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Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, Third Quarter Fiscal Year 2009

Los Alamos
NATIONAL LABORATORY
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EXECUTIVE SUMMARY

This periodic monitoring report summarizes vapor-monitoring activities conducted during the third quarter of fiscal year (FY) 2009 at Material Disposal Area (MDA) H, Solid Waste Management Unit 54-004, at Technical Area 54 at Los Alamos National Laboratory. The objective of the monitoring is to evaluate trends in volatile organic compound (VOC) concentrations and tritium activity levels over time in subsurface vapor at MDA H.

Monitoring conducted during the third quarter of FY2009 included field screening and collecting vapor samples from 15 sampling ports within 3 vapor-monitoring boreholes at MDA H. Vapor samples were submitted for laboratory analyses of VOCs and tritium. Tritium concentrations have been corrected to account for the effects of silica gel–bound water.

The analytical results continue to confirm the presence of VOCs and tritium in pore-vapor samples collected at MDA H. These results are consistent with previous sampling results. Vapor-monitoring results indicate that concentrations of VOCs in pore gas are not high enough to cause groundwater screening levels to be exceeded. Tritium values decrease with distance from MDA H and depth in borehole location 54-01023.

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1.0 INTRODUCTION

This periodic monitoring report presents the results of vapor-monitoring activities conducted during the third quarter of fiscal year (FY) 2009 at Material Disposal Area (MDA) H, Solid Waste Management Unit 54-004, at Technical Area 54 (TA-54) at Los Alamos National Laboratory (LANL or the Laboratory).

MDA H is located in the east-central portion of the Laboratory at TA-54 (Figure 1.0-1) on Mesita del Buey. MDA H is a 70-ft by 200-ft (0.3-acre) fenced area consisting of nine inactive vertical disposal shafts arranged in a line approximately 15 ft within, and parallel to, its southern fence line (Figure 1.0-2). Each shaft is cylindrical, 6 ft in diameter, and 60 ft deep. The shafts are filled with solid-form waste to a depth of 6 ft below ground surface (bgs). The waste in Shafts 1 to 8 is covered by a 3-ft layer of concrete placed over 3 ft of crushed tuff; the waste in Shaft 9 is covered by 6 ft of concrete. The regional aquifer beneath MDA H is estimated to be at an average depth of approximately 1040 ft bgs, based on data from nearby wells and the predictions of the hydrogeologic conceptual model for the Pajarito Plateau (LANL 1998, 059599).

From May 1960 to August 1986, MDA H functioned as the Laboratory's primary disposal area for classified solid-form waste. Between periods of waste disposal, each shaft was covered with a padlocked steel plate to prevent unauthorized access to classified materials. Much of the classified waste was nonhazardous; however, various hazardous chemicals, radionuclide-contaminated materials, and materials contaminated by high explosives were also disposed of at MDA H. These materials included scraps and shapes contaminated with depleted uranium, drummed radioactive waste, fuel elements, a tritium-contaminated unit, plutonium-contaminated shapes, and decontamination and decommissioning scrap.

Vapor monitoring at MDA H consists of screening 15 sampling ports in 3 vapor-monitoring boreholes (Figure 1.0-2). Volatile organic compound (VOC) and tritium samples are collected from each of the 15 sampling ports completed within each stratigraphic unit. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the New Mexico Environment Department (NMED) in accordance with U.S. Department of Energy policy.

Vapor monitoring at MDA H has been conducted since the second quarter of FY2005. The NMED-approved vapor-monitoring boreholes, and the corresponding sampling intervals that were field screened and sampled are presented in Table 1.0-1. A summary of vapor-monitoring activities follows.

- On April 11, 2003, NMED sent a letter (NMED 2003, 075939) approving the Resource Conservation and Recovery Act facility investigation report for MDA H (LANL 2001, 070158) and subsequent addendum to the report (LANL 2002, 073270).
- In May 2003, the Laboratory submitted the corrective measures study for MDA H (LANL 2003, 076039) identifying a preferred remedy. Comments were received from NMED, and the report was reissued in June 2005 (LANL 2005, 089332).
- In December 2004, NMED sent a letter (NMED 2004, 092217) requesting that the Laboratory collect quarterly subsurface vapor-monitoring samples from borehole locations 54-15461, 54-15462, and 54-01023 to provide data to facilitate NMED's selection of an appropriate remedy for MDA H.

- In May 2005, NMED sent a letter (NMED 2005, 092219) requesting that the Laboratory continue to collect quarterly subsurface vapor-monitoring samples from borehole locations 54-15461, 54-15462, and 54-01023.
- In February 2005, the Laboratory began quarterly pore-gas monitoring using an inflatable packer sampling system. In March 2006, the Laboratory installed dedicated Flexible Liner Underground Technology (FLUTe) sampling membranes into each MDA H pore-gas monitoring location.
- NMED reviewed the 2007 pore-gas monitoring report and, based on packer sampling results for trichloroethene (TCE) in pore-gas samples collected before installing dedicated sampling equipment (FLUTe), suggested that the FLUTe membrane was adsorbing VOCs (NMED 2007, 099277; NMED 2008, 100480). A comparison of VOCs in subsurface vapor samples was conducted during the second and third quarters of FY2008. The purpose of the test was to compare VOC concentrations using the FLUTe system versus the packer system to collect subsurface vapor samples. This test compared vapor-sampling results between the FLUTe systems currently used at MDA H with the packer sampling system used at MDA H from 2001 to 2006. The results of this test are discussed in “Pilot Test Report for Comparing Packer and FLUTe Vapor-Sampling Systems at Material Disposal Area H” (LANL 2008, 103889). Pore gas was sampled using the FLUTe membrane system during the second quarter sampling event; however, the FLUTe membrane was damaged during the removal process to accommodate packer sampling for the comparison study. The membrane was sent to the manufacturer for repair before it was reinstalled for third quarter sampling activities, which were conducted as planned. During the membrane removal, the tubing was disconnected from the manifold and subsequently misaligned when it was reinstalled before third quarter FY2008 sampling activities were conducted.
- During the first quarter FY2009 (December 2008) sampling event, the field crew observed that one tube connecting the FLUTe membrane’s subsurface sampling port to the surface manifold in borehole location 54-15462 did not correspond to the correct fitting for that depth interval on the manifold. The borehole was sampled in the observed tubing configuration (with the exception of the 60-ft port depth, which was not sampled), and the membrane was removed following sampling. After the membrane was removed, it was determined that five of the six tubes were not connected to the correct fittings for the depth intervals on the manifold. In addition, one sampling port (60-ft depth) was not reconnected to any sample tubing at that time.
- As a result of the tubing misalignment, the samples collected from the borehole during the third and fourth quarter FY2008 sampling events and the first quarter FY2009 sampling event were aligned with the wrong depth intervals. Although the misalignment of the tubing in borehole location 54-15462 was not discovered until the first quarter FY2009 sampling event, the ambient-air values measured in the port indicated the tubing may have been disconnected in the 60-ft port depth during the fourth quarter FY2008 sampling event. Therefore, the 60-ft port depth was not sampled during the fourth quarter FY2008 and first quarter FY2009 sampling events. The 60-ft port depth was sampled during the third quarter FY2008 sampling event; however, the results are not representative of formation air at this port depth.
- Because of the problems with the tubing configuration in borehole location 54-15462, the Laboratory corrected the field documentation (sample collection logs and field notebooks) for the third and fourth quarter FY2008 sampling events and for the first quarter FY2009 sampling event.
- The Sample Management Database records were updated to correlate the results to the correct port depths sampled in borehole location 54-15462 during the third and fourth quarters of FY2008 and the first quarter of FY2009.

- Analytical results and their associated port depths were reported correctly in “Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, Fiscal Year 2008” (LANL 2009, 105191).
- The third quarter FY2008 pore-gas results presented in “Pilot Test Report for Comparing Packer and FLUTe Vapor-Sampling Systems at Materials Disposal Area H” were incorrect (LANL 2008, 103889). The information presented in this report was revised and the report was resubmitted to NMED in February 2009 as “Pilot Test Report for Comparing Packer and FLUTe Vapor-Sampling Systems at Materials Disposal Area H, Revision 1” (LANL 2009, 105076).
- Although pore-gas screening and analytical data for borehole location 54-15462 reported for the third and fourth quarters of FY2008 and the first quarter of FY2009 were corrected in all field and laboratory documentation to correlate the results to the actual depths monitored, NMED rejected all data for this borehole collected during these three events. The data were rejected on the basis that misalignment of the sampling ports to the manifold may have resulted in inadequate purge volumes (NMED 2009, 105599).
- On August 20, 2009, NMED submitted a letter to the Laboratory discussing the presence of VOCs and tritium in the subsurface at MDA H, table discrepancies, and the rejection of tritium in the third and fourth quarter of FY2008 and the first quarter of FY2009 because of inadequate purge times. Table discrepancies were corrected and resubmitted. The Laboratory rejected the VOC sampling results because the purge time for the three quarters was not adequate. The Laboratory includes the tritium data NMED rejected because tritium analysis is dependent on weight accumulation of water vapor, not on purge time (NMED 2009, 106786).

Subsurface vapor-field screening and sampling are being performed to characterize VOC concentration and tritium activity level trends in subsurface vapor over time. Field-screening data and analytical laboratory results for the third quarter of FY2009 and the previous three quarters are presented in this report.

2.0 SCOPE OF ACTIVITIES

The following sampling activities were completed at MDA H during the third quarter of FY2009, as directed by NMED in a December 21, 2004, letter to the Laboratory (NMED 2004, 092217) and in a May 17, 2005, letter to the Laboratory (NMED 2005, 092219). Third quarter vapor-monitoring activities were conducted from April 29, 2009, to May 11, 2009. Vapor-monitoring boreholes and the corresponding sampling intervals field screened and sampled during the third quarter are presented in Table 1.0-1. Vapor-monitoring borehole locations are shown in Figure 1.0-2.

- Each sampling interval was purged to ensure that formation air was sampled in accordance with Standard Operating Procedure EP-ERSS-SOP-5074, Sampling of Sub-Atmospheric Air.
- Pore gas from each sampling interval was field screened for carbon dioxide (CO_2) and oxygen (O_2) using a Landtec GEM-500 and for selected VOCs, CO_2, and water vapor using a Brüel and Kjær (B&K) Type 1302 multigas photoacoustic analyzer. The pressure differential was also measured at each sampling interval.
- Vapor samples were collected from each sampling interval in SUMMA canisters for laboratory analyses of VOCs using U.S. Environmental Protection Agency (EPA) Method TO-15.
- Tritium samples were collected from each sampling interval with silica gel columns for laboratory analysis using EPA Method 906.0.

- A total of 15 VOC samples were collected from 15 ports in three boreholes.
- A total of 15 tritium samples were collected from 15 ports in three boreholes.

No investigation-derived waste was generated during quarterly monitoring.

2.1 Third Quarter FY2009 Deviations

The required vapor-monitoring locations and sampling intervals for MDA H are presented in Table 1.0-1. No deviations from the sampling plan occurred during the third quarter FY2009 sampling event.

3.0 REGULATORY CRITERIA

The March 1, 2005, Compliance Order on Consent (the Consent Order) does not identify any cleanup standards, risk-based screening levels (SLs), risk-based cleanup goals, or other regulatory criteria for pore gas at MDA H. Therefore, an analysis was conducted to evaluate the potential for contamination of groundwater by VOCs in pore gas using SLs based on groundwater cleanup levels in the Consent Order. The analysis evaluated the groundwater concentration that will be in equilibrium with the maximum concentrations of VOCs detected at MDA H during the most recent monitoring event. The equilibrium relationship between air and water concentrations is described by the following equation.

$$C_{water} = C_{air}/H'$$ **Equation 3.0-1**

Where C_{water} = the volumetric concentration of contaminant in water,

C_{air} = the volumetric concentration of contaminant in air, and

H' = dimensionless form of Henry's law constant.

If the predicted concentration of a particular VOC in groundwater is less than the SL, then no potential exists for exceedances of groundwater cleanup levels. The analysis of the third quarter MDA H VOC pore gas data is presented in section 5.0.

Because there are no SLs for pore gas that address the potential for groundwater contamination, the screening evaluation was based on groundwater standards or tap water SLs and Henry's law constants that describe the equilibrium relationship between vapor and water concentrations. The source of the Henry's law constants is the NMED technical background document (NMED 2009, 106420) or the EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm). The following dimensionless form of Henry's law constant was used:

$$H' = \frac{C_{air}}{C_{water}}$$ **Equation 3.0-2**

Equation 3.0-2 can be used to calculate the following screening value (SV):

$$SV = \frac{C_{air}}{1000 \times H' \times SL}$$ **Equation 3.0-3**

where C_{air} is the concentration of a particular VOC in the pore-gas sample (µg/m^3), H' is the dimensionless Henry's law constant, SL is the screening level (µg/L), and 1000 is a conversion factor from L to m^3. The SLs are the groundwater standards or tap water SLs. The groundwater standards are the EPA maximum contaminant level (MCL) or New Mexico Water Quality Control Commission (NMWQCC) groundwater standard, whichever is lower. If there is no MCL or NMWQCC standard, the EPA regional tap water SL (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) is used and adjusted to 10^{-5} risk for carcinogens. The numerator in Equation 3.0-3 is the actual concentration of the VOC in pore gas, and the denominator represents the pore-gas concentration needed to exceed the SL. Therefore, if the SV is less than 1, the concentration of the VOC in pore gas does not exceed the SL, even if the VOC plume were in contact with groundwater. Table 3.0-1 presents the calculated concentrations of contaminants in pore gas corresponding to groundwater SLs.

4.0 FIELD-SCREENING RESULTS

Third quarter FY2009 vapor-monitoring field-screening activities were conducted at MDA H from April 29 to April 30, 2009. Before sampling, each sample interval was purged to ensure formation air was collected. The vapor from each port was field screened using a Landtec GEM-500 photoionization detector equipped with an 11.7-electron volt lamp to measure percent CO_2 and O_2. Each interval was monitored with the Landtec until CO_2 and O_2 readings stabilized. The stabilized percent CO_2 and O_2 values measured at each sampling location during the third quarter of FY2009 and the previous three quarters are provided in Table 4.0-1. After the tubing was purged and stabilized, VOC field-screening results were collected using a B&K Type 1302 multigas photoacoustic analyzer to estimate VOC concentrations. The B&K is calibrated for analysis of four VOCs, including trichlorofluoromethane (Freon 11); tetrachloroethene (PCE); 1,1,1-trichloroethane (TCA); and TCE. It also measures CO_2 and water vapor. The stabilized B&K field-monitoring values measured at each sampling location for the third quarter of FY2009 and the previous three quarters at each sampling location are provided in Table 4.0-2. The field-screening quality assurance/quality control (QA/QC) program is summarized in Appendix B, section B-5.0.

5.0 ANALYTICAL DATA RESULTS

Third quarter FY2009 vapor-sampling activities were conducted at MDA H from April 29 to May 11, 2009. Sampling locations and depths are provided in Table 1.0-1. Analytical vapor samples were collected in SUMMA canisters and submitted for laboratory analyses of VOCs according to EPA Method TO-15. Analytical vapor samples were collected in silica gel columns and submitted for laboratory analyses of tritium according to EPA Method 906.0. Table 5.0-1 presents analytical results for detected VOCs in samples collected during the third quarter of FY2009 and the three previous quarters. Detected VOC concentrations for the third quarter FY2009 are shown in Figure 5.0-1. Table 5.0-2 presents analytical results for detected activity levels of tritium in samples collected during the third quarter of FY2009 and the three previous quarters. Detected tritium activity levels for the third quarter FY2009 are shown in Figure 5.0-2. Analytical data and reports for the third quarter FY2009 and the three previous quarters are included in Appendix C (on CD included with this report). Tritium and VOC analytical data were reviewed in accordance with the QA/QC program presented in Appendix B.

