data are nearly five years old, NERT should consider comparing the new data to the 2008 data to ensure comparability. If a significant difference is observed, then the difference should be discussed as part of the Uncertainty Section in the resulting HRA.

ENVIRON acknowledges that the soil gas data collected by ENSR are nearly five years old. All available data will be considered and a data usability evaluation will be included in the report (i.e., the Human Health Risk Assessment [HHRA]) to identify and present the rationale for the specific data that is used for spatial analysis and/or risk assessment. Significant findings will also be discussed in the Uncertainty Analysis.

4. Section 2.3 Sampling Locations, the Work Plan includes eight new soil gas samples. NDEP recommends one additional soil gas sample located adjacent to monitor well M-23 located in Parcel D (see attached marked up version of Figure 2). Figure 2 from the work plan shows that with the addition of one soil gas sample in Parcel D, there will be 12 locations that have collocated soil gas at five feet below ground surface (bgs) and shallow ground water samples. Data from these collocated samples will allow further evaluation of the conclusion reached in the Site-Wide Soil Gas Human Health Risk Assessment, Section 6.1.1.1 (Northgate, 2010). Figure 2 with highlights and markups from the subject Deliverable is attached for reference to the comments herein.

The Work Plan has been revised to include a total of 9 additional soil gas samples. One additional sample, E-SG-9 has been added to Figure 4 (previously Figure 2) adjacent to monitor well M-23.

5. Section 2.3 Sample Locations, page 8, last paragraph, please provide the locations of the soil property samples on Figure 2. In addition, please provide a table listing the soil types/classifications and associated properties and justification for the values to be used for the proposed samples.
The locations of the soil property samples have been added to Figure 4 (previously Figure 2). In addition, Table 7 Soil Properties Data has been added to the Work Plan and provides the sample identifying information, associated soil properties, and soil types that will be relied upon for modeling purposes. Section 5.2.3.1 Fate and Transport Modeling provides justification for use of these soil properties, which are taken from samples collected as part of the 2010 Site-Wide Soil Gas HRA (Northgate 2010b).
6. Sections 2.3.1-2.3.5 Parcels, pages 8-9, please clarify whether the 'near-parcel' soil gas samples will be used to assess 'on-parcel' risk. If so, please include justification.
The soil gas data will be used for two primary purposes as described in the last paragraph of Section 4.1 Data Sources. First, the data will be used to evaluate groundwater and soil results relative to the Conceptual Site Model (CSM) developed for the Site and Study Area (Figure 5). Second, the data will be used to characterize potential risk to human health associated with the vapor intrusion pathway. The Data Usability Assessment will identify data of appropriate quality to meet the specific objectives of the evaluations, including the evaluation of whether 'near-parcel' soil gas samples will be used to assess 'on-parcel' risk.
7. Section 2.4 Sampling Methodology, pages 9-10, NDEP provides the following comments:
 - a. NDEP recommends that hand-augered probes ('inside locations') be allowed to equilibrate a minimum of 48 hours.
The Work Plan has been revised to specify the equilibration time for the soil gas probes installed via hand augering. The minimum equilibration time for hand-augered probes will be 48 hours. As stated in the Work Plan, for probes installed using direct-push methods, the minimum equilibration time will be 30 minutes. For clarity, the equilibration time is the waiting period from when the probe is sealed (including both the annular seal as well as the tubing cap) to when purging and sampling begins.
 - b. Please clarify the manner in which the purge volume will be calculated. The work plan reads as if the tubing is the only item considered in the purge calculation. The dry bentonite volume and the filter pack volume should also be included in the purge volume calculation.
The Work Plan has been revised to clarify how the purge volume will be calculated. One purge volume will include the following volumes:
 - *The internal volume of tubing;*
 - *The void space of the sand pack around the probe tip; and*
 - *The void space of the dry bentonite in the annular space.**To calculate the void space of the sand and dry bentonite a porosity of 30% will be assumed.*
 - c. NDEP recommends that helium not be used as a tracer. It is recommended that a liquid tracer (e.g., a mixture of n-propanol and n-pentane) be used.

ENVIRON acknowledges that the use of a liquid tracer would be easier to implement; however, the use of helium has significant advantages as outlined below:

- Helium, being a conservative gaseous tracer, does not rely on temperature-dependent volatilization and is not subject to phase partitioning within the subsurface like organic liquid tracers making the shroud concentrations easier to generate and maintain in a reproducible manner and the concentrations at depth (in the case of leaking probes) more comparable and consistent;*
- Helium can be monitored within the probe during purging to identify leaks before a sample is collected potentially avoiding costly analyses of compromised samples and remobilizations for resampling;*
- Helium can be used to quantitatively evaluate the magnitude of a leak, so field decisions can be made whether a replacement probe is necessary;*
- Helium, unlike some organic liquid tracers, will not interfere with analysis of target organic compounds.*

As discussed in our teleconference on February 21, 2013, ENVIRON believes the use of helium as a leak check compound will enhance data quality and ultimately reduce the time in the field and accordingly reduce project costs.