A systematic low bias in previously reported tritium pore-vapor measurements has been identified (Whicker et al. 2009, 106429); tritium data presented in Table 5.0-2 have been corrected for this low bias (Marczak 2009, 106500). The low bias resulted from the properties of silica gel, the medium used to collect water vapor from pore-gas samples. Drying the silica gel before it is used in sampling cannot completely remove the water bound to the silica gel molecules without degrading the silica gel properties. Thus, when water vapor is collected from the pore gas, the tritiated water vapor is diluted into the water bound to the silica gel molecules. The tritium results were corrected using the percent moisture value determined by the analytical laboratory.

5.1 Data Summary

During the third quarter of FY2009, 20 VOCs were detected in the 15 vapor samples collected from MDA H. Dichlorodifluoromethane was detected in all 15 samples and Freon-11 was detected in 14 samples. Chlorobenzene and 1-butanol were detected in nine samples. TCA was detected in eight samples, toluene in seven samples, and 2-butanone and 1,1,2-trichloro-1,2,2-trifluoroethane were detected in six samples each. PCE was not detected in analytical samples in the third quarter. The two highest concentrations of VOCs were 800 $\mu g/m^3$ (210 ppbv) of toluene and 280 $\mu g/m^3$ (110 ppbv) of 2-propanol in borehole location 54-15462 at port depths of 254 ft bgs and 200 ft bgs, respectively. Third quarter FY2009 toluene and 2-propanol concentrations were the same order of magnitude as the concentrations reported in the second quarter FY2009 in that same borehole. Third quarter FY2009 VOC concentrations were generally consistent with VOC concentrations observed during the three previous sampling events (Table 5.0-1).

Tritium was detected in 14 of the 15 vapor samples collected at activity levels ranging from 621 pCi/L to 16,424,700 pCi/L. The highest tritium activity levels were detected in vapor samples collected from borehole location 54-01023, the monitoring borehole nearest MDA H, indicating a tritium source in the shafts. During the third quarter of FY2009, tritium activity levels in this borehole location decreased with depth from 16,424,700 pCi/L at the top port depth (10 ft bgs) to 2,149,850 pCi/L at the second lowest port depth (200 ft bgs). The sample from the lowest port depth in borehole location 54-01023 this quarter reported tritium as not detected. The highest tritium activity level (16,424,700 pCi/L) is more than twice the magnitude of the highest activity level from the previous three quarters (7,213,580 pCi/L in the fourth quarter of FY2008). Tritium activity levels in borehole locations 54-15461 and 54-15462 in the third quarter of FY2009 ranged from 621 pCi/L to 4937 pCi/L. A decrease in activity levels was not observed in these two borehole locations. The highest activity level in these outer locations is more than 400 times less than the lowest tritium activity level at borehole location 54-01023, indicating that tritium activity levels decrease quickly with distance from MDA H.

5.2 Data Evaluation

The VOC results from the third quarter of FY2009 were screened to evaluate whether the concentrations of VOCs are a potential source of groundwater contamination. Because there are no SLs for pore gas that address the potential for groundwater contamination, the screening evaluation was based on groundwater standards or tap water SLs and Henry's law constants that describe the equilibrium relationship between vapor and water concentrations (see section 3.0).

SVs were calculated for the maximum concentrations of VOCs detected at MDA H using Equation 3.0-3 during the third quarter of FY2009. The evaluation included the 20 VOCs detected in MDA H samples for which there are MCLs, NMWQCC standards, or EPA regional tap water SLs (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm). Table 5.2-1 presents the results of the pore-gas screening. SVs were less than 1.0 for all detected VOCs, indicating VOC concentrations in the pore gas beneath MDA H do not pose an immediate potential source of groundwater contamination.

6.0 SUMMARY

The purpose of the quarterly pore-gas monitoring activities at MDA H is to evaluate trends in VOC concentrations and tritium activities in subsurface vapor at MDA H over time. The results from the third quarter FY2009 monitoring event are summarized as follows.

- VOCs are present at low concentrations (≤800 µg/m^3 or ≤210 ppbv) in subsurface vapor and are generally consistent with concentrations observed during the three previous quarterly sampling events.
- Maximum detected concentrations of VOCs are present in borehole location 54-15462. VOC concentrations do not decrease with depth and are fairly consistent throughout the borehole location, except for those VOCs such as 2-propanol that are detected only at one or two depths.
- The maximum detected concentrations of all VOCs in pore gas were less than the concentrations needed to exceed groundwater SLs.
- Analytical laboratory results for tritium have been corrected to account for the impact of silica gel–bound water (including those provided in Appendix C). All discussions of data, detections, and trends present the corrected tritium concentrations.
- Tritium in pore vapor was detected in 14 samples analyzed during the third quarter of FY2009; the activity levels in borehole locations 54-15461 and 54-15462 are generally consistent with those detected during the three previous quarterly sampling events, but the activity levels in borehole location 54-01023 were more than twice the levels measured in the previous three quarters.
- Tritium activity levels in pore vapor at borehole location 54-01023 were more than 400 times higher than activities from borehole locations 54-15461 and 54-15462 at similar depths. Tritium activities decreased laterally within a short distance from MDA H. Tritium activity levels in borehole location 54-01023 decreased with depth. The activity levels did not decrease in the other two boreholes.

7.0 REFERENCES AND MAP DATA SOURCES

7.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

LANL (Los Alamos National Laboratory), May 22, 1998. "Hydrogeologic Workplan," Los Alamos National Laboratory document LA-UR-01-6511, Los Alamos, New Mexico. (LANL 1998, 059599)

LANL (Los Alamos National Laboratory), May 2001. “RFI Report for Material Disposal Area H at Technical Area 54,” Los Alamos National Laboratory document LA-UR-01-1208, Los Alamos, New Mexico. (LANL 2001, 070158)

LANL (Los Alamos National Laboratory), October 2002. “Addendum to the RFI Report for Material Disposal Area H (Solid Waste Management Unit 54-004) at Technical Area 54,” Los Alamos National Laboratory document LA-UR-02-3397, Los Alamos, New Mexico. (LANL 2002, 073270)

LANL (Los Alamos National Laboratory), May 2003. “Corrective Measures Study Report for Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54,” Los Alamos National Laboratory document LA-UR-03-3354, Los Alamos, New Mexico. (LANL 2003, 076039)

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LANL (Los Alamos National Laboratory), September 2008. “Pilot Test Report for Comparing Packer and FLUTe Vapor-Sampling Systems at Material Disposal Area H,” Los Alamos National Laboratory document LA-UR-08-5872, Los Alamos, New Mexico. (LANL 2008, 103889)

LANL (Los Alamos National Laboratory), January 2009. “Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, Fiscal Year 2008,” Los Alamos National Laboratory document LA-UR-09-0473, Los Alamos, New Mexico. (LANL 2009, 105191)

LANL (Los Alamos National Laboratory), February 2009. “Pilot Test Report for Comparing Packer and FLUTe Vapor-Sampling Systems at Material Disposal Area H, Revision 1,” Los Alamos National Laboratory document LA-UR-09-0924, Los Alamos, New Mexico. (LANL 2009, 105076)

Marczak, S., July 2009. “Technical Implementation of the Correction Factor Calculation for Tritium in Pore-Gas Data,” Los Alamos National Laboratory document LA-UR-09-4629, Los Alamos, New Mexico. (Marczak 2009, 106500)

NMED (New Mexico Environment Department), April 11, 2003. “Approval of RCRA Facility Investigation Report for Material Disposal Area H,” New Mexico Environment Department letter to P. Nanos (LANL Interim Director), and D. Gregory (DOE-OLASO) from J. Young (NMED), Santa Fe, New Mexico. (NMED 2003, 075939)

NMED (New Mexico Environment Department), December 21, 2004. “Notification to Collect Additional Vapor Monitoring Data at MDA H, SWMU 54-004, at TA-54,” New Mexico Environment Department letter to D. Gregory (DOE LASO) and G.P. Nanos (LANL Director) from N. Dhawan (NMED-HWB), Santa Fe, New Mexico. (NMED 2004, 092217)

NMED (New Mexico Environment Department), May 17, 2005. “Notification for Additional Information for MDA H, SWMU 54-004, at TA-54,” New Mexico Environment Department letter to D. Gregory (DOE LASO) and G.P. Nanos (LANL Director) from N. Dhawan (NMED-HWB), Santa Fe, New Mexico. (NMED 2005, 092219)

NMED (New Mexico Environment Department), December 21, 2007. "Review of Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, Fiscal Year 2007," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2007, 099277)

NMED (New Mexico Environment Department), February 26, 2008. "Status of Remedy Selection at Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2008, 100480)

NMED (New Mexico Environment Department), April 7, 2009. "Review of the Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, Fiscal Year 2008, Revision 1 and the Pilot Test Report for Comparing Packer and FLUTe Vapor-Monitoring Systems at Material Disposal Area H, Revision 1," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2009, 105599)

NMED (New Mexico Environment Department), August 2009. "Technical Background Document for Development of Soil Screening Levels, Revision 5.0," New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico. (NMED 2009, 106420)

NMED (New Mexico Environment Department), August 20, 2009. "Review of the Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, Second Quarter Fiscal Year 2009," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2009, 106786)

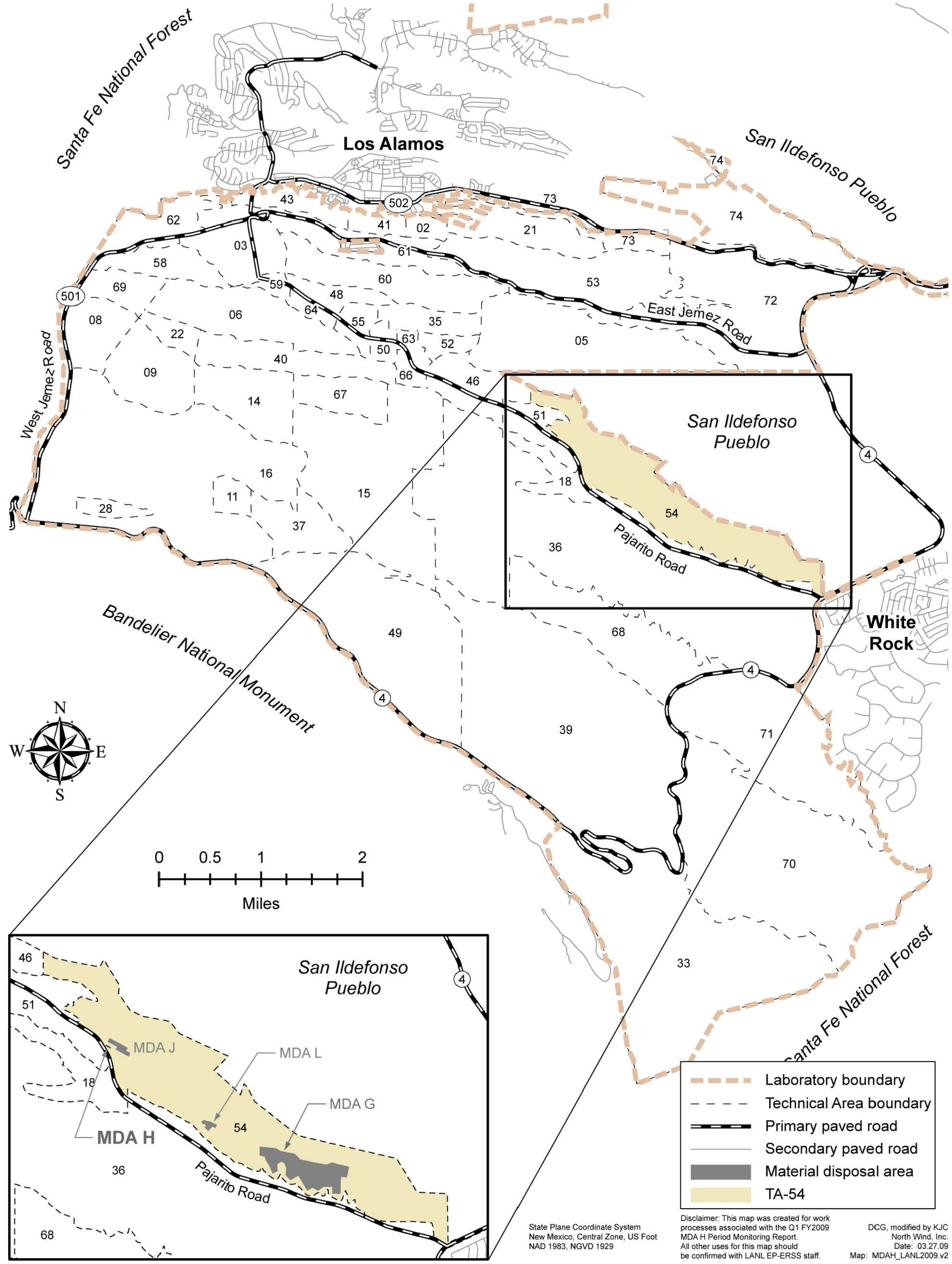
Whicker, J.J., J.M. Dewart, S.P. Allen, W.F. Eisele, M.C. McNaughton, and A.A. Green, June 17, 2009. "Corrections for Measurement of Tritium in Subterranean Vapor Using Silica Gel," Los Alamos National Laboratory document LA-UR-09-03837, Los Alamos, New Mexico. (Whicker et al. 2009, 106429)

7.2 Map Data Sources

Data sources used in original figures created for this report are described below and identified by legend title.

Legend Item	Data Source
Disposal pit	Waste Storage Features; LANL, Environment and Remediation Support Services Division, GIS/Geotechnical Services Group, EP2007-0032; 1:2,500 Scale Data; 13 April 2007.
Disposal shaft	Waste Storage Features; LANL, Environment and Remediation Support Services Division, GIS/Geotechnical Services Group, EP2007-0032; 1:2,500 Scale Data; 13 April 2007.
Elevation contour	Hypsography, 10, 20, & 100 Foot Contour Intervals; LANL, ENV Environmental Remediation and Surveillance Program; 1991.
Fence	Security and Industrial Fences and Gates; LANL, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 10 September 2007.

Legend Item	Data Source
LANL boundary	LANL Areas Used and Occupied; LANL, Site Planning & Project Initiation Group, Infrastructure Planning Division; 19 October 2008.
MDA	Materials Disposal Areas; LANL, ENV Environmental Remediation and Surveillance Program; ER2004-0221; 1:2,500 Scale Data; 23 April 2004.
Paved road	Paved Road Arcs; LANL, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 10 September 2007.
Structure	Structures; LANL, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 10 September 2007.
TA boundary	Technical Area Boundaries; LANL, Site Planning & Project Initiation Group, Infrastructure Planning Division; 19 September 2007.
Unpaved road	Dirt Road Arcs; LANL, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 10 September 2007.
Vapor-monitoring well	Point Feature Locations of the Environmental Restoration Project Database; LANL, Environment and Remediation Support Services Division, EP2007-0754; 30 November 2007.



State Plane Coordinate System
New Mexico, Central Zone, US Foot
NAD 1983, NGVD 1929

Disclaimer: This map was created for work
processes associated with the Q1 FY2009
MDA H Period Monitoring Report.
All other uses for this map should
be confirmed with LANL EP-ERSS staff.

DCG, modified by KJC
North Wind, Inc.
Date: 03.27.09
Map: MDAH_LANL2009.v2

Figure 1.0-1 Location of MDA H in TA-54 with respect to Laboratory TAs and surrounding land holdings

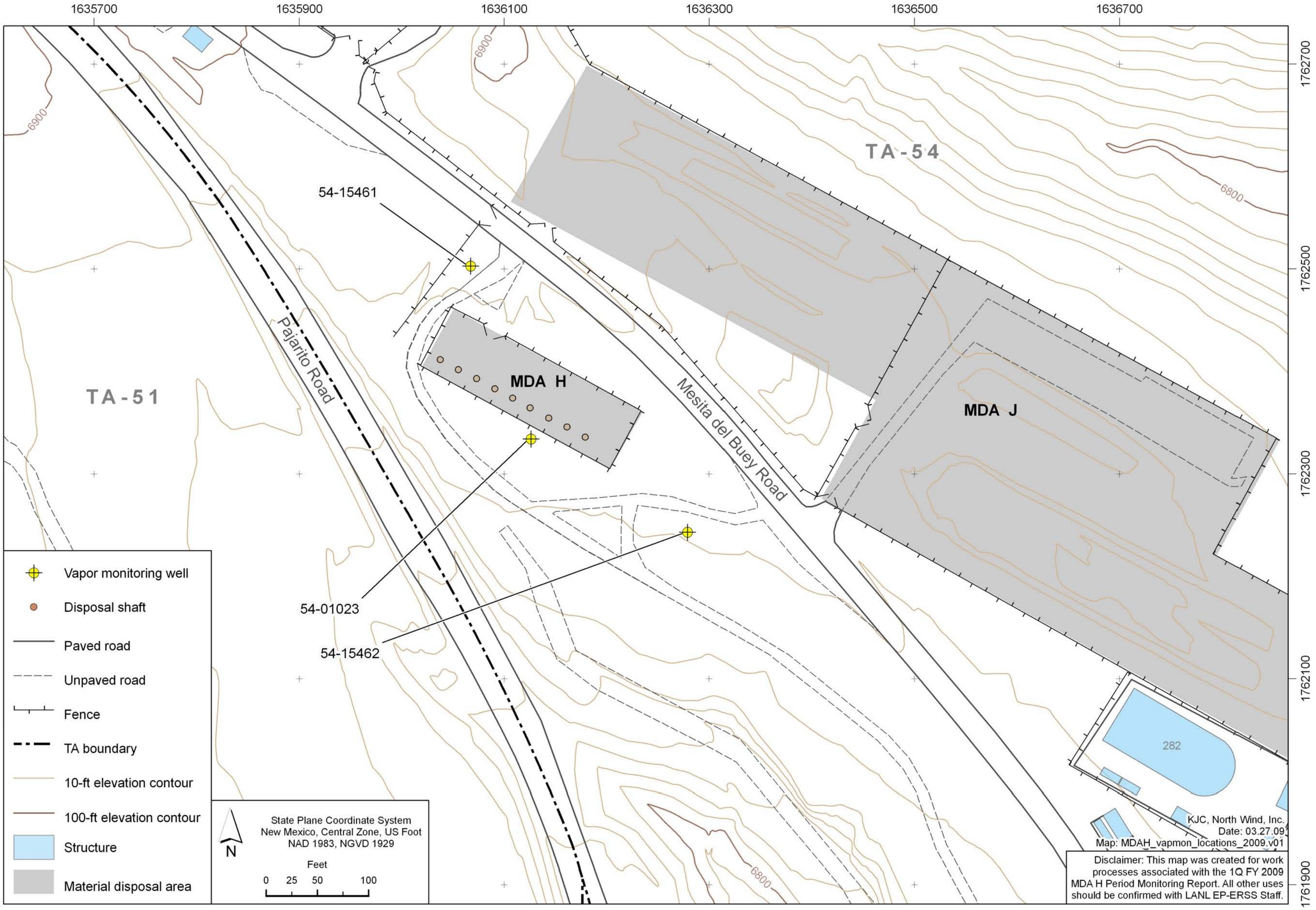
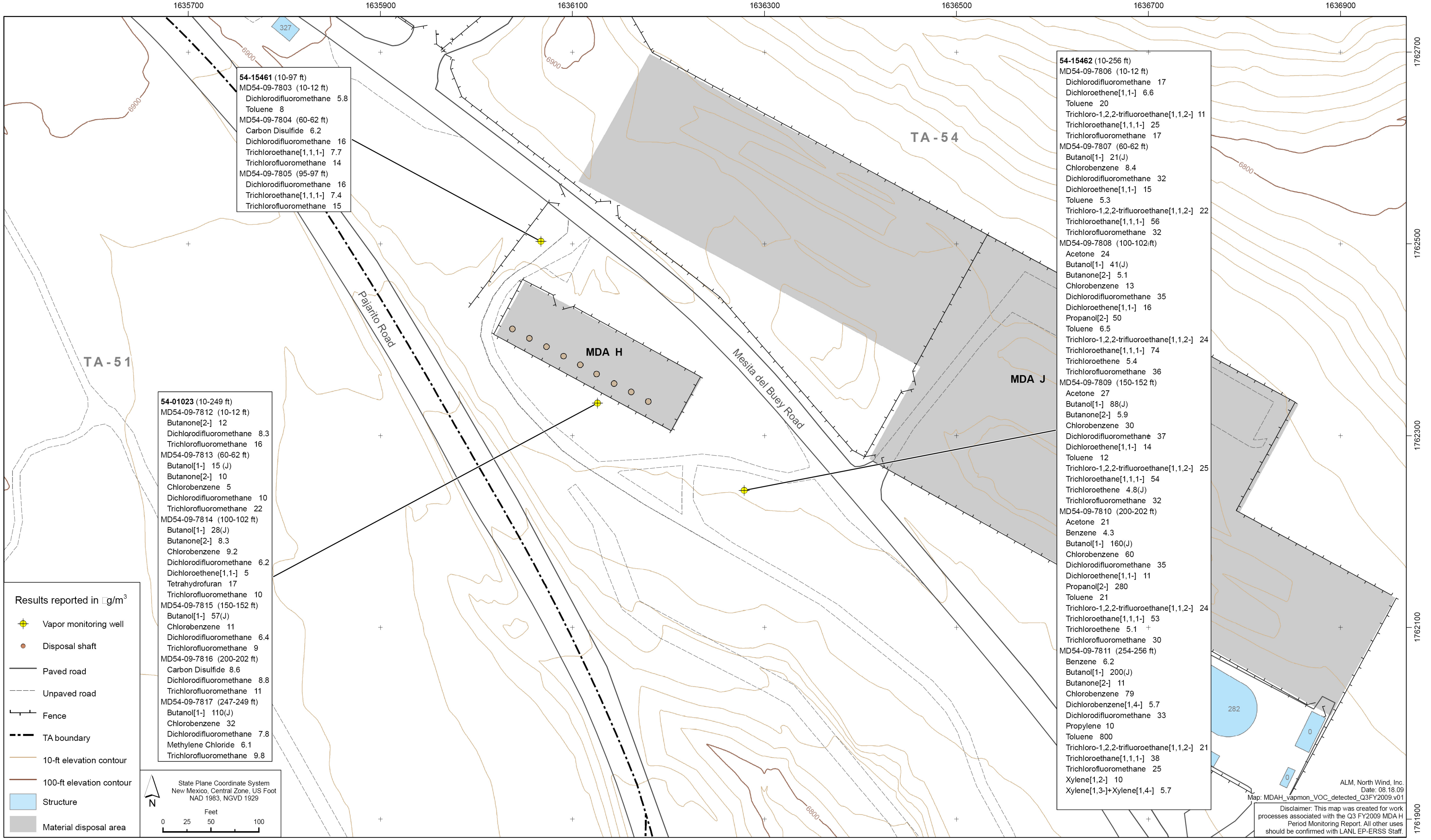


Figure 1.0-2 Locations of MDA H pore-gas monitoring boreholes



54-15461 (10-97 ft)
MD54-09-7803 (10-12 ft)
Dichlorodifluoromethane 5.8
Toluene 8
MD54-09-7804 (60-62 ft)
Carbon Disulfide 6.2
Dichlorodifluoromethane 16
Trichloroethane[1,1,1-] 7.7
Trichlorofluoromethane 14
MD54-09-7805 (95-97 ft)
Dichlorodifluoromethane 16
Trichloroethane[1,1,1-] 7.4
Trichlorofluoromethane 15

54-01023 (10-249 ft)
MD54-09-7812 (10-12 ft)
Butanone[2-] 12
Dichlorodifluoromethane 8.3
Trichlorofluoromethane 16
MD54-09-7813 (60-62 ft)
Butanol[1-] 15 (J)
Butanone[2-] 10
Chlorobenzene 5
Dichlorodifluoromethane 10
Trichlorofluoromethane 22
MD54-09-7814 (100-102 ft)
Butanol[1-] 28(J)
Butanone[2-] 8.3
Chlorobenzene 9.2
Dichlorodifluoromethane 6.2
Dichloroethene[1,1-] 5
Tetrahydrofuran 17
Trichlorofluoromethane 10
MD54-09-7815 (150-152 ft)
Butanol[1-] 57(J)
Chlorobenzene 11
Dichlorodifluoromethane 6.4
Trichlorofluoromethane 9
MD54-09-7816 (200-202 ft)
Carbon Disulfide 8.6
Dichlorodifluoromethane 8.8
Trichlorofluoromethane 11
MD54-09-7817 (247-249 ft)
Butanol[1-] 110(J)
Chlorobenzene 32
Dichlorodifluoromethane 7.8
Methylene Chloride 6.1
Trichlorofluoromethane 9.8

54-15462 (10-256 ft)
MD54-09-7806 (10-12 ft)
Dichlorodifluoromethane 17
Dichloroethene[1,1-] 6.6
Toluene 20
Trichloro-1,2,2-trifluoroethane[1,1,2-] 11
Trichloroethane[1,1,1-] 25
Trichlorofluoromethane 17
MD54-09-7807 (60-62 ft)
Butanol[1-] 21(J)
Chlorobenzene 8.4
Dichlorodifluoromethane 32
Dichloroethene[1,1-] 15
Toluene 5.3
Trichloro-1,2,2-trifluoroethane[1,1,2-] 22
Trichloroethane[1,1,1-] 56
Trichlorofluoromethane 32
MD54-09-7808 (100-102 ft)
Acetone 24
Butanol[1-] 41(J)
Butanone[2-] 5.1
Chlorobenzene 13
Dichlorodifluoromethane 35
Dichloroethene[1,1-] 16
Propanol[2-] 50
Toluene 6.5
Trichloro-1,2,2-trifluoroethane[1,1,2-] 24
Trichloroethane[1,1,1-] 74
Trichloroethene 5.4
Trichlorofluoromethane 36
MD54-09-7809 (150-152 ft)
Acetone 27
Butanol[1-] 88(J)
Butanone[2-] 5.9
Chlorobenzene 30
Dichlorodifluoromethane 37
Dichloroethene[1,1-] 14
Toluene 12
Trichloro-1,2,2-trifluoroethane[1,1,2-] 25
Trichloroethane[1,1,1-] 54
Trichloroethene 4.8(J)
Trichlorofluoromethane 32
MD54-09-7810 (200-202 ft)
Acetone 21
Benzene 4.3
Butanol[1-] 160(J)
Chlorobenzene 60
Dichlorodifluoromethane 35
Dichloroethene[1,1-] 11
Propanol[2-] 280
Toluene 21
Trichloro-1,2,2-trifluoroethane[1,1,2-] 24
Trichloroethane[1,1,1-] 53
Trichloroethene 5.1
Trichlorofluoromethane 30
MD54-09-7811 (254-256 ft)
Benzene 6.2
Butanol[1-] 200(J)
Butanone[2-] 11
Chlorobenzene 79
Dichlorobenzene[1,4-] 5.7
Dichlorodifluoromethane 33
Propylene 10
Toluene 800
Trichloro-1,2,2-trifluoroethane[1,1,2-] 21
Trichloroethane[1,1,1-] 38
Trichlorofluoromethane 25
Xylene[1,2-] 10
Xylene[1,3-]+Xylene[1,4-] 5.7

Figure 5.0-1 VOCs detected in vapor samples at MDA H

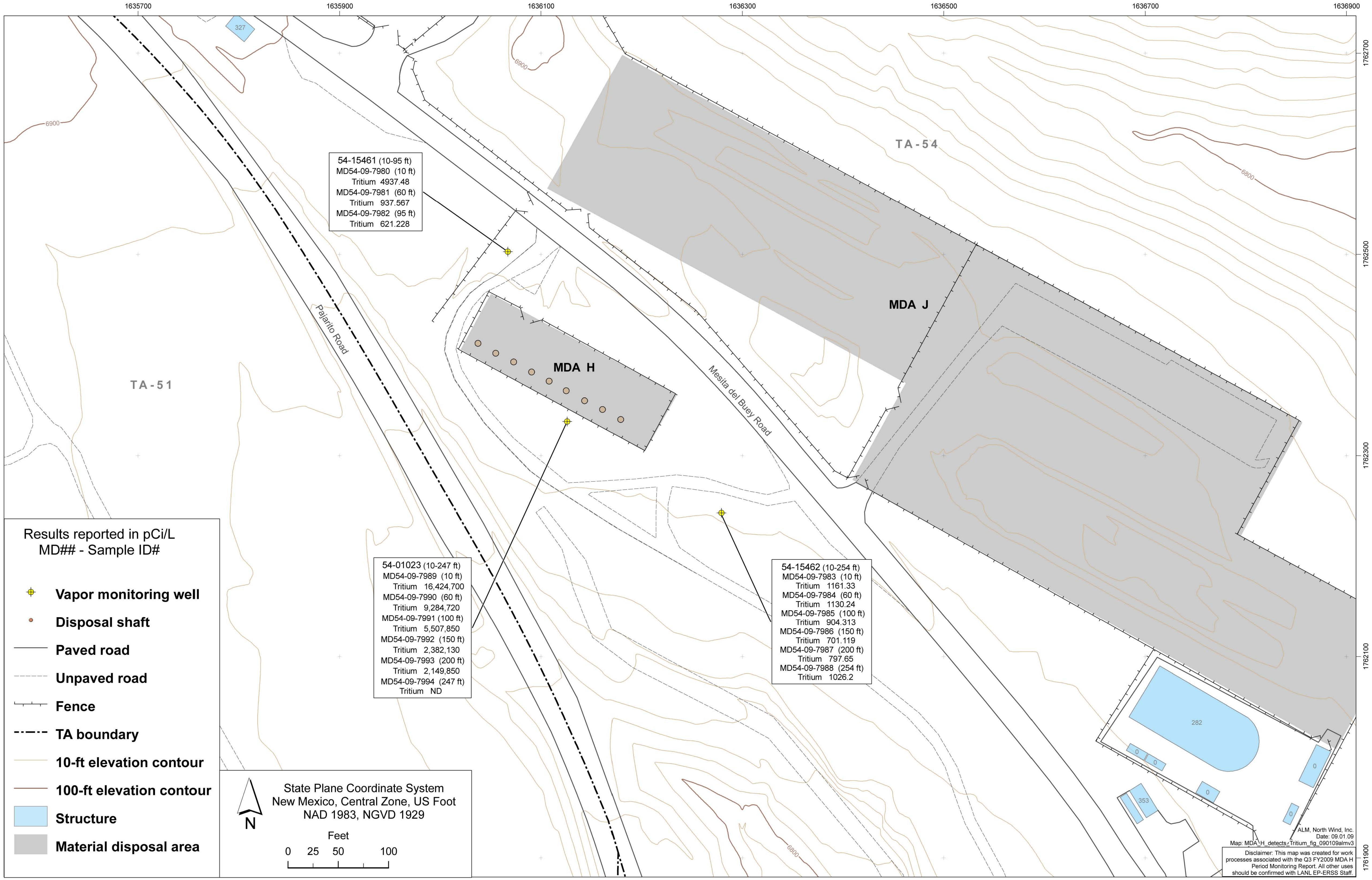


Figure 5.0-2 Tritium detected in vapor samples at MDA H

Table 1.0-1
MDA H Subsurface Vapor-Monitoring Locations

Borehole ID	**VOC and Tritium Sampling-Port Depth (ft)**					
54–01023	10 (10–12)	60 (60–62)	100 (100–102)	150 (150–152)	200 (200–202)	247 (247–249)
54–15461	10 (10–12)	60 (60–62)	95 (95–97)	—*	—	—
54–15462	10 (10–12)	60 (60–62)	100 (100–102)	150 (150–152)	200 (200–202)	254 (254–256)

Notes: Depths denote locations where VOC and tritium samples were collected. Sampling intervals are given in parentheses.