- d. Clarify whether the samples will be duplicate samples (collected simultaneously with a T-splitter) or replicate samples (collected sequentially). Depending on the final number of primary soil gas samples, duplicates/replicates should be collected at a rate of 5%. *Duplicate samples will be collected at the same time as the primary sample using a T-fitting. Replicate sampling is not planned. The Work Plan has been revised to specify that duplicate samples will be collected at a rate of 5% (one duplicate for every 20 primary samples).*
8. Sections 2.4 Sampling Methodology and 2.6 Analytical Testing, pages 9-12, NERT should confirm the laboratory's ability to achieve the practical quantitation limits (PQLs) that are at or below risk-based levels for use in the HRA. *ENVIRON will ensure that the PQLs are below concentrations corresponding to either a cancer risk level of 10^{-6} for carcinogens or a hazard quotient of 1 for non-carcinogens.*
9. Section 3.0 Evaluation, Interpretation, and Reporting of Results, NDEP recommends the following data analysis and risk evaluation:
 - a. Cross plots (scatter plots) as done by Northgate (2010) should be done for the new and combined data sets; *ENVIRON will prepare cross plots for collocated soil gas and monitor well samples collected in or proximal to the Study Area.*
 - b. Compare ground water VOC concentrations used for the Northgate (2010) Site-Wide Soil Gas Human Health Risk Assessment with most recent groundwater sample results for the same wells. *ENVIRON will compare groundwater VOC concentrations presented in the Northgate (2010b) Site-Wide Soil Gas HRA with the most recent groundwater sample results for the same wells to evaluate any temporal changes to VOC concentrations in groundwater. (See in this report, Table 2.)*

- c. Calculate risk for the new soil gas samples and compare with risk calculations for the earlier data set; and
ENVIRON will compare the risk calculations for the new soil gas samples to the risk results presented in the Northgate (2010b) Site-Wide Soil Gas HRA.
 - d. Calculate risk using the groundwater VOC concentrations and compare with risk associated with the soil gas.
For collocated samples, ENVIRON will calculate risk using VOC concentrations for groundwater and the associated soil gas samples, and will compare the two sets of risk results.
 - e. Alternative evaluations may be proposed but must be inclusive of data from both the earlier data set and most recent data set. If the analysis as mentioned herein indicates a problem with the comparability of the data sets then NDEP and NERT would need to determine path forward.
All data evaluations presented in the HHRA will include the earlier and most recent data sets. If inconsistencies (not explained by the difference in time frames) are identified in the data sets, ENVIRON will determine a path forward in conjunction with NDEP.
10. Section 5.0 References, page 15, this section should include NDEP approval status for all Deliverables related to the NERT site.
The NDEP approval status has been added to the appropriate references in what is now Section 7.0, References.
 11. Tables, NERT should include a data table listing potential contaminants associated with the LOUs within and adjacent to the Parcels C/D/E/F/G/H to demonstrate that these LOUs did not contain volatile organic compounds (VOCs).
Table 1, which identifies whether VOCs have been associated with LOUs within and upgradient of the Parcels, has been added to the Work Plan. Additionally, these LOUs are shown on Figure 4.
 12. Figure 2 Soil Gas and Groundwater Sampling Locations, NERT should also review the available well locations from the Olin site to the west as it appears that a number of wells exist that are not displayed on this figure. Sampling data from the group of Companies at the Olin site would provide a much more robust data set. However, please note that justification for using "near-parcel" sample locations for "on-parcel" risk.
ENVIRON reviewed well locations from neighboring properties using NDEP's Regional Database and has displayed on Figure 4 (previously Figure 2) those shallow wells located near the Study Area that have been sampled for VOCs. As noted in the response to Comment #6, the specific use of the available soil gas and groundwater data will be documented in the Data Usability Assessment, including the evaluation of whether 'near-parcel' soil gas samples will be used to assess 'on-parcel' risk.
 13. Figure 2, NERT should confirm that there are no groundwater monitor wells in or near Parcel G (please refer to annotated version of Figure 2 attached).
As described in Section 3.3.4 Parcel G, there is one shallow groundwater well (TR-8) located in Parcel G. (This well was not included in the previously submitted October 2012 Draft Soil Gas Investigation Work Plan.) The last paragraph of Section 2.0 Description, Historical Uses, and Previous Soil and Groundwater Investigation, page 10, (previously Section 1.6 Previous Groundwater Investigations, page 6) has been revised accordingly. Additionally, groundwater well TR-8 has been added to Figure 4 (previously Figure 2).