*— = Borehole location only has three ports.

Table 3.0-1
Henry's Law Constants, Groundwater SLs, and Calculated Concentrations Corresponding to Groundwater SLs for Detected VOCs in Pore Gas

VOC	Henry's Law Constant[a] (dimensionless)	Groundwater SL (µg/L)	Calculated Concentrations in Pore Gas Corresponding to Groundwater Standard (µg/m³)
Acetone	0.0016	22,000[b]	35,200
Benzene	0.228	5[c]	1140
Butanol[1-]	0.00036[b]	3700[b]	1332
Butanone[2-]	0.0023	7100[b]	16,330
Carbon Disulfide	0.59	1000[b]	590,000
Chlorobenzene	0.13	100[c]	13,000
Dichlorobenzene[1,4-]	0.0996	75[c]	7470
Dichlorodifluoromethane	14	390[b]	5,460,000
Dichloroethene[1,1-]	1.1	5[d]	5500
Methylene Chloride	0.13	5[c]	650
Propanol[2-]	0.00033[b]	na[e]	na
Propylene	na	na	na
Tetrahydrofuran	na	na	na
Toluene	0.272	750[d]	204,000
Trichloro-1,2,2-trifluoroethane[1,1,2-]	22	59,000[b]	1,298,000,000
Trichloroethane[1,1,1-]	0.705	60[d]	42,300
Trichloroethene	0.4	5[c]	2000
Trichlorofluoromethane	4	1300[b]	5,200,000
Xylene[1,2-]	0.213	1400[b]	298,200
Xylene[1,3-]+Xylene[1,4-]	0.27	10,000[b,f]	2,700,000

Note: Calculated concentrations in pore gas corresponding to groundwater standard derived using Equation 3.0-3.

[a] Henry's Law Constant from NMED (2009, 106420, Appendix B).

[b] EPA regional screening levels from http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

[c] EPA MCL (40 Code of Federal Regulations 141.61).

[d] NMWQCC groundwater standard (20.6.2.3103 New Mexico Administrative Code).

[e] na = Not available.

[f] SL for xylene[1,3-]+xylene[1,4-] is for xylene mixture.

Table 4.0-1
Field-Screening Results Using a Landtec GEM-500 at MDA H

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
				Date	Result (%)	Date	Result (%)	Date	Result (%)	Date	Result (%)
54-01023	Ambient	Ambient	CO_2	9/9/08	0	12/3/08	0	3/11/09	0.6	4/30/09	0
			O_2	9/9/08	20.5	12/3/08	20.8	3/11/09	21.4	4/30/09	21.7
	10	10–12	CO_2	9/9/08	0.7	12/3/08	0.1	3/11/09	0.8	4/30/09	0.2
			O_2	9/9/08	19.7	12/3/08	20.2	3/11/09	21.1	4/30/09	21.3
	60	60–62	CO_2	9/9/08	0.6	12/3/08	0.1	3/11/09	1	4/30/09	0.4
			O_2	9/9/08	19.6	12/3/08	19.9	3/11/09	21	4/30/09	21.1
	100	100–102	CO_2	9/9/08	0	12/3/08	0.1	3/11/09	1	4/30/09	0.2
			O_2	9/9/08	20	12/3/08	19.9	3/11/09	20.8	4/30/09	20.3
	150	150–152	CO_2	9/9/08	0.3	12/3/08	0	3/11/09	0.9	4/30/09	0.1
			O_2	9/9/08	20	12/3/08	20	3/11/09	21	4/30/09	20.2
	200	200–202	CO_2	9/9/08	0.2	12/3/08	0	3/11/09	0.8	4/30/09	0.2
			O_2	9/9/08	20	12/3/08	20	3/11/09	20.9	4/30/09	20
	247	247–249	CO_2	9/9/08	0.2	12/3/08	0	3/11/09	0.8	4/30/09	0.2
			O_2	9/9/08	20	12/3/08	20.2	3/11/09	21.1	4/30/09	20.1
54-15461	Ambient	Ambient	CO_2	9/9/08	0	12/3/08	0	3/9/09	0	4/29/09	0
			O_2	9/9/08	20.2	12/3/08	20.7	3/9/09	20.9	4/29/09	20.8
	10	10–12	CO_2	9/9/08	0.3	12/3/08	0	3/9/09	1	4/29/09	0.3
			O_2	9/9/08	20	12/3/08	20.5	3/9/09	20.7	4/29/09	20.7
	60	60–62	CO_2	9/9/08	NS*	12/3/08	0.1	3/9/09	1.2	4/29/09	0.7
			O_2	9/9/08	NS	12/3/08	19.9	3/9/09	20.6	4/29/09	20.6
	95	95–97	CO_2	9/9/08	NS	12/3/08	0.1	3/9/09	1	4/29/09	0.7
			O_2	9/9/08	NS	12/3/08	19.7	3/9/09	20.7	4/29/09	20.5

Table 4.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
				Date	Result (%)	Date	Result (%)	Date	Result (%)	Date	Result (%)
54-15462	Ambient	Ambient	CO_2	9/11/08	0	12/5/08	0	4/2/09	0	4/29/09	0
			O_2	9/11/08	20.3	12/5/08	20.7	4/2/09	21.8	4/29/09	20.8
	10	10–12	CO_2	9/11/08	0	12/5/08	NS	4/2/09	0	4/29/09	0.5
			O_2	9/11/08	16.7	12/5/08	20.4	4/2/09	21.9	4/29/09	20.1
	60	60–62	CO_2	NS	NS	NS	NS	4/2/09	0	4/29/09	0.6
			O_2	NS	NS	NS	NS	4/2/09	21.7	4/29/09	19.4
	100	100–102	CO_2	9/11/08	0.1	12/5/08	0	4/2/09	0	4/29/09	0.5
			O_2	9/11/08	19.2	12/5/08	20.6	4/2/09	21.7	4/29/09	19.3
	150	150–152	CO_2	9/11/08	0	12/5/08	0	4/2/09	0	4/29/09	0.3
			O_2	9/11/08	19.8	12/5/08	20.4	4/2/09	21.6	4/29/09	19.6
	200	200–202	CO_2	9/11/08	0	12/5/08	0	4/2/09	0	4/29/09	0.3
			O_2	9/11/08	19.4	12/5/08	20.4	4/2/09	22	4/29/09	19.8
	254	254–256	CO_2	9/11/08	0	12/5/08	0	4/2/09	0	4/29/09	0.2
			O_2	9/11/08	20.2	12/5/08	19.9	4/2/09	22.1	4/29/09	19.5

Note: Grey shading indicates data rejected by NMED (2009, 105599).

*NS = Not sampled.

Table 4.0-2
Field-Screening Results Using a B&K Multigas Analyzer at MDA H

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte (Unit)	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
				Date	Result	Date	Result	Date	Result	Date	Result
54-01023	Ambient	Ambient	CO_2 ($\mu g/m^3$)	9/9/08	1,240,000	12/3/08	758,000	3/11/09	872,000	4/30/09	726,000
			Freon-11 ($\mu g/m^3$)	9/9/08	295	12/3/08	-401	3/11/09	178	4/30/09	-1000
			H_2O ($\mu g/m^3$)	9/9/08	13,000,000	12/3/08	5,060,000	3/11/09	3,060,000	4/30/09	19.6[a]
			PCE ($\mu g/m^3$)	9/9/08	7020	12/3/08	-1870	3/11/09	2690	4/30/09	-4100
			Pressure Differential (kPa)	9/9/08	0	12/3/08	0	3/11/09	0	4/30/09	0
			TCA ($\mu g/m^3$)	9/9/08	333,000	12/3/08	-4090	3/11/09	2980	4/30/09	-1100
			TCE ($\mu g/m^3$)	9/9/08	8250	12/3/08	2460	3/11/09	4670	4/30/09	2610
	10	10–12	CO_2 ($\mu g/m^3$)	9/9/08	12,000,000	12/3/08	9,180,000	3/11/09	9,470,000	4/30/09	5,060,000
			Freon-11 ($\mu g/m^3$)	9/9/08	613	12/3/08	-481	3/11/09	-482	4/30/09	253
			H_2O ($\mu g/m^3$)	9/9/08	26,800,000	12/3/08	10,500,000	3/11/09	6,710,000	4/30/09	54.2[a]
			PCE ($\mu g/m^3$)	9/9/08	-1680	12/3/08	-167	3/11/09	-2500	4/30/09	-1400
			Pressure Differential (kPa)	9/9/08	0.06	12/3/08	0	3/11/09	-0.03	4/30/09	0.03
			TCA ($\mu g/m^3$)	9/9/08	-5320	12/3/08	-22,900	3/11/09	-42,000	4/30/09	-6900
			TCE ($\mu g/m^3$)	9/9/08	-911	12/3/08	552,000	3/11/09	41.7	4/30/09	-1500
	60	60–62	CO_2 ($\mu g/m^3$)	9/9/08	9,760,000	12/3/08	9,810,000	3/11/09	15,200,000	4/30/09	6,160,000
			Freon-11 ($\mu g/m^3$)	9/9/08	494	12/3/08	-246	3/11/09	-835	4/30/09	140
			H_2O ($\mu g/m^3$)	9/9/08	23,800,000	12/3/08	11,300,000	3/11/09	7,650,000	4/30/09	59[a]
			PCE ($\mu g/m^3$)	9/9/08	-2220	12/3/08	765	3/11/09	-5900	4/30/09	-4200
			Pressure Differential (kPa)	9/9/08	0.1	12/3/08	0	3/11/09	-0.11	4/30/09	0.05
			TCA ($\mu g/m^3$)	9/9/08	-4890	12/3/08	-25,000	3/11/09	-65,000	4/30/09	-8300
			TCE ($\mu g/m^3$)	9/9/08	-193	12/3/08	4200	3/11/09	-2500	4/30/09	-248

Table 4.0-2 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte (Unit)	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
				Date	Result	Date	Result	Date	Result	Date	Result
54-01023	100	100–102	CO_2 ($\mu g/m^3$)	9/9/08	3,310,000	12/3/08	8,640,000	3/11/09	13,900,000	4/30/09	3,370,000
			Freon-11 ($\mu g/m^3$)	9/9/08	951	12/3/08	-321	3/11/09	-923	4/30/09	-590
			H_2O ($\mu g/m^3$)	9/9/08	20,900,000	12/3/08	10,000,000	3/11/09	8,030,000	4/30/09	59[a]
			PCE ($\mu g/m^3$)	9/9/08	-786	12/3/08	508	3/11/09	-5300	4/30/09	-1900
			Pressure Differential (kPa)	9/9/08	0.09	12/3/08	-0.02	3/11/09	-0.12	4/30/09	0.05
			TCA ($\mu g/m^3$)	9/9/08	-6380	12/3/08	-23,400	3/11/09	-57,000	4/30/09	-4000
			TCE ($\mu g/m^3$)	9/9/08	-3460	12/3/08	4070	3/11/09	-1700	4/30/09	1580
	150	150–152	CO_2 ($\mu g/m^3$)	9/9/08	6,820,000	12/3/08	6,640,000	3/11/09	12,500,000	4/30/09	3,230,000
			Freon-11 ($\mu g/m^3$)	9/9/08	-544	12/3/08	-498	3/11/09	-685	4/30/09	-642
			H_2O ($\mu g/m^3$)	9/9/08	19,700,000	12/3/08	9,430,000	3/11/09	8,380,000	4/30/09	58.8[a]
			PCE ($\mu g/m^3$)	9/9/08	-1520	12/3/08	1170	3/11/09	-4600	4/30/09	3140
			Pressure Differential (kPa)	9/9/08	0.14	12/3/08	-0.1	3/11/09	-0.3	4/30/09	0.03
			TCA ($\mu g/m^3$)	9/9/08	-1100	12/3/08	-19,700	3/11/09	-50,000	4/30/09	-4200
			TCE ($\mu g/m^3$)	9/9/08	1300	12/3/08	4080	3/11/09	-1700	4/30/09	-767
	200	200–202	CO_2 ($\mu g/m^3$)	9/9/08	6,620,000	12/3/08	6,430,000	3/11/09	9,790,000	4/30/09	4,380,000
			Freon-11 ($\mu g/m^3$)	9/9/08	-160	12/3/08	-876	3/11/09	-568	4/30/09	-483
			H_2O ($\mu g/m^3$)	9/9/08	17,600,000	12/3/08	9,430,000	3/11/09	8,570,000	4/30/09	61[a]
			PCE ($\mu g/m^3$)	9/9/08	-1130	12/3/08	-473	3/11/09	-2200	4/30/09	-1800
			Pressure Differential (kPa)	9/9/08	0.14	12/3/08	-0.05	3/11/09	-0.35	4/30/09	0
			TCA ($\mu g/m^3$)	9/9/08	2070	12/3/08	-18,100	3/11/09	-37,000	4/30/09	-2600
			TCE ($\mu g/m^3$)	9/9/08	1310	12/3/08	5030	3/11/09	-1200	4/30/09	1890

Table 4.0-2 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte (Unit)	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
				Date	Result	Date	Result	Date	Result	Date	Result
54-01023	247	247–249	CO_2 (µg/m^3)	9/9/08	6,350,000	12/3/08	6,070,000	3/11/09	8,350,000	4/30/09	4,340,000
			Freon-11 (µg/m^3)	9/9/08	-63	12/3/08	-315	3/11/09	-759	4/30/09	-1100
			H_2O (µg/m^3)	9/9/08	17,200,000	12/3/08	10,400,000	3/11/09	8,940,000	4/30/09	58.2[a]
			PCE (µg/m^3)	9/9/08	-1650	12/3/08	-355	3/11/09	-2700	4/30/09	-3200
			Pressure Differential (kPa)	9/9/08	NS[b]	12/3/08	0.03	3/11/09	-0.29	4/30/09	0.06
			TCA (µg/m^3)	9/9/08	2150	12/3/08	-16,000	3/11/09	-30,000	4/30/09	-1300
			TCE (µg/m^3)	9/9/08	734	12/3/08	3610	3/11/09	202	4/30/09	1730
54-15461	Ambient	Ambient	CO_2 (µg/m^3)	9/9/08	616,000	12/3/08	630,000	3/9/09	970,000	4/29/09	774,000
			Freon-11 (µg/m^3)	9/9/08	28.6	12/3/08	-68.7	3/9/09	199	4/29/09	-330
			H_2O (µg/m^3)	9/9/08	9,880,000	12/3/08	4,250,000	3/9/09	7,780,000	4/29/09	30.3[a]
			PCE (µg/m^3)	9/9/08	4990	12/3/08	2670	3/9/09	3290	4/29/09	-1100
			Pressure Differential (kPa)	9/9/08	0	12/3/08	0	3/9/09	0	4/29/09	0
			TCA (µg/m^3)	9/9/08	440	12/3/08	-1440	3/9/09	-2200	4/29/09	-2700
			TCE (µg/m^3)	9/9/08	5260	12/3/08	1930	3/9/09	2180	4/29/09	1110
	10	10–12	CO_2 (µg/m^3)	9/9/08	7,960,000	12/3/08	3,170,000	3/9/09	10,300,000	4/29/09	6,840,000
			Freon-11 (µg/m^3)	9/9/08	68.7	12/3/08	-533	3/9/09	-524	4/29/09	-466
			H_2O (µg/m^3)	9/9/08	18,400,000	12/3/08	10,800,000	3/9/09	10,900,000	4/29/09	61.3[a]
			PCE (µg/m^3)	9/9/08	716	12/3/08	-2050	3/9/09	-3000	4/29/09	-533
			Pressure Differential (kPa)	9/9/08	0	12/3/08	0	3/9/09	0	4/29/09	0
			TCA (µg/m^3)	9/9/08	-21,300	12/3/08	5320	3/9/09	-43,000	4/29/09	-11,000
			TCE (µg/m^3)	9/9/08	1300	12/3/08	4130	3/9/09	-1300	4/29/09	-1600

Table 4.0-2 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte (Unit)	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
				Date	Result	Date	Result	Date	Result	Date	Result
54-15461	60	60–62	CO_2 (µg/m^3)	9/9/08	8,780,000	12/3/08	9,290,000	3/9/09	13,200,000	4/29/09	11,700,000
			Freon-11 (µg/m^3)	9/9/08	120	12/3/08	-521	3/9/09	-835,000	4/29/09	-774
			H_2O (µg/m^3)	9/9/08	14,600,000	12/3/08	10,200,000	3/9/09	11,600,000	4/29/09	61.8[a]
			PCE (µg/m^3)	9/9/08	765	12/3/08	-299	3/9/09	-5400	4/29/09	-3100
			Pressure Differential (kPa)	9/9/08	0.02	12/3/08	0	3/9/09	0.07	4/29/09	0.02
			TCA (µg/m^3)	9/9/08	-18,100	12/3/08	-5850	3/9/09	-53,000	4/29/09	-14,000
			TCE (µg/m^3)	9/9/08	3190	12/3/08	4260	3/9/09	-1900	4/29/09	-618
	95	95–97	CO_2 (µg/m^3)	9/9/08	8,590,000	12/3/08	8,750,000	3/9/09	13,800,000	4/29/09	11,500,000
			Freon-11 (µg/m^3)	9/9/08	-418	12/3/08	-515	3/9/09	-908	4/29/09	-1600
			H_2O (µg/m^3)	9/9/08	13,600,000	12/3/08	10,200,000	3/9/09	12,100,000	4/29/09	61.7[a]
			PCE (µg/m^3)	9/9/08	216	12/3/08	-222	3/9/09	-5200	4/29/09	-5600
			Pressure Differential (kPa)	9/9/08	0.01	12/3/08	0	3/9/09	0.07	4/29/09	0.02
			TCA (µg/m^3)	9/9/08	-13,300	12/3/08	-8510	3/9/09	-54,000	4/29/09	-11,000
			TCE (µg/m^3)	9/9/08	2350	12/3/08	4540	3/9/09	-2000	4/29/09	3450
54-15462	Ambient	Ambient	CO_2 (µg/m^3)	9/11/08	729,000	12/5/08	585,000	4/2/09	796,000	4/29/09	871,000
			Freon-11 (µg/m^3)	9/11/08	-126	12/5/08	-229	4/2/09	-2600	4/29/09	-1500
			H_2O (µg/m^3)	9/11/08	8,550,000	12/5/08	2,520,000	4/2/09	24,300	4/29/09	35.3[a]
			PCE (µg/m^3)	9/11/08	-132	12/5/08	1590	4/2/09	5460	4/29/09	731
			Pressure Differential (kPa)	9/11/08	0	12/5/08	0	4/2/09	0	4/29/09	0
			TCA (µg/m^3)	9/11/08	-2700	12/5/08	-1150	4/2/09	-4200	4/29/09	-6100
			TCE (µg/m^3)	9/11/08	477	12/5/08	1610	4/2/09	6080	4/29/09	1960

Table 4.0-2 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte (Unit)	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
				Date	Result	Date	Result	Date	Result	Date	Result
54-15462	10	10–12	CO_2 (µg/m^3)	9/11/08	4,860,000	12/5/08	2,090,000	4/2/09	2,510,000	4/29/09	8,560,000
			Freon-11 (µg/m^3)	9/11/08	408	12/5/08	-143	4/2/09	-2200	4/29/09	153
			H_2O (µg/m^3)	9/11/08	21,400,000	12/5/08	6,110,000	4/2/09	54,400	4/29/09	59.8[a]
			PCE (µg/m^3)	9/11/08	-1490	12/5/08	5560	4/2/09	-3500	4/29/09	227
			Pressure Differential (kPa)	9/11/08	0	12/5/08	0	4/2/09	0.15	4/29/09	0
			TCA (µg/m^3)	9/11/08	-1540	12/5/08	-2680	4/2/09	-4400	4/29/09	-13,000
			TCE (µg/m^3)	9/11/08	-1110	12/5/08	4380	4/2/09	10,500	4/29/09	-1200
	60	60–62	CO_2 (µg/m^3)	NS	NS	NS	NS	4/2/09	5,070,000	4/29/09	9,750,000
			Freon-11 (µg/m^3)	NS	NS	NS	NS	4/2/09	-1200	4/29/09	-2400
			H_2O (µg/m^3)	NS	NS	NS	NS	4/2/09	58,400	4/29/09	60.6[a]
			PCE (µg/m^3)	NS	NS	NS	NS	4/2/09	7870	4/29/09	1990
			Pressure Differential (kPa)	9/11/08	0.01	12/5/08	0.21	4/2/09	0	4/29/09	0.06
			TCA (µg/m^3)	NS	NS	NS	NS	4/2/09	-19,000	4/29/09	-16,000
			TCE (µg/m^3)	NS	NS	NS	NS	4/2/09	1000	4/29/09	2030
	100	100–102	CO_2 (µg/m^3)	9/11/08	4,790,000	12/5/08	2,210,000	4/2/09	5,420,000	4/29/09	9,230,000
			Freon-11 (µg/m^3)	9/11/08	-269	12/5/08	-492	4/2/09	-2700	4/29/09	-1200
			H_2O (µg/m^3)	9/11/08	14,000,000	12/5/08	4,170,000	4/2/09	53,100	4/29/09	60.7[a]
			PCE (µg/m^3)	9/11/08	-1570	12/5/08	1910	4/2/09	-1700	4/29/09	-1800
			Pressure Differential (kPa)	9/11/08	0	12/5/08	0.21	4/2/09	0	4/29/09	0.02
			TCA (µg/m^3)	9/11/08	-3600	12/5/08	-7980	4/2/09	-19,000	4/29/09	-13000
			TCE (µg/m^3)	9/11/08	1430	12/5/08	3860	4/2/09	7080	4/29/09	1780

Table 4.0-2 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte (Unit)	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
				Date	Result	Date	Result	Date	Result	Date	Result
54-15462	150	150–152	CO_2 (µg/m^3)	9/11/08	4,000,000	12/5/08	1,930,000	4/2/09	3,450,000	4/29/09	5,990,000
			Freon-11 (µg/m^3)	9/11/08	345	12/5/08	-326	4/2/09	-589	4/29/09	-1500
			H_2O (µg/m^3)	9/11/08	21,500,000	12/5/08	4,810,000	4/2/09	48,600	4/29/09	60.2[a]
			PCE (µg/m^3)	9/11/08	-1040	12/5/08	744	4/2/09	2440	4/29/09	-941
			Pressure Differential (kPa)	9/11/08	0	12/5/08	-0.09	4/2/09	-0.11	4/29/09	0.04
			TCA (µg/m^3)	9/11/08	-3650	12/5/08	-6380	4/2/09	-7200	4/29/09	-14,000
			TCE (µg/m^3)	9/11/08	-1410	12/5/08	2390	4/2/09	2950	4/29/09	2640
	200	200–202	CO_2 (µg/m^3)	9/11/08	3,710,000	12/5/08	2,500,000	4/2/09	4,230,000	4/29/09	5,960,000
			Freon-11 (µg/m^3)	9/11/08	237	12/5/08	-281	4/2/09	-13,000	4/29/09	-1400
			H_2O (µg/m^3)	9/11/08	21,700,000	12/5/08	5,730,000	4/2/09	50,300	4/29/09	59.7[a]
			PCE (µg/m^3)	9/11/08	-1770	12/5/08	665	4/2/09	-4100	4/29/09	-2200
			Pressure Differential (kPa)	9/11/08	0	12/5/08	0	4/2/09	-0.11	4/29/09	0
			TCA (µg/m^3)	9/11/08	-4470	12/5/08	-10,600	4/2/09	-17,000	4/29/09	-7100
			TCE (µg/m^3)	9/11/08	-1370	12/5/08	2810	4/2/09	55,900	4/29/09	4070
	254	254–256	CO_2 (µg/m^3)	9/11/08	3,440,000	12/5/08	704,000	4/2/09	2,700,000	4/29/09	4,980,000
			Freon-11 (µg/m^3)	9/11/08	470	12/5/08	137	4/2/09	-11,000	4/29/09	-1600
			H_2O (µg/m^3)	9/11/08	22,200,000	12/5/08	5,710,000	4/2/09	42,400	4/29/09	59.1[a]
			PCE (µg/m^3)	9/11/08	-1490	12/5/08	4710	4/2/09	2060	4/29/09	-510
			Pressure Differential (kPa)	9/11/08	0.03	12/5/08	-0.25	4/2/09	-0.03	4/29/09	0
			TCA (µg/m^3)	9/11/08	-3570	12/5/08	-5320	4/2/09	-5400	4/29/09	7700
			TCE (µg/m^3)	9/11/08	-2060	12/5/08	-772	4/2/09	46,600	4/29/09	3930

Notes: All results reported in µg/m^3 were converted from ppm assuming 1 atmosphere and 25°C. Grey shading indicates data rejected by NMED (2009, 105599).

[a] Results presented in Tdew (dew point).

[b] NS = Not sampled.

Table 5.0-1
Pore-Gas VOCs Detected at MDA H, Third Quarter FY2009 and Three Previous Quarters

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result ($\mu g/m^3$)	Date	Result (ppbv)	Result ($\mu g/m^3$)	Date	Result (ppbv)	Result ($\mu g/m^3$)	Date	Result (ppbv)	Result ($\mu g/m^3$)
54-01023	10	10–12	Acetone	9/9/08	ND[a]	ND	12/3/08	ND	ND	3/11/09	5	12	4/30/09	ND	ND
			Butanone[2-]	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	4.1	12
			Carbon Disulfide	9/9/08	1.6	4.8	12/3/08	1.2	3.7	3/11/09	ND	ND	4/30/09	ND	ND
			Dichlorodifluoromethane	9/9/08	3.6	18	12/3/08	3.1	16	3/11/09	3.1	15	4/30/09	1.7	8.3
			Toluene	9/9/08	1.1	4.1	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/9/08	ND	ND	12/3/08	0.76	5.8	3/11/09	ND	ND	4/30/09	ND	ND
			Trichloroethane[1,1,1-]	9/9/08	0.97	5.3	12/3/08	0.74	4	3/11/09	ND	ND	4/30/09	ND	ND
			Trichlorofluoromethane	9/9/08	8.8	49	12/3/08	7.5	42	3/11/09	7.1	40	4/30/09	2.9	16
	60	60–62	Acetone	9/9/08	ND	ND	12/3/08	6	14	3/11/09	5.5	13	4/30/09	ND	ND
			Butanol[1-]	9/9/08	16	49	12/3/08	30	92	3/11/09	11(J)	32(J)	4/30/09	4.9(J)	15(J)
			Butanone[2-]	9/9/08	ND	ND	12/3/08	1.3	3.8	3/11/09	ND	ND	4/30/09	3.4	10
			Carbon Disulfide	9/9/08	ND	ND	12/3/08	21	64	3/11/09	ND	ND	4/30/09	ND	ND
			Chlorobenzene	9/9/08	1.7	8	12/3/08	2.4	11	3/11/09	ND	ND	4/30/09	1.1	5
			Dichlorodifluoromethane	9/9/08	4.4	22	12/3/08	4.5	22	3/11/09	5	25	4/30/09	2.1	10
			Tetrachloroethene	9/9/08	ND	ND	12/3/08	0.83	5.6	3/11/09	1	6.9	4/30/09	ND	ND
			Toluene	9/9/08	ND	ND	12/3/08	0.87	3.3	3/11/09	ND	ND	4/30/09	ND	ND
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/9/08	1.3	10	12/3/08	1.4	11	3/11/09	1.2	9.3	4/30/09	ND	ND
			Trichloroethane[1,1,1-]	9/9/08	1.9	10	12/3/08	3.1	17	3/11/09	2.7	15	4/30/09	ND	ND
			Trichloroethene	9/9/08	1	5.6	12/3/08	1.2	6.3	3/11/09	ND	ND	4/30/09	ND	ND
			Trichlorofluoromethane	9/9/08	11	63	12/3/08	9.3	52	3/11/09	11	61	4/30/09	3.9	22

Table 5.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)
54-01023	100	100–102	Acetone	9/9/08	3.7	8.7	12/3/08	5.2	12	3/11/09	ND	ND	4/30/09	ND	ND
			Butanol[1-]	9/9/08	23	70	12/3/08	18	56	3/11/09	6.4	20	4/30/09	9.2(J)	28(J)
			Butanone[2-]	9/9/08	1.5	4.3	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	2.8	8.3
			Carbon Disulfide	9/9/08	6.4	20	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Chlorobenzene	9/9/08	3.4	16	12/3/08	3.6	16	3/11/09	0.93	4.3	4/30/09	2	9.2
			Dichlorodifluoromethane	9/9/08	2.7	13	12/3/08	4.3	21	3/11/09	5.4	27	4/30/09	1.2	6.2
			Dichloroethene[1,1-]	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	1.3	5	4/30/09	ND	ND
			Tetrachloroethene	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	0.9	6.1	4/30/09	ND	ND
			Tetrahydrofuran	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	5.9	17
			Toluene	9/9/08	0.91	3.4	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/9/08	ND	ND	12/3/08	1.4	11	3/11/09	1.7	13	4/30/09	ND	ND
			Trichloroethane[1,1,1-]	9/9/08	2.5	14	12/3/08	3.4	18	3/11/09	2.5	14	4/30/09	ND	ND
			Trichloroethene	9/9/08	ND	ND	12/3/08	0.94	5	3/11/09	ND	ND	4/30/09	ND	ND
			Trichlorofluoromethane	9/9/08	4.9	27	12/3/08	8.4	47	3/11/09	11	64	4/30/09	1.8	10
	150	150–152	Acetone	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	4.6	11	4/30/09	ND	ND
			Butanol[1-]	9/9/08	38	110	12/3/08	32	97	3/11/09	15	45	4/30/09	19(J)	57(J)
			Butanone[2-]	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	1.1	3.2	4/30/09	ND	ND
			Chlorobenzene	9/9/08	7.1	33	12/3/08	2.6	12	3/11/09	1.3	5.9	4/30/09	2.5	11
			Dichlorodifluoromethane	9/9/08	4.4	22	12/3/08	3.7	18	3/11/09	4.8	24	4/30/09	1.3	6.4
			Dichloroethene[1,1-]	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	1.4	5.4	4/30/09	ND	ND
			Ethyltoluene[4-]	9/9/08	5.7	28	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Toluene	9/9/08	1.2	4.7	12/3/08	ND	ND	3/11/09	1.5	5.6	4/30/09	ND	ND
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/9/08	1.5	11	12/3/08	1.3	9.7	3/11/09	1.6	12	4/30/09	ND	ND