14. Figure 2, NDEP provides the following comment for NERT to consider when analyzing the data: The Site-Wide Soil Gas Human Health Risk Assessment (Northgate, 2010) indicates that 25 of the soil gas sampling locations were collocated with monitor wells. The deliverable (Northgate, 2010) states that "These data were plotted and a linear regression model was applied, which showed that the data were reasonable linearly correlated (R^2 of 0.54). However, there are two pairs of samples (SG36/M11 and SG52/MW16) where the soil gas concentration is high but the shallow groundwater concentration is very low and these two sets of data points appear to be outliers. When the data were re-analyzed without these samples, the linear correlation was significantly improved (R^2 of 0.94). These data further support the conclusion that the source of chloroform in soil gas is shallow groundwater." The attached Figure 2 has two dashed circles (orange) at the approximate locations and are areas where soil gas and ground water monitoring well data are identified as outliers (Northgate, 2010) in that the soil gas concentrations were much higher than would have been indicated by groundwater concentrations at these locations. The latter might be interpreted as potential soil source as opposed to groundwater. The latter would require more work to establish but is not viewed as relevant to the Parcels C/D/E/F/G/H soil gas investigation and evaluation.
ENVIRON will keep this comment in mind when revising the draft Site-Wide Soil Gas HRA prepared by Northgate (2010). Further, the possibility that soil is a potential source within the Study Area will be considered if similar "outliers" are identified based on the proposed sampling.
15. NDEP provides the following statements and comments regarding each of the Parcel areas:
- Parcels C/D/E have five collocated soil gas and groundwater samples; and six collocated samples if the NDEP recommended soil gas sample at monitor well M-23 were included. Also there are four soil gas samples within and immediately adjacent to Parcels C/D/E; and one planned new soil gas sample. Also, there are five groundwater monitor wells within and immediately adjacent to Parcels C/D/E. Parcel C contains no LOUs. However, as similarly requested in above-comments, NERT should confirm via a data table listing potential contaminants associated with the LOU 68 located along the northeast corner of Parcel D to demonstrate that these LOUs did not contain VOCs.
See response to NDEP Comment 11.
 - Parcel F has one existing collocated soil gas and groundwater sample; and with the proposed soil gas sampling there will be two collocated sample locations. Parcel F will have three new soil gas sample locations. Adjacent to and to both north and south, there are existing groundwater monitor wells and gas locations. Also as similarly requested in above-comments, NERT should confirm via a data table listing potential contaminants associated with LOUs 63 and 65c to demonstrate that the LOUs did not contain VOCs.
See response to NDEP Comment 11.
 - Parcel G has two new soil gas sample locations and one previous soil gas sample. The proposed soil gas locations are consistent with the mapped ground water chloroform concentrations; that is, maximum to lowest expected groundwater VOC concentration. NERT should confirm that there are no groundwater monitor wells in or near Parcel G and should confirm via data table listing potential contaminants associated with LOU 65d to demonstrate that the LOU did not contain VOCs.
See response to NDEP Comments 11 and 13.
 - Parcel H has two soil gas samples within its boundary and three soil gas samples immediately adjacent to the north. There is one collocated soil gas sample and groundwater sample. Parcel H is in an area of low ($10E-07$ to $10E-09$) interpreted soil gas and risk (Northgate, 2010). Parcel H contains no LOUs; thus, groundwater should be source for VOCs.

ENVIRON acknowledges this comment and that groundwater is likely the VOC source in Parcel H.

References

ENVIRON, 2012a. *Draft Soil Gas Investigation Work Plan for Parcels C, D, F, G, and H*, Nevada Environmental Response Trust Site, Henderson, Nevada. October.

ENVIRON, 2012b. *Remedial Investigation and Feasibility Study Work Plan*, Nevada Environmental Response Trust Site, Henderson, Nevada. December 17.

Northgate Environmental Management, Inc. (Northgate). 2010a. *Capture Zone Evaluation Report*, Tronox LLC. Henderson, Nevada. December 10. ENVIRON to submit a Response to Comments and resubmit the 2010 Model.

Northgate and Exponent, Inc. 2010b. *Site-Wide Soil Gas Human Health Risk Assessment*. November 22. Not reviewed by NDEP.