Table 5.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result (µg/m³)	Date	Result (ppbv)	Result (µg/m³)	Date	Result (ppbv)	Result (µg/m³)	Date	Result (ppbv)	Result (µg/m³)
54-01023	150	150–152	Trichloroethane[1,1,1-]	9/9/08	4.6	25	12/3/08	3.6	19	3/11/09	2.5	14	4/30/09	ND	ND
			Trichlorofluoromethane	9/9/08	6.2	35	12/3/08	5.8	33	3/11/09	9.2	52	4/30/09	1.6	9
			Trimethylbenzene[1,2,4-]	9/9/08	9	44	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Trimethylbenzene[1,3,5-]	9/9/08	2	10	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Xylene[1,2-]	9/9/08	1.1	5	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Xylene[1,3-]+Xylene[1,4-]	9/9/08	0.98	4.3	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
	200	200–202	Acetone	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	5	12	4/30/09	ND	ND
			Carbon Disulfide	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	2.8	8.6
			Carbon Tetrachloride	9/9/08	1	6.6	12/3/08	1.2	7.6	3/11/09	1.1	7	4/30/09	ND	ND
			Dichlorodifluoromethane	9/9/08	4.5	22	12/3/08	4.2	21	3/11/09	5.8	29	4/30/09	1.8	8.8
			Dichloroethene[1,1-]	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	2.1	8.4	4/30/09	ND	ND
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/9/08	1.9	14	12/3/08	1.7	13	3/11/09	2.4	19	4/30/09	ND	ND
			Trichloroethane[1,1,1-]	9/9/08	4.9	26	12/3/08	3.7	20	3/11/09	3.7	20	4/30/09	ND	ND
			Trichlorofluoromethane	9/9/08	6.1	34	12/3/08	4.8	27	3/11/09	6.7	38	4/30/09	1.9	11
	247	247–249	Benzene	9/9/08	1.8	5.9	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Butanol[1-]	9/9/08	54	160	12/3/08	70	210	3/11/09	32	98	4/30/09	37(J)	110(J)
			Carbon Disulfide	9/9/08	2.8	8.8	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	ND	ND
			Carbon Tetrachloride	9/9/08	ND	ND	12/3/08	1.2	7.8	3/11/09	1.1	7	4/30/09	ND	ND
			Chlorobenzene	9/9/08	19	88	12/3/08	9.6	44	3/11/09	4.8	22	4/30/09	7	32
			Dichlorodifluoromethane	9/9/08	2.8	14	12/3/08	3.4	17	3/11/09	4.3	21	4/30/09	1.6	7.8
			Methylene Chloride	9/9/08	ND	ND	12/3/08	ND	ND	3/11/09	ND	ND	4/30/09	1.8	6.1
			Tetrachloroethene	9/9/08	ND	ND	12/3/08	2.1	14	3/11/09	ND	ND	4/30/09	ND	ND
			Toluene	9/9/08	8.2	31	12/3/08	1.2	4.6	3/11/09	0.98	3.7	4/30/09	ND	ND

Table 5.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)
54-01023	247	247–249	Toluene	9/9/08	8.2	31	12/3/08	1.2	4.6	3/11/09	0.98	3.7	4/30/09	ND	ND
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/9/08	1.1	8.5	12/3/08	1.3	10	3/11/09	1.6	12	4/30/09	ND	ND
			Trichloroethane[1,1,1-]	9/9/08	1.8	9.6	12/3/08	1.9	10	3/11/09	1.3	7	4/30/09	ND	ND
			Trichloroethene	9/9/08	ND	ND	12/3/08	0.89(J)	4.8(J)	3/11/09	ND	ND	4/30/09	ND	ND
			Trichlorofluoromethane	9/9/08	4	22	12/3/08	4.4	25	3/11/09	4.6	26	4/30/09	1.7	9.8
54-15461	10	10–12	Acetone	9/9/08	ND	ND	12/3/08	3.8	9.2	3/9/09	ND	ND	4/29/09	ND	ND
			Carbon Disulfide	9/9/08	1.6	5	12/3/08	ND	ND	3/9/09	2.2	6.7	4/29/09	ND	ND
			Dichlorodifluoromethane	9/9/08	1.4	6.8	12/3/08	ND	ND	3/9/09	2.6	13	4/29/09	1.2	5.8
			Toluene	9/9/08	ND	ND	12/3/08	ND	ND	3/9/09	ND	ND	4/29/09	2.1	8
			Trichloroethane[1,1,1-]	9/9/08	ND	ND	12/3/08	ND	ND	3/9/09	1.3	7.3	4/29/09	ND	ND
			Trichlorofluoromethane	9/9/08	ND	ND	12/3/08	ND	ND	3/9/09	1.6	9	4/29/09	ND	ND
	60	60–62	Carbon Disulfide	9/9/08	ND	ND	12/3/08	ND	ND	3/9/09	1.4	4.3	4/29/09	2	6.2
			Dichlorodifluoromethane	9/9/08	3.3	16	12/3/08	3.2	16	3/9/09	3.2	16	4/29/09	3.3	16
			Trichloroethane[1,1,1-]	9/9/08	1.9	10	12/3/08	1.8	9.9	3/9/09	1.8	9.7	4/29/09	1.4	7.7
			Trichlorofluoromethane	9/9/08	2.4	14	12/3/08	2.3	13	3/9/09	2.3	13	4/29/09	2.6	14
	95	95–97	Acetone	9/9/08	4.7	11	12/3/08	ND	ND	3/9/09	11	27	4/29/09	ND	ND
			Butanone[2-]	9/9/08	ND	ND	12/3/08	ND	ND	3/9/09	1.8	5.3	4/29/09	ND	ND
			Dichlorodifluoromethane	9/9/08	3.5	17	12/3/08	3.4	17	3/9/09	3.5	17	4/29/09	3.4	16
			Trichloroethane[1,1,1-]	9/9/08	2	11	12/3/08	1.8	10	3/9/09	2	11	4/29/09	1.4	7.4
			Trichlorofluoromethane	9/9/08	2.8	16	12/3/08	2.6	14	3/9/09	2.9	16	4/29/09	2.7	15
54-15462	10	10–12	Acetone	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	10	25	4/29/09	ND	ND
			Benzene	9/11/08	ND	ND	12/5/08	50	160	4/2/09	4.9	16	4/29/09	ND	ND
			Butadiene[1,3-]	9/11/08	ND	ND	12/5/08	10	23	4/2/09	ND	ND	4/29/09	ND	ND

Table 5.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)
54-15462	10	10–12	Butanone[2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	2.8	8.4	4/29/09	ND	ND
			Cyclohexane	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	2.7	9.4	4/29/09	ND	ND
			Dichlorodifluoromethane	9/11/08	1.6	8.1	12/5/08	ND	ND	4/2/09	1.7	8.6	4/29/09	3.4	17
			Dichloroethene[1,1-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	1.6	6.6
			Ethylbenzene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	1.3	5.8	4/29/09	ND	ND
			Hexane	9/11/08	ND	ND	12/5/08	11	38	4/2/09	2.5	8.8	4/29/09	ND	ND
			n-Heptane	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	1.4	6	4/29/09	ND	ND
			Propanol[2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	96	240	4/29/09	ND	ND
			Propylene	9/11/08	ND	ND	12/5/08	38	66	4/2/09	10	18	4/29/09	ND	ND
			Tetrahydrofuran	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	1.6	4.6	4/29/09	ND	ND
			Toluene	9/11/08	ND	ND	12/5/08	45	170	4/2/09	280	1000	4/29/09	5.4	20
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	1.4	11
			Trichloroethane[1,1,1-]	9/11/08	3.1	17	12/5/08	ND	ND	4/2/09	1.7	9.5	4/29/09	4.6	25
			Trichlorofluoromethane	9/11/08	1.3	7.3	12/5/08	ND	ND	4/2/09	1.1	6.1	4/29/09	3	17
			Xylene[1,2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	1.8	7.6	4/29/09	ND	ND
			Xylene[1,3-]+Xylene[1,4-]	9/11/08	ND	ND	12/5/08	14	60	4/2/09	3.5	15	4/29/09	ND	ND
	60	60–62	Acetone	NS[b]	NS	NS	NS	NS	NS	4/2/09	35	84	4/29/09	ND	ND
			Butanol[1-]	NS	NS	NS	NS	NS	NS	4/2/09	12	37	4/29/09	7(J)	21(J)
			Butanone[2-]	NS	NS	NS	NS	NS	NS	4/2/09	4.8	14	4/29/09	ND	ND
			Carbon Disulfide	NS	NS	NS	NS	NS	NS	4/2/09	6.5	20	4/29/09	ND	ND
			Chlorobenzene	NS	NS	NS	NS	NS	NS	4/2/09	1.3	5.9	4/29/09	1.8	8.4
			Dichlorodifluoromethane	NS	NS	NS	NS	NS	NS	4/2/09	4.1	20	4/29/09	6.6	32
			Dichloroethene[1,1-]	NS	NS	NS	NS	NS	NS	4/2/09	ND	ND	4/29/09	3.9	15

Table 5.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result (μg/m³)	Date	Result (ppbv)	Result (μg/m³)	Date	Result (ppbv)	Result (μg/m³)	Date	Result (ppbv)	Result (μg/m³)
54-15462	60	60–62	Propanol[2-]	NS	NS	NS	NS	NS	NS	4/2/09	92	230	4/29/09	ND	ND
			Tetrahydrofuran	NS	NS	NS	NS	NS	NS	4/2/09	2.5	7.3	4/29/09	ND	ND
			Toluene	NS	NS	NS	NS	NS	NS	4/2/09	45	170	4/29/09	1.4	5.3
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	NS	NS	NS	NS	NS	NS	4/2/09	1.5	11	4/29/09	2.8	22
			Trichloroethane[1,1,1-]	NS	NS	NS	NS	NS	NS	4/2/09	5.3	29	4/29/09	10	56
			Trichlorofluoromethane	NS	NS	NS	NS	NS	NS	4/2/09	2.8	16	4/29/09	5.7	32
			Xylene[1,3-]+Xylene[1,4-]	NS	NS	NS	NS	NS	NS	4/2/09	0.89	3.9	4/29/09	ND	ND
	100	100–102	Acetone	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	30	70	4/29/09	10	24
			Benzene	9/11/08	ND	ND	12/5/08	17	54	4/2/09	0.85(J)	2.7(J)	4/29/09	ND	ND
			Butadiene[1,3-]	9/11/08	ND	ND	12/5/08	3.2	7	4/2/09	ND	ND	4/29/09	ND	ND
			Butanol[1-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	18	53	4/29/09	14(J)	41(J)
			Butanone[2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	4.2	12	4/29/09	1.7	5.1
			Chlorobenzene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	2.3	10	4/29/09	2.8	13
			Dichlorodifluoromethane	9/11/08	3	14	12/5/08	1.5	7.5	4/2/09	3.9	19	4/29/09	7	35
			Dichloroethene[1,1-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	4.1	16
			Ethylbenzene	9/11/08	ND	ND	12/5/08	1.4	6.3	4/2/09	ND	ND	4/29/09	ND	ND
			Hexane	9/11/08	ND	ND	12/5/08	8.7	31	4/2/09	ND	ND	4/29/09	ND	ND
			n-Heptane	9/11/08	ND	ND	12/5/08	3.8	16	4/2/09	ND	ND	4/29/09	ND	ND
			Propanol[2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	20	50
			Propylene	9/11/08	ND	ND	12/5/08	16	27	4/2/09	ND	ND	4/29/09	ND	ND
			Tetrahydrofuran	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	2.9	8.4	4/29/09	ND	ND
			Toluene	9/11/08	ND	ND	12/5/08	19	70	4/2/09	22	84	4/29/09	1.7	6.5
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/11/08	1.1	8.6	12/5/08	ND	ND	4/2/09	1.4	11	4/29/09	3.1	24

Table 5.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result (µg/m³)	Date	Result (ppbv)	Result (µg/m³)	Date	Result (ppbv)	Result (µg/m³)	Date	Result (ppbv)	Result (µg/m³)
54-15462	100	100–102	Trichloroethane[1,1,1-]	9/11/08	6.7	37	12/5/08	ND	ND	4/2/09	6	33	4/29/09	14	74
			Trichloroethene	9/11/08	1	5.4	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	1	5.4
			Trichlorofluoromethane	9/11/08	2.4	14	12/5/08	1.1	6.1	4/2/09	2.8	16	4/29/09	6.4	36
			Xylene[1,2-]	9/11/08	ND	ND	12/5/08	0.93	4	4/2/09	ND	ND	4/29/09	ND	ND
			Xylene[1,3-]+Xylene[1,4-]	9/11/08	ND	ND	12/5/08	3.5	15	4/2/09	ND	ND	4/29/09	ND	ND
	150	150–152	Acetone	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	49	120	4/29/09	11	27
			Benzene	9/11/08	ND	ND	12/5/08	0.89	2.8	4/2/09	1.2	3.7	4/29/09	ND	ND
			Butanol[1-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	29	89	4/29/09	29(J)	88(J)
			Butanone[2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	0.89	2.6	4/29/09	2	5.9
			Carbon Disulfide	9/11/08	1.2	3.8	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	ND	ND
			Chlorobenzene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	5.2	24	4/29/09	6.6	30
			Dichlorodifluoromethane	9/11/08	4.5	22	12/5/08	1.4	7	4/2/09	3.1	15	4/29/09	7.4	37
			Dichloroethene[1,1-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	3.5	14
			Toluene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	31	120	4/29/09	3.1	12
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/11/08	1.7	13	12/5/08	ND	ND	4/2/09	1.1	8.4	4/29/09	3.3	25
			Trichloroethane[1,1,1-]	9/11/08	7.8	43	12/5/08	ND	ND	4/2/09	3.3	18	4/29/09	9.8	54
			Trichloroethene	9/11/08	0.93	5	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	0.89(J)	4.8(J)
			Trichlorofluoromethane	9/11/08	3.5	20	12/5/08	1	5.8	4/2/09	1.9	11	4/29/09	5.8	32
	200	200–202	Acetone	9/11/08	ND	ND	12/5/08	6	14	4/2/09	33	78	4/29/09	9	21
			Benzene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	1.3	4.3
			Butanol[1-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	42	130	4/29/09	53(J)	160(J)
			Butanone[2-]	9/11/08	ND	ND	12/5/08	1	3	4/2/09	5.7	17	4/29/09	ND	ND
			Carbon Disulfide	9/11/08	1	3.2	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	ND	ND

Table 5.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result ($\mu g/m^3$)	Date	Result (ppbv)	Result ($\mu g/m^3$)	Date	Result (ppbv)	Result ($\mu g/m^3$)	Date	Result (ppbv)	Result ($\mu g/m^3$)
54-15462	200	200–202	Chlorobenzene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	6.2	29	4/29/09	13	60
			Dichlorodifluoromethane	9/11/08	5.6	28	12/5/08	2	9.7	4/2/09	4.5	22	4/29/09	7.1	35
			Dichloroethene[1,1-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	2.8	11
			Ethanol	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	32	60	4/29/09	ND	ND
			Propanol[2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	110	280
			Tetrahydrofuran	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	2.9	8.4	4/29/09	ND	ND
			Toluene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	53	200	4/29/09	5.6	21
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/11/08	2	15	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	3.1	24
			Trichloroethane[1,1,1-]	9/11/08	7.3	40	12/5/08	ND	ND	4/2/09	5	27	4/29/09	9.7	53
			Trichloroethene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	0.96	5.1
			Trichlorofluoromethane	9/11/08	3.8	21	12/5/08	1.5	8.3	4/2/09	2.8	15	4/29/09	5.3	30
	254	254–256	Acetone	9/11/08	ND	ND	12/5/08	4.3	10	4/2/09	300	720	4/29/09	ND	ND
			Benzene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	1.9	6.2
			Butanol[1-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	50	150	4/29/09	67(J)	200(J)
			Butanone[2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	8.4	25	4/29/09	3.9	11
			Carbon Disulfide	9/11/08	1.6	4.9	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	ND	ND
			Carbon Tetrachloride	9/11/08	ND	ND	12/5/08	6.4	40	4/2/09	ND	ND	4/29/09	ND	ND
			Chlorobenzene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	11	49	4/29/09	17	79
			Chloroform	9/11/08	ND	ND	12/5/08	1.8	8.6	4/2/09	ND	ND	4/29/09	ND	ND
			Dichlorobenzene[1,4-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	0.95	5.7
			Dichlorodifluoromethane	9/11/08	4.1	20	12/5/08	4.5	22	4/2/09	ND	ND	4/29/09	6.6	33
			Propylene	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	6.1	10
			Toluene	9/11/08	ND	ND	12/5/08	2.2	8.3	4/2/09	200	750	4/29/09	210	800

Table 5.0-1 (continued)

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	Analyte	4th Quarter FY08			1st Quarter FY09			2nd Quarter FY09			3rd Quarter FY09		
				Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)	Date	Result (ppbv)	Result (µg/m^3)
54-15462	254	254–256	Trichloro-1,2,2-trifluoroethane[1,1,2-]	9/11/08	1.4	11	12/5/08	2	15	4/2/09	ND	ND	4/29/09	2.7	21
			Trichloroethane[1,1,1-]	9/11/08	5	27	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	6.9	38
			Trichlorofluoromethane	9/11/08	2.8	16	12/5/08	3.3	19	4/2/09	ND	ND	4/29/09	4.4	25
			Xylene[1,2-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	2.3	10
			Xylene[1,3-]+Xylene[1,4-]	9/11/08	ND	ND	12/5/08	ND	ND	4/2/09	ND	ND	4/29/09	1.3	5.7

Note: See Appendix A for data qualifier definitions. Grey shading indicates data rejected by NMED (2009, 105599).

[a] ND = Not detected.

[b] NS = Not sampled.

Table 5.0-2
Tritium Pore-Vapor Results at MDA H

Borehole ID	Port Depth (ft bgs)	Sampling-Port Interval (ft bgs)	4th Quarter FY08		1st Quarter FY09		2nd Quarter FY09		3rd Quarter FY09	
			Date	Result (pCi/L)	Date	Result (pCi/L)	Date	Result (pCi/L)	Date	Result (pCi/L)
54-01023	10	10–12	9/16/08	5,168,460	12/12/08	4,977,760	3/10/09	4,635,190	5/4/09	16,424,700
	60	60–62	9/16/08	7,231,580	12/12/08	5,020,150	3/10/09	3,998,480	5/4/09	9,284,720
	100	100–102	9/16/08	2,465,690	12/12/08	1,017,050	3/10/09	2,337,200	5/4/09	5,507,850
	150	150–152	9/16/08	1,269,790	12/12/08	1,024,600	3/10/09	1,155,930	5/4/09	2,382,130
	200	200–202	9/16/08	752,970	12/12/08	1,080,790	3/10/09	1,244,830	5/4/09	2,149,850
	247	247–249	9/16/08	602,321	12/12/08	944,477	3/10/09	746,273	5/11/09	ND[a]
54-15461	10	10–12	9/15/08	3423.34	12/11/08	2563.72	3/11/09	2369.83	4/30/09	4937.48
	60	60–62	9/15/08	690.54	12/11/08	619.13	3/11/09	8706.76	4/30/09	937.57
	95	95–97	9/15/08	433.66	12/11/08	712.75	3/11/09	21854.80	4/30/09	621.23
54-15462	10	10–12	9/22/08	14424.70	12/11/08	671.62	4/6/09	ND	5/1/09	1161.33
	60	60–62	NS[b]	NS	NS	NS	4/6/09	ND	5/1/09	1130.24
	100	100–102	9/22/08	ND	12/11/08	361.47	4/6/09	ND	5/1/09	904.31
	150	150–152	9/22/08	ND	12/11/08	6223.58	4/3/09	ND	5/4/09	701.12
	200	200–202	9/22/08	396.36	12/11/08	333.55	4/3/09	369.90	5/4/09	797.65
	254	254–256	9/22/08	5529.50	12/11/08	1119.10	4/3/09	ND	5/1/09	1026.20

[a] ND = Not detected.

[b] NS = Not sampled.

Table 5.2-1
Screening of VOCs Detected in Pore Gas at MDA H

VOC	Maximum Detected Pore-Gas Concentration (µg/m³)	SL (µg/L)	Calculated Concentrations in Pore Gas Corresponding to Groundwater Standard (µg/m³)	SV (unitless)
Acetone	27	22,000[a]	35,200	0.00077
Benzene	6.2	5[b]	1140	0.0054
Butanol[1-]	200	3700[a]	1332	0.15
Butanone[2-]	12	7100[a]	16,330	0.00073
Carbon Disulfide	8.6	1000[a]	590,000	0.000015
Chlorobenzene	79	100[b]	13,000	0.0061
Dichlorobenzene[1,4-]	5.7	75[b]	7470	0.00076
Dichlorodifluoromethane	37	390[a]	5,460,000	0.0000068
Dichloroethene[1,1-]	16	5[c]	5500	0.0029
Methylene Chloride	6.1	5[b]	650	0.0094
Propanol[2-]	280	na[d]	na	na
Propylene	10	na	na	na
Tetrahydrofuran	17	na	na	na
Toluene	800	750[c]	204,000	0.0039
Trichloro-1,2,2-trifluoroethane[1,1,2-]	25	59,000[a]	1,298,000,000	0.000000019
Trichloroethane[1,1,1-]	74	60[c]	42,300	0.0017
Trichloroethene	5.4	5[b]	2000	0.0027
Trichlorofluoromethane	36	1300[a]	5,200,000	0.0000069
Xylene[1,2-]	10	1400[a]	298,200	0.000034
Xylene[1,3-]+Xylene[1,4-]	5.7	10,000[b,e]	2,700,000	0.0000021

Note: Calculated concentrations in pore gas corresponding to groundwater SLs derived from denominator of Equation 3.0-3.

[a] EPA regional screening levels from http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

[b] EPA MCL (40 Code of Federal Regulations 141.61).

[c] NMWQCC groundwater standard (20.6.2.3103 New Mexico Administrative Code).

[d] na = Not available.

[e] SL for xylene[1,3-]+xylene[1,4-] is for xylene mixture.

Appendix A

Acronyms and Abbreviations, Metric Conversion Table, and Data Qualifier Definitions

A-1.0 ACRONYMS AND ABBREVIATIONS

B&K	Brüel and Kjær
bgs	below ground surface
DCE	1,1-dichloroethylene
DER	duplicate error ratio
EPA	Environmental Protection Agency (U.S.)
eV	electron volt
FLUTe	Flexible Liner Underground Technology
FY	fiscal year
kPa	kilopascal
LANL	Los Alamos National Laboratory
LCS	laboratory control sample
MCL	maximum contaminant level
MDA	material disposal area
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
PCE	tetrachloroethene
PID	photoionization detector
QA	quality assurance
QC	quality control
RPD	relative percent difference
RPF	Records Processing Facility
SL	screening level
SV	screening value
SOP	standard operating procedure
SOW	statement of work
TA	technical area
TCA	1,1,1-trichloroethane
TCE	trichloroethene
TPU	total propagated uncertainty
VOC	volatile organic compound

A-2.0 METRIC CONVERSION TABLE

Multiply SI (Metric) Unit	by	To Obtain U.S. Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
millimeters (mm)	0.0394	inches (in.)
micrometers or microns (µm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (µg/g)	1	parts per million (ppm)
liters (L)	0.26	gallons (gal.)
milligrams per liter (mg/L)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

A-3.0 DATA QUALIFIER DEFINITIONS

Data Qualifier	Definition
U	The analyte was analyzed for but not detected.
J	The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.
J+	The analyte was positively identified, and the result is likely to be biased high.
J-	The analyte was positively identified, and the result is likely to be biased low.
UJ	The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific detection or quantitation limit.
R	The data are rejected as a result of major problems with quality assurance/quality control parameters.

Appendix B

Quality Assurance/Quality Control Program

B-1.0 INTRODUCTION

This appendix discusses analytical methods and data quality review and summarizes the effects of data quality exceptions on the acceptability of the analytical laboratory data.

Quality assurance (QA), quality control (QC), and data validation procedures were implemented in accordance with the Los Alamos National Laboratory (LANL or the Laboratory) “Quality Assurance Project Plan Requirements for Sampling and Analysis” (LANL 1996, 054609) and the Laboratory’s statement of work (SOW) for analytical services (LANL 2000, 071233). The results of the QA/QC activities were used to estimate the accuracy, bias, and precision of the analytical measurements. QC samples, including method blanks, blank spikes, matrix spikes, laboratory control samples (LCS), internal standards, initial and continuing calibrations, and surrogates, were used to assess laboratory accuracy and bias.

The type and frequency of QC analyses are described in the analytical services contract. Other QC factors, such as sample preservation and holding times, were also assessed. The requirements for sample preservation and holding times are given in standard operating procedure (SOP) ER-ERSS-SOP-5056, Sample Containers and Preservation. Evaluating these QC indicators allows estimates to be made of the accuracy, bias, and precision of the analytical suites. A focused data validation was also performed for all the data packages (identified by request number) that included a more detailed review of the raw data results. The procedures used for data validation are listed in Table B-1.0-1. Copies of the raw analytical data, laboratory logbooks, and instrument printouts are provided in data packages as part of Appendix C (on CD included with this document).

Analytical data were reviewed and evaluated based on U.S. Environmental Protection Agency (EPA) National Functional Guidelines, where applicable (EPA 1999, 066649). Data have also been assessed using guidelines established in SW-846 (EPA 1997, 057589). As a result of the data validation and assessment efforts, qualifiers have been assigned to some of the analytical records.

B-1.1 Maintenance of Chain of Custody

To maintain chain of custody is to document or demonstrate the possession of an item by only authorized individuals. The chain-of-custody process, described in EP-ERSS-SOP-5058, Chain of Custody for Analytical Data Record Packages, provides confidence in and documentation of analytical data integrity by establishing the traceability of the sample from the time of collection through processing to final maintenance as a record. The chain-of-custody forms are provided in Appendix C (on CD).

B-1.2 Sample Documentation

Establishing sample documentation acceptability, described in EP-ERSS-SOP-5058, is the first step toward verifying an analytical system has produced data of known quality. Documentation depends on the accessibility of review items that accurately and completely describe the work performed. In the absence of adequate sample documentation, data quality cannot be independently verified.

B-1.3 Sample Preservation

Sample preservation is the use of specific types of sample containers and preservation techniques, as described in EP-ERSS-SOP-5056, Sample Containers and Preservation. Sample preservation is mandatory for hazardous site investigations because the integrity of any sample decreases over time.

Physical factors (light, pressure, temperature, etc.), chemical factors (changes in pH, volatilization, etc.), and biological factors may alter the original quality of a sample. Because the various target parameters are uniquely altered at varying rates, distinct sample containers, preservation techniques, and holding times have been established to maintain sample integrity for a reasonable and acceptable period of time.

B-1.4 Holding Time

Holding time, the maximum amount of time a sample can be stored without unacceptable changes in analyte concentrations, is described in EP-ERSS-SOP-5056. Extraction holding time refers to the time that elapses between sample collection and sample preparation; analytical holding time refers to the time that elapses between sample preparation and analysis.

B-1.5 Initial and Continuing Calibration Verification (Including Interference-Check Standards)

Calibration verification establishes a quantitative relationship between the response of the analytical procedure and the concentration of the target analyte. There are two aspects of calibration verification: initial and continuing. The initial calibration verifies the accuracy of the calibration curve and the individual calibration standards being used to perform the calibration. The continuing calibration ensures that the initial calibration is still holding and correct as the instrument is used to process samples. Interference-check samples are used to determine if a high concentration of a single analyte in a sample interferes with the accurate quantitation of other analytes.

B-1.6 Analyte Identification (Including Spectra Review and Thermal Ionization Cavity Review)

Analyte identification is the process of associating an instrument signal with a compound or analyte of interest. Evaluation of signal retention times, spectral overlap, multipeak pattern matching, and mass spectral library searches are tools for making analyte identification determinations.

B-1.7 Analyte Quantitation

Analyte quantitation is the association of an instrument signal with a concentration and the determination that a recorded signal is detected or not detected. Detection limits, instrument calibration linear ranges, and internal standards are tools for making analyte quantitation evaluations.

Organic chemical results are not detected if reported results are less than or equal to the method detection limit adjusted by sample-specific dilution or concentration factors.

Radionuclide results reported at less than the minimum detectable activity are not detected (U). Each radiochemical result is also compared to the corresponding 1-sigma total propagated uncertainty (TPU). If the result is not greater than 3 times the TPU, it is also qualified as U.

B-1.8 Method Blank

A method blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as those used in the environmental sample processing and which is extracted and analyzed in the same manner as the corresponding environmental samples. Method blanks are used to assess the potential for sample contamination during extraction and analysis. All target analytes should be below the contract-required detection limit in the method blank (LANL 2000, 071233).

B-1.9 Matrix Spike Recoveries

A matrix spike is an aliquot of sample spiked with a known concentration of the target analyte(s). Matrix spike samples are used to measure the ability to recover prescribed analytes from a native sample matrix. Spiking typically occurs before sample preparation and analysis. Acceptable percentage recoveries for matrix spikes vary by method but should generally be greater than 10% for an analytical result to be usable (LANL 2000, 071233).

B-1.10 Surrogate Recoveries

A surrogate (an organic chemical compound) is similar in composition and behavior to target analytes but is not typically found in environmental samples. Surrogates are added to every blank, sample, and spike to evaluate the efficiency with which target analytes are recovered during extraction and analysis. The recovery percentages of the surrogates vary by method but should generally be greater than 10% for an analytical result to be usable (LANL 2000, 071233).

B-1.11 Internal Standard Responses

Internal standards are chemical compounds that are added to blank, sample, and standard extracts at known concentrations. They are used to compensate for (1) analyte concentration changes that might occur during storage of the extract, and (2) quantitation variations that can occur during analysis. Internal standard responses are used to adjust the reported concentrations for the quantitation of target analytes. The response factors for internal standards vary by method but should generally be within the range of ≥50% to ≤200% (LANL 2000, 071233).

B-1.12 LCS Recoveries

An LCS is a known matrix that has been spiked with compound(s) that are representative of the target analytes. The LCS is used to document laboratory performance. The acceptance criteria for LCSs are method-specific, but should generally be greater than 10% for an analytical result to be usable (LANL 2000, 071233).

B-1.13 Laboratory and Field Duplicates (Including Serial Dilutions)

Laboratory duplicates are two portions of a sample taken from the same sample container (prepared for analysis and analyzed independently but under identical conditions) used to assess or demonstrate acceptable laboratory-method precision at the time of analysis. Each duplicate sample is equally representative of the original material. Duplicate analyses are also performed to generate data and to determine the long-term precision of an analytical method on various matrices. All relative percent differences (RPDs) between samples and field duplicates should be ±35% (LANL 2000, 071233). The RPD is defined by the equation $\mathrm{RPD} = [|D1 - D2| / (D1 + D2)] \times 100\%$, where D1 and D2 represent the analytical measurements on duplicate samples.

For radionuclides, the duplicate error ratio (DER) may also be used to quantify precision. The DER is defined by the equation $\mathrm{DER} = |S–D| / \mathrm{sqrt}(2\sigma S^2 + 2\sigma D^2)$, where S represents the original sample value, D represents the duplicate value, and 2σS and 2σD represent the 2-sigma uncertainties surrounding the original and duplicate samples, respectively. A DER below 3 indicates sample-to-field-duplicate precision that is in control.

Field duplicates are independent samples collected as closely as possible at the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently.

Serial dilution checks are performed for certain inorganic analyses to determine if dilutions have been prepared correctly, and to identify any effects that may arise from characteristics of the sample matrix.

B-1.14 Field Blanks

A field blank is a sample of analyte-free medium taken to the sampling site and exposed to the atmosphere during sample-collection activities. Field blanks are used to measure contamination introduced during sample collection.

B-2.0 LABORATORY ANALYSIS SUMMARY

During the third quarter fiscal year (FY) 2009, 15 pore-gas volatile organic compound (VOC) samples, 2 VOC field duplicates, 2 VOC field blanks, 1 VOC equipment blank, 15 tritium samples, 2 tritium field duplicates, and 2 tritium field blanks were collected at Solid Waste Management Unit 54-004, also known as Material Disposal Area (MDA) H. Analyses for VOCs were performed using EPA Method TO-15 and for tritium using EPA Method 906.0. All QC procedures were followed as required by the analytical services SOW (LANL 2000, 071233). Table B-2.0-1 lists the analytical methods used for VOC and tritium analyses.

Sampling locations, sampling ports, and validated analytical results are presented in Tables 5.0-1 and 5.0-2 of the periodic monitoring report. The data, including the qualified data, are usable for evaluation purposes.

The tritium and VOCs analyses are summarized in the following sections. The required minimum detectable activity or estimated quantitation limit is prescribed in the analytical services SOW (LANL 2000, 071233).

B-3.0 ORGANIC CHEMICAL ANALYSES

Two VOC results were rejected (qualified as R) because they were not analyzed with a valid calibration curve or a standard at the reporting limit.

B-3.1 Maintenance of Chain of Custody

Chain of custody was properly maintained for all samples.

B-3.2 Sample Documentation

All samples were properly documented in the field.

B-3.3 Sample Preservation

No sample preservation is required for VOCs.

B-3.4 Holding Time

The holding times were met for all samples.

B-3.5 Initial and Continuing Calibration Verification

Initial calibration criteria were not met for 30 VOC results. Affected results were qualified as estimated (J) or estimated not detected (UJ).

Initial or continuing calibration verification was recovered outside the method-specific limits for 15 VOC results. Affected results were qualified as estimated not detected (UJ).

B-3.6 Analyte Identification (Including Internal Standards, and Spectra Review)

Analyte identification criteria were met for all sample analyses.

B-3.7 Method Blank

Method blank results for VOC analyses were within acceptable limits for all results.

B-3.8 Surrogate Recoveries

All surrogate recoveries for VOC analyses were within acceptable limits.

B-3.9 Internal Standard Responses

All internal standard responses for VOC analyses were within acceptable limits.

B-3.10 LCS Recoveries

LCS recoveries were within acceptable limits for all but 18 VOC results. LCS recoveries were lower than the lower acceptable limit but greater than 10%. Affected results were qualified as estimated not detected (UJ).

B-3.11 Laboratory and Field Duplicates

Laboratory and field duplicates indicate acceptable precision. The two field duplicates collected during the third quarter of FY2009 had RPDs less than 35%.

B-3.12 Field Blanks and Equipment Blanks

One field blank collected on April 30, 2009, from borehole location 54-01023 contained detected concentrations of acetone and toluene. Four sampling results (three for acetone and one for toluene) were detected but at concentrations less than or equal to 5 times the concentration of the related analyte in the trip blank and are qualified as not detected (U).

B-4.0 RADIOCHEMICAL ANALYSES

No tritium data were rejected.

B-4.1 Maintenance of Chain of Custody

Chain of custody was properly maintained for all samples.

B-4.2 Sample Documentation

Samples were properly documented in the field.

B-4.3 Sample Preservation

No sample preservation is required for tritium.

B-4.4 Holding Times

The holding times were met for all tritium analyses.

B-4.5 Method Blanks

Method blank results were within acceptable limits for all tritium analyses.

B-4.6 LCS Recoveries

The LCS recoveries were within acceptable limits for all tritium analyses.

B-4.7 Field Duplicates

Laboratory duplicate analyses indicate acceptable precision for all tritium analyses. The two field duplicates collected during the second quarter of FY2009 had DERs less than 3.

B-4.8 Field Blanks and Equipment Blanks

One field blank collected on May 11, 2009, from borehole location 54-01023 contained estimated detected (J) concentrations of tritium. The sample collected on May 11, 2009, had tritium results qualified as estimated not detected (UJ).

B-5.0 FIELD-MONITORING SUMMARY

B-5.1 Volatile Organic Compounds

Field-monitoring data are less costly to generate than analytical laboratory data and are immediately available to guide field decisions. Field-monitoring results are generated by rapid methods of analysis that provide less precision than laboratory analyses. Field-monitoring data provide analyte (or at least chemical class) identification and quantification, although the quantification may be relatively imprecise.

Field monitoring of subsurface vapor monitoring at MDA H is conducted using guidance provided in ER-ERSS-SOP-5074, Sampling of Sub-Atmospheric Air. This procedure covers the use of the Brüel and Kjær (B&K) Type 1302 multigas analyzer and the Landtec GEM 500 photoionization detector (PID).

The B&K is maintained through calibration and changing or cleaning of filters as needed. The B&K is calibrated before use each quarter by a certified calibration laboratory. The B&K is adjusted before each day's use to compensate for ambient pressure and temperature. A daily operational check is conducted through the analysis of ambient air readings and triplicate readings of known quantities of mixed organic analytes in nitrogen. These verification check analyses confirm analytical stability, the instrument zero point for each analyte is correctly set, and the stored calibration curve remains applicable to current instrument response to the presence of organic chemicals. Concentrations of gas standards analyzed before each day's use are expected to be within ±20% of their known values. Additionally, during each sample analysis, a low-sample flow condition will trigger an alarm on the B&K and the VOC measurement is not completed.

The presence of nontarget VOCs bias B&K target analyte results if they have an acoustic response to infrared light similar to the target analyte. Trichlorofluoromethane (Freon-11) generates a measurable acoustic signal in response to light with a wavelength of 11.6 µm proportional to its concentration. Other VOCs generating an acoustic signal to light at this wavelength include (Freon-114) (Chemical Abstract Service [CAS] 76-14-2; 1,2-dichloro-1,1,2,2-tetrafluoroethane) and Freon-21 (CAS 75-43-4; dichlorofluoromethane), neither of which is reported by EPA Method TO-15. Tetrachloroethene (PCE) generates an acoustic signal in response to light with a wavelength of 11.1 µm. Other VOCs responding to light at this wavelength include styrene (CAS 100-42-5) and (Freon-113) (CAS 76-13-1, 1,1,2-trichloro-1,2,2-trifluoroethane), neither of which is reported by EPA Method TO-15; Freon-12 (CAS 75-71-8, dichlorodifluoromethane); ethanol (CAS 64-17-5); and 1,1-dichloroethylene (DCE) (CAS 75-35-4). Results indicate that DCE and Freon-113 are detected in most samples at MDA H at concentrations that generate a measurable acoustic signal in response to light with a wavelength included in the acoustic signal interpreted as PCE, which may make the PCE readings appear higher on the B&K. Table B-5.0-1 presents VOCs that interfere with each of the four B&K target analytes.

Data generated using the B&K Type 1302 are supported by calibration records that bracket the periods of analyses. Calibration information is reported below for the B&K Type 1302 photoacoustic analyzer used to generate results presented in this periodic monitoring report.

- On March 12, 2009, the B&K with serial number 1732805 was calibrated before the third quarter monitoring event. The zero points were set for 1,1,1-trichloroethane (TCA), trichloroethene (TCE), Freon-11, PCE, carbon dioxide (CO_2), and water vapor. Span concentrations of TCA at 10.57 ppm, TCE at 8.5 ppm, Freon-11 at 30.5 ppm, PCE at 19.3 ppm, and CO_2 at 990 ppm were used to generate calibration response curves.
- After the third quarter monitoring event, the B&K with serial number 1732805 was calibrated on June 15, 2009.

The Landtec GEM 500 PID is calibrated by a certified calibration laboratory. During calibration, methane (CH_4), oxygen (O_2), and CO_2 zero points are set, and each analyte's calibration response curves is developed. The CH_4 reading is filtered to an infrared absorption frequency of 3.41 mm (nominal), the frequency specific to hydrocarbon bonds. Landtec instruments are calibrated using certified CH_4 mixtures and will give correct readings, provided no other hydrocarbon gases present are present within the sample (e.g., ethane, propane, butane). If other hydrocarbons are present, the CH_4 reading will be higher (never lower) than the actual CH_4 concentration being monitored. The extent to which the CH_4 reading is affected depends upon the concentration of the CH_4 in the sample and the concentration of the other hydrocarbons. The effect of other hydrocarbons is nonlinear and difficult to predict. The CO_2 reading is filtered to an infrared absorption frequency of 4.29 µm (nominal), the frequency specific to CO_2. Therefore, any other gases usually found on landfill sites will not affect the CO_2 reading. The O_2 sensor is a galvanic cell type and suffers no influence from CO_2, hydrogen sulfide, nitrate, sulfide, or hydrogen.

Calibration is confirmed before each day's use through the analysis of multiple readings of ambient air. Zero readings of CH_4 and CO_2 are expected. O_2 is expected to read 20.9%. O_2 readings within ± 25% of 20.9% are considered acceptable.

Data generated using the Landtec GEM-500 PID are supported by calibration records that arrive with the rented instrument previous to the period of analyses. Calibration is performed by Geotech's Colorado Service Center in Denver, Colorado. Calibration information is reported below for the Landtec PID used to generate results presented in this periodic monitoring report.

- Unit 1039 was calibrated on April 15, 2009. The zero points were set for CH_4, CO_2, and O_2. Calibration was performed so that CH_4 and CO_2 reached ±15% of a known concentration, and O_2 was set to read ambient air at 20.9%. Pump flow was confirmed to be 525 cc/min.

B-5.2 Tritium

Silica gel is the medium used at the Laboratory to collect moisture from pore-vapor samples. This moisture is analyzed for tritium using liquid scintillation counting. Dry silica gel contains bound water, which dilutes the tritium sample. A correction factor for this dilution is developed for each sample based on the percent moisture value determined by the analytical laboratory (Marczak 2009, 106500; Whicker et al. 2009, 106429).

Silica gel is prepared for sampling by drying it at a temperature above $100^{\circ}C$. This drying does not remove bound water. The amount of silica gel used in each sample is weighed before the sample is collected (typically about 135 g). The sample canister with silica gel is weighed before sampling. The sampling procedure, EP-ERSS-SOP-5074, Sampling of Sub-Atmospheric Air, requires collecting at least 5 g of moisture. After sampling, the sample canister with silica gel is weighed again.

The sample (canister plus silica gel) is shipped to the analytical laboratory where the canister with the silica gel is weighed again. The silica gel is emptied into a distillation apparatus and heated to $110^{\circ}C$, driving moisture off the silica gel. This moisture is collected and analyzed for tritium by liquid scintillation. The laboratory also weighs the empty canister. The laboratory calculates the percent moisture of the sample as the amount of moisture collected divided by the calculated weight of the wet silica gel. The value of the tritium concentration and the calculated percent moisture are reported to the Laboratory in the analytical data package and the electronic data deliverable.

The correction factor for the impact of bound water is determined for each sample using the percent moisture value determined by the analytical laboratory (Marczak 2009, 106500). Tritium results presented in this report have been corrected for bound-water dilution.

B-6.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the New Mexico Environment Department Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document *submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.*

EPA (U.S. Environmental Protection Agency), 1997. "Test Methods for Evaluating Solid Waste, Laboratory Manual, Physical/Chemical Methods," SW-846, 3rd ed., Update III, Office of Solid Waste and Emergency Response, Washington, D.C. (EPA 1997, 057589)

EPA (U.S. Environmental Protection Agency), October 1999. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," EPA540/R-99/008, Office of Emergency and Remedial Response, Washington, D.C. (EPA 1999, 066649)

LANL (Los Alamos National Laboratory), March 1996. "Quality Assurance Project Plan Requirements for Sampling and Analysis," Los Alamos National Laboratory document LA-UR-96-441, Los Alamos, New Mexico. (LANL 1996, 054609)

LANL (Los Alamos National Laboratory), December 2000. "University of California, Los Alamos National Laboratory (LANL), I8980SOW0-8S, Statement of Work for Analytical Laboratories," Rev. 1, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2000, 071233)

Marczak, S., July 2009. "Technical Implementation of the Correction Factor Calculation for Tritium in Pore-Gas Data," Los Alamos National Laboratory document LA-UR-09-4629, Los Alamos, New Mexico. (Marczak 2009, 106500)

Whicker, J.J., J.M. Dewart, S.P. Allen, W.F. Eisele, M.C. McNaughton, and A.A. Green, June 17, 2009. "Corrections for Measurement of Tritium in Subterranean Vapor Using Silica Gel," Los Alamos National Laboratory document LA-UR-09-03837, Los Alamos, New Mexico. (Whicker et al. 2009, 106429)

Table B-1.0-1
Data Validation Procedures

Procedure	Title	Effective Date
SOP-1561, Rev. 0	Routine Validation of Volatile Organic Compound (VOC) Analytical Data	6/10/2008
SOP-1566, Rev. 0	Routine Validation of Gamma Spectroscopy, Chemical Separation Alpha Spectrometry, Gas Proportional Counting, and Liquid Scintillation Analytical Data	6/30/2008

Table B-2.0-1
Analytical Methods Used for Sample Analyses

Analytical Method	Analytical Description	Target Compound List
EPA Method TO-15	VOCs in pore gas	See analytical services SOW (LANL 2000, 071233)
EPA Method 906.0	Tritium in pore gas	Tritium

Table B-5.0-1
B&K Target Analytes and Potential Interfering Analytes

Target	Potential Interfering Analyte
PCE	Styrene
PCE	Freon-113
PCE	Freon-12
PCE	DCE
PCE	Ethylene oxide
PCE	Ethanol
PCE	Dipropylnitrosamine
PCE	1,1-Dimethylhydrazine
PCE	1,4-Diethylene dioxide
PCE	Cyclohexene
PCE	tert-Butyl alcohol
PCE	m-Vinyltoluene
PCE	Vinyl chloride
PCE	Tetrahydrofurane
PCE	Silicium tetrafluoride
PCE	Nitromethane
PCE	Nitrogen trifluoride
PCE	α-Methylstyrene
PCE	Monomethyl hydrazine
PCE	Methyl iodide
PCE	n-Hexane
PCE	Acetic anhydride
PCE	1,3-Butadiene
Freon-11	Freon-114
Freon-11	Freon-21
Freon-11	Carbonyl sulphide
Freon-11	Methyl acetate
Freon-11	Chloropicrine
Freon-11	Cyclohexane
Freon-11	Dimethylnitrosamine
Freon-11	Epichlorohydrine
Freon-11	Ethane
Freon-11	Ethylene oxide
Freon-11	Ethyl formate
Freon-11	2-Nitropropane

Table B-5.0-1 (continued)

Target	Potential Interfering Analyte
Freon-11	Phosgene
Freon-11	Vinyl acetate
TCA	Fluorobenzene
TCA	Ethyl benzene
TCA	Dimethyl formamide
TCA	Dichloromethane
TCA	1,2-Dichloroethane
TCA	o-Dichlorobenzene
TCA	Dibutyl phthalate
TCA	Chloromethane
TCA	m-Xylene
TCA	1,1,2-Trichloroethane
TCA	o-Toluidine
TCA	Toluene
TCA	Phenol
TCA	Chlorobenzene
TCA	Carbon dioxide
TCA	Boron trifluoride
TCA	Aniline
TCA	Acetophenone
TCA	Hydrogen cyanide
TCA	n-Heptane
TCE	Arsine
TCE	Butanone
TCE	1,2-Difluoroethane
TCE	Diethyl ketone
TCE	Dinitrogendifluoride
TCE	2-Pentanone
TCE	2-Propanol
TCE	Sulfur hexafluoride
TCE	Vinyl chloride

Appendix C

Analytical Suites and Results and Analytical Reports
(on CD included with this document